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ORAL FREE PAPER ABSTRACTS
Objective: To evaluate the functional and oncological results of primary aneurysmal bone cysts (ABCs) treated with percutaneous sclerosant therapy.

Design: Retrospective analysis.

Methods: Between May 2009 to December 2015, 70 patients with primary, unintervened ABC of the extremity were treated in our institute. Out of these, 2 patients were operated for pathological fractures, 2 with excision & 5 with curettage. The remaining 61 patients were treated with serial intralesional sclerosant injections. 3% polidocanol was injected into the lesion under image guidance on an outpatient basis. Patients were evaluated clinically and radiologically between 6 to 8 weeks. Decrease in pain and improvement in range of movements were clinical markers. Sclerosis and decrease in size of lesion were radiological markers. Repeat injection was given every 8 weeks if deemed necessary. The mean age of patients was 20 years (1 to 53). There were 21 cases in upper limb, 28 in lower limb and 12 in the pelvis.

Results: 26 patients were given single injection, 20 - 2 injections, 9 - 3 injections and 6 patients needed more than 3 injections. 4 patients were lost to follow up. Out of remaining 57 patients, 50 (87.78 %) healed with sclerosant. 24 with 1 injection, 17 - 2 injections, 4 - 3 injections and 5 with more than 3 injections. Of the 7 that did not heal, 3 needed excision and 4 were treated with curettage. There were no complications due to the injections. The 50 healed patients had a mean follow up of 51 months (23 - 95). One patient had a recurrence 3 years later which was again treated with a sclerosant injection and has now healed.

Conclusion: Percutaneous sclerosant therapy appears as a safe and minimally invasive alternative to surgery in treatment of primary ABC's.
Session Name: Session 04
Abstract Number: 39
Abstract Title: **CEP55 promotes the proliferation and invasion of tumor cell via the AKT signaling pathway in osteosarcoma**
Authors: Shoufeng Wang, Leilei Xu, Jin Xiong
Presenter: Shoufeng Wang, Unit Of Musculoskeletal Tumors, Department Of Orthopaedics, Drum Tower Hospital, Nanjing University Medical School, China.

Objective: The molecular mechanisms underlying the development of osteosarcoma have not been fully understood. In this study, we investigated for the first time the clinical and experimental function of CEP55 in osteosarcoma.

Methods: This study was approved by the ethics committee of the Affiliated Drum Tower Hospital of Nanjing University Medical School. Osteosarcoma specimens and the corresponding adjacent normal tissues were obtained from 98 patients who underwent surgical interventions from June 2006 to May 2013. For immunohistochemistry (IHC) analysis, all the samples were fixed in 10% formalin, embedded in paraffin and sectioned consecutively by 4 μm. For expression analysis, a total of 21 tissue samples were immediately frozen and stored in liquid nitrogen until RNA or protein extraction. Baseline characteristics of the patients were collected from medical records, including age, gender, Enneking stage, metastasis, tumor location, tumor recurrence and histologic subtype.

Results: We found that CEP55 was overexpressed in osteosarcoma, and the expression level was correlated with the metastasis and poor prognosis of osteosarcoma. Through in vitro experiments, we confirmed that knockdown of CEP55 could significantly induce the cell cycle arrest at G1 phase and suppress the proliferation, migration and invasion of osteosarcoma cells. In addition, CEP55 knockdown was observed to suppress osteosarcoma tumor growth in nude mice. Global gene expression profiling of MNNG/HOS cells with CEP55 silenced showed that AKT pathway might be involved in the regulation of osteosarcoma cell activity. Two downstream factors of AKT signaling, CCND1 and FN1, were found to have significantly higher expression in the tumor tissues, and their mRNA expression levels were remarkably correlated with that of CEP55.

Conclusion: To conclude, our data suggested that CEP55 can be used as a prognostic marker for osteosarcoma, which highlighted the significance of CEP55 signaling as a putative therapeutic target.
Aim: Deleted in breast cancer 1 (DBC1/CCAR2) is a protein of interest because of its diverse roles in tumorigenesis and its possible role as an androgen receptor (AR) co-activator. However, there are limited studies on the role of DBC1 in osteosarcoma. Therefore, we investigated the role of DBC1 and AR and their relationship in osteosarcoma.

Methods: Tissue-microarray slides were immune-stained for DBC1 and AR. The human osteosarcoma cell lines, U2OS (wild-type P53) and SaOS2 (P53-null) were used. Transfection for the short interfering RNA (siRNA) for DBC1 and AR and the plasmid for wild-type DBC1 were performed. Cell cycle analysis was performed with a FACStar flow cytometer. Western blot analysis for DBC1, AR, P53, acetylated-P53, P21, P27, BAX, BCL-2, TGFβ, NFκB, PCNA, Rho A, Ubiquitin, PARP1, and actin were performed.

Results: DBC1-positivity was significantly associated with larger tumor size (p = 0.028), higher tumor stage (p = 0.035), and higher histologic grade (p = 0.015). AR-positivity was significantly associated with higher tumor stage (p = 0.005) and higher histologic grade (p = 0.002). The knock-down of DBC1 and AR significantly reduced the migration and invasion activity of both U2OS and SaOS2 cells. The knock-down of DBC1 increased the protein expression of P21, P27, and BAX but decreased the expression of BCL2, TGFβ, RhoA, NFκB, and PCNA in both U2OS and SaOS2 cells. Interestingly, the protein expression of AR was decreased with the knock-down of DBC1, but the mRNA level of AR remained unchanged with the knock-down of DBC1.

Conclusions: These results suggest that DBC1 is involved in the progression of osteosarcoma by regulating the invasion-related metastatic potential of osteosarcoma. DBC1 has involved in the post-translational stabilization of AR by disturbing ubiquitination and proteosome-mediated degradation of AR.
Session Name: Session 04
Abstract Number: 111
Abstract Title: The Production of Vancomycin Tricalcium Phosphate Cement And a Study on Its Biomechanical and Antimicrobial Properties
Authors: Vivek Ajit Singh, Chang
Presenter: Vivek Ajit Singh, University of Malaya, Malaysia.

Purpose:
Cement is used as a filler for bone cavities in the treatment tumours. Biodegradable cement (Tricalcium-Phosphate-Cement, TCP), is increasing use as it can replace the bone. High concentrations of antibiotic can be added to the cement to minimize infection. Conventionally, polymethylmethacrylate (PMMA) cement is used. However, after complete elution of antibiotics, it remains as a foreign body. The use biodegradable is ideal as removal is not necessary.

This study is mainly looking into the potential application of absorbable TCP cement as an antibiotic carrier. Vancomycin was used as it is the commonest used antibiotics in hand mixed antibiotic cements. The specific objectives are to compare the compressive strength versus PMMA-vancomycin, and their antimicrobial property.

Method:
Test samples were prepared by admixing vancomycin powder in concentrations of 2.5%, 5% and 10% to the cement. Then the cement was molded into standardized cylinder shapes for compressive strength and pellets for microbiological testing.

Results:
The average compressive strength of plain TCP cement was 10.62 MPa. With addition of 2.5%, 5% and 10% vancomycin, the average compressive strengths were 8.01 MPa, 7.52 MPa and 7.23 MPa, a reduction of 24.6%, 29.2% and 31.9% (figure 1). Addition of vancomycin weakened the TCP cement significantly but there is no significant difference at various concentrations tested.

The Kirby Bauer zone of inhibition test was carried out on MRSA culture agar. The average diameters of zone of inhibition for TCP-vancomycin 2.5%, 5% and 10% were 24.7mm, 25.9mm and 26.8mm, which significantly outperformed their PMMA-vancomycin counterparts (18.2mm, 19.33mm and 21.5mm).

Conclusion:
TCP has poor mechanical performance but has superior elution property. It is suitable for filling up bone gaps and local antibiotic delivery. It is recommended for contained defects.
Session Name: Session 04
Abstract Number: 159
Abstract Title: Comparison of the activity preservation for bone morphogenetic protein-2 between ECIR- and freezing-treated autografts used for biological reconstruction
Authors: Pokuei Wu, WeiMing Chen
Presenter: Pokuei Wu, Taipei Veteran General Hospital, Taiwan.

Aims/Objectives: Recycle autografts have been commonly used in biological reconstruction in conjunction with bone wide resection surgery. Extracorporeal irradiation (ECIR) and freezing are the two major options pretreating tumor-bearing autografts prior to transplantation. Comparative evaluation for the impacts on the activity of bone morphogenetic protein-2 (BMP-2) between these two techniques however has not yet been reported.

Methods: The bone tissues extracted from six human femoral heads were either treated by ECIR with different doses (5000, 15000, 30000 rad) or by liquid nitrogen for different duration (5, 10, 15 minutes). The amount of BMP-2 was then analyzed by use of enzyme-linked immunosorbent assay (ELISA). To directly evaluate the effect of ECIR or freezing treatment on the activity of BMP, commercial recombinant human BMP-2 (rhBMP-2) was supplemented to the culture of human mesenchymal stem cell (hMSC). The post-treated activity of rhBMP-2 was quantitated by measuring the osteogenic differentiation of hMSC with Alizarin Red S Staining method. Western blotting assay was applied for analyzing the activation of BMP signaling pathway by use of the Phospho-Smad antibodies.

Results: There was no difference in the amount of BMP-2 among the treatment with three doses of ECIR and three time points of cryotherapy. The osteogenic differentiation mediated by rhBMP-2 was decreased after liquid nitrogen freezing (Figure 2). In addition, ECIR treatment worsened the rhBMP-2-induced osteogenic differentiation on hMSC in comparison with the control group without supplementing rhBMP-2 (Figure 2). Both ECIR and liquid nitrogen treatment lowered the expression of regulatory factors involved in the BMP-activated signaling cascade.

Conclusions: In the perspective of preserving BMP-2 activity, freezing-treated recycle autograft may result in a better outcome of osteo-induction than ECIR does. Further investigation on the factors involved in bone formation is required in the future experiments.
Aim and Objective
Giant cell tumor of bone (GCTB) is an osteolytic primary bone neoplasm characterized by the presence of numerous osteoclasts.

The critical role of the Vitamin D depletion in inducing RANKL system mediated osteoclast differentiation and osteoclastogenesis prompted us to hypothesize that this pathway may be involved in producing the large osteoclast population typical of GCTBs. We analyzed the prevalence of Vitamin D deficiency in patients with primary GCTB to elucidate any difference in levels amongst the matched control population.

Materials and Methods
130 patients of primary GCTBs presenting to our center with no prior history of Vitamin D supplementation were subjected to Serum 25(OH)D vitamin levels prior to initiation of treatment. Age and sex matched 310 controls were identified from the general health check population that underwent the investigation without any obvious clinical presentation of Vitamin D deficiency. Analysis performed on the non-parametric data and Mann Whitney U Test used to derive inference.

Results
56 females and 76 males with median age 31 years (Range 14 to 67 years) presented to our center with primary GCTB. Median Vitamin D level in the GCTB group was 15.9ng/ml (Mean 19.41; Range 1.03 to 92) as compared to the control population with median level of 22.2ng/ml (Mean 25.1; Range 2.6 to 87.9). The results were significant (p value <0.05) as compared to the control population in all decades, except the third decade (p value 0.0548).

Conclusion
Significant reduced vitamin D levels observed in the GCTB population as compared to the control population supports the hypothesis that vitamin D - RANKL pathway and resultant osteoclastogenesis due to vitamin D deficiency may play a role in course and natural history of GCTB.

The association between Vitamin D deficiency and GCTB may in the future help us cure or prevent GCTBs.
Objective
Schwannomatosis is a rare late-onset tumor predisposition disorder, and the third major form of neurofibromatosis. Peripheral nervous system involvement is almost the exclusive presentation in schwannomatosis. The main clinical manifestation and indication for active treatment is pain, which may be debilitating when the growing tumor compresses the nerve. About a third of schwannomatosis cases develop in families and a subset is associated with germline variants in the tumor suppressor gene SMARCB1. We performed genetic analyses using genomic DNA on patients with schwannomatosis and their families.

Methods
Genetic analyses were performed, including a SMARCB1 exome screening on 8 sporadic affected individuals, one familial affected individual and 2 unaffected descendants as well as whole exome sequencing for affected individuals without any variants in the coding regions of SMARCB1.

Results
Our SMARCB1 screening showed significant variants in 3 patients including familial cases. According to whole exome sequencing data, one sporadic affected individual had a mutation in LZTR1, another known genetic predisposition to familial schwannomatosis. In addition, multiple variants in the MSH6 gene were detected in 3 sporadic affected individuals. This group of sporadic cases may be a heterogeneous population containing a genetic cause more likely to be unrelated to chromosome 22.

Conclusions
MSH6 is a strong candidate for the phenotype.
Background Anti-angiogenesis tyrosine kinase inhibitors (TKIs) have been shown to prolong progression-free survival (PFS) in advanced osteosarcoma. Methylsulfonic apatinib is a TKI that specifically inhibits vascular endothelial growth factor receptor-2 (VEGFR-2). We aimed to assess the activity of apatinib in patients with locally advanced or multiple metastatic high-grade osteosarcoma progressing after standard treatment.

Methods This phase 2 trial was conducted at Peking University People’s Hospital. We enrolled participants (≥16 years of age) with relapsed or unresectable osteosarcoma progressing after chemotherapy. Participants received 750 mg or 500 mg apatinib according to body surface area (BSA) once daily until disease progression or unacceptable toxicity. The primary endpoint was objective response rate and PFS at four months. This trial is registered with ClinicalTrials.gov identifier: NCT02711007.

Findings A total of 37 participants were enrolled between March 17, 2016 and June 9, 2017. Until final follow-up, the objective response rate (CR+PR at least 3 m) was 56.76% (21/37). The four-month PFS rate was 52% (95% CI 32%–68%). However, 9/37 (24.32%) patients were progression-free at six months. Median PFS and overall survival (OS) were 4.44 (95% CI 3.12–7.08) and 8.77 (95% CI 6.73–16.70) months, respectively. Toxic effects led to dose reductions or interruptions in a total of 25/37 (67.57%) patients. The most common grade 3–4 adverse events were pneumothorax in 5 (13.51%) patients, wound dehiscence in four (10.81%), abdominal cramps in three (8.11%), hypokalemia in two (5.41%), and bilirubin increase, proteinuria, hypertriglyceridaemia, hand–foot skin reaction, and anemia each in one (2.70%). No other serious adverse events were reported during the trial. There were no treatment-related deaths.

Conclusion Apatinib is a sensitive drug for advanced osteosarcoma with a high response rate after failure of chemotherapy, with similar duration of response compared to other TKIs.
Aims
Metastasis of high-grade sarcomas has been reported to influence the survival. We retrospectively investigated the cause and effect of delaying treatment for malignant soft tissue tumors.

Methods
We enrolled 111 patients with malignant soft tissue tumors. Their common histologies were liposarcoma in 37 cases, undifferentiated pleomorphic sarcoma in 19 cases and myxofibrosarcoma in 10 cases. The average follow-up periods were 30 months. A total of 33 patients had metastases during the course. We retrospectively examined the period between their symptom onset and their previous doctor visit (A period), the period between their previous doctor visit and the referral to a specialized institution (B period) and the period between the referral to a specialized institution and starting treatment (C period). We analyzed these factors using the Mann-Whitney test (p<0.05) in the patients with and without metastasis.

Results
The respective median A, B and C periods were 10 months, 28 days and 21 days in the patients with metastasis and 4 months, 19 days and 31 days in those without metastasis. The p-values for the A, B and C periods were 0.02, 0.03 and 0.07, respectively.

Conclusions
A total of 33 patients had metastases, even though their C periods were shorter than those without metastasis. One reason for the development of metastasis in those patients was possibly a delay in consulting a doctor due to the patients’ low sense of urgency, while another reason was a delay in being referred to our institution because 10 patients had undergone an unplanned excision by either a dermatologist, plastic surgeon or urologist at a previous hospital. We must educate the general population further on the fact that malignant soft tissue tumors can metastasize and we need to create more opportunities to discuss how to treat these rare cancers with doctors in other departments.
Session Name: **Session 04**  
Abstract Number: **185**  
Abstract Title: **Anatomical Location of Viable Tumor Cells before Definitive Surgery: A New Parameter with High Prognostic Performance in Osteosarcoma**  
Authors: Seung Hyun Kim, Kyoo-Ho Shin  
Presenter: Seung Hyun Kim, Yonsei University, South Korea.

**Purpose**  
The purpose of this study was to evaluate the clinical importance of anatomical location of viable tumor cells before surgery in osteosarcoma.

**Methods**  
39 osteosarcoma patients were retrospectively reviewed. The viable tumor cell population of tumor was regarded as low dADC area of tumor in diffusion-weight MRI. The anatomical relationship of viable tumor cells with neurovascular structure was evaluated.

**Results**  
Oncologic outcome was evaluated as Disease free survival. The mean follow up period was 32.3±21.29 months (Max=118 months, Min=12 months). Among 39 cases, Six cases of metastasis occurred and mean latency to metastasis was 16.8±4.72 months (Max=22.4 months, Min=11.2 months). Using logistic regression analysis, Chemoresponse, ALP elevation at diagnosis, tumor size as Tumor axial ratio (TAR), joint invasion, and anatomical location of viable tumor cells before surgery was evaluated. The only anatomical location of viable tumor cells was significantly associated with metastasis (OR=10.222, P=0.050). Otherwise, chemoresponse (OR=1.714, P=0.675), ALP (OR=2.857, P=0.336), TAR (OR=5.667, P=0.142), and joint invasion (OR=9.779, P=0.055) were not significant. The AUC value of anatomical location of viable tumor cells was 0.759 (CI=0.534 to 0.985) and superior to that of chemoresponse (AUC=0.564, [CI]=0.223 to 0.905).

**Conclusions**  
Abutting or close location to neurovascular structure of viable tumor cell population of tumors is a risk factor for metastasis in osteosarcoma.
BACKGROUND:
In sarcoma resection and major oncosurgical reconstruction, there is lack of standard guidelines about antibiotic protocols and current protocols are varied. The present survey tries to understand the variation in practice preferences as well as shed some light on how individual surgeons make their choices in selecting the protocol.

METHODS:
A cross-sectional survey was conducted among the members of Indian Musculoskeletal Oncology Society. All participants were asked questions regarding their selection of antibiotic protocols and their rationale in deciding these protocols. Survey answers were collected using an anonymous online survey tool.

RESULTS:
Of the 50 active surgeons who received the questionnaire, 31 responded (62% response rate). All agreed that they would give preoperative antibiotics. 67.78% stated that they would give antibiotics 20-30 mins before incision. 67.7% preferred only cephalosporins while 22.5% added aminoglycoside. Postoperatively 61% continued iv antibiotics till drain removal. 19% gave iv only on the day of surgery. 51.6% would not change the antibiotic protocol even if the reconstruction involves allograft / radiated bone but rest would either upscale the drug or duration. 32% did not give any oral antibiotics after completion of iv course, while 54% gave till a period ranging between 5 days till suture removal. 64% were ready to change their antibiotic protocol if there was evidence that a shorter duration protocol is equally effective. 39% insisted that they would change if such evidence is presented as part of a society guideline.

CONCLUSION:
The practice preferences vary a lot among the sarcoma surgeons. This is due to lack of guidelines that clearly define the antibiotic prophylaxis protocol. Two thirds of surgeons are ready to change their protocols specially when supported by guidelines from a society. This should be primer for the oncology societies to start clinical trials and formulation of antibiotic prophylaxis guidelines.
Aims/Objectives: Biological reconstruction by allografts or recycled autografts have been commonly used after wide resection of bone sarcoma. Comparative evaluation between the two techniques however has not yet been reported.

Methods: In this retrospective case-control study, among a total of 255 patients of high-grade osteosarcoma receiving biological reconstruction, 91 cases were reconstructed with allograft whereas the other 164 were reconstructed with recycled autograft. The graft-related outcomes were assessed by ISOLS allograft radiographic evaluation protocol. Complications and graft failure were determined in accordance with the modified system recently published. Patients’ functional evaluation was graded by MSTS function scoring system.

Results: The average graft union time was 8.4±6.4 months for allografts and 9.5±6.1 months for the recycled autografts (p=0.881). Radiographic evaluation revealed no difference in the average criteria but allograft showed lower scoring for the graft fracture criterion (p=0.006). The graft fracture rate was 7.7% in allografts and 2.1% in recycled autografts (p=0.009). Other complications leading to second surgery such as soft tissue failure, non-union and infection did not show significant difference in incidence between the use of allograft and recycled autografts. Tumor progression was only originated from soft tissue or host bone rather than the implanted grafts in both groups. Five-year graft survival rates were 74.1% versus 88.5% for allografts and recycled autografts (p=0.042). Functional scores were comparable between both groups.

Conclusions: We conclude that both allografts and recycled autografts are desirable biological materials for reconstruction after resection of bone sarcoma. However, lower fracture rate and higher graft survival rate were demonstrated in recycled autografts. And there is no risk of tumor progression from recycled autografts.
Abstract Title: Local recurrence in biological reconstruction of high-grade osteosarcoma: Is re-limb salvage safe?
Authors: Hung-Kai Weng, Po-Kuei Wu, Chao-Ming Chen, Wei-Ming Chen
Presenter: Hung-Kai Weng, National Cheng Kung University Hospital, Tainan And Dou-liou Branch, Taiwan.

Objectives
Limb salvage procedures for treating osteosarcoma in long bones become a trend, but local recurrence is a concern. In previous reports, 6-12% local recurrence rates were mentioned after limb salvage procedures and the survival rates of local recurrence became poor. We investigated the outcomes of patients who underwent limb salvage or amputation where recurrent osteosarcoma was found.

Materials and Methods
We retrospectively reviewed 290 high-grade osteosarcoma patients in limbs between 1998 and 2012. 22 patients receiving reconstruction with tumor prosthesis were excluded. Total 34 (12.7%) cases had pathology-prove local recurrence. The management of each recurrence was evaluated, and patient’s demographic data, tumor properties, and treatment methods were correlated with post-recurrence survival (PRS).

Results
There were 21 patients (61.8%) who were amenable to repeat limb-salvage surgery (LS group), whereas 12 received limb amputation (LA group). A patient who cannot receive further surgical intervention was excluded. The mean duration of local recurrence was 22.0 and 21.6 months in LS and LA group (p=0.87). The five-year survival rate was 55.3% in LS group and 58.3% in LA group (p=0.897). Secondary local recurrence was 8 (38.1%) in LS group and 1 (6.2%) in LA group (p=0.065). Three complications (14.3%) need revision surgery occurred in LS group including graft fracture, deep infection and artery occlusion. The final limb salvage rate was 90.5% in LS group. If surgical margin was examined in both groups, the five-year survival rate was 66.7% with negative surgical margin and 0% with positive margin (p<0.01). The five-year event free rate was 66.7% and 0% respectively (p<0.01).

Conclusions
Local surgical treatment of recurrent osteosarcoma in previously reconstructed limb is highly individualized. Limb salvage was still a reasonable and safe method as amputation. However, higher technical demand and complication rate would be the major concerns.
Objective: To investigate functional and oncologic outcomes of patients treated with PBA and complications.

Methods: We retrospectively reviewed 80 patients underwent PBA between 2011 and 2017. The mean age of patients was 23 years (6-84) and follow-up time was 36.5 months (3-82). There were 7, 50 and 23 patients with stage I, II and III by Enneking, respectively. Reconstructions were distal femur in 29, proximal tibia in 26, proximal humerus in 6 and others in 19. The mean graft-length was 15 cm (6-32). Graft was soaked in 65° Celsius of saline solution for 30 minutes and fixed by long stem or plate or both. Articular surface was resurfaced with prosthesis. Patient outcomes and complications were reviewed.

Results: The 5-year disease-specific survival was 100%, 72.1% and 30.6% for patients with stage I, II and III, respectively. The overall MSTS score was 82% (50-97) and Oxford knee score was 40/48 (24-46). The 5-year graft survival was 78.5%. Two grafts were removed at post-operative period because of positive margin and vascular problem. Complications included superficial infection in 4 patients (5%) treated with debridement, deep infection in 2 patients (3%) required revision to endoprosthesis in 1 and amputation in 1 patient. Recurrences were found in 4 patients (5%) required wide excision in 2, revision to allograft in 1 and amputation in 1. All was soft-tissue recurrence. Graft fractures were found in 3 patients (4%) required revision to allograft in 1. Aseptic loosening was found in 1 patient and non-union required bone grafting was found in 1 patient (1%). The incorporation time was 9 months (range, 3.5-22).

Conclusion: PBA is one of good and simple alternative methods for limb-sparing surgery. With adding joint replacement and proper fixation, PBA provides immediate weight bearing, yields good functional and oncologic outcomes with relatively lower cost and acceptable complications.
Aim/Objective
Epiphyseal-preservation surgery for osteosarcoma is an alternative method which has been indicated carefully to selected patients. The tumor-devitalised autograft treated with liquid nitrogen procedure is one of the biological reconstruction method. The limb length discrepancy is usually appeared in children with their growth. This study was aimed to investigated the residual epiphysis growth following epiphyseal-preservation surgery for childhood osteosarcoma around the knee joint.

Methods
We retrospectively reviewed 12 patients with osteosarcoma who underwent epiphysis preserving tumor excision (8 in distal femur and 4 in proximal tibia) and reconstructed by using tumor-devitalized frozen autograft. The mean patient age was 11 (range, 6 to 14) years. The mean follow-up periods were 63 (range, 41 to 90) months. Epiphysis transverse growth rate, epiphysis-width discrepancy (EWD) and collapse of epiphysis were evaluated. Functional outcome, complications and oncological status were also investigated.

Results
The mean epiphysis growth rate was 12.6 % (range, 3.3 to 28.0 %) of affected side and 12.7 % (range, 3.8 to 28.9 %) of contralateral side, mean EWD was 0.1mm (range, −1.0 to 1.7 mm), mean LLD was −26.1 mm (range, −1 to −48 mm) and two patients with distal femoral reconstruction underwent limb lengthening of tibia. There was no apparent collapse of the residual epiphysis. The mean MSTS score was 27.7 (range, 18 to 30).

Conclusions
Epiphysis transverse growth was not diminished, and there was absence of epiphyseal collapse even after epiphyseal-preservation surgery in this small series. With careful assessment for epiphyseal tumor involvement, epiphyseal-preservation surgery shall be possible, and could be an alternative method worth considering.
Introduction
During frozen recycled autograft-prosthesis-composite reconstruction for proximal tibia malignancy, we used patellar chevron osteotomy instead of patellar tendon detachment to preserve better extensor mechanism. Furthermore, we designed patellar cryo-free method to protect innocent patella during freezing and reported our experience in 2016 APMSTS. In this study, we used an animal model to validate safety and efficacy of the patellar cryo-free method.

Methods
Six swine proximal tibia along with patellar tendon and half-resected patella were obtained from a legal livestock shamble and dived into group A (n=3, traditional patella freezing) and group B (n=3, patella cryo-free). In group A, the proximal tibia, patella and patellar tendon were all immersed into liquid nitrogen (LN) for 15 minutes followed by slow thawing for another 15 minutes. In group B, the innocent patella was held away from the LN and rinsed with warm water during freezing. Temperature curve, bone tissue of the patella and proximal tibia were collected in both groups for analysis.

Results
Ideal therapeutic temperature of tibia bone could be achieved in both groups during cryotherapy whereas the temperature of the patella was kept in room temperature in group B. After cryotherapy, the H&E stain revealed bone and cartilage damage in proximal tibia in both groups and in patella of group A, but not in patella of group B. When analysis with TUNEL assay, viable cells was only found in patella of group B, which suggested better preservation of the biological properties of the innocent patella during cryo-free method.

Discussion
Our studies confirmed that patellar cryo-free technique could preserve biological properties of resected patella and enhanced healing after fixation. Based on our basic study and clinical experience, we believe the application of patella cryo-free technique in frozen recycled autograft reconstruction could provide better clinical outcomes for patients with proximal tibia malignancy.
Purpose
We have used liquid nitrogen processing to allow for recycling of the resected tumor-bearing bone. In this study, we examined the histology of retrieved frozen autograft after having been implanted for limb reconstruction.

Materials and Methods
Frozen tumor-bearing autograft specimens treated with liquid nitrogen were obtained from six patients with a mean age of 33.7 years (8-68 years). These specimens were retrieved at the time of revision surgery for local tumor recurrence or complications at a mean of 30.1 months (2-96 months) postoperatively and were studied histologically.

Results
Tumor cells were completely eradicated from the frozen bone in all cases. In a specimen retrieved 5 months after implantation, a small area of the bone showed active osteoblasts and osteocytes. In three cases retrieved greater than 1 year after implantation, active osteoblasts and osteocytes were observed widely throughout the frozen bone implant indicating the onset of osteogenesis commencing soon after implantation. Osseous incorporation was noted along the cortical host-graft junction as indicated by the continuity of bone trabeculae. Notably, in the specimen which was retrieved 8 years after implantation, excellent bone revitalization and incorporation was observed.

Discussion and Conclusions
Our results suggest that liquid nitrogen-treated tumor-bearing bone might have superior biologic characteristics making it a better implant for bone replacement in limb reconstruction surgery and should be considered one of the most useful recycled materials for biological reconstruction.
Aim: of our study was to evaluate the functional outcome following surgical excision for sacral tumors without any reconstruction.

Methods: Observational prospective study with evaluation of data on patients who had undergone surgery for sacral tumors from Jan 2006 to Jan 2016. 28 cases fulfilled the inclusion criteria. All patients had undergone partial or total sacrectomy depending on the tumor extent. Patients were evaluated for age, gender, sacrectomy levels, tumor type and functional outcome. Patient Reported Outcomes Measurement Information System PROMIS Global Item short form for assessing the functional outcome of the cohort.

Results: Of the 28 patients, there were 17 males and 11 females. Average age in twas 35.6 years (range 22 to 64 yrs). Chordoma was the commonest tumor seen in 19 patients (68%). There were 4 Malignant Peripheral Nerve Sheath Tumors, 2 Ewing sarcomas, 2 Chondrosarcomas and 1 MFH. The sacral levels of the tumor were as follows S1 (n=6), S2 (n=12), S3 (n=7) and S4 (n=3). We used the posterior approach to remove all tumors. Total sacrectomy was done in 12 cases while level based sacral resection was done in the 16 cases. The average follow up in the study was 38.5 months (24 to 44 months) PROMIS was done at the end of 2 years in 21 patients, 7 patients had died and 2 patients were alive with disease and were excluded from functional evaluation. Level based resections of sacrum were compared for function using the Chi square test for nominal variables and the Fisher’s test for continous variable. More cephalic the resection, poorer was the physical health on PROMIS, total Sacrectomy 38 to 44 versus S4 56 to 68, less interference because of pain.

Conclusions: No reconstruction with intrumentation is a viable opton in these patients.
Aim/Objective: To study the oncological and functional outcome of patients who underwent intercalary resection and reimplantation of sterilized bone after extra corporeal radiotherapy for malignant tumours of the extremity for which non vascularized fibular autograft or bone cement was used to augment the sterilized bone.

Method: 41 patients in the age group of 8 to 54 underwent intercalary resection and reimplantation of the sterilized tumour bone during the study period of March 2010 to January 2015. 25 patients had non vascularized fibular graft for augmentation while the rest 16 had bone cement filled in the medullary cavity for the same. Oncological and functional outcomes, rate of union of graft, graft fracture, post operative infection, time for weight bearing, donor site morbidity and need for secondary procedures for bone union were assessed.

Results – None of the patients in both groups had any graft fracture during the study period. The time for union at the diaphyseal site was lesser for the fibular group but was not statistically different. The rate of union at the metaphyseal ends was found to be the same. Soft tissue local recurrence was found in three patients, two in the bone cement group. Though there was no significant difference in the final functional outcome the weight bearing was started significantly earlier in the bone cement group. Donor site morbidity was seen in three patients in the fibular group. Bone grafting had to be done for two patients each in the both groups fro the diaphyseal end.

Conclusions Though fibular graft augmentation had a slight advantage in bone union at the diaphyseal end bone cementing is equally effective method of augmenting the sterilized tumour bone with no donor site morbidity and equal oncological and functional outcomes.
Session Name: Session 06  
Abstract Number: 412  
Abstract Title: How Would You Prefer Your Intra-epiphyseal Resection: "Orange Peel or Biscuit"?
Authors: Harzem Ozger, Bugra Alpan, Osman Emre Aycan, Natig Valiyev  
Presenter: Harzem Ozger, Acibadem University School Of Medicine Dept. Of Orthopaedics And Traumatology, Turkey.

Introduction:
This paper aims to answer the question of whether it is feasible to perform intercalary biological reconstruction in osteosarcoma cases with epiphyseal involvement and how to do it.

Patients and Methods:
Eleven osteosarcoma patients with unequivocal epiphyseal involvement (6M/5F), who underwent intercalary biological reconstruction between 1990-2016, were identified in the senior author’s registry. Tumor location was proximal tibia in 5 patients, distal femur in 4, distal humerus in 1 and distal tibia in 1 patient. Mean age was 14.6 (5-29) and mean follow-up was 48 (15-165) months. Mean pre-chemotherapy tumor length was 14.3 (7.2-28.2) cm, mean resected segment length was 17.4 (9.0-28.5) cm. Nine patients underwent reconstruction with “frozen hotdog – liquid nitrogen treated shell and free vascular fibula graft (FVFG) combination ” method while 2 underwent reconstruction with FVFG only. Mean FVFG length was 20.0 (15.0-25.3) cm. Mean epiphyseal segment thickness after resection was 13 (5-16) mm.

Results:
Tumor necrosis ratio was >95% in 5 patients and surgical margins were negative in all. Limb length discrepancy was the most common complication with a mean shortness of 2.6 (0-6) cm. Mean MSTS was 73.7%. Good to excellent results were obtained for fusion in 9 patients, resorption in 10, graft shortening in 7, fixation in 7 and hypertrophy in 6 patients. No local recurrence occurred. Two patients were metastatic at the time of last follow-up and one died of disease. One patient was offered amputation for diaphyseal osteomyelitis. Arthrodesis had to be performed due to deformity in the distal tibia case.

Conclusion:
Salvaging the joint in osteosarcoma patients with epiphyseal involvement is possible, however, requires demanding resection and reconstruction technique. Although local control rate was 100% in this paper, patients must be well informed about benefits of biological reconstruction in the long-term and also about the risks regarding surgical margins.
Purpose: two main goals of limb-salvage tumor surgery are removing tumor lesion and normalization of the affected limbs in function and appearance. Unique anatomic and structural conditions continue to present structural allografts are particularity suited. The authors therefore performed historical review of Sytenko Institute experience of using structural allografts for limb salvage surgeries by last 60+ years.

Methods: about 3,400 limb salvage surgeries were performed. There were most numbers of hemiarthroplasty and intercalary resections with massive cortical structural allografts. The historical records were reviewed to determinate the ultimate outcome in these reconstructions in terms of joint preservations, reoperations, major revisions and subsequent amputations.

Results: the general rate of infection complications was quite higher (28%), allograft fractures and nonunions were detected in 16% cases. It was the main cause of revisions surgeries. The amputation rate was 39% because infection, local tumor relapse and nonunion.

Conclusion: the intercalary bone allograft reconstruction had better functional results and low complication rate than that for allograft hemiarthroplasty. The ultimate long-term limb salvage structural allografts rate in this series (> 50%) confirms the applicability of allograft reconstruction in selected cases.
Session Name: Session 09  
Abstract Number: 126  
Abstract Title: How does iliosacral bone tumor resection without reconstruction affect the ipsilateral hip joint?  
Authors: Tao Jin, Wei-Feng Liu, Hai-Rong Xu, Yuan Li, Lin Hao, Xiao-Hui Niu  
Presenter: Lihui Xu, Beijing Ji Shui Tan Hospital, China.

Background: Whether reconstruction is more beneficial after iliosacral bone tumor resection remains controversial. The aim of this study is to assess functional outcomes and to reveal changes in the ipsilateral hip joint after partial iliosacral resection.

Methods: From 1998 to 2016, 21 patients aged 20–66 years underwent iliosacral resection, 18 without reconstruction (group 1) and 3 with reconstruction (group 2). Function was evaluated using the MSTS 1993, and disability was measured using the TESS. I-A distance was defined as the distance from the iliosacral joint to the upper line of the acetabulum along the curved line. Group 1 were subdivided into two groups: group 1A included the patients with a defect less than one-third of the I-A distance and group 1B the remainder. Acetabulum-head index (AHI) and center-edge angle (CE angle) were measured. The relationship between defect length and femoral head coverage was analyzed.

Results: The mean follow-up was 67.3 months. Eighteen patients were included in group 1 and three in group 2. The final average MSTS 1993 score was 93.6% in group 1 and 93.3% in group 2. The mean TESS was 98 in group 1 and 98.5 in group 2. AHI and CE angle between groups 1 and 2 were not different. The AHI was 80±5.4% in group 1A and 67±9.0% in group 1B (t=−3.740, P=0.002), while the CE angle was 29±5.9° in group 1A and 20±6.3° in group 1B (t=−3.172, P=0.006) at the last follow-up. Regarding the limb-length discrepancy, group 1 and 2 were similar whereas group 1A and 1B were statistically different (group 1A: 0.7±0.7cm; group 2: 2.6±1.0cm; t=−4.324, P=0.001).

Conclusions: Iliosacral resection without reconstruction removing more than one-third of the I-A distance leads to an impairment of the limb-length discrepancy and an increase of the defect of the acetabular coverage without altering the functional outcome.
Aim/Objective
There are a few reports about the radial reconstruction by using a tumor-devitalized autograft for the radial malignant tumors. In this report, we present three cases of radial reconstruction by using tumor-devitalized autografts treated with liquid nitrogen after tumor excision.

Methods
This study assessed three patients aged 14 (rhabdomyosarcoma involving radius), 46 (osteosarcoma), and 65 (metastatic renal cell cancer) years. The surgical technique involved excision of tumor with adequate margin, removal of soft tissue, curettage and treatment of the excised bone in liquid nitrogen, followed by thawing and using it for reconstruction. Reconstruction methods were intercalary grafts in two patients and composite reconstruction with radial head prosthesis in one patient. Two patients received neoadjuvant chemotherapy. We evaluate the limb function, bone union, and complication.

Results
The mean follow-up period was 133.3 (94.1-158.3) months. The median length of the frozen autografts was 45.4 mm (26.0 mm, 46.0 mm, 64.3 mm), for one case each of proximal, shaft, and distal radius reconstruction. Bone union was achieved in all cases, with no evidence of progressive or massive bone absorption or tumor recurrence. None of the frozen autografts were removed at the final follow-up. A mean the Musculoskeletal Tumor Society (MSTS) score of 92.3%. In regard to the oncological outcome, two patients remained disease free, but the third patient died due to cancer-related causes. Complications included one case of posterior interosseous nerve palsy.

Conclusions
Although this is the observational case series, the frozen autografts for the radial reconstruction provided an excellent MSTS score, low complication rate and good union. This technique could be considered the treatment option of radial malignant bone tumor.
INTRODUCTION:
Hip transposition arthroplasty originally required prolonged postoperative bed rest and immobilization. The aim of this study was to determine whether temporary external fixation could facilitate postoperative physiotherapy in seven patients with malignant pelvic tumors who underwent acetabular resection and hip transposition arthroplasty.

PATIENTS:
7 cases with pelvic sarcoma were temporally applied with external fixation following tumor resection and reconstructive surgery between 2008 and 2012. The pins for external fixation were inserted into the affected femur and healthy contralateral ilium. External fixation was removed 6 weeks postoperatively and weight-bearing was started. The postoperative rehabilitation courses and functional results (MSTS score) were assessed.

RESULTS:
The average postoperative follow-up was 55 months. With temporary external fixation, standing along a bed was achieved in an average of 7.3 (range, 6-9) days after surgery, transferring to a wheel chair, 11.6 (6-28) days, and gait training using parallel bars, 21.1 (7-48) days. Three patients could walk without a crutch or cane, three with one cane, and one with one crutch. Average limb length discrepancy was 5.5cm. There was no major complication related to external fixation or the surgical procedure. The average MSTS score was 74%.

DISCUSSION:
Hip transposition with temporary external fixation can facilitate bone stabilization, soft tissue reconstruction after pelvic resection, and time to postoperative physiotherapy, resulting in early rehabilitation and good functional results without major complications.
Session Name: Session 09
Abstract Number: 301
Abstract Title: Surgical Treatment of Aggressive Vertebral Hemangiomas with Compressive Myelopathy - Decompression with Vertebroplasty? or Total Tumor Resection?
Authors: Jianmin Li, Zhiping Yang, Xin Li, Zhenfeng Li, Qiang Yang,
Presenter: Xin Li, Qilu Hospital Of Shandong University, China.

Objectives: To investigate the effect of two operations - decompression with vertebroplasty and total tumor resection for the aggressive vertebral hemangiomas with compressive myelopathy.

Methods: 26 patients suffered from aggressive vertebral hemangiomas with compressive myelopathy between 2000 and 2015. There were 11 males and 15 females with the mean age of 23 years (15-69 years). Solitary tumors occurred in 6 patients and multiple in 20. The responsible segment was located at cervical spine in 6 cases, thoracic in 18 cases and lumbar in 2. The Frankel grade was A in 1 case, C in 5, D in 18, E in 2. The ESCC grade was I in 5, II in 15, III in 6. The pathologic diagnosis was clear in 18 cases through preoperative needle biopsy and 8 through intraoperative fast pathologic examination. The operation was decompression, vertebroplasty and internal fixation in 11 cases, vertebral tumor resection and reconstruction through anterior approach in 6, total spondylectomy through posterior approach in 8, tumor resection and reconstruction through one-stage combined anterior and posterior approach for axis in 1.

Results: The mean follow-up time was 75 months (12-194 months). The Frankel grade was D in 4 cases and E in 22 after half year postoperatively. The tumor progression occurred in 4 cases which were 3 in decompression alone group. The patients were treated with total spondylectomy in 2 and stereotactic radiosurgery in 1. One patients with axis tumor suffered from tumor progression after delivery and treated with decompressive surgery and radiotherapy. The internal fixation-related complications occurred in 4 cases.

Conclusion: Aggressive spinal hemangioma with spinal cord compression requires surgery. The vertebral resection can gain tumor controlling better and decompression fuller. Palliative decompression combined with vertebroplasty can also save the spinal cord function, but some patients would face the risk of tumor recurrence.
OBJECTIVE: Distal fibulectomy after tumor resection leaves ankle unstable, we assess functional and oncological outcome of using prolene mesh anchorage between distal tibia and talus as a lateral restraint to prevent instability.

DESIGN: Retrospective analysis

METHODS: Between 01/01/2006 and 31/12/2016, 6 patients (3 PNET, 1 OGS, 1 GCT and 1 Angiosarcoma) underwent distal fibulectomy. 5 male and 1 female presented at mean age of 29yrs(13 to 43). Distal fibulectomy was done through standard lateral approach. Mean resection length was 12.6cm (9 to 16). In all patient prolene mesh was anchored to distal tibia and talus using screw or ethibond suture. 2 patients required pedicle flap for soft tissue defect following resection. 3 patients (2 PNET and 1 Angiosarcoma) received post operative radiotherapy. Rehabilitation protocol for all patients included below knee cast for 6 weeks followed by gradual full weight bearing mobilization and ankle range of motion.

RESULTS:
At mean follow up of 60 months (17 to 128) all patients were available for final assessment. All tumors were excised with negative margin. 2 patients required re exploration of pedicle flap one of which required free flap subsequently. No patient developed local or distal recurrence. 5 year overall survival and disease free survival was 100%. On radiological evaluation at final follow up only one patient had valgus deformity without any restriction of activity. Mean MSTS score was 28(29 to 24).

CONCLUSION: Anchoring prolene mesh to distal tibia and talus after distal fibulectomy for bone tumors is an easy, cost effective and reproducible method of retaining lateral stability with good functional results.
Session Name: Session 09
Abstract Number: 395
Abstract Title: Use of cement-bone graft composite in patients having giant cell tumors with extensive cortical loss- The “Longitudinal Sandwich”
Authors: Akshay Tiwari
Presenter: Akshay Tiwari, Musculoskeletal Oncology Dmg, Max Institute Of Cancer Care, India.

Title
Use of cement-bone graft composite in patients having giant cell tumors with extensive cortical loss- The “Longitudinal Sandwich”

Aim
To describe a technique using cement-bone graft composite in giant cell tumors of bone with two or three cortices destroyed, used together in a longitudinal alignment.

Methods
Twelve patients having giant cell tumor of bone with cortical destruction of 180 to 270 degrees circumference underwent curettage and reconstruction with cement and bone graft aligned along the axis of the bone. All patients were operated by the presenting author. Curettage consisted of use of high speed burr and use of phenol as adjuvant. Cement was used to fill the cavity and cortico-cancellous autograft was paced alongside the cement separated by a layer of gelfoam. Fixation was added wherever deemed necessary.

Results
After a minimum follow up of 2 years, none of the patients showed a collapse or fracture of the bone, and restoration of bone stock was adequate enough to allow unrestricted use of the limb in all patients. Recurrence was observed in two patients- one in bone and one in soft tissue.

Conclusion
The “longitudinal sandwich” is a useful technique in giant cell tumors having just one or two cortices remaining. While cement gives immediate stability to maintain bone length and circumvents the problem of limited bone graft availability, bone graft restores the much needed bone stock.
Aim
To describe a method of curopsy of a large pelvic aneurysmal bone cyst using computer navigation

Methods
The 3D trauma and spine navigation system from Brainlab was used. Pre op registration with MRI and CT scan with 1 mm cuts of the pelvis was done. After placing the pins at appropriate sites including the iliac crest, ASIS and AIIS, registration was successfully done with < 2 mm accuracy. The surgical instruments to be used were also registered by placing fiducial markers mounted on pins. Real time guidance was used to strip off the inner lining on the wall and the septations of the cyst. The accuracy of the placement of the sharp instruments enabled us to venture close to the cyst lining without the fear of puncturing the cyst wall/ injuring pelvic viscera. A Jemshidi needle was also used under navigation guidance to break the septations and inject sclerosant (2% Polidocanol) well away from critical structures (bladder, neurovascular structures).

Results
The procedure was successfully completed with no postoperative complications. Clinical evaluation and imaging at 6 weeks and 12 weeks post procedure showed absence of pain and reossification. Further long term follow up is awaited.

Conclusion
Though navigation primarily helps in refining out bone cuts during resection but its use can be extended in other procedures also like curopsy. Certain large aneurysmal bone cysts can be treated by navigation guided curopsy where image guidance (fluoroscopy) may not be enough to confidently reach the cyst wall close to visceral structures. Larger studies with longer follow up is required to see if this technique produces superior results compared to conventional image intensifier guided curopsy in such settings.
Introduction: The stem, which anchors the implant to the bone, may be considered as the most important part of a modular tumor endoprosthesis. The stem design provides stability even with limited bone-implant interface. If the remaining bone is too short to provide primary stability despite exceptional implant design, then bone stock may be expanded with bone recycling. The authors intend to demonstrate how to deal with extremely short segments in endoprosthetic reconstruction.

Patients and Methods: Review of authors’ tumor registry yielded 6 patients (5M/1F) over the last decade, whose primary endoprosthetic reconstruction proved extremely challenging, due to inadequate bone stock. Pathology was osteosarcoma in 5 patients and chondrosarcoma in one. Mean age was 22 (9-55) years and mean follow-up was 22 (6-56) months. The reconstructed site was proximal humerus in 3, distal femur in 2 and proximal tibia in one. Three patients had skip metastases and 3 had direct intramedullary extension. Mean resected segment length was 289 (235-370) mm, resection ratio 86% (77-90), remaining effective bone length 48 (33-75) mm and mean unsupported prosthesis stem length was 65 (18-160) mm. HA-coated pentagonal cross-section cementless stem was used in 5 patients and a cemented cylindrical stem from another manufacturer was used in one. Liquid nitrogen recycled autografts with a mean length of 103 (35-170) mm were used to augment bone stock in 4 patients.

Results: Mean MSTS was 71%. ISOLS radiologic scores were good to excellent in 5 (83%) patients. Mean prosthesis specific survival was 18 (6-32) months due to unrelated implant breakage of cemented prosthesis. Local recurrence in one patient was managed with local resection. Limb salvage rate was 100%.

Conclusion: HA-coated pentagonal cross-section offers exceptional anchorage in critically short segments. Liquid nitrogen recycled segments can be used to expand bone-implant interface when inadequate bone stock jeopardizes limb salvage.
Aim/Objective
Curettage is a surgical option for bone tumours, such as giant cell tumour (GCT), chondroblastoma, and metastatic bone tumours, along with en bloc resection. These tumours are often hyper-vascular, therefore curettage may complicate intra- to post-operative management, by interrupting visibility of the tumour and requiring more blood transfusion. We hereby introduce our strategy for these tumours: pre-operative intravenous embolization combined with intra-operative intravenous balloon occlusion and navigation system if desired.

Methods (Patients)
From January 2017 to March 2018, seven spinal or pelvic bone tumours in six patients were treated by curettage, including modified Harrington procedure (three). The six diseases were two giant cell tumours and four metastatic bone tumours (thyroid cancer, renal cancer, breast cancer, and pancreatic cancer). Intravenous embolization, using both metallic coils and embolic predictable, was performed 4–48 hours pre-operatively in all the seven surgeries, whereas balloon occlusion just before surgeries in three. Intra-operative navigation assistance was used in two surgeries for accurate access to tumour and prevention of unnecessary bone destruction. Follow-up period ranged 1–14 (mean, 5.4) months.

Results
Intra-operatively, tumours were all accessed directly and accurately, destroying minimum bone in two navigation surgeries. All the seven tumours were visible with bleeding controlled, especially in the three cases (two GCTs and one metastatic thyroid cancer) using intra-operative balloon occlusion. With balloon occlusion, intra-operative field was dry as if using tourniquet. Intra-operative blood loss ranged 50–1282 g (mean, 601 g), requiring blood transfusion (RBC: 4–8 units) among three surgeries. Post-operative course was uneventful in all the surgeries but one modified Harrington procedure, which suffered from 2 x 4-cm skin necrosis and deep infection.

Conclusion
Intra-operative balloon occlusion is an effective adjuvant tool for curettage of bone tumours, enabling safer and more accurate curettage by minimizing intra-operative bleeding.
Aims: After acetabular resection for sarcomas, achieving a bony femoro-pelvic fusion is very difficult and prosthetic reconstructions has very high complication rates. We reconstructed the defects with a simple polypropylene mesh between femoral head and remaining part of pelvis thereby aiming at a pseudo-arthrosis and analyzed its functional outcome.

METHODS: 24 patients having bone tumors of the pelvis underwent acetabular resections and femoro-pelvic pseudoarthrosis. Commonest Histology was chondrosarcoma (13). According to Enneking’s classification, type II (1), type I+II (5), type II+III (14), type I+II+IV (2), type I+II+III (2) resections were carried out. A 30 x 30 cm polypropylene mesh was tied to the remains of capsule around the head and was then turned on itself to make a strong braided rope like structure. It was passed through remaining ilium/ischium/sacrum and was tied to itself in proper rotation with heavy ethibond suture. Functional limb results were reported according to MSTS functional scores.

RESULTS: 20/24 patients attained independent ambulation. Mean time to full weight bearing was 4.7 months (3-9 months). There were 2 flap necrosis, 2 infections, 1 nerve injury and 1 vascular injury. Local recurrence occurred in 3 (13%) and Systemic metastasis developed in 10 patients (47% of malignant tumors). At last follow up 14 are alive without any signs of disease. Average MSTS score was 22 (range 13-27). Best MSTS scores were with type II or I+III IH where ilium was left to support the femur while worst was with type I+II+III resection patient. Patients with higher BMI have poorer functional outcome with meshplasty.

CONCLUSION: Mesh-pseudoarthrosis is a very simple reconstruction option which has an excellent functional outcome. It reduces surgical time and eliminates uncertainties pertaining to fusion/joint replacement. This should be strongly recommended as a method of reconstruction to patients undergoing acetabular resections.
Introduction: The primary bone tumours of the tibia are quite common. Resection and the defect so created is reconstructed with bone grafts struts, bone transport, prosthetic replacement or medialisation of fibula. We present our experience of tibialisation of fibula for bridging these gaps.

Methods: This study includes 24 patients; 16 males and 08 females with age ranging from 09-40 years (average: 32 years) in last 15 years. There were 14 malignant and 10 benign tumours. All tumours were treated with wide resection and centralisation of fibula fixing it either with screws or Kirschner’s wire. The follow-up ranged between 24-180 months (median: 64 months).

Results: We achieved good union at both ends and hypertrophy of centralised fibula. In two patients additional bone grafts were required for union at one end. Two patients died of metastasis. Functional results were evaluated using Musculoskeletal Tumour Society (MSTS) score. The overall MSTS score was 25.50.

Conclusions: Tibialization of fibula is one time, biological and cost effective treatment for suitable indications for filling the gaps in tibia after resection of aggressive benign and malignant tumours.
Aims: To investigate a proper reconstruction method of spinopelvic stability after total en bloc sacrectomy.

Methods: Ten patients received total en bloc sacrectomy and reconstruction with 3D-printed endoprostheses in our center between Jul. 2015 and Sep. 2017. There were 7 males and 3 females with mean age of 40.0 (15-68) years. The design of the prosthesis stemmed from the concept of an endoprosthesis with porous bone-contacting surfaces that could connect lumbar spine and ilium, connect both sides of ilium, and rebuild the structure of loading transfer through anterior spinal column in one step while conducive to bone in-growth to the trabecular pores.

Results: All operations were accomplished smoothly. The mean operation time was 392.5 (250-660) min and mean intra-operative hemorrhage was 3530 (1600-8100) ml. Peri-operative complications occurred in 4 patients including 2 wound healing problems and 2 deep infections. After a mean follow-up of 12.6 (6-33) months, there were 8 patients with no evidence of disease, 2 patients with recurrences, and 1 patient died of disease. Imaging evidence of instrumental complications were found in 3 patients and all of them were breakage of screws, of whom only 1 patient combined with local recurrence received re-operation in which the prosthesis was found hardly removed because of the stable bone-prosthetic osseointegration, and other 2 patients who dispensed with re-operation were without pain and ambulatory impairment and were with imaging evidence of bone-endoprothestic osseointegration shown by CT scans. At latest follow-up, 80% of all patients could walk with no aids of canes/crutches, and 60% of all patients were pain-free.

Conclusions: Our mid-term follow-up results proved that the application of 3D-printed endoprosthesis for reconstruction after total en bloc sacrectomy could achieve satisfactory spinopelvic stability by facilitating osseointegration at the bone-implant interface, without additional surgical time, haemorrhage and complications.
Objective
Large pelvic defects following tumor resections around sacrum and posterior pelvic column require sophisticated reconstructive solutions such as dedicated customized implants manufactured with 3D technology. The aim of the study is to present the innovative methods of reconstructions in sarcoma patients in whom the sacral and pelvic resections were performed at the same surgical procedure.

Methods
Material was composed of 20 selected patients hospitalised at The Department of Orthopaedic Oncology of Pomeranian Medical University of Szczecin, Poland between 2013 and January 2018 due to advanced forms of primary bone tumors. All patients were reconstructed with 3D custom made implants of the same origin. The surgical procedure in all cases was combined partial or total sacrectomy with the resection of posterior pelvic column. The reconstruction of the defect was performed by 3D custom made implants covered with deep EPORE® surface (Implantcast). We used gammakamera SPECT/CT GE Hawkeye 4 bone scintigraphy with TcPPm MDP dynamic, planar and tomographic aquisitions to precisely visualise the bone ingrowth into the surface of the implant. The test and clinical evaluation were performed at 12 month after surgery in all patients.

Results
We showed promising short term results regarding both oncological aspects and reconstruction options in patients treated with wide sacro-pelvic resections. Good functional results were achieved as the presented surgical techniques and firm primary stability of the new concepts of implants enabled better healing and osseointegration.

Conclusions
The presented methods show the possibilities of oncologically clear wide sacro-pelvic tumor resections, step by step surgical techniques of nerve roots release have a great impact on functional results. The sacro-pelvic reconstructions are mainly based on innovative implants designs with deep porous layers such as EPORE® can help stimulate osteoblasts migration form the adherent bony area.
Session Name: **Session 11**  
Abstract Number: **121**  
Abstract Title: **Preliminary Outcomes of Short-Stem Cemented GMRS Modular Reconstructive Prosthesis for Revisions of Lower Limb**  
Authors: Hairong Xu, Yuan Li, Xiaohui Niu  
Presenter: Hairong Xu, Beijing Ji Shui Tan Hospital, China.

**Objective**  
The purpose of this study is to report the preliminary outcomes this short-stem cemented GMRS modular reconstructive prosthesis with with porous coating shoulder for revisions of low limb.

**Methods**  
Twenty-four patients who had type 2 failure of the prosthesis and treated with GMRS were included in this retrospective study. There were 14 males and 10 females. The mean age at first treatment was 29.5 years (range, 15-56). The primary tumors located in 16 cases in the distal femur, 6 cases in the proximal tibia, and 2 case in the proximal femur. The short-stem cemented GMRS (Stryker) prosthesis systems are used in these revision surgeries. Extracortical bone incorporation was measured over a 4-cm length of the porous-coated region of the prosthesis in four zones (the medial and lateral aspects on anteroposterior radiographs and the anterior and posterior aspects on lateral radiographs) and was reported as the percentage of the total length (4 cm) covered by extracortical bone with a thickness of >1 mm. Body wright bearing was limited until medullary graft healing. The Musculoskeletal Tumor Society (MSTS) Score was reported.

**Results**  
In this series, the mean interval between the first surgery and the revision was 5.7 years (range, 2-9). With a mean follow-up of 26.3 months (range, 3-59), the average percentage of the porous-coated region that was covered by extracortical bone formation was 69.3% (range, 0-100%) for all patients. No patients developed aseptic loosening of the revision prosthesis at the most recent follow-up. There were no infections, periprosthetic fractures or implant breakage in this series. The mean Musculoskeletal Tumor Society score 28.8 (range, 26 to 30).

**Conclusions**  
We demonstrate significant satisfactory short-term outcomes of this cemented GMRS modular reconstructive prosthesis for revisions of low limb.
Objective: - Proximal tibia is one of the common sites for variety of musculoskeletal tumors. Management of these tumors remains a challenging task as the extensor mechanism has to be sacrificed. Purpose of this study was to evaluate clinical and functional outcome in patients undergoing patellar tendon reconstruction using prolene mesh while having an endoprosthetic reconstruction for proximal tibia tumors.

Methods: - Retrospective evaluation of 53 patients who underwent proximal tibia resection and endoprosthetic reconstruction using Adler’s Proximal tibia endoprosthesis and patellar tendon reconstruction using Prolene mesh 30 cm x 30 cm from 2012 to 2017. The prolene mesh used was quadrupled and the remnant of the patellar tendon was sutured with one end of this prolene mesh and the other end was passed through the patellar tendon attachment site on the proximal tibia component of the prosthesis and looped back upwards and sutured with proximal part and the gastrocnemius flap.

Results: - Out of 53 patients, 4 underwent a/k amputation for recurrence of the tumor, 5 patients had infection, 3 patients had to undergo revision surgery for implant failure and 6 patients died due to metastasis and other complications. The mean follow-up was of 38 months (range- 8 - 58). The mean extension lag was 3 degrees and mean active flexion of the knee was 108 degrees. The mean MSTS score was 78% (48- 93%).

Conclusions: - There was significantly less extension lag and good range of motion was achieved with less complications. The use of prolene mesh for reconstruction of the patellar tendon is a simple, cost effective and dependable alternative.
Aim/Objective: Tumor endoprosthesis is widely accepted as a reliable reconstruction method after massive bone tumor resection. Analysis of implant survival for endoprosthesis reconstruction has been reported, whereas there are not enough information demonstrating in detail about the mode of failure. The aim of this study is to clarify the implant survival and failure mode of tumor endoprosthesis reconstruction after the lower limb tumor resection.

Methods: 144 patients who had the tumor endoprosthesis reconstruction for femur or tibia in our institution from 1990 to 2015 were subjected to this study. We defined the event of implant survival as having removal of the tumor endoprosthesis or amputation. Implant failure was also defined as a postoperative failure which required surgical intervention. The mode of failure was classified based on Henderson criteria.

Results: Median follow up after first reconstruction surgery was 52.5 months (range, 1-275 months) and 35 patients (24%) experienced the removal of the prosthesis or amputation. The implant survival at 5 and 10 years were 78 and 59%, respectively. Implant failure occurred in 52 cases (36%), and the failure-free survival at 5 and 10 years were 63 and 53%, respectively. Most common failure was soft tissue (16 cases, 11%) occurring during the period from 1 to 36 months (median 2 months). Aseptic loosening was found only in 4 cases (3%), most of case occurred within 2 years, although all of them resulted in the removal of implant. Tumor progression (70%) was also affected to the implant survival. Prognostic factor analysis demonstrated that chemotherapy was a significant poor prognostic factor for both implant survival and failure (p<0.0001), whereas no specific relation to mode of failure was observed (p=0.5).

Conclusion: Aseptic loosening and tumor progression were highly related to the implant survival. Chemotherapy might affect not only the infection or relapse but prosthesis stabilization.
Government subsidy in a middle-income country like the Philippines provides hospitalization assistance but endoprostheses are out-of-pocket expenditures, prompting some patients to opt for amputation even if they are good candidates for limb salvage surgery. To address this dilemma, we adopted a 2-stage method for endoprosthetic reconstruction (EPR) at the UP-PGH. Resected bone tumor is temporarily reconstructed with a nail and antibiotic-bone cement spacer. EPR is undertaken as a second stage once patient and family have recovered medically and financially.

Objective: Review all patients who have undergone 2-stage EPR procedure and evaluate demographics, time interval between 2 surgeries, complications from either surgery and eventual function and oncologic status.

Methods: A review was made of all patients at our Unit who had undergone the procedure over a period of 15 years (1999-2014). All patients received complete treatment from our Unit and had follow-up of at least 24 months or until death.

Results: There were 17 patients aged 9-63 years, 14 had osteosarcoma, the others were chondrosarcoma, GCT and renal cell metastasis. 14 patients had tumors in the distal femur; 3 in the proximal tibia. Length of reconstruction averaged 17cm (10-27cm). While waiting for the 2nd stage, 4 temporary nails broke. Interval between the 2 procedures averaged 18 months. Aside from 2 patellar fractures, there were no early postoperative problems. In general, knee ROM was limited in patients whose interval between procedures was over 18 months. 12 of 17 patients were ANED (38-175 mos), 2 had DOC (160, 165 mos) and 3 had DOD.

Conclusion: This 2-stage method for EPR is an alternative for tumor units working under financial limitations of low to middle-income countries. Except for 2 patellar fractures, there were no increased complications immediately postoperatively. 18 months would seem to be an appropriate interval between the 2 procedures to prevent knee stiffness.
Aim
To determine the current practices in staging for extremity chondrosarcoma.

Methodology
Online survey followed by analysis was done using online portal (surveymonkey.com). Survey was answered by medical fraternity involved in treatment of extremity chondrosarcomas.

Results
137 members participated in the survey of which 118 completed it. 84% were surgeons, 9% Radiologists, 3% were medical and radiation oncologists and 1% belonged to Nuclear medicine fraternity. 64% have been treating chondrosarcomas for more than 5 years. 55% saw less than 10 cases of chondrosarcoma per year. 88% felt a biopsy is mandatory if the radiology is suspicious chondrosarcoma. 65% suggested NCCT Thorax + Bone scan was the best staging modality. 19% suggested PET CT for staging. 65% opined that lung is the most common site of distant metastasis followed by 31% for both Lung and Bones. 66% answered that solitary skeletal metastasis is seen in less than 2% of the cases and 43% opined it is more common in recurrent chondrosarcomas and 47% opined that the incidence of bony metastasis is with no specific type of chondrosarcoma. 26% said that performing a bone scan was likely to impact management, 28% said it will not impact management and 46% were unsure. Of the group who thought that a bone scan would impact management or were unsure, the majority (56%) opined that this was relevant only in were of the opinion that skeletal survey is essential only in grade 2 and Grade 3 chondrosarcomas.

Conclusion
There was a lack of consensus regarding the staging for Chondrosarcomas. Only 26% of respondents were convinced that performing a bone scan was likely to impact management. There is a need to analyze large data sets (retrospective / prospective) to arrive at an evidence based staging algorithm for chondrosarcomas.
Purpose: The purpose of this study was to clarify the results of definitive proton beam radiotherapy for inoperable bone and soft tissue sarcoma.

Materials and Methods: The 45 patients with unresectable sarcoma who underwent proton beam radiotherapy (PBRT) between 2002 and 2016 were the subjects of this study. The indications for PBRT were a large tumor close to critical organs with no or a single metastasis. There were 27 men and 18 women with a mean age of 52 years. Among the subjects, 40 patients received concurrent chemotherapy. We evaluated the overall survival rate, local control rate and complications. The results were compared with those of the 44 patients who underwent three-dimensional conformal radiotherapy with photons (CRT) for local control during the same period.

Results: The total radiation dose averaged 69 Gy (54-84) in the PBRT group and 53 Gy (40-70) in the CRT group. The 5-year survival rate of the PBRT group was 77%, which was significantly better than that of the CRT group (9%; P<0.001). The 2- and 5-year local control rates were 76% and 62% in the PBRT group, respectively, and 54% and 19% in the CRT group, respectively, a significant difference (P=0.0015). Although 24 of 45 tumors were greater than 10 cm in size, the local control rate in the PBRT group was better than in previous studies describing conventional methods. Major complications developed in 7 patients (16%), including 3 secondary malignancy, 3 hemorrhagic colitis, 3 insufficient fracture, 1 infectious wound dehiscence, and 1 esophageal perforation.

Conclusion: Although the PBRT group included many large tumors, PBRT enabled the use of a higher dose of radiotherapy, and the local control rate was better than in previous reports. PBRT with a dose of more than 60 Gy is an excellent alternative treatment for unresectable sarcoma.
Spinal seeding is occasionally observed in patients with advanced cancer. Making a diagnosis is not easy because it produces various symptom patterns.

The purpose of this study is to examine the progress of patients diagnosed with spinal seeding. Since 2010, nineteen patients with spinal seeding were included in this study. The average age at diagnosis was fifty-seven (33-77). Primary lesions were breast cancer (7), lung cancer (6), malignant lymphoma (3), colon cancer (2) and gastric cancer (1). In seventeen patients, brain metastasis were observed before the diagnosis of spinal seeding. Thirteen patients had cerebellar metastasis. At the diagnosis of spinal seeding, paralysis was seen in ten patients and sensation disturbance was seen in fifteen. Tumor cell was detected from cerebrospinal fluid in nine patients. The average survival period after the diagnosis was six (1-22) months.

Eleven patients had cervical disseminated lesion. In this group, the median survival time (MST) was 1.5 months and one-year survival rate was 9%, those were significantly shorter than that of patients without cervical lesion. MST of patients having paralysis was 2.9 months, and that was significantly shorter than patients without paralysis.

It is not easy to make a diagnosis of spinal seeding because the case with dissemination is very few in number and they produce varied manifestations. Gd enhanced MRI is the optimal imaging system to diagnose the cases with spinal seeding, and we examined the patients with disseminated lesion on MRI in this study. We thought that drop metastasis would frequently occur because brain metastasis was observed in most cases before the diagnosis of spinal seeding. It was known that the disseminated patients would have an extremely poor prognosis because the proper method of treatment had not been established. It is the subject of future investigation because the patients that long-term survival is enabled by using chemotherapy and radiation therapy has been reported.
Aim: The operative stabilization treatment for metastatic pathological diaphyseal femoral fracture is challenging, however the consensus on which implants and techniques are more appropriate still not well established. We therefore analyzed the results to identify the prognostic factors of surgical fixation for pathological fractures at subtrochanter and shaft of femur.

Methods: A retrospective descriptive multicenter study was performed by collecting data from six institutes in Thailand. One hundred and fifteen patients with both impending and actual fracture were enrolled. Demographic data, surgical techniques, and postoperative complications were recorded. Musculoskeletal Tumor Society (MSTS) functional score and Eastern Cooperative Oncology Group (ECOG) performance status were used for functional evaluation. A Kaplan-Meier survival analysis was used to determine survival rate.

Results: There were 51 male patients in this study with the overall average age of 58 years. Lung cancer, breast cancer, and multiple myeloma were among the three most common primary malignancies. Pathological fractures included 60 subtrochanters and 55 femoral shafts with 83 actual and 32 impending fractures. Long cephalomedullary nailing, centromedullary nailing, and locking compression plating were performed in 44, 28, 27 cases sequentially. The mean postoperative MSTS score was 20 and ECOG score was 2.56. The mean oncological survival time was 10.7 months. Patient survival rates were 77% at 12 months and 60% at 60 months, while the implant survival rates were 97% at 1 year and 92% at 5 years postoperatively. There were four implant failures, but no significant factor was found after univariate and multivariate analysis that affect the survival. However, nailing consumed more operative time than plating, while cement augmentation caused more intraoperative bleeding than fixation alone.

Conclusions: Operative stabilization for metastatic pathological diaphyseal femoral fracture provided early ambulation and acceptable strength during the terminal period of these patients regardless of any techniques choosing by the experienced surgeons.
Aim
Endoprosthetic reconstruction of the proximal femur is an effective treatment of metastasis. On the other hand, whether proximal femur should be resected with an adequate surgical margin is still controversial. Recently we perform the intentional intralesional procedure as a routine procedure. The aim of this study was to investigate the clinical outcome to validate this procedure.

Subjects and methods
Forty-eight patients underwent endoprosthetic reconstruction for bone metastasis of the proximal femur from 2001 to 2017. There were 21 men and 27 women with a mean age of 61 years and a mean follow-up period of 9.5 months. There were 27 pathologic bone fracture cases, and 21 impending bone fracture cases. The wide resection group comprised 28 cases, and the intentional intralesional resection group 20 cases. These groups were compared with respect to surgical invasiveness including blood loss and operative time, perioperative complication, ambulant status, and postoperative survival period.

Results
Pain relief was achieved in all cases, and the rate with ambulant status at postoperative 3 months was 87.5%. In the wide resection group the mean operative time was 230 minutes, and mean blood loss was 689 ml. In the intentional intralesional resection group the operative time was 136 minutes (p<0.001), and blood loss 257 ml (p<0.001), indicating significantly lower invasiveness. The 6- and 12-month cumulative survival rates were 70% and 39% respectively. Deep infection and hip dislocation requiring additional surgery were noted in one case of the wide resection group. No significant differences were noted in local recurrence rate between the two groups.

Conclusion
For metastatic bone tumor, systemic therapy must be given top priority. It is desirable that the surgery be as minimally invasive and the prompt resumption of systemic therapy. The intentional intralesional procedure makes possible both lower complication rate and shortening of the hospitalization period.
Aims: Conventional hip hemiarthroplasty may result in less morbidity and better function than proximal replacement megaprostheses, when used for metastases of the proximal femur. However, conventional hip hemiarthroplasty for metastases of the proximal femur poses challenges such as extensive bone defect and blood loss, when compared with conventional hemiarthroplasty done for other causes, as well as the difficulty in local control of the tumor.

Methods: This study investigated postoperative complications, functional and oncologic outcome in a series of patients (n=50) who underwent conventional hemiarthroplasty for metastases of the proximal femur at our institute.

Results: Three patients (6%) died during the initial 30-day postoperative period. In all, 16 patients (32%) developed complications: local complication in 8 patients, systemic in 6 patients and both in 2 patients. Respiratory complications such as pleural effusion and bronchopneumonia were the common systemic complication (n=7), followed by deep vein thrombosis with pulmonary thromboembolism (n=2), disseminated intravascular coagulation (n=1) and cardiac arrhythmia (n=1). Hip dislocation (n=2) and surgical site infection (n=2) were the most common local complications.

38 patients (76%) regained ambulation postoperatively, 17 of whom were community ambulatory. Postoperative VAS score was significantly lower than the preoperative VAS score (p<0.001). For local control, 5 patients developed local recurrence (10%), 2 local recurrences near the distal tip of the arthroplasty stem.

Conclusions: Despite the successful functional recovery and pain relief, the risk of postoperative complications and local recurrence is considerable in conventional hemiarthroplasty for metastases of the proximal femur. Although conventional hip arthroplasty results in satisfactory outcome in most cases, the relatively frequent postoperative complications and local recurrences need to be considered in patients with metastases to the proximal femur.
Session Name: **Session 13**
Abstract Number: **347**
Abstract Title: **Risk factors for development of bone metastasis from Renal Cell Carcinoma**
Authors: Anand Raja, Mayilvahanan Natarajan
Presenter: Anand Raja, Cancer Institute (WIA), Adyar, Chennai, India.

**Background**
Bone metastasis represents an increasing clinical problem in advanced renal cell carcinoma (RCC) as survival improves. There are few data on the natural history of bone disease in RCC.

**Question/Purpose:**
We investigated clinical factors in RCC to identify potential risk factors for development of bone metastasis in patients treated for RCC in a metachronous setting.

**Methods:**
Retrospective chart review of 194 patients with renal cell cancer.
Data on Clinico-pathologic factors, biochemical factors (Haemoglobin(Hb), alkaline phosphatase(ALP), calcium(CA), serum LDH), Skeletal related events(SRE) and bone directed therapies were collected. Risk factors were stratified according to MSKCC scoring into good, intermediate and poor risk.

**Results:**
194 patients. 141(72.68%) males. Median age 54 years (Range 18-81 years). 144(74,22%) had clear cell histology. 26(13.40%) patients developed bone metastasis. 10 Patients had solitary metastasis in bone. Commonest sites were spine 19 patients(73.07%), ribs (6 patients) and pelvis(4 patients). Multivariate analysis revealed that patients with bone metastases from RCC has significantly elevated levels of Hb, ALP, CA and LDH compared to patients who did not develop bone metastasis. ROC curves demonstrated that Hb had highest sensitivity and ALP had highest specificity in predicting metastasis in renal cell cancer. Median time to development for bone metastasis was 38 months for good risk, 17 months for intermediate risk and 3 months for poor risk patients. 50% patients experienced at least one SRE. Time to development of second SRE was prolonged with the use of bone protecting agents. Median survival after development of bone metastasis was 12 months.

**Conclusion:**
Early detection of bone metastasis is essential for optimal management and treatment of SREs in patients with metastatic RCC. Hb, ALK, LDH and CA levels predicted the development of bone metastasis. Commonest site of metastasis was spine and early institution of bone protection agents delayed the development of second SRE.
OBJECTIVE: To assess the oncological outcomes following surgical treatment of skeletal extremity and pelvic chondrosarcoma

DESIGN: Retrospective analysis

METHODS: 251 operated patients of extremity and pelvic chondrosarcoma of bone were identified from a prospectively maintained surgical data base from January 2006 to December 2015. Their clinical, radiological, histopathological and follow up details were retrieved from case files and electronic medical records. 105 patients were of age < 40 years and 146 > 40 years. There were 176 male and 75 female patients. 170 tumors were in the extremities and 81 in the pelvis. 234 patients had a high-grade (II and III) and 17 had a low-grade (I) tumor. 16 patients were metastatic at presentation. 28 patients had a pathological fracture. 191 patients underwent limb salvage and 42 had ablative surgeries. 18 patients were excluded from the analysis as they did not follow up after surgery. 9 patients were lost to follow up. All surviving patients had a minimum follow up of 24 months.

RESULTS: 206 patients underwent surgical resection with adequate margins, 25 patients had inadequate margins. 16 patients had local recurrences. Of these patients who had margin positive excision 9 of 16 cases were located in pelvis. The 5-year OS was 81% and DFS was 66%. 5yr OS for grade 2 chondrosarcomas was 83% compared to 61% for grade 3 and 94% for grade 1 chondrosarcomas. 5 yr OS for patients with pathological fracture (28) was 57% as against 84% for no fractures (205) (P value=0.003).

CONCLUSION: Limb salvage with wide margins is oncologically safe. Margin positive excision and pelvic location are significant prognostic factors for local recurrence in chondrosarcoma. Grade of chondrosarcoma and presence of pathological fracture impacts on survival.
Session Name: **Session 13**  
Abstract Number: **190**  
Abstract Title: **Changing Odds of Survival over Time among Patients Undergoing Surgical Resection of Extremity Soft Tissue Sarcoma**  
Authors: Yongsung Kim, Han-Soo Kim, Ilkyu Han,  
Presenter: **Yongsung Kim, Seoul National University Hospital, South Korea.**

**Background** While survival after extremity soft tissue sarcoma (STS) is traditionally reported as actuarial survival, conditional survival may be more clinically relevant by accounting for time already survived. We compared actuarial and conditional survival of the patients with STS who underwent surgical resection.

**Methods** We analyzed 668 patients who underwent surgery for localized extremity STS at our institution. Actuarial survival was estimated using Kaplan-Meier method. Cox proportional hazards models were used to evaluate factors associated with overall survival. Five year conditional survival estimates at “χ” year after surgery were calculated as follows: $CS_5 = S(\chi+5)/S(\chi)$

**Results** While the actuarial survival decreased over time, 5-year conditional survival (CS5) increased, with CS5 at 1, 3, 5 years after surgery noted to be 85.3%, 89.4%, and 93.4%, respectively compared with 6-, 8-, and 10-year actuarial survival rates after surgical resection were 82.9, 79.8, and 78.9%, respectively. The calculated CS5 exceeded the actuarial survival especially in patients with risk factors such as larger tumor size, FNCLCC grade 3, and positive margin status. Patients with tumor size ≥ 5 cm had an actuarial survival 71.3% at 10 years versus a CS5 of 90.0% in patients alive at 5 years. Likewise, patients with FNCLCC grade 3 tumors had an actuarial survival 74.4% at 10 years versus a CS5 of 97.8% in patients alive at 5 years.

**Conclusions** With conditional survival, a more dynamic and accurate survival estimation is possible especially for the high risk patients. Conditional survival can be useful in predicting survival and in clinical decision making in extremity STS.
Akihiko Takeuchi, Norio Yamamoto, Xiaohui Niu, Wei-Ming Chen, Tomoki Nakamura, Saminathan Suresh Nathan, Takaumi Ueda, Shintaro Iwata, Akira Kawai, Yong-Koo Kang, Apichat Asavamongkolkul, Edward HM Wang, Vivek Ajit Singh, Toshiharu Shirai, Yang-Guk Chung

Presenter: Akihiko Takeuchi, Department of Orthopaedic Surgery, Kanazawa University Graduate School of Medical Sciences, Japan.

**Aim/Objective**
A diffuse tenosynovial giant cell tumor (D-TGCT) is a locally aggressive benign, synovial tumor predominantly involving the knee, followed by the hip, ankle, elbow, and shoulder. This multicenter study was aimed to evaluate clinical outcomes of diffuse-type tenosynovial giant cell tumor (D-TGCT) in Asians.

**Methods**
Patients with biopsy-proven D-TGCT in large joints with minimum 3-year follow-up were included. Local recurrence-free survival (LRFS) and predictive factors associated with LRFS were analyzed. LR was defined as recurrence following complete resection, or residual tumor progression following incomplete resection. MSTS scores and oncological status at final follow-up were recorded. The factors influenced the local recurrence and limb function were analyzed.

**Results**
One hundred five patients were included, 82 with primary and 23 with recurrent tumors (41 men, 64 women). Mean age was 40 years (8 to 82), and mean follow-up was 80 months (36 to 231). Thirty-six patients (34.3%) developed LR. 5-year-LRFS was 71.5%, and complete tumor excision was significantly correlated with better local control (P=0.01). Joint replacement was eventually performed in 9 patients (8.6%). Final oncological status showed 47 were CDF, 21 were NED, and 37 were AWD. Mean MSTS score was 27.7 in those CDF, 26.6 in NED, and 24.8 in AWD. Age (>41 y.o.) (P=0.03), post-operative osteoarthritis (P=0.04) and alive with disease (P=0.03) were independent risk factor of worse MSTS score (<75%). Moreover, there was significant difference of MSTS score between progressive (20.4) and stable (26.2) AWD (P<0.001).

**Conclusions**
Complete excision may lead to favorable oncological and functional outcomes although the possibility of it is determined by the tumor extension. There seems a role for palliative excision to preserve limb function in those alive with stable disease.
Aim:
The aim was to investigate the influence of venous tumor thrombus on the prognosis of pelvic tumor.

Methods:
We reviewed 82 cases of pelvic osteosarcoma initially treated in our center from 2008 to 2017, of which 15 cases were diagnosed with venous tumor thrombus. The median follow-up durations of the non-thrombus group and the thrombus group were 20 and 11 months, respectively. Oncological outcomes of the two groups were compared and analyzed.

Results:
The incidence of initial pulmonary metastasis (PM) was higher in the thrombus group (33.3% vs. 10.4%, p=0.023). Wide or marginal margins were obtained in 63 cases (94.0%) in the non-thrombus group, but only in 1 case (6.7%) in the counterpart. In the non-thrombus group, local recurrence (LR) was seen in 22 cases (32.8%) with the mean recurrence-free survival (RFS) of 36.7±3.7 months. New PM was seen in 27 cases (40.3%) with the mean pulmonary-metastasis-free survival (PMFS) of 29.2±3.2 months. 29 patients (43.3%) died with the mean overall survival (OS) of 36.1±3.1 months. In the thrombus group, LR was observed in 10 cases (66.7%) with the mean RFS of 9.6±1.7 months. New PM were seen in 13 cases (86.7%) with the mean PMFS of 7.7±2.5 months. 11 patients (73.3%) died with the mean OS of 16.8±3.2 months. Multi-variable analysis revealed that initial PM (OR: 5.424, p=0.001) and intra-lesional margin (4.123, p=0.030) were correlated with LR, and that initial PM (3.515, p=0.006) and tumor thrombus (4.056, p=0.049) were correlated with new PM, and that initial PM (3.423, P=0.005), LR (3.504, p=0.003) and post-operative extra-pulmonary metastasis (2.987, P=0.017) were correlated with mortality. Moreover, tumor thrombus (217.924, p<0.001) and involvement of L5/S1 foramen (25.281, p=0.041) were detrimental to obtain satisfactory margins.

Conclusions:
Venous tumor thrombus compromises surgical margins and leads to higher risks of recurrence, pulmonary metastasis and mortality.
Abstract

Objective: The major operations of soft tissue and bone sarcomas are associated with significant blood loss and transfusion requirements. There is a sharp increase in mortality rate and transfusion-acquired infection of allogenic blood; therefore, reduce using it should be considered. The intervention hypothesized that low dose of TXA could reduce blood loss and transfusion requirements during these operations.

Methods: Twenty-two patients were randomized into two groups. The control group received placebo and study group received tranexamic acid intravenously 2 grams followed by intravenous infusion of 1 gram drip in 8 hours. Volume of intraoperative blood loss, amount of blood transfusion, volume of drained blood, decreased hemoglobin levels and thromboembolic complications were recorded.

Results: Mean of intraoperative blood loss in TXA group and control group were 300 and 600 ml, respectively, P= 0.356. Volume of drained blood was not reduced in TXA group compared with control group [180 (0-580) mL vs. 100 (0-580) mL]. Amount of blood transfused was lower in patients receiving TXA than in control group [1(0-15) unit vs. 0(0-5); P= 0.699]. Decrease of hemoglobin levels was lower in TXA group than control group [1.79±1.39 vs. 2.51±1.36; P= 0.235]. No thromboembolic complications were detected.

Conclusions: Tranexamic acid have clinical effect in decrease of blood loss and transfusion requirements but not statistically significant in patients undergoing extremity primary malignant musculoskeletal tumor surgery.
INTRODUCTION
Distal femur is the most common location for osteosarcoma. In some osteosarcomas in distal femur, the soft tissue mass can bulge into the anterior knee joint. There is little literature focused on these osteosarcomas. The purpose of this study was to detect the incidence of this kind of osteosarcoma and to evaluate the local recurrence rate for intra-articular and extra-articular resection.

MATERIALS AND METHODS
This was a retrospective study from our database. We reviewed all the osteosarcomas located at distal femur from Jan 2005 to Dec 2014 treated in our center. We found out the cases the soft tissue mass bulged into the anterior knee joint in MRI and CT scan and calculated the incidence of this kind of osteosarcoma. We compared the local recurrence rate when the intraarticular or extraarticular resection was performed. The cases treated with amputation were excluded in the local recurrence analysis.

RESULTS
We treated 520 cases of osteosarcoma in the distal femur in this time duration. The soft tissue mass bulged into the anterior knee joint in imaging in 93 cases (17.9%). The limb salvage surgery were performed in 83 cases and amputation in 10 cases. The soft tissue mass bulged into but not contaminate the joint cavity in limb salvage cases. Intra-articular resection was performed in 64 cases (77.1%) and extra-articular resection in 19 cases (22.9%). After the follow-up, the local recurrence rate was 6.3% and 5.3% in intra-articular and extra-articular resection group respectively. All the local recurrence sites were not at the knee joint cavity.

CONCLUSIONS
The soft tissue mass bulges into the anterior knee joint is not uncommon in the osteosarcoma of distal femur. There is no difference in local recurrence rate when the intra-articular or extra-articular resection is performed when the tumor does not contaminate the anterior joint cavity.
This study investigates a large cohort of patients with sarcomas to identify risk factors in both for recurrence. Knowledge of this may help stratify patients for follow up.

Method: all patients treated for at a sarcoma centre with newly diagnosed non metastatic sarcomas, and adequate follow-up were included.

Results: 5958 patients were eligible of which 51% had a STS and 49% a bone sarcoma. 2981 patients (50%) developed metastases at a median time of 1.25 years. Risk factors for metastases were: high-grade (HR 4.2), amputation (versus limb salvage) (HR 1.8), involved margins (HR 1.5), male sex (HR 1.1), older age (HR 1.013) and size of tumour (HR 1.03). 6926 patients were available for the local recurrence study of whom 14% developed a local recurrence. Risk factors were margins, grade, limb salvage, age and tumour size. Using these criteria modelling could predict the risk of developing either local recurrence or metastases. For high risk patients, most metastases (95%) developed within five years but in low risk patients more than half the metastases developed after five years. 88% of those who develop metastases will die of their disease with a median survival of 10 months. In patients who are alive at five years without metastases or local recurrence (1953 patients) 218 (11.2%) subsequently died of their disease. Further survival with tumour-related death as the endpoint was 91.4% at 10 years and 87% at 15 years. The only factors related to survival were age, high-grade tumour and further development of local recurrence.

Conclusion: aggregation of risk factors can predict the risk of patients developing recurrent disease and the likely time for it to arise. This can be used to stratify patients into high and low risk categories for follow up and also to predict how long follow up should be continued.
Aims/Objectives
Due to their rarity and the vague clinical presentation, misdiagnosis of soft tissue sarcoma (STS) is common. In the worst case, unplanned excisions (UE) may occur, usually requiring further treatment at tertiary tumour centres. However, resulting re-resections and adjuvant RTX (ARTX) are associated with an increased morbidity. On the other hand, the impact of UEs on overall survival (OS) are contradictory.

Methods
Altogether, 728 STS patients (352 female, 376 male, mean age: 58.0 years) who had undergone primary surgery or re-resection at three tertiary tumour-centres were retrospectively included (median follow-up: 5.5 years). Gray’s and log-rank-tests were used for time-to-event analyses. A propensity score (PS) was generated based on differences at baseline between non-UE and UE-patients. Based on the PS, an inverse-probability-of-UE-weight (IPUEW) was calculated, allowing re-calculation of time-to-event analyses following adjustment for imbalances between UE- and non-UE-patients.

Results
281 patients (38.6%) had undergone UE prior to referral, with similar incidences at the three tumour-centres. The risk of UE being performed was raised in male (p=0.05) and young patients (0.036) with a long history of symptoms (p<0.005) and small (p<0.005), superficially located STS (p<0.005). Plastic reconstructions (p<0.005) and ARTX (p=0.041) were significantly more often necessary in UE-patients. Moreover, UE-patients had a significantly better OS in the univariate setting (5-/10-year OS: 78.6%/63.3% for UE; 70.6%/57.9% for non-UE; p=0.028). Due to the strong correlation between positive prognostic factors and a prior UE, however, a re-calculation after weighting for the IPUEW was performed. Consequently, the prognostic benefit of UE regarding OS was lost (p=0.241).

Conclusions
Prior UE definitely raises the morbidity due to increased need for ARTX and plastic reconstructions. However, UEs have no direct impact on OS. Nevertheless, it remains under debate whether a more aggressive treatment approach in UE-patients actually compensates for the inappropriate UE, wherefore they must be definitely avoided.
Session Name: **Session 14**  
Abstract Number: **40**  
Abstract Title: **Rethinking the follow-up of soft tissue sarcomas: a multicenter analysis of 835 cases**  
Authors: Florian Posch, Maria Smolle, Madeleine Willegger, Per-Ulf Tunn, Elisabeth Goldenitsch, Bernadette Liegl-Atzwanger, Carmen Döller, Reinhard Windhager, Andreas Leithner, Joanna Szkandera  
Presenter: Andreas Leithner, Department Of Orthopaedics And Trauma, Medical University Of Graz, Austria.

**Aim:** The ESMO guidelines propose a thorough post-surgical follow-up of patients with localized soft tissue sarcoma (STS) in order to early detect local recurrence (LR) and distant metastasis (DM). However, in this setting the optimal timing and length of follow-up is unclear. In this study, we use flexible parametric modeling to study time-dependent patterns of recurrence to obtain guidance for a rational duration and intensity of aftercare for STS.

**Methods:** In this ambispective cohort study, 835 patients with localized STS who were treated with surgery in curative intent between 1994 and 2016 at 4 centers in Austria and Germany were followed-up.

**Results:** During a median follow-up of 5.4 years we observed 107 LR and 179 occurrences of DM. In flexible parametric modeling, the rates of LR and DM showed a highly non-constant pattern, with both LR and DM having a peak at around 1 year after surgery, followed by a sharp decline. Importantly, patterns of LR and DM rates strongly differed according to tumor characteristics, such as tumor grade and histologic subtype. Patients with G3 tumors had the highest peak rate of LR, but the LR rate in G2 tumors exceeded the LR rate of G3 tumors at around 2 years after surgery. Patients with malignant peripheral nerve sheath tumors (MPNST) and myxofibrosarcoma featured constantly higher LR rates than patients with liposarcoma.

**Conclusion:** In patients with localized STS after curative surgery, rates of LR and DM are highly non-constant over time and are strongly modified by tumor characteristics. These findings contradict a “one-size-fits-all” aftercare policy, but rather support the concept of a time- and risk-adapted strategy for personalized post-surgical follow-up. Follow-up for LR should only be extended beyond 5 years for selected high-risk histologic subtypes. Follow-up for DM may be ceased after 5 years for high grade tumors.
Aim/objective: Superficial soft tissue sarcoma (STS) may represent a distinct subgroup of STS with different clinicopathologic characteristics resulting in favorable outcomes, when compared with deep-seated STS. However, only few studies focusing on superficial STS have been reported.

Methods: A retrospective review was conducted on 253 patients who underwent surgical removal of superficial STS at our institute. Clinicopathologic characteristics and prognostic factors for disease-specific survival (DSS) and local recurrence-free survival (LRFS) were investigated.

Results: 113 patients (39%) presented after an unplanned excision and 41 patients (16%) presented with locally recurrent tumors. 17 patients (7%) had metastatic disease at the time of diagnosis. Undifferentiated pleomorphic sarcoma was the most common histological type (n=103, 41%). The 5-year DS and LRFS were 82.6±2.9% and 77.6±2.9%, respectively. On univariate analysis of DS, age ≥ 50 (p=0.002), high histologic grade (p= 0.040), size ≥ 4cm (p=0.014), positive surgical margin (p=0.037) and invasion of the deep fascia (p=0.029) were associated with worse DS. On multivariate analysis, only invasion of the deep fascia remained significant (OR=2.0, p=0.049). For LRFS, age ≥ 50 (p=0.003), positive surgical margin (p=0.001) and presentation with recurred tumors (p<0.001) were associated with increased local recurrence. On multivariate analysis, age ≥ 50 (OR=2.0, p=0.022) and positive surgical margin (OR=3.5, p=0.003) remained significant.

Conclusion: Clinicopathologic characteristics and prognostic factors of superficial STS differ from those of deep-seated STS. These findings suggest the utility of unique prognostic factors for superficial STS.
2 published studies (Potter 2009 and Parry 2017) conclude that patients with fungating soft tissue sarcomas (STS) have a poorer outcome than patients without fungation. Both studies, however, included patients with variables which could bias study results. These 2 studies included all anatomic sites, all ages, both low and high grade sarcomas and both non-metastatic and metastatic patients. We had previously reported similar results but had similarly included these confounding variables.

Methods: We decided to reevaluate our data and limit biases by including only adult patients, high grade lesions, only extremity STS, and exclude recurrent lesions and patients with metastasis on presentation. All patients received complete treatment by the senior author or the Unit during a period of 20 years (1993-2012) and had a follow-up of at least 24 months or until death. Our objective was to compare demographics, treatment offered, and oncologic outcomes of patients with and without fungation. Following these very strict inclusion and exclusion criteria, we were left with 10 patients with fungating STS of the extremities (STSE-F) and 39 patients with non-fungating STS of the extremities (STSE-NF).

Results: Average patient age, tumor size and tumor location were similar. There were more patients with subcutaneous lesions among the STSE-F group. Most patients with fungating lesions underwent amputation (80% vs 33%). Local recurrence was similar but there were more patients with systemic metastasis among the STSE-F. Patient status included more patients DOD among the STSE-F compared to the STSE-NF (70% vs 38%). Among the STSE-NF, 21% had DOC.

Conclusion: Strict inclusion and exclusion criteria to control for potential biases resulted in a relatively small number of patients. In this small cohort, however, we had more subcutaneous lesions, more amputation surgeries, and more systemic metastases in the group of patients with fungating STSE with 70% DOD.
Malignant peripheral nerve sheath tumours (MPNST) are rare soft tissue sarcoma which exhibit a biologically aggressive behaviour with propensity for rapid progression and high mortality rate. Our objectives were to identify the prognostic factors for local recurrence and distant metastasis, to analyse the survival outcome and to identify the prognostic factors related to patients’ survival.

Methods
We performed a retrospective review of 32 patients diagnosed with MPNST from 2009 to 2017 in Lerdsin Hospital. The mean age of presentation was 51 years old with 14 males and 18 females. The most common affected site was lower limb (56%) compared to upper limb (13%) and central location (31%). Thirty-one percent of patients had underlying neurofibromatosis type 1 (NF-1). Most patients had high grade tumour (81%) and mean tumour size was 12.2 cm (range, 1-25 cm). All except one patient underwent tumour excision whilst 31% had positive margin. Adjuvant treatment consisted of radiation (61%), chemotherapy (18%) or both (9%).

Results
The local recurrence rate was 26% with a median survival time after surgery of 56 months (95% CI 31.7-79.5) and 5-year overall survival rate was 39%. High tumour grade and male patients were significantly associated with distant metastasis on univariate analysis but no predictors for local recurrence were identified. Age <45, high tumour grade, triton tumour subtype, diagnosis of NF-1, local recurrence, metastasis and use of adjuvant chemotherapy were all associated with disease specific survival (DSS). Multivariate analysis identified local recurrence (HR=20.035, 95% CI 1.8-222.8) as the single poor prognostic factor for DSS.

Conclusions
High tumour grade, local recurrence and distant metastasis all adversely affects the survival in MPNST. However, adjuvant chemotherapy or radiotherapy did not appear to improve survival. Limitations of this study include retrospective design and small sample size.
PURPOSE:
Soft tissue sarcomas (STS) are generally treated with wide resection and followed by radiotherapy. However, it poses risks of reduced functional outcome as important muscle groups sometimes need to be sacrificed. We present a time-based functional outcome evaluation using MSTS (clinician-reported-based outcome) and TESS (patient reported-based score).

METHODS:
All patients with resection for STS in the last 10 years were evaluated (102 patients for MSTS and 84 for TESS from May 2006 to December 2017). The scores were analysed with SPSSv.21 and mean values were compared.

RESULTS:
The age range from 17-98 years (mean: 55.12±17.37). Mean duration of follow-up: 30.94 months (1-120 months). 49% were male and 53% female.
The mean total MSTS score: 81.99% (last follow up); [upper limb: 80.69±27.75 (16.7-100%), lower limb: 82.27±22.58 (20-100%) and axial skeleton: 82.38±22.74 (33.3-100%). The mean TESS score: 88.32% (6-100%); upper limb was 88.89±14.30 (44.7-100%), lower limb: 90.64±12.17 (46-100%) and axial skeleton: 80.51±24.77 (9.8-100%).

Overall, MSTS and TESS stabilize at the first year with steady progress over time. TESS for lower limb, upper limb and axial skeleton plateaued at the first year, except axial skeleton, which stabilised at second year (Figure 1). There is significant difference in MSTS and TESS score for axial skeleton, upper-limb and lower-limb (p= 0.034).

CONCLUSION:
Soft tissue sarcoma resections generally has good functional outcome in both clinician-based and patient-based scores and the function stabilises early and remain so in the future.
Objective
The aim is to analyse the survival of adult extremity soft tissue sarcoma in a single institution for 10 years duration.

Methods:
Data of 128 patients treated prior to 2008 (10 years follow-up) were obtained. The mean age was 53.0 years old. Male to female was 1.6 to 1. Lower limb accounted for 60.2%, followed by upper limb 24.2%, pelvic 10%, and trunk. Liposarcoma accounted for 35.9% followed by pleomorphic sarcoma 18.75% and synovial sarcoma 10.16%. 84% underwent wide resection. Demographic studies and prognostic clinical characteristics were assessed for overall survival by using Kaplan Meier method and Cox proportional hazard regression.

Results:
At 1 year, the overall survival was 72%. This was reduced to 65% at the second year. At 5 years, estimated 58% survived and remained at 10 year. No demographic results were statistically significant in affecting the overall survival (age, sex, sites of tumor, and subtypes of sarcoma - p-value >0.05).
35.16% or 45 of the patients were complicated with distant metastasis. 19% or 25 of them had pulmonary metastasis, 9% had other distant organ metastasis such as liver, brain and skeletal region and 7.03% suffered both metastases. 24.2% had recurrence of tumor and 35.16% complicated with distant metastasis. It was made up of 19% of overall pulmonary metastasis Limb salvage or amputation surgery, pre- and post- operative chemotherapy and radiotherapy were not statistically significant impact on survival (p-value >0.05).
Pulmonary and distant metastasis, and local recurrence were the prognostic factors that significantly affect the overall survival (p <0.001). Multivariate analyses revealed pulmonary (CI: 3.08, p <0.001) and distant (CI: 2.30, p <0.004) metastasis were significantly reduce the survival.

Conclusions
Overall survival of soft tissue sarcoma is equivalent to other centres. Presence of pulmonary and/or distant metastasis significantly influences patients’ survival.
INTRODUCTION: Due to the infiltrative growth pattern of myxofibrosarcoma, there are reports that the local recurrence rate for this subtype of soft tissue sarcoma is much higher than for other types. Our goal was to examine both local recurrence and overall outcomes for patients treated for myxofibrosarcoma.

METHODS: One-hundred-and-forty-five patients treated surgically for a myxofibrosarcoma between 1989 and 2012 were identified from our prospectively collected database. Patient and tumor characteristics, treatment details, local recurrence-free, metastasis-free, and overall survival were determined. Survival was estimated with the method of Kaplan and Meier.

RESULTS:
Mean age was 61 years and 54% were male. 135 were primary presentations, 5 of whom had concurrent metastatic disease. 10 patients presented as local recurrences. 46 patients (32%) had an unplanned excision at an outside center prior to referral. 92 (63%) tumors were in the lower extremity, 72 (50%) were superficial, 36 (25%) were grade 1, 37 (25%) were grade 2, and 72 (50%) were grade 3. Mean tumor diameter was 9.2 cm (median 6.5 cm, range 1-36 cm). Preoperative radiotherapy was employed in 83 cases, postoperative in 9. Flap closure and/or skin grafting was necessary in 73 cases (50%); 1 patient required an amputation. Surgical margins were negative in 121 cases (83%). Ten patients (7%) developed a local recurrence and 35 (24%) developed metastases. 103 (71%) are currently alive without disease. Estimated 5-year local recurrence-free survival was 91.8%, 5-year metastasis-free survival was 73.1%, and 5-year overall survival was 68.8%. Development of metastases was dependent on grade. There was no difference in local recurrence for those who had a prior inadvertent surgical excision (log rank 0.4).

CONCLUSIONS: Our experience suggests that when managed with a multidisciplinary approach at a specialist sarcoma center, the local recurrence rate of appropriately treated myxofibrosarcoma is similar to those of other soft-tissue sarcomas.
Introduction: Extraskeletal Ewing’s sarcoma (EES) is a rare entity, accounting for 15% of all Ewing’s sarcomas. EES is highly aggressive. Local relapse and distant metastases are frequent. It needs aggressive surgical resection, adjuvant chemotherapy and radiotherapy. This retrospective study was performed to assess oncologic outcomes in patients with EES.

Method: All operated cases of EES included from January 2005-December 2014 (n=37). Data extracted through surgical audit. Patients were treated by multidisciplinary approach with use of chemotherapy, radiotherapy & surgical excision for all cases. Overall survival (OS) and Event-free survival (EFS) was calculated at 5yrs.

Result: Age ranged from 5-52yrs with mean age of 25yrs. M:F ratio was 20:17. 9 patients were <18yrs and 28 patients were >18yrs of age. 30 cases were located in the extremities, while 7 were axial. 5/37 patients (13.5%) were metastatic at presentation. Mean duration of follow-up was 54 months (3-137 months). 24 patients were alive, 11 dead and 2 were lost to follow-up. 25 patients had <99% necrosis, 7 patients had 100% necrosis on histopathology. Necrosis could not be evaluated in 5 patients who underwent tumor bed excision. 10/37 patients had recurrence of which 7 were distant recurrence (DR), 3 were both LR (local recurrence) and DR. All are dead. 1 patient died due to adjuvant chemotherapy. 3 patients had R1 resection. OS at 5 yrs for all was 70%. OS for metastatic patients at 5yrs was 20%, while for non-metastatic patients it was 78% (p-value < 0.001). EFS at 5yrs for all was 68%. EFS for metastatic patients at 5yrs was 20%, while for non-metastatic patients it was 76% (p-value < 0.001). 7 patients who had 100% necrosis had 100% OS & EFS at 5yrs but was not statistically significant (p-value < 0.075).

Conclusion: OS at 5yrs in our study was 70%. Metastasis at presentation had overall poor prognosis. Age, site, response to chemotherapy did not impact on survival in our study, possibly due to small number of cases.
Session Name: Session 16  
Abstract Number: 406  
Abstract Title: Three decades of Peri-operative Interstitial Brachytherapy for Soft Tissue Sarcomas: Long-term outcomes  
Authors: Siddhartha Laskar, Avinash Pilar, Nehal Khanna, Ajay Puri, Ashish Gulia, Sashikant Juvekar, Nirmala Jambhekar, Prakash Nayak, Bharat Rekhi, Sudeep Gupta, Jyoti Bajpai, Amit Janu, Yogesh Ghadi, Subhash Desai  
Presenter: Siddhartha Laskar, Tata Memorial Hospital, India.

AIM: To report the long-term outcomes with a combination of organ conserving surgery and peri-operative interstitial brachytherapy (BT) for adults with soft tissue sarcomas treated at a tertiary cancer centre.

METHODS: Between December 1986 and December 2016, 353 patients with non-metastatic soft tissue sarcomas were treated with combined modality approach at our institute. The median age was 44 years (Range: 18-88 years) and majority (64%) were males. Sixty-nine percent had primary tumours and tumours involving the extremities. Spindle cell sarcoma was the most common histology (22%) followed by pleomorphic sarcoma (16%) and synovial sarcoma (14%). Majority (69%) had grade III tumours. The treatment included wide local excision of the primary tumour followed by BT alone in 65% and a combination of BT with external beam radiotherapy (EBRT) in 35% of the patients. Majority (88%) underwent primary closure, while 12% required plastic reconstruction. Close or positive margins were seen in 17%.

RESULTS: After a median follow-up of 50 months (range: 2-187 months), the 10-year local control (LC), disease-free survival (DFS), and overall survival (OS) for the entire cohort was 82%, 64%, and 81%, respectively. On multivariate analysis deep tumours and a positive margin significantly predicted for a worse LC. Deep tumours, positive margin, Tumour size >5cm and high grade predicted a worse DFS. Deep tumours and tumour size >5cm predicted a worse OS. Acute wound complications were seen in 40 (11%) patients and were not higher in patients with plastic reconstruction (p=0.48) or patients receiving EBRT (p=0.32). Subcutaneous fibrosis (24%) was the most common late complication and strongly correlated with additional EBRT (p=0.001).

CONCLUSIONS: Interstitial BT with or without EBRT, as a part of function-preserving protocol results in excellent local control in patients with STS. BT alone results in fewer complications compared with the combination of BT and EBRT.
Objective: To determine the outcome of extremity synovial sarcomas treated at our centre.

Methods: This is a retrospective review of a prospectively maintained database. Two hundred and forty eight patients of extremity synovial sarcoma operated at our institution between January 2006 and December 2015 were included in the study. Clinico pathological characteristics, treatment given and oncological outcome were analysed. Localised disease was seen in 210 (85%) patients and 38 (15%) had metastatic disease at presentation. Amputation was done in 60 patients (24 %) while limb salvage surgery was possible in 188 cases (76%). Radiation therapy in either preoperative or postoperative settings was given to 168 patients (68%) and 159 (64%) patients received chemotherapy.

Results: Median duration of follow up was 31 month (2 – 130 months) while for survivors it is 45 months (2-130 months). At time of last follow up 153 patients were alive, 82 were dead and 13 patients were lost to follow up. Overall, 11 patients developed only local recurrence (LR), 97 developed only distant recurrence (DR) and 28 had both LR and DR. Of 13 patients who had margin positive, 7 had only DR and one each had LR and LR with DR, one patient was lost to follow up and 3 patients were disease free. The 3-year overall survival rate 74 % for the entire cohort. The 3-year disease - free survival rate of localised synovial sarcoma was 56.6%. On multivariate analysis- size, type of surgery performed and use of radiation therapy is associated with disease free survival.

Conclusion: Synovial sarcoma is a rare disease, which requires multi modality management for better outcomes. Limb sparing surgery is possible in majority of patients. Risk of metastatic disease is high inspite of wide resection and use of radiation therapy and chemotherapy.
POSTER ABSTRACTS
Fibrous dysplasia is a benign pathological condition usually observed in the first three decades of life. A single bone may be involved either wholly or partially, or multiple bones may be affected, we aimed to use curettage and cementation as a control method of fibrous dysplasia of the proximal radius.

We describe our finding with the treatment of fibrous dysplasia of the proximal radius in five patients (4 females, one male), the mean age 28.6 years (22 to 39 years). The lesions were in the metaphysis extending to the diaphysis. Persistent pain and pain after pathological fracture were the indications for surgical intervention.

We used an extensile approach to expose the lesion then extended curettage using a high speed burr and filling the cavity with bone cement. Functional outcome and radiological findings were monitored on follow-up visits. The mean follow-up period was 3.2 years (ranged from 2 years to 5 years). There was no recurrences and no patient sustained a fracture at the end of the filling cement. At the time of the last follow-up all patients have excellent score (mean 27 points) according to The Musculoskeletal Tumor Society scoring system. Extended Curettage and cementation provide a safe and reliable alternative for control of fibrous dysplasia of proximal radius with little morbidity with little risk of recurrence and low incidence of complications.
Aims: Cross-linked N-telopeptides of type I collagen (NTx) is an established biochemical marker of bone resorption that has been used to monitor the effect of surgery and drugs in patients with Giant Cell Tumor of Bone. The aim of this study was to determine the serum NTx level in GCT patients and find out the affecting factors.

Methods: We studied serial measurements of Serum NTx in a prospective study of 83 patients with GCT between April 2013 and April 2014 at The Beijing JST hospital. Patients were divided into two groups; Group A: combination of zoledronic acid with surgery; and Group B: surgery alone. Serum NTx level was tested at predefined time points: a) at admission, b) 3 days after Zometa administration, prior to Surgery and c) 7-10 days post-surgery.

Results: Our results show that the mean initial serum NTx level of all our patients is higher than the normative reference value (22.8±10.7 nM BCE vs. 14.8±4.7 nM BCE in males; and 23.3±11.9 nM BCE vs. 12.6±3.2 nM BCE in females) and correlates well with tumor volume. Zometa, surgery alone and combination of both can reduce the serum NTx level to the the baseline reference value.

Conclusions: Our findings suggest that serum NTx level may be used as a surrogate biomarker to judge therapeutic effect of treatments on patients with GCT. It may also help us to decide when to stop drugs and when to intervene for surgical ablation.
Background: The poliostotic forms of fibrous dysplasia compromise the skeleton in an extensive way and produce complex deformities, especially in lower limbs. The classic treatment is the axial correction by osteotomies and intramedullary nailing. Between 2001 and 20015, 36 patients were operated with this method in our centre. With the average need of 1,7 wedge osteotomies per patient to achieve axial correction. This is a difficult procedure due to the association of multiplanar deformities, absence of medullary canal and an inadequate cortical bone.

Proper planning is essential in order to achieve the correction in all the planes affected minimizing the number of bone wedges and complications.

Methods: We present a series of 6 paediatric patients (7 surgeries), with diagnose of poliostotic fibrous dysplasia treated since 2016. All of them had femoral affection. In 2 cases the tibia was affected too.

The preoperative planification was made using a software that allows to process the CT images and create a virtual model of the bone where we size the angles in all planes of the deformity. After that, we plan the sites of osteotomy, the amount of bone to resect and with that information did the wedge resection in base of custom made cutting guides. Once the axial correction was achieved, osteosynthesis was performed.

Results: The correction was achieved with an average of 1,14 wedge osteotomies (1 osteotomy in 6 surgeries, 2 osteotomies in 1). Also, we have found a reduction in 22% of the surgical time, and a sensible reduction of the blood loss.

Conclusion:
Virtual planification improved our surgical results, achieving more accuracy in the axial correction using lower number of wedges. Also, the surgical time, blood loss and the number of intraoperative complications decreased.
Aim: To evaluate the efficacy of intra-lesional Pamidronate in the surgical treatment of aneurysmal bone cysts.

Methods: A comparative observational study was undertaken consisting of two groups. Group 1 consisted of 16 patients with mean age of 11.7 years who underwent curettage with Pamidronate soaked bone graft substitute. Group 2 consisted of 24 patients with mean age of 8.8 years who underwent curettage alone. Follow up period was 2 years. Study end points were to describe the changes in ossification and bone density of the lesion with serial radiographs and clinical evolution of pain for each patient.

Results: No severe complications were noted in both the groups. Both groups revealed decrease in size of the lesion with pain relief but the Pamidronate group did not have any recurrences compared to 9 recurrences in the other group which was statistically significant (p < 0.5). The ossification on serial radiographs were complete in 13 and partial in 3 of the 16 patients in the Pamidronate group.

Conclusion: Intra-lesional Pamidronate appears to be an effective adjuvant modality to reduce recurrence rates in the treatment of aneurysmal bone cysts.
Aim/Objectives:
The aim of this study is to examine the impact of neoadjuvant/adjuvant chemotherapy on the prognosis in patients with metastatic non-small round cell soft tissue sarcoma (STS).

Methods:
We retrospectively reviewed 26 metastatic STS patients who were treated with neoadjuvant/adjuvant chemotherapy and definitive treatments in Nagoya University Hospital from February 2006 to July 2017. The factors (age, sex, metastatic tumor sites, and primary tumor factors) which affect neoadjuvant/adjuvant chemotherapy and the relation between neoadjuvant/adjuvant chemotherapy (all, or 4 courses) and disease-free survival (DFS) or overall survival (OS) were analyzed. p-values of <0.05 were considered to indicate significance. The median follow-up period after first metastasis was 28.0(6.5-97.1) months.

Results:
There were 18 males and 8 females with a median age of 51 (18-81) years at first metastasis. The histologic subtypes were 7 MFH/UPS, 6 MPNST, 4 liposarcoma, 4 synovial sarcoma, and 5 others. The metastatic sites were 20 lung, 4 soft tissue, and 2 others. All patients achieved disease-free status after surgeries and in one case proton radiotherapy for bone metastasis. Median course of neoadjuvant/adjuvant chemotherapy was 4 (1-4). Regimens of neoadjuvant/adjuvant chemotherapy were 6 ICE, 3 DXR, 2 IFM/DXR, and 2 others. There were no factors which affect neoadjuvant/adjuvant chemotherapy. Four courses of neoadjuvant/adjuvant chemotherapy associated with good DFS (p=0.027, Figure), but did not associate with good OS in patients with metastatic STS. Neoadjuvant/adjuvant chemotherapy did not associate with good DFS and OS.

Conclusion:
Enough course of neoadjuvant/adjuvant chemotherapy with definitive treatment associated with good DFS, but did not associate with good OS in metastatic STS. There are some limitations such as small study population and retrospective nature in this study. Prospective study may be needed to determine the value of neoadjuvant/adjuvant chemotherapy for this setting.
Session Name: **Poster Session**  
Theme: **Adjuvant modalities**  
Abstract Number: **180**  
Abstract Title: **When to resect: Fixed or flexible neoadjuvant chemotherapy**  
Authors: **Sudhir Kumar Garg, Kisley Dimri, Purnima Aggarwal, RPS Punia, Sandeep Gupta**  
Presenter: **Sudhir Kumar Garg, Government Medical College & Hospital, Chandigarh, India.**

Introduction: Neoadjuvant chemotherapy has become the standard of care due to its many advantages: makes resection easier thus improving the chances of limb salvage, allows pathologist to assess response to chemotherapy to plan adjuvant chemotherapy. The aims of this study was to evaluate whether a minimum fixed number of neoadjuvant chemotherapt cycles affect the type of surgery i.e. resection & reconstruction or amputation/disarticulation

Material & methods: Total patients were 538. 397 patients had Osteosarcoma, 124 patients had Ewing’s sarcoma and 17 patients had MFH/Leiomyosarcoma. Distal femur was affected in 312, Proximal tibia in 108, Proximal humerus in 81 and others in 37. In 63 patients tumour was too large/fungating: underwent primary amputation/disarticulation and received adjuvant chemotherapy only. Pts. with osteosarcoma were given minimum 3 cycles and pts. with Ewing’s sarcoma were given minimum 4 cycles of neoadjuvant chemotherapy.

Results: There was decrease or no significant change in intramedullary/soft tissue extent of the tumour in 432 patients. There was significant increase in intramedullary or soft tissue extent of the tumour in 43 pts., all with osteosarcoma. This increase didn’t change the earlier planned surgery in 24 pts. However in 19 patients it lead to amputation/disarticulation where the tumour was initially resectable and amenable to limb salvage procedure.

Conclusions: Response to neoadjuvant chemotherapy should be carefully monitored. Fixed number of neoadjuvant chemotherapy cycles irrespective of response can decrease the chances of limb salvage in a significant number of patients. Carryout clinical examination before every cycle of neo-adjuvant chemotherapy: if any concern- repeat MRI and intervene early. There is no significant advantage of insisting on giving a predetermined number of neoadjuvant chemotherapy cycles as various studies have shown that it doesn’t improve survival. Similarly adapted adjuvant chemotherapy cannot salvage patients where tumours demonstrate a poor histologic response to preoperative chemotherapy.
Aim
Giant cell tumor of bone (GCTB) accounts for 5% of primary skeletal tumors. They can be locally aggressive and approximately 3% metastasize to the lung. Treatment consists of curettage with local adjuvants such as cementation, phenol, cryotherapy and ablation for local control. Recently, denosumab, a fully human monoclonal antibody of RANKL, has been shown to produce osteoblastic change of the lesion, and is likely a novel and effective method for the treatment of GCTB. Furthermore, several reports also demonstrated efficacy of denosumab for lung metastases. In this study, we analyzed the effectiveness of denosumab for lung metastases of GCTB.

Methods
We retrospectively evaluated 5 cases of GCTB with lung metastases treated with denosumab (120mg/month). In 4 cases, metastases appeared after resection of the tumor, and one case was observed at the initial visit. Location of tumors included spinal bone in 3 cases, and one each in the distal radius and distal ulna. Treatment of local lesions consisted of resection in 3 cases and curettage in 2 cases. Three cases, which included radius, ulna and thoracic spine, showed metastases after local recurrences. 2 cases had been treated with zoledronic acid before denosumab administration.

Results
Follow-up periods were 18~35 M (av. 42 M) after denosumab administration. All cases demonstrated reduction in size of lung metastasis after 2~3 months of denosumab therapy. Osteoblastic change of metastases appeared in 3 cases after 8~33 months. In the ulna case, denosumab administration lead to complete ossification in 21 months after marked shrinkage of the lesion. GCTB of the thoracic spine lead to death due to local failure despite maintaining control of the lung metastasis.

Conclusion
Denosumab exhibits a tumor reduction effect of lung metastases followed by osteoblastic change of the lesion.
Background: Osteosarcoma is the most common of primary bone cancer. Current treatment includes surgery and chemotherapy to decrease the recurrent rate. The bone cement has role in filling bone defect after surgery and stabilized the endoprosthesi. The bisphosphonate is used for osteoporosis and prevent skeleton-related event in cancer. In addition, the bisphosphonate shown the potential to inhibit osteosarcoma cell in vitro.

Objective: To analyze cytotoxic effect of Zoledronic acid - loaded PMMA bone cement in human osteosarcoma cell line

Materials and Methods: Various concentrations of zoledronic acid were mixed with bone cement and placed in distilled water. The distilled water was test with osteosarcoma cell line in vitro for the cytotoxic effect in daily for seven days with the MTT assay and compare the cytotoxic effect of Zoledronic acid - loaded PMMA bone cement in various concentration from first to seventh day.

Results: Zoledronic acid is released from bone cement, remains biologically active to inhibits the in vitro growth of osteosarcoma cell line. The effective concentration of Zoledronic acid-loaded PMMA bone cement is 0.50, 0.75, 1.00, 2.00 mg/g inhibit osteosarcoma cell line 41.9%, 43.3%, 44.1%, 50%, respectively. They have significant effectiveness compare to concentration of Zoledronic acid at 0.25 mg/g that inhibit osteosarcoma cell line 18.75%(p<0.001). The effectiveness is related to elapsed time. The first day is most effectiveness to inhibit osteosarcoma cell line compare to second to seventh day. Zoledronic acid has synergistic effect to Doxorubicin that used as standard chemotherapy for Osteosarcoma.

Conclusions: In this study show that Zoledronic acid have cytotoxic effect for inhibit osteosarcoma cell line after loaded PMMA bone cement in vitro. Efficacy of Zoledronic acid-loaded PMMA bone cement is related to concentration of Zoledronic acid and elapsed time.
AIM: Does denosumab reduce the risk of recurrence after resection or intralesional surgery?

METHODS: 54 patients with 30 primary GCTs and 25 recurrent GCTs between Nov 2013 and July 2016 were treated with denosumab. Mean number of doses were 6.8 per patient preoperatively. The minimum follow up was 12 months. For case-matched comparison study, we identified controls as 34 patients undergoing curettage [from retrospective analysis of 68 patients curetted without denosumab between Feb 2010 and July 2016] matched to 25 denosumab-treated patients in terms of site, size, Campanacci grade, recurrent versus primary status and with a minimum 2 years follow up for control group. Patients undergoing resection were planned for surgery after 3 doses of denosumab. The resections could not be case-matched for comparison owing to smaller numbers.

RESULTS: We observed 14 recurrences out of 37 curetted tumours (38%). In the case-matched analysis, 11 of 25 patients in the denosumab-treated curettage group had recurrences (44%) compared with 7 of 34 (21%) in the nondenosumab-treated control group. The risk of denosumab-treated patients experiencing local recurrence was nonsignificant with a two-tailed p value of 0.0853 (significance at p < 0.05) as derived from Fisher’s exact test. There was no recurrence in the resection group. Since we do not have a control group for resection, we are unable to comment on the importance of this finding.

CONCLUSIONS: Although we could not demonstrate a higher risk of local recurrence with preoperative denosumab for intralesional surgery, we advise caution in its routine use for intralesional procedures. We believe that denosumab treatment before resection of a large tumour aids resection without tumour spillage, particularly where important structures like neurovascular bundle are dissected away from the tumour margin, although we cannot confirm that it helps lower the incidence of recurrence.
Objective: To assess the oncological outcome of patients with dedifferentiated chondrosarcoma of bone.

Design: Retrospective analysis

Methods: Between January 2006 to December 2015, 251 cases of chondrosarcoma of bone were operated in our institute. Their clinical, radiological and histopathological details were retrieved from case files and electronic medical records. 11/251 cases were dedifferentiated chondrosarcoma. Mean age of these patients was 43.7 years (25 – 68 years). There were 3 cases in the pelvic girdle, 2 in the upper limb and 6 in the lower limb. None of the cases had metastasis at presentation. 4 cases presented with pathological fracture. All patients were operated at a mean of 9 weeks from date of presentation (6 – 16 weeks). 1 patient had margin positive resection and died within 6 months with local and distant recurrence. 4 out of 11 received non-methotrexate based chemotherapy (Ifosfamide, Adriamycin and Cisplatin) post surgery based on the multi-disciplinary joint committee decision. Out of 11, 6 patients have died, 2 cases are lost to follow up and 3 are disease free. Oncologic outcomes were calculated at the end of 2 years considering pathological fractures and chemotherapy.

Results: Median follow up was 10 months (0 – 113 months). OS for this series was 48%. OS for cases with/out pathological fractures was 50% and 46% respectively (p value=0.979). OS for cases with/out chemotherapy was 38% and 56% respectively (p value=0.69).

Conclusion: The present study shows that prognosis of dedifferentiated chondrosarcoma is poor. Complete surgical excision should be the initial treatment for patient, with chemotherapy usage still controversial. It is important to differentiate this sub group in view of the vastly different prognosis compared to other sub groups.
Aim: Giant cell tumour (GCT) of the bone is a commonly encountered aggressive benign tumour. Denosumab, a RANKL inhibitor, has gained popularity in halting the osteolysis in RANKL pathway and hence been used extensively in cases of GCT over the past few years. We evaluated the effect of various regimens of denosumab on GCT and the rate of recurrence following curettage of lesion in patients treated with neoadjuvant denosumab therapy.

Methods: 124 cases of GCT (59 proximal tibia, 43 distal femur, 8 pelvis, 6 distal radius, 5 hand and foot, 1 talus, 1 distal tibia and 1 proximal humerus) treated by denosumab, followed by extended curettage were analysed retrospectively. Histological, radiological and modified musculoskeletal tumour society (MSTS) scoring were analysed before and after administering various regimens of 120mg of Inj. Denosumab subcutaneously. Rate of recurrence on follow-up was compared with the rate of recurrence in patients with 57 cases of GCT operated without denosumab.

Result: Following denosumab therapy, 95.96% (n=119) patients had improved functional outcome as evidenced by a mean MSTS score improvement of 63.2% and there was no significant difference in improvement of MSTS score, in patients receiving <=3 doses (group1, n=69) and >3 doses (group2, n=55) of denosumab (p=0.142). There was also no difference in improvement of radiological outcome (p=0.436) as 91.3% (n=63) of the patients in group1 showed improvement by at least one Campanacci grade on x-ray when compared to 92.7% (n=51) of patients in group2. On follow-up for a median time of 21.4 months, 24.3% of patients operated following denosumab therapy had recurrence of tumour, when compared to 9.8% of patients without denosumab therapy (p=0.012).

Conclusion: The effect of Denosumab of GCT can be achieved with reduced number of doses. Denosumab has to be used cautiously in selected cases with a personalized treatment strategy as it can lead to increased chances of tumour recurrence.
Session Name: **Poster Session**  
Theme: **Adjuvant modalities**  
Abstract Number: **381**  
Abstract Title: **Tibial turn up plasty for a failed limb salvage surgery of distal femur osteosarcoma**  
Authors: Hirohisa Katagiri, Mitsuru Takahashi, Hideki Murata, Junji Wasa,  
Presenter: Hirohisa Katagiri, Shizuoka Cancer Center Hospital, Japan.

Purpose: The purpose of this case report is to present an alternative for a failed limb salvage surgery of the distal femoral osteosarcoma.

Patients: The patient is a 22-year-old female. She had been operated for osteosarcoma in the right distal femur when she was 7-year old. The tumor located at the metaphysis and extended into epiphysis. Expandable prosthesis was thought to be too large and not suitable for this young patient. We resected the tumor and reconstructed with pasteurized autologous tumor bearing bone. One year later, an iliac lymph node metastasis was found. We resected the metastasis with the external iliac vein. Since then, she has been disease free. The implanted pasteurized bone united but late complications developed. Because of the knee instability from ligamentous insufficiency and quadriceps muscle weakness, she could bear her weight only a little on her leg and needed two crutch gait. In addition, the femur, as well as the tibia showed insufficient growth resulting 11cm of limb discrepancy. Consequently, femur and tibia became atrophic. She had suffered tibial fracture twice from a minor trauma. Rotation plasty was impossible because she had vascular abnormality and skin with superficial veins worked as drainage veins.

Method: We performed tibial turn-up plasty to make her lower extremity similar to knee disarticulation. First, distal femur was taken out. Second, lateral skin and fibula was resected followed by amputation at just proximal to ankle joint. Finally, the tibia with medial skin was rotated as a vascularized pedicle graft and distal tibial osteotomy surface was osteosynthesized to proximal femoral cutting line so as the tibial plateau work as weight bearing area.

Result and Conclusion: She can walk with a cane and a knee prosthesis without phantom pain. This tibial turn up plasty can be an option for failed limb salvage surgery.
Session Name: Poster Session  
Theme: Basic Research  
Abstract Number: 13  
Abstract Title: Antitumor effect of sclerostin against osteosarcoma  
Authors: Masanori Okamoto, Kazushige Yoshida, Jun Sasaki, Kaoru Aoki, Yasuo Yoshimura, Atsushi Tanaka, Shuichiro Suzuki, Munehisa Kito, Naoto Saito, Hiroyuki Kato  
Presenter: Masanori Okamoto, Shinshu University School Of Medicine, Japan.

Introduction: Wnt signaling regulates the development, growth, maintenance, and differentiation of stem cells. Canonical Wnt signaling regulates the expression of various genes, in addition to cell proliferation and differentiation. Hyperactive Wnt signaling promotes tumorigenesis and metastasis of various cancers. Sclerostin, an extracellular soluble factor secreted by osteocyte, inhibits bone formation via canonical Wnt signaling. Here, we investigated the antitumor effect of sclerostin on osteosarcoma, a malignant tumor derived from osteoblast lineage cells.

Method: Osteosarcoma model mice were prepared by transplantation into the dorsal region of C3H/He and BALB/c-nu/nu mice using osteosarcoma cell lines LM8 (mouse) and 143B (human), respectively. AlamarBlue and scratch assays were performed to evaluate cell proliferation. A migration assay was performed to evaluate the cells’ migratory ability. Sclerostin was administered intraperitoneally to the mice once a day at 80 ng/g body weight for 7 days to examine the suppression of the increase in tumor diameter and prolongation of survival. mRNA and protein levels were evaluated by RT-qPCR, and western blotting and immunostaining, respectively.

Result: Administering sclerostin to osteosarcoma cells suppressed the expression of Wnt target genes, and significantly inhibited the growth and migratory ability of osteosarcoma cells. Sclerostin significantly inhibited tumor growth and improved survival of mice, as shown by the Kaplan Meier curves and survival data.

Conclusion: Sclerostin suppressed the proliferative capacity and migratory ability of osteosarcoma cells. The osteosarcoma model mice showed inhibited tumor growth and prolonged survival periods. Since sclerostin is not a cytotoxic agent, it is necessary to investigate the effect of its combined use with existing anticancer drugs, such as doxorubicin, for future clinical applications.

Figure: Kaplan-Meier curve showing the cumulative survival of osteosarcoma model mice with or without administration of sclerostin. Survival was significantly better in mice administered sclerostin (P = 0.001).
Giant cell tumor (GCT) is a benign tumor including neoplastic stromal cell and osteoclast-like giant cell. Though the etiology remains unclear, some studies shown that the characteristics of GCT are similar to mesenchymal stem cell. Though GCT is a benign tumor, it is harmful to bone destruction, and easy to recurrence, metastasis or malignant change. Surgery is the most efficient therapeutic strategy while currently, denosumab was found to be useful for GCT treatment that suppresses the growth of osteoclast-like giant cell and controls the tumor progression though there are still some side effects. Thus the aim of this study is to confirm the genetic change on neoplastic stromal cell of GCT after denosumab treatment and whether these changed genes related to tumor recurrence or cancer stem cells enrichment.

Methods: In this study, we collect primary cells from GCT tumor section of patients with or without denosumab treatment and use microarray to analysis the genetic change. Then quantitative PCR to identify the gene level and Western blot or immunostain for protein expression level.

Results: Primary stromal cells isolated from patients who received denosumab showed higher growth rate, migration ability, and osteogenesis ability than non-treated groups. Denosumab group also increased spheroid formation ability that indicated the enrichment of cancer stem cell population.

Conclusion: Though the usage of denosumab suppressed the size of GCT, there still some side effects of denosumab on neoplastic stromal cells that need to pay more notice on clinical use.
Session Name: **Poster Session**  
Theme: **Basic Research**  
Abstract Number: **34**  
Abstract Title: **Surgical management of metastasis in the femur**  
Authors: **Shoufeng Wang, Jin Xiong, Leilei Xu**  
Presenter: **Shoufeng Wang. Unit Of Musculoskeletal Tumors, Department Of Orthopaedics, Drum Tower Hospital, Nanjing University Medical School, China.**

**Objective**  
To investigate the efficacy and significance of surgical management of metastasis in the femur.

**Methods**  
Thirty nine patients with metastases in the femur treated by surgery were investigated and followed up between March, 2005 and August, 2013 in our department retrospectively. The expecting and actual life span was estimated and compared. The patients with impending fracture were evaluated by Mirels’ scoring system. The location of lesion was in proximal femur for 25 cases, including two patients with bilateral lesions. There were 8 cases with lesion in femoral neck, 12 cases in intertrochanteric area and 7 cases in subtrochanteric area. The location of lesion was in diaphysis of femur for 12 cases including one patient with bilateral lesion with pathologic fracture. The other two patients had metastasis in distal femur. The pain score was assessed before and after surgery. The functional level was assessed by Enneking’ rating scale in the third, sixth, twelfth and last follow-up months respectively.

**Results**  
The average follow-up was 14 months (0.2-63 months). The median survival was 8.5 months (0.2-63 months) for patients deceased. There were 19 patients suffered from lung cancer. Their median survival was 9 months (3-24 months) till last follow-up. The pain decreased significantly after surgery than that before surgery (P<0.05). The actual survival time was longer than the expecting survival time by the Dutch model scoring system and the difference was found significant statistically (P<0.05). The functional level score was ranged from 14 to 26 points postoperatively during the follow-up.

**Conclusion**  
The surgical management was referred to the complete fracture, impending fracture, location, extent of involvement of the lesion in the femur. As one of the systemic management of metastasis, surgical management of metastasis in the femur played an important role in the relief of pain, improvement of the functional level and the quality of life.
Objective: To investigate method and efficacy in treatment of recurrent giant cell tumor of the bone in limbs.

Method: Twenty-three patients with recurrent giant cell tumor were treated during October 2001 to July 2008. There were 14 male and 9 female patients. The lesion in distal femur was found in 9 cases, proximal tibia in 5 cases, distal radius in 4 cases, proximal humerus in 3 cases, proximal femur in 2 cases. The treatment included secondary curettage and packing with bone cement in 15 patients, tumor resection and prosthetic reconstruction in 6 patients and auto-fibula reconstruction in 2 cases, which was selected according to lesion location and radiographic grades.

Results The follow-up was 10 months to 6 years and 6 months. The average follow-up time was 37.6 months. In the secondary curettage group, two recurrent cases were found (13.3%). There was no recurrence in the tumor resection group. The excellent and good outcome was achieved in 75.3% patients in the tumor resection and reconstruction group according to the Eneeking system.

Conclusions: The recurrence is existed in treatment of recurrent GCT by intralesional curettage. However, it will be the preferred method in treatment of recurrent GCT because better joint function is saved. Local recurrence rate can be reduced and better outcome can be achieved by radical resection and reconstruction in some cases.
Objective
To investigate the imaging features, classification and surgical management of soft tissue recurrence after treatment of giant cell tumor of bone in limbs.

Methods
From January 2002 to December 2014, 293 cases with giant cell tumor of bone in limbs were analyzed retrospectively. The imaging features of 6 patients with soft tissue recurrence after treatment of giant cell tumor of bone in limbs were investigated and the literature was reviewed. According to the imaging characteristics, the soft tissue recurrence after treatment of giant cell tumor of bone was classified into 3 types as follows: type 1: soft tissue recurrence with peripheral ossification, type 2: soft tissue recurrence with central ossification, type 3: pure soft tissue recurrence without ossification. All the patients were followed up. The surgical procedure and outcome were recorded.

Results
Among the six cases with soft tissue recurrence after treatment of giant cell tumor of bone, one was classified with type 1, one was classified as type 2 and four cases were classified as type 3. Among these cases with soft tissue recurrences, one was treated with wide resection and 5 were treated with marginal excision. The average follow-up was 28 months. The second soft tissue recurrence was not detected during the period of follow-up.

Conclusion
The imaging classification of soft tissue recurrence after treatment of giant cell tumor of bone in limbs is helpful for a surgeon to select the appropriate imaging procedure to detect the recurrence. The marginal resection was a feasible approach to have a better outcome.
Session Name: Poster Session
Theme: Basic Research
Abstract Number: 37
Abstract Title: Reconstruction of bone defect with allograft and retrograde intramedullary nail for distal tibia osteosarcoma
Authors: Shoufeng Wang, Jin Xiong, Leilei Xu
Presenter: Shoufeng Wang, Unit Of Musculoskeletal Tumors, Department Of Orthopaedics, Drum Tower Hospital, Nanjing University Medical School, China.

Abstract
Objective
To investigate the effectiveness of tibiotalocalcaneal arthrodesis with a retrograde nail and allograft in the limb salvage surgery for patients with distal tibia osteosarcoma.

Methods
5 patients diagnosed as distal tibia osteosarcoma underwent ankle arthrodesis with a retrograde nail in our hospital. During the follow-up, radiographic views of the ankle joint were taken in two planes to assess bone healing and axis alignment. Other measurements of outcomes included procedure-related complications, local recurrence, and metastasis. Functional outcomes were evaluated with the Musculoskeletal Tumor Society (MSTS) scoring system.

Results
Postoperative complications occurred in 4 patients, including 4 cases of mild subcutaneous fluid and 1 case of screw breakage. All patients showed stable ankle and could stand or walk with the assistance of crutch before the complete union between allograft and host bone. One patient died due to the multiple bone and pulmonary metastasis at 1 year after surgery. As for the other 4 patients, they were followed-up regularly for a mean period of 42 months. No local recurrence or distant metastasis occurred in any of these four patients. All the 4 patients expressed satisfaction with the outcome. According to MSTS scale, the mean postoperative functional score was 74.3% ± 4.4% (range, 70% - 81%).

Conclusions
Intramedullary retrograde nail for distal tibia osteosarcoma could produce a satisfactory outcome in terms of functional results and complications. Excellent stabilization of the ankle joint can be achieved through this technique, as it allows patients to perform much earlier postoperative weight-bearing exercise.
Objective: To investigate the early complications and short-term clinical observation of free vascularized fibula in reconstruction of defect after osteosarcoma resection in limbs.

Materials and Methods: 10 patients with osteosarcoma in limbs underwent free vascularized fibula reconstruction after tumor resections were retrospectively reviewed in our unit from May 2015 to June 2017. Six are male and four are female. There are two cases in femur, four in humerus, two in ulna and 2 in tibia. The average age was 28.2 years old(14-62yrs). The average length was 14.8 cm(8-20cm). Two cases were treated with free vascularized fibula. Eight patients were treated with free vascularized fibula and allograft. Three cases were revised with free vascularized after allograft reconstruction alone among these ten patients. The average blood loss was 560ml(100-1000ml). The total blood loss in patients with composite reconstruction with fibula and allograft were more than cases with fibula reconstruction alone. During the follow-up 3 months after operation, the function was evaluated with MSTS evaluation system.

Results: The average follow-up was 12.3 months(1-24months). All the patients were followed up well. The average MSTS score was 26 points(11-30 points). The complications included one case was revised three times after composite reconstruction with fibula and allograft after osteosarcoma resection in femur because of non-union between host bone and composite bone and internal fixation failure. This patient is followed up recently. One patient suffered from a delayed incision healing in the proximal tibia. The wound healed after multiple debridement and dressing exchanges.

Conclusion: The reconstruction with free vascularized fibula for the defect after tumor resection in patient with osteosarcoma in limbs is a good option and may achieve a good long-term function. However, the reconstruction should be stable and may need the composite reconstruction with vascularized fibula and allograft.
Osteosarcoma is the most frequent malignant primary tumor of bone in children and adolescents with an approximately 5-year survival about 50-60%. Lung metastasis remains as the most challenging condition during treatment and follow-up, which has been regarded as the main reason for bottle neck of prognosis. Tumor thrombus is occasionally diagnosed in patients with malignant tumor. It usually exists during tumor angiogenesis associated with proliferation and metastasis. The presentation shows aggressive features and advanced stage of the disease. Tumor thrombus is associated with highly metastasis potential. Based on the evolution theory of tumor metastasis, tumor thrombus can be the intermediate phase between local invasion and distal metastasis. In order to investigate the underlying mechanism and identify candidate metastasis driver genes, we collected a set of high quality paired tumor tissue, both the primary site and corresponding tumor thrombus that were treated by thrombectomy. In this study, we present a large-scale transcriptome analysis, by RNA sequencing, of 4 patients diagnosed with large pelvic osteosarcoma with tumor thrombus. The dysregulated genes between primary site and thrombus suggested that the complement and coagulation cascades, focal adhesion and extracellular matrix receptor was correlated with the formation of tumor thrombus. Tissue factoe was identified as major marker in coagulation pathway activation. We also identified NOTCH2NL-NBPF1 fusion genes in all the four patients. All of these findings broaden our knowledge of osteosarcoma thrombus and may also contribute to the novel mechanism of metastasis in osteosarcoma.
Aim
Accurate staging is essential, as an early diagnosis of metastasis has a big impact on patients’ management, prognosis and quality of life. Radio-imaging modalities have different sensitivities, specificities and predictive values. Conventional staging uses CT thorax and Tcm99 MDP Bone scans. We aim to assess the validity of the use of whole body diffusion weighted MRI (DW-MRI) for the detection and surveillance of metastases in sarcoma patients.

Methods
This is a prospective study, carried out from 1/11/2013 to 31/7/2016. All new patients were enrolled as the study subjects. 30 patients were recruited, each underwent conventional staging (CT-Thorax and Bone scan), as well as a whole body DW-MRI. In cases of disparity, further imaging was carried out at 3, 6, 12 and 18 months till the true status of the metastasis was ascertained.

Results
Whole body DW-MRI is effective in detection of lung and/or bone metastases. DW-MRI has a high specificity, positive predictive value (PPV) and negative predictive value (NPV). Whole body DW-MRI had significantly lower sensitivity (40.0% vs 100.0%; P=0.003), higher specificity (100% vs 75%; P=0.017), and lower negative predictive value (76.9% vs 100.0%; P=0.044), when compared CT thorax for lung metastases. Bone scan in the detection of bone metastases, the whole body DW-MRI had higher estimates of specificity (92.0% vs 83.3%), area under the ROC (AUC 0.958 vs 0.917), and positive predictive value (60.0 vs 33.3) (Figure 1). However, it is not statistically significant due to the small number of subjects with bone metastases.

Conclusion
Whole body DW-MRI is a valid test for the detection and surveillance of metastases in sarcoma patients with an added benefit of the ability to detect soft tissue and marrow metastasis. However, CT thorax still remains the imaging of choice for the detection and surveillance of pulmonary metastases.
Purpose: DNA damage response (DDR) molecules are protective against genotoxic stresses. However, DDR molecules are also involved in the survival of cancer cells during anti-cancer therapies. Therefore, DDR molecules are potential markers of cancer progression and therapeutic targets. In this study, we evaluated the immunohistochemical expression of PARP1, rH2AX, BRCA1, and BRCA2 and their prognostic significance in soft tissue sarcoma (STS).

Methods: Immunohistochemical expression of PARP1, rH2AX, BRCA1, and BRCA2 were evaluated by the sum of the staining intensity scores and the staining area scores in each tissue microarrays (TMA) core. Based on the immunohistochemical staining scores of the PARP1, γH2AX, BRCA1, and BRCA2 expression, the STSs were grouped as negative or positive for each stain. The univariate and multivariate Cox regression hazard analysis and Kaplan-Meier survival analysis were performed for the survival analysis.

Results: The expression of PARP1, rH2AX, BRCA1, and BRCA2 were significantly associated with each other and were associated with higher tumor stage and presence of distant metastasis. The expression of PARP1, rH2AX, and BRCA2 were significantly associated with shorter disease-specific survival (DSS) and event-free survival (EFS) by univariate analysis. BRCA1 expression was associated with shorter DSS. Multivariate analysis revealed the expression of PARP1 and rH2AX were independent poor prognostic indicators of DSS and EFS. BRCA2 expression was an independent poor prognostic indicator of DSS. In addition, the combined expression patterns of PARP1, rH2AX, BRCA1, and BRCA2 (CSddrm) were independent prognostic predictor of DSS (P < 0.001) and EFS (P = 0.016). The ten-year DSS rate of the CSddrm-low, the CSddrm-intermediate, and the CSddrm-high subgroups were 81%, 26%, and 0%, respectively.

Conclusions: This study demonstrate that the individual and combined expression of DDR molecules PARP1, rH2AX, BRCA1, and BRCA2 could be predictive of the prognosis of STS patients.
PURPOSE:
Limb length discrepancy of lower extremities (LLD) is a common complication after limb-salvage in the skeletally immature. The natural course of compensation leads to biomechanical alteration leading to short and long-term adverse effects. More than 2cm LLD is accepted as significant to cause decompensation. Attempt to reexamine the functionally significant LLD level in relation to height and true length of the limb was performed using dynamic gait analysis with primary focus on kinematics and secondary focus on kinetics. Functional adaptation was analyzed. Proposed predictor index (PI) is based on height(Ht) and true length(TL) as a screening tool.

METHODOLOGY
Subjects were 40 males (age: 20 to 40 years) with no LLD. Reflective markers were attached at specific points in lower extremity. Subjects walked in gait lab at a self-selected natural walking pace with artificially induced LLD of 0, 1, 2, 3, and 4 cm (shoe raise) after a 30 minutes accommodation period. Motion was captured with Infrared cameras. Primary kinematic (knee flexion and pelvic obliquity) and secondary kinetic (ground reaction force [GRF]) were measured at right and left heel strike.

RESULTS
Significant correlation was demonstrated between PI based on Ht and TL with kinetic components. Long limb knee flexion, long limb pelvic obliquity and short limb pelvic obliquity were significant in relation to PI (p < 0.001). There was no correlation between PI and GRF. Proposed PI (figure 1) were analyzed using ROC curve. LLD/Ht is superior PI compared to LLD/TL. LLD/Ht as a PI with value of 1.75 is 80% specific and 76% sensitive.

CONCLUSION
PI of LLD/Ht (reference value =1.75) is superior to PI of LLD/TL. Hence, PI of LLD/Ht is proposed as a screening ratio to identify group at risk of adverse effects with the value of more than 1.75.
Purpose:
Oncology patients often experience various psychological distresses resulted from emotional stress of the disease and the treatment procedures, fear of disease progression and recurrence as well as distress triggered by living with physical restrictions. The most common psychological disorders among cancer patients are anxiety and depression. Untreated psychological problems will affect one’s quality of life, self-esteem, social interactions and oncology treatment adherence. The present study determined the prevalence and associated risk factors of anxiety and depression among orthopaedic oncology patients, their quality of life (QOL) and coping strategies.

Methods:
Cross-sectional study. Self-report questionnaire from (HADS), (WHOQOL-BREF) and (Brief COPE) was used. Risk factors were analysed with multiple logistic regression.

Results:
one-hundred-and-ninety-one patients were recruited. 49.2% male with median age of 39.4 years. Majority were GCT (22.5%), osteosarcoma (20.4%) and pleomorphic sarcoma (12.6%). Metastatic cases were from breast, prostate and lung cancer. 29.8% had anxiety and 16.2% had depression. 15.2% has both. QOL median scores differed significantly between patients with and without anxiety and depression. Patients with both anxiety and depression had lower QOL scores (p<0.001). Age, psychology health score and radiotherapy were inversely related to anxiety levels. Chemotherapy was related to anxiety and depression. Physical and psychology health scores were related to lower levels of depression. Those with anxiety adopted denial, behavioural disengagement, venting and self-blame as their coping strategies. Similar trend was observed among depressed patients except acceptance was common in non-depressed patients. Patients with a combination of anxiety and depression exhibited denial and behavioural disengagement (Figure 1).

Conclusion:
There is a high prevalence of psychological disorders among orthopaedic oncology patients. Psychosocial evaluation should be done on a routine basis and appropriate psychiatric referrals and consultations could be established to facilitate patients during the course of treatment.
Introduction
Osteosarcoma (OS) is the most common primary malignant tumor of bone in children and adolescents. Some of the biologic factors evaluated as potential prognostic factors in OS are the expression of P-glycoprotein (P-gp) and erb-2.

Aim of the study
1. To study the expression of P-glycoprotein and HER-2/neu protein in the pre-treatment biopsy specimen and correlate this with histological chemotherapeutic response.
2. To assess histopathological and immunohistochemical prognostic factors of osteosarcomas that affect the survival.

Materials and methods
133 cases of Osteosarcoma were included during a period of eleven years from 1st January 2000–31st December 2010. The clinical features were taken from case files. The pattern of expression of P-glycoprotein (P-gp) and Her-2/neu in pre-treatment biopsy samples were correlated with chemotherapeutic response and overall survival. IHC analysis was done in 36 cases. The percentage of necrosis was assessed using Huvos grading system. Histological and immunohistochemical prognostic factors were assessed using Cox’s proportional hazard regression model. Survival plots were made using Kaplan-Meier method.

Results
The age of the patients ranged between 0-14 years. The region of long bone where tumor occurred, intensity of p-glycoprotein positivity and presence of metastasis were statistically significant prognostic factors. Number of mitosis, presence of necrosis and histologic response following NACT had no significant correlation with survival. Histologic response after NACT had no correlation with P-gp and Her-2 expression in pre-treatment biopsy sample. Her-2 was not expressed in any of the cases. Overall survival was 70.59% at 3-years and 30% at the end of 5-years.

Conclusion
Location of tumor in long bones, presence of metastasis, intensity of positivity of P-glycoprotein were found to be of prognostic significance. Number of mitosis, presence of necrosis and histologic response following NACT had no correlation with survival.
Aims/Objectives: Freezing Nitrogen Ethanol Composite (FNEC) was developed for the adjuvant cryotherapy treating musculoskeletal tumors. Previous studies proved similar tumor ablation between FNEC and liquid nitrogen (LN) treatment. This study aims to investigate the preclinical effectiveness and safety of FNEC in an animal model.

Methods: Primary GCT stromal cells were obtained from fresh tissue of five GCT patients. Matrigel containing GCT cell was directly introduced onto the chicken chorioallantoic membrane (CAM) of Fertilized eggs. The growing GCT tumor nodules were collected from the CAM and were randomly divided into three groups and then separately treated with LN or FNEC for 5 minutes. Afterwards, all the 15 GCT tumor grafts were transplanted into separate secondary CAM. After 7-day incubation, the number of blood vessel was manually calculated. Anti-human nuclei (HuNu) antibody was used to detect the cells of human origin. For developing human GCT-bearing mice, pelvic bone fragments were harvested from patients and implanted into the back of NOD/SCID mice. After 10 weeks, human xenograft bone was either treated with LN or FNEC for three minutes. The bones and soft tissues adjacent to 2cm from the frozen sites were collected for further analysis.

Results: Both LN and FNEC treatments significantly inhibited neovascularization of GCT tumor in CAM. Quantitation on the HuNu positive cells indicating the amount of human origin tumor cells revealed significantly higher level in the secondary CAM of negative controls than that of both LN and FNEC treatment. Mice skin adjacent to the LN-frozen human xenograft bone revealed more severe detachment between epidermis and dermis in comparison with FNEC treatment. Likewise, the level of muscle fragmentation was lower in the FNEC-treated mice.

Conclusions: We conclude that FNEC exhibits cryoablation effect similar to LN does. In terms of damages on the adjacent tissues, however, FNEC is more desirable.
INTRODUCTION: Established tumor cells can create microenvironments that suppress effective anti-tumor activity. Apart from T-cells that possess anti-tumor effect, T-regulatory cells are known to play a vital role in tumor promotion and progression. Many cancer studies have revealed imbalances between T-regulatory and T-helper cells that contribute to the disease progression in patients. Thus, this study was prompted to investigate the difference in the Th/Treg ratio and their associated key cytokines that may play a role in sarcomas.

METHODOLOGY: Peripheral T-helper and T-regulatory cells in sarcoma patients and healthy volunteers were analysed by flow-cytometry. The concentration of corresponding key cytokines in culture supernatants in presence of a mitogen for 24, 48 and 72 hours at 37°C in humidified 5% CO₂ incubator was measured by enzyme-linked immunosorbent assay.

RESULTS: The mean percentage of T-helper cells in sarcoma patients was significantly lower (p<0.05) than in healthy subjects. T-helper related cytokines; TNF-α and IFN-γ were also decreased markedly (p<0.05). IL-17A was also reduced in sarcoma patients but statistically, this was not significant (p>0.05) (Table 1). However, there was no significant difference (p>0.05) in the mean percentages of T-regulatory cells in sarcoma patients when compared against healthy subjects. In contrast, LAP-TGF-β1 was higher in sarcoma patients but this was not statistically significant (p>0.05) (Table 1).

CONCLUSION: This study revealed that slight imbalance of Th/Treg ratio does exist in sarcoma patients compared to healthy subjects indicating impaired immune function but, this imbalance was not really apparent. Bigger sample size may give more significant result on Th/Treg ratio that could strongly represent as biological marker to elucidate the immune status of sarcoma patients.
A computer-aided diagnostic model of bone sarcomas around the knee based on radiomics and artificial intelligence

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Aim/Objective
Bone sarcomas commonly involve distal femur and proximal tibia. The present study aim to build a computer-aided diagnostic model of bone sarcomas around the knee joint, mainly through newly-appeared artificial intelligence technologies including recognition and deep study of radiomic images.

Methods
Radiomic images of 39 normal knees and 33 knees affected by bone sarcomas were randomly collected as the training set, while radiomic images of another 12 normal knees and 8 knees affected by bone sarcomas were randomly collected as the validation set. Two deep study methods including support vector machine and convolutional neural networks were adopted for building computer-aided diagnostic model in the training set. The accuracy of the model in differentiating normal and diseased images was tested in the validation set.

Results
An accuracy of 95% was achieved using the support vector machine method by examining a total of 37 vectors including gray degree, gradient, and entropy et al. An accuracy of 95% was also achieved in a model built by three-layer convolutional neural networks.

Conclusions
Computer-aided diagnostic model based on radiomics and artificial intelligence is promising in the field of bone and soft tissue diagnosis. This model can facilitate the screening of bone sarcomas around the knee in primary hospitals lacking of experienced radiologist or orthopedic oncologist. Besides, the model could potentially increase the accordance rate of histologic and radiologic diagnosis, which could substantially aid the orthopedic surgeons and oncologists in the planning of the treatment. More importantly, the model may be implemented in the survival estimation, evaluation of therapeutic effectiveness, and drug selection in the future.
Purpose: In Ewing sarcoma family of tumor (ESFT), blood ProGRP (progastrin-releasing peptide) level is elevated in some cases. The purpose of this study is to examine usefulness of blood ProGRP in ESFT.

Material and method: 16 ESFT patients with a median age of 32 years were included in this study. As a control group, 43 cases with other tumors mimicking ESFT clinically or pathologically were also analyzed. The serum ProGRP and NSE level before treatment was measured. In addition, we calculated the tumor volume before treatment with CT or MRI and investigated a correlation with serum ProGRP and NSE level. Furthermore, in 6 cases that pretreatment ProGRP level was high and ProGRP was measured more than once during the course of treatment, we evaluated correlation between the change of tumor volume and ProGRP or NSE level.

Result: The serum ProGRP level elevated over the twice the normal level upper limit in 8 of the 16 cases with ESFT, but in only 1 of 43 control cases. The serum NSE level also elevated in 14 cases of ESFT and 8 cases of the control group, but the range of the elevation was much smaller than that of ProGRP. In 7 patients who showed elevated initial serum ProGRP levels, the tumor volume before treatment was positively correlated with its ProGRP level (coefficient of correlation = 0.9718). In 6 cases that ProGRP was measured during the course of treatment, ProGRP level correlated well with tumor volume, but NSE level didn’t correlate.

Conclusion: The serum ProGRP level was elevated in half of the cases with ESFT. Pretreatment tumor volume significantly correlated with ProGRP level, and serum ProGRP level clearly correlated with therapeutic responses. ProGRP could serve as a useful tumor marker for ESFT in terms of diagnosis, response evaluation or follow-up of the patients.
PURPOSE:
Recycling tumour bone by sterilizing them is fast becoming popular as an alternative method of limb salvage surgery. There are various methods described in the literature such as irradiation, autoclave, liquid nitrogen and pasteurization to name a few.

METHODS:
We describe our method of pasteurization with examples, indications, contraindications and the functional and radiological outcome of our cases. The device used an instrument boiler passed down by the surgeon’s father to him (Figure 1).

CONCLUSION:
Pasteurization is effective is sterilizing the bone while retaining the quality of the recycle bone.
Osteosarcoma is a malignant musculoskeletal tumor in a high degree of malignancy, and the predilection among adolescents, young children, or the elderly. Currently due to advances in surgery, chemotherapy and imaging technology, has improved survival may be to 70-80 %, but still low for the chemical treatment is not sensitive to patient survival. The most obvious clinical feature of osteosarcoma is new bone formation among tumor site and in parietal site, some called “sun burst”. Whether the degree of osteogenesis related to the prognosis of osteosarcoma or the chemotherapy reaction remains unclear. There are many factors that reported to influence and control osteogenesis, including estrogen receptor (ER). Whether the activation or deficiency of ER in osteosarcoma plays role on prognosis is worthy for further investigation. In this study, we used mesenchymal stem cells (MSCs) as cell model to investigate the factors that effects on osteogenesis. The ER silenced MSCs stable lines showed impaired growth rate and decreased osteogenesis ability. Treatment tamoxifan, an estrogen receptor inhibitor, also suppressed osteogenesis of MSCs. In osteosarcoma cell lines, silenced the expression level of ER not only suppressed osteogenesis but also inhibited tumor colony formation. Moreover, osteosarcoma patients with ER(+) pattern showed larger tumor size though no difference on survival rate. Taken together, ER may be a potential target on osteosarcoma treatment for growth control and for prognosis prediction.
Session Name: **Poster Session**  
**Theme:** Basic Research  
Abstract Number: **272**  
Abstract Title: *In the age of 3D printing; biological osteoarticular reconstruction with ECRT for acetabulum takes the lead!*

**Authors:** Manit Gundavda Rajeev Reddy, Manish Agarwal  
**Presenter:** Manit Gundavda, P. D. Hinduja Hospital, Mumbai, India.

**Background:** Pelvic resections are challenging, and reconstruction of the resected acetabulum to restore mobility and stability is even more difficult. Extracorporeal radiation therapy (ECRT or extracorporeal irradiation) of autograft bone and reimplantation allows for a perfect size match and has been used with some success in the extremities.

**Objectives:** In a small series, we asked: (1) What was the median surgical time and blood loss for these procedures? (2) Is there evidence of osteonecrosis or cartilage loss at a minimum of 2 years after ECRT of acetabular autografts, and what functional scores were achieved? (3) What were the oncologic outcomes after ECRT?

**Methods:** Between March 2007 and January 2018, one surgeon performed 18 ECRT acetabular resections and reimplantations. Of those, 10 with minimum 2-year followup are reported on here with respect to oncologic, functional, and radiographic assessment; all 18 (5 partial acetabular and 13 complete acetabular resections) are reported on for purposes of surgical parameters and early complications.

**Results:** Median surgical time was 8.6 hours (500 minutes) and median blood loss was 1900 mL. There were no perioperative wound-related complications. Two patients underwent a second surgical procedure during the postoperative period, one for a femoral artery thrombus and another for a complete sciatic nerve deficit while one patient had a femoral artery embolectomy performed at time of primary surgery. No patients developed avascular necrosis of the femoral head, or grafting showed radiographic evidence of joint space narrowing. The median MSTS score was 28 (range, 17-30). No fractures in the radiated segment of reimplanted bone were seen in this small series.

**Conclusions:** Results suggest that ECRT is a potential option in selected patients who have good bone stock and adequate soft tissue coverage. Although technically challenging, ECRT is a low-cost alternative to prostheses in providing a mobile and stable hip.
Session Name: Poster Session
Theme: Basic Research
Abstract Number: 329
Abstract Title: Outcomes of Simple Curettage and Impaction grafting of Allogeneic Bone Chip for Enchondromas of the Hand
Authors: Min Wook Joo, Younho Choi
Presenter: Min Wook Joo, St. Vincent’s Hospital, College Of Medicine, The Catholic University Of Korea, South Korea.

Objective
Although curettage is the standard care for symptomatic enchondromas, controversy surrounds surgical procedure, adjuvant treatment, and void management. Besides, it is questionable whether the methods or results of the surgery depend on the preoperative evaluation on the basis of the existing radiologic assessment criteria. Thus, we analyzed outcomes after management of enchondroma of the hand by simple curettage and impaction grafting of allogeneic bone chip.

Methods
Medical records of patients who underwent simple curettage and impaction grafting of allogeneic bone chip for enchondroma of the hand from 2005 to 2015 were reviewed. Demographic data, radiologic and operation-related information, and clinical outcomes were investigated. Differences in clinical outcomes according to preoperative radiological evaluations and location of a lesion were analyzed.

Results
There were 52 females 36 males with a median age of 32 years. Median symptom duration was 2 months. Common locations were the metacarpus and the proximal phalanx, and lesions in the distal phalanx were relatively rare. Median main length of lesions was 15.4mm. Median volume of grafted bones was 3cc. Median radiologic consolidation period was 3 months. Median duration of immobilization was 2 weeks, and median time for return to demanding physical activity was 8 weeks. Median MSTS score was 96.7 preoperatively, and 100 at 3 months after surgery. Recurrence developed in one patient. Median follow-up was 12 months. Kruskal-Wallis test showed no significant differences in time for return to demanding physical activity and radiologic consolidation according to preoperative Takagawa Kazuoki classification, and Campanacci grade. Mann-Whitney test also demonstrated no significant differences depending on location of a lesion.

Conclusion
Preoperative radiologic criteria would have no significant influence on clinical results after surgery. Simple curettage and impaction grafting of allogeneic bone chip could be an excellent surgical option for enchondroma of the hand, regardless of the location of lesions.
Objective
It is a challenge to perform joint-preserving surgery and biological reconstruction for patients with bone sarcomas in the proximal humerus. We investigated the clinical outcomes of joint-saving resection and reconstruction using pasteurized autograft with vascularized fibular graft in the patients with bone sarcomas in the proximal humerus.

Methods
We reviewed the medical records of the patients with malignant bone tumors in the proximal humerus who underwent joint-saving resection followed by pasteurized autograft and vascularized fibular graft in this institution from 2003 to 2015.

Results
There were 4 males and 3 females, with median age of 44. On-lay and modified in-lay grafts were used in 3 and 4 patients, respectively. Screw fixation or conventional plating could not guarantee skeletal stability after reconstruction. So long as fixation devices maintain the stability, junctional union, especially in diaphyseal junction, was ultimately achieved. Bone scintigraphy, performed in 4 patients, demonstrated viability of humeral head. Median MSTS functional score was 83.3 at last follow-up. Median follow-up period was 62 months

Conclusions
Joint-preserving resection for bone sarcomas in the proximal humerus and reconstruction using pasteurized autograft and vascularized fibular graft could result in favorable junctional union and excellent functional result. Firm fixation by locking plate might be mandatory in this procedure.
Objective
Management of benign vascular tumors of soft tissue is a multidisciplinary field. Successful treatment requires in-depth understanding of the classification scheme, natural history, available modalities, and prognosis. Local recurrence after surgical excision is high although the lesions are biologically benign. Besides, they sometimes recur multiple times. The objective of this study was to evaluate risk factors for recurrence after surgical treatment in the benign vascular tumors of soft tissue and establish a management strategy.

Methods
Medical records of patients who underwent surgical excision for benign vascular tumors of soft tissue from 2002 to 2017 were reviewed. We included intramuscular angioma, venous hemangioma, arteriovenous malformation/hemangioma, and angiomatosis on the basis of the latest edition of WHO classification. Potential risk factors for recurrence such as age, gender, symptom duration, related syndromes, multiplicity, angiomatosis, location and depth, main length, and surgical margin were assessed by logistic regression and machine learning analysis using the support vector machine (SVM) algorithm.

Results
There were 139 females 101 males with a median age of 28.5 years. Median symptom duration was 24 months. Extremity lesion was most common. Nineteen patients had angiomatoses, and eight had multiple lesions. Median main length was 3.15 cm. Recurrence developed in 24 patients. Median follow-up was 93 months. Multivariate analysis following Univariate analysis showed that age, angiomatosis, and depth were significant predictive factors for recurrence. The overall accuracy of the linear SVM classifier was 96.67%. The sensitivity and specificity of the model were 91.67% and 97.22%. The area under the curve (AUC) was 0.9965. Surgical margin and depth of lesions were the most informative features of the model.

Conclusions
As it is difficult to achieve free surgical margin in lesions involving multiple tissue planes, or crossing multiple muscles, it would be better to consider combined treatment or other alternative strategy.
Objective
While curettage has been regarded as the mainstays of current management of aneurysmal bone cysts (ABCs), curopsy is a recently described percutaneous technique that has gained interest due to its limited invasiveness and favorable rates of local control. If curopsy fails, detailed curettage is generally the second choice. The objective of this study was to evaluate pre-curettage predictive factors for recurrence after curettage following curopsy in ABC.

Methods
We retrospectively reviewed the medical records of the patients who underwent curopsy once among those registered with a diagnosis of primary ABC in the oncology database between January 1999 and June 2016. Potential risk factors for recurrence, including age, gender, the extent of a lesion, Campanacci grade, and the rate of increase in main length and ballooning of a lesion, were analyzed by logistic regression.

Results
Among 239 patients who underwent curopsy, 36 (15.1 %) did not show signs of consolidation after curopsy; there were 20 females and 16 males, with a median age of 12.5 years. Nineteen lesions were located in the long tubular bone and seven in the short tubular bone. Recurrence developed in eight patients after additional aggressive curettage. In ABCs in the tubular bone, multivariate analysis demonstrated that the rate of increase in ballooning of a lesion was a statistically significant predictive factor for recurrence after curettage following curopsy (p=0.016).

Conclusions
We believe that it would be better to consider combined treatment or other alternative strategy in ABCs showing rapid progression of ballooning after curopsy. Further studies on more cases with longer follow-up period should be mandatory.
Objective
Once clinically detectable nodal metastasis has occurred, the prognosis in squamous cell carcinoma (SCC) is poor. A dilemma, therefore, lies in the management of SCCs with no clinical or radiologic evidence of metastatic disease or a clinical N0 status. No clear-cut guidelines exist to date. Sentinel lymph node biopsy (SLB) has been considered as a method to detect micro-metastasis early. We tried to review a data on our recent experiences of SLB in squamous cell carcinoma.

Methods
Among patients with pathologically diagnosed squamous cell carcinoma in the extremity without lymph node or distant metastasis identified clinically or radiologically from March 2014 to February 2017, the medical records on cases who underwent wide excision for the primary lesion and sentinel lymph node dissection under gamma detection system after preoperative lymphoscintigraphy were reviewed. Age, gender, symptom duration, precancerous lesion, location and main length of lesion, surgery, pathological reports including sentinel node status, local recurrence, distant metastasis, oncologic outcome, and follow-up period were identified and analyzed.

Results
Eleven patients were investigated, with the median age of 64 years. Most common location was the hand. Median main length and depth were 20.5 and 13.5 mm. Complete excision for the primary lesion was achieved in all patients. The median number of dissected nodes was 2. Nine patients were continuously disease-free within the median follow-up period of 15 months. As a positive lymph node was observed in one patient, adjuvant chemotherapy was initiated early, and the patient showed no evidence of disease at 33 months after surgery. In one patient without any positive nodes, nodal metastases were observed 11 months after operation.

Conclusions
We believed that the role of SNB under gamma detection system after lymphoscintigraphy could be promising. Meticulous care is always required in technical error from radioisotope injection to histological diagnosis.
Objective
As management and prognosis are different between enchondroma and low-grade chondrosarcoma (LCS), differential diagnosis is very important. Although various clinical and radiological clues have been proposed for differential diagnosis, it is difficult to distinguish both diagnoses. The objective of this study was to evaluate the efficacy of single-photon emission computed tomography (SPECT) scan in differential diagnosis of the chondroid tumors in the long bone.

Methods
Among patients who were pathologically diagnosed as enchondroma or LCS of the long bone from July 2015 to November 2017, we retrospectively reviewed the medical records on cases of which radiological impression and histological diagnosis were identical. Maximum standard uptake value (SUVmax), mean standard uptake value (SUVmean), and tumor volume were measured from SPECT scan images, and we statistically analyzed the differences in the values.

Results
There were 18 females and 10 males. Median ages of 14 patients with enchondromas and the rest of patients with LCS were 51 years. Median main lengths were 3.2 cm in enchondroma and 6.15 cm in LCS. Median follow-up period was 12 months. Median SUVmax, SUVmean, and tumor volume were 12.34, 5.06, and 11.12 in enchondroma and 20.59, 8.16, and 14.14 in LCS. Mann-Whitney U test demonstrated that differences in SUVmax, and SUVmean between enchondromas and LCSs were statistically significant (p<0.001, and p=0.024). The areas under ROC curves for SUVmax and SUVmean were 0.88 (p=0.001) and 0.75 (p=0.024). Using a cut-off value of SUVmax of 16.6, the sensitivity and specificity were 85.7 % and 100 %. With a cut-off value of SUVmean of 6.7, the sensitivity and specificity were 78.6 % and 71.4 %.

Conclusions
While it is still challenging to distinguish enchondroma and LCS in the long bone, SPECT scan might facilitate differentiation of the diagnoses. Further studies on more cases with longer follow-up should be mandatory.
Revitalization of frozen autologous bone graft by using adipose derived stem cells

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Aim/Objectives: Adipose-derived mesenchymal stem cells (ADSCs) are highly safe and pluripotent stem cells. We are conducting a research on tissue regeneration using adipose-derived regenerative cells and ADSCs. In this study, we report the ability of ADSCs to regenerate frozen bone in vitro and in vivo for clinical application.

Methods: Culture supernatant of ADSCs served as the conditioned culture group, whereas Dulbecco’s Modified Eagle Medium (DMEM) was used as the control group. Rat osteoblasts were cultured using a medium consisting of conditioned or control medium as an in vitro experimental model, and the signaling pathway of osteoblasts was examined using the western blotting assay. In addition, RNA was extracted from rat osteoblasts co-cultured with rat ADSCs in non-contact co-culture (ADSCs group) and rat osteoblasts in non-contact co-culture (control group), and the gene expression level was examined using various types of real-time PCR. Next, as an in vivo experimental model, the femoral shaft of the rat was removed and was frozen with liquid nitrogen, which was then reimplanted with an autologous bone transplantation. Using type I collagen gel plus $5.0 \times 10^6$ ADSCs (ADSCs group) and without ADSCs (control group), histopathological examination of bone regeneration ability was conducted.

Results: In vitro, the conditional culture of ADSCs enhanced the Smad and JNK pathways of the differentiation and osteogenesis signal of osteoblasts. BMP2 expression of osteoblasts in the co-culture group was significantly lower than that in the control group. In vivo, in the 8th week, the ADSCs group had significantly higher revitalization rate compared with the control group. Moreover, the osteogenesis-promoting action of ADSCs for frozen bone was suggested.

Conclusions: In vitro, the promotion of osteoblast differentiation and osteogenesis-promoting action of ADSCs was confirmed. In vivo, the possibility of promoting frozen bone regeneration was suggested, and its clinical application is expected in the future.
Background - Distal tibial tumor are not uncommon, but reconstruction of distal tibial defect after resection of the whole tumor out with sound oncological margin, is very difficult, because of ankle mortis and management of soft tissue is also difficult. In our study we have done tibialisation of fibula, along with centralization of fibula and arthodesis of distal talofular joint, further augmentation by distal tibial locking plate.

Aims and objectives - to evaluate long term result of biological reconstruction.
And possible complications.

Material and method - In between January 2013 to January 2016 we have selected 6 cases of distal tibial malignant tumor at IPGME&R KOLKATA.
After clinical evaluation we use core needle biopsy most of the cases for histological diagnosis. Then as per decisions of tumor board we send selected case for Neoadjuvent chemo or induction chemo at Radiotherapy department. We perform limb salvage in selected cases and perform biological reconstruction. We allow weight bearing after radiological hypertrophy of fibula around 3 months. Mean follow up 18 months.

Results - we have done a prospective observational study using MSTS system to evaluate clinical outcomes of the performance after the operation.
One case got infected treated with debridement. Other patients doing well with average MSTS score above 23. As there is no chance of donor site morbidity and handling of soft tissue is easier as there is single bone leg. This procedure need no microvascular expertise.

Conclusion - we have seen as a mother bone fibula help us for successful limb salvage both in short term and long term.
Abstract Title: Reconstruction methods after internal hemipelvectomy in malignant pelvis tumors in children and adolescents.
Authors: Andrzej Szafranski, Magdalena Rychlowska-Pruszynska, Bartosz Pachuta, Iwona Malesza, Justyna Dusinska, Tomasz Walenta
Presenter: Andrzej Szafranski, Institute Of Mother & Child, Poland.

Purposes: summary of reconstruction methods after hemipelvectomy in malignant bone tumours resection in children and adolescents.

Methods: retrospective analysis of the patients treated in Institute of Mother & Child with malignant bone tumors of the pelvis in the period 1994-2017. In the period 1994 to 2017 in our Clinic 74 patients have been operated with primary malignant bone tumors in pelvis localization; 41 boys and 33 girls, in age from 5 to 18 years, average 13 years. Operations have been made in second step, after neoadjuvant chemotherapy. In histopathologic diagnosis were sarcoma Ewingi in 45 pts., osteosarcoma in 21 pts., chondrosarcoma in 8 pts.

Localization by Enneking classification; stage I were in 22pts, stage II in 41 and stage III in 11 pts. Total hemipelvectomy have been made in 4 pts and internal hemipelvectomy in 70 pts In reconstruction were used different systems; bone grafts, AO plates, endoprostheses and trevira tube. Custom made endoprostheses, Lumic endoprosthese, 3D custom made implants.

Results. Alive 53 from 74 pts, follow up 2 to 23 yrs, mean 6,2 yrs. Early and late complication were observed in 34 cases. Satisfactory functional results in 68 %

Conclusion; Possibility of internal hemipelvectomy depends on; 1) localization and extent of the tumor; 2) tumor reaction after neo-adjuvant chemotherapy 3) patients age. Internal hemipelvectomy as limb salvage surgery is satisfactory, but sufficient results of surgery depend on extent of operation and good rehabilitation. 3)Operator experience is of basic importance for surgery.4) In our opinion best results we can achieve by closing the pelvic ring after the end of patients growing 5) In children the mixed – lumic and 3D implants solution seems to be the better reconstruction in spite of pelvis growing
We present a case of a recurrent giant cell tumor of the distal humerus managed with en-bloc resection with arthrodesis using non-vascularized fibular graft. This is a case of 18 year old male with a five-month history of left elbow mass. Radiographs showed lysis of distal 10cm of the humerus. Open biopsy revealed giant cell tumor of the distal humerus. Initial management was extended curettage with iliac bone graft augmentation. Local recurrence and progression of lesion was observed after seventeen months. Patient eventually underwent en-bloc resection of giant cell tumor of the distal humerus with elbow reconstruction using non-vascularized fibular graft with plates and screws. Elbow arthrodesis at one hundred ten degrees of flexion was done to maintain position of function. No palsy was noted immediately post-operatively. Patient maintained on arm sling one month post-operatively with stable elbow arthrodesis. En-bloc wide resection is required for cases of aggressive local recurrence. Reconstruction using non-vascularized fibular autograft can be an option for elbow reconstruction in distal humerus resections more than 10cm in length.
The aim of present study was to investigate the preliminary results of patients who received external fixation system for the treatment of bone defect, limb length discrepancy (LLD) and deformity caused by bone tumor excision.

Methods Twenty-two patients received external fixation treatment using Orthofix for bone defect after tumor excision or complications after limb salvage surgery between June 2011 and March 2016. The diagnosis was osteosarcoma in 10 patients, Ewing’s sarcoma in 2 patients, ABC in 5 patients and other diagnosis in 4 patients. The patients included 11 males and 11 females with a mean age of 16.5 years old. The location of bone defect or LLD was proximal femur 6, diaphysis of femur 3, distal femur 8, proximal tibia 2 and diaphysis of tibia 3. The external fixation was used for adjuvant fixation after complex reconstruction in 10 patients, bone distraction lengthening for LLD in 5 patients, temporary fixation after open biopsy in 3 patients, fixation for pathology fracture preoperatively in one patient, bone transportation over locking plate in 1 patients, and joint distraction for dislocation after tumor ablation in 2 patients.

Results The mean follow-up for all 22 patients was 36.0±17.8 months. The mean length of bone defect was 12.3±4.2cm, and the bone defect was reconstructed by vascularized fibular, allograft and autograft. The mean external fixation period was 4.8 months . All the ten patients got bone union. The mean MSTS score was 87.2±6.5. The mean distraction length was from 6.5 to 8.5cm. Complication included 2 axial deviation during distraction and 2 fractures after removal. Pin site infection was observed in 2 cases. The mean MSTS 93 score for bone lengthening group was 89.2±5.1

Conclusion Orthofix external fixation system can be used in reconstruction for complex bone defect after tumor resection and to correctnLLD after limb salvage surgery.
The reconstruction of large bone defect at diaphysis or metaphysis in children following resection of malignant bone tumors remains a challenge. The biologic preservation of joint surface, a long-term viable reconstruction and ideally preserving the growth potential are the optimal reconstruction procedure. Although several biological reconstructions methods are reported, the optimal reconstruction is debatable. Here we present our results of reconstruction using recycled tumor bone with vascularized fibular graft.

Methods Eleven pediatric patients who underwent lower extremity limb salvage with the use of pasteurized tumor bone and intramedullary free fibular transfer were identified. There were ten boys and one girl with a mean age of 13.3 years and mean followup of 15.3 months. The defect was in diaphysis (n=5) and diaphysis (n=6) with 9 in femur and 2 in tibia. The mean defect length was 15.1 cm (9-21cm). Resected tumor bone was devitalized by hypertonic saline (10%) at 60°C for 20 min.

Results The mean period required for bone union was 9.3 months (6-16 months). Uptake of fibular can be seen on bone scan in 9 (82%) patients at 3 months after surgery. One postoperative infection occurred at 3 months postoperatively in a patient with tibia defect. One patient received amputation due to bone metastasis distal to the reconstruction location. No fracture or plate breakage was observed. The mean MSTS score was 84.8% at last follow-up. Fibular hypertrophy occurred in 2 patients with follow up period longer than 2 years.

Conclusions Use of devitalized tumor bone in conjunction with intramedullary vascularized free fibulas appears to be a reliable method for the reconstruction of large bony tumors of the lower extremity in children with acceptable complication rate.
Aims/Objectives
Giant cell tumour is a benign but aggressive lesion with a high recurrence rate. Treatment options varies according to the grading and extent of the tumour. Various methods of reconstruction has been described if resection is performed. We present a case of a 34-years-old lady with a giant cell tumour (GCT) of the distal radius who was treated with wide excision and reconstruction using deep circumflex iliac artery osteocutaneous flap.

Methods
A 37-year-old lady presented with GCT of the distal end radius (Campanacci Grade III) which required excision with skeletal reconstruction. However patient refused aggressive treatment for her disease. Instead she opted for extended curettage. Prior to surgery she was treated with denosumab to provide a rim of sclerotic bone to prevent perforation of the thin cortical bone. Recurrence of the tumour occurred 6 months later. and refused further treatment. She presented 2 months later with extension of the disease to the skin presenting us with great difficulty in achieving skin coverage after resection. MRI demonstrated intramedullary lesion with cortical erosions proximal of previous operative site, with significant extraosseous soft tissue component, bone erosion and aneurysmal bone cysts formation. There were multiloculated cystic lesion with haemorrhagic component within the subcutaneous tissue of volar aspect of distal forearm. Conventional angiogram of bilateral lower limb revealed an incidental finding of peroneal artery magna (PAM) of bilateral lower limb. Consequently, wide resection with free vascularized fibular flap was not possible. Instead a decision was made to use free osteofasciocutaneous deep circumflex iliac artery flap.

Result
The flap healed with no complications. However, due to the bulky nature of the flap liposuction of the surgical flap is being considered by the plastic team.

Conclusions
Management of Campanacci Grade III GCT is challenging which may require complex osteocutaneous reconstruction.
Aims and objectives:
En bloc resection, extracorporeal irradiation (ECI) and re-implantation have been used selectively at our institute as a part of limb preservation surgery of malignant bone tumours. We report our experience of using ECI for management of malignant bone tumours in the form of functional outcomes.

Methods:
From year 2015 to 2017, 15 patients with primary malignant bone tumours were enrolled into this study. The eligibility criteria included histopathological proof of malignancy, no evidence of distant metastases and suitability for limb preservation surgery. The affected bone segment was resected, irradiated extra corporally with a dose of 50 Gy and stabilized with the host bone, using suitable internal fixation. Functional outcome was assessed by Musculoskeletal Tumour Society (MSTS) scoring system. The patients were followed up to evaluate the healing of the osteotomy, functional recovery, potential complications due to graft as well as due to tumour such as local recurrence and distant metastases. The mean follow up duration was 24 months (range 12 to 36 months).

Results:
There were 8 males and 7 females with median age of 16.5 years. Histopathologically, 10 patients had Ewing’s sarcoma and 5 patients had osteosarcoma. Distribution of primary site was as follows: Femur 10 patients, tibia 3 patients and humerus 2 patients. The mean union time for diaphyseo-diaphyseal union was 11 months and for metaphyseo-diaphyseal union was 6.5 months. The mean MSTS score was 27 at last follow-up. Two patients developed distant metastases and died of disease. Implant failure and non union was seen in one patient requiring revision surgery. One patient had surgical site infection which was treated with debridement. One patient had arterial thrombosis leading to above knee amputation.

Conclusion:
Extracorporeal irradiation is an excellent form of reconstruction in appropriately selected patients who are suitable for limb preservation surgery.
 Objective
To evaluate the clinical outcome of Alcohol-inactivated autograft replantation with articulation preservation in treatment of osteosarcoma in distal femur, and to explain the reason for and treatments of common complications.

Methods
Ten patients with osteosarcoma in distal femur were treated with this method from January 2004 to May 2011 (7 males and 3 female), with the median age 21 years and average age 20.1 years (15 to 24 years) at surgery. On the basis of Enneking tumor staging, nine patients were identified as IIB stage, one as III stage. The postoperative results were evaluated according to MSTS limb function score system and ISOLS composite graft evaluation method.

Results
10 patients obtained first-stage healing. With the mean follow-up of 34 months (12 to 110 months), one died of local recurrence and metastasis 13 months after operation, and three died of multiple metastasis 9 months, 12 months, 24 months respectively after operation. Three cases (30%) experienced the second operation of open reduction, bone implantation and embracing fixator internal fixation because of inactivated autograft fracture, one of which died after half year, and one got bony healing after four months with no abnormal sign after 48 months’ follow-up. One of the above 3 cases experienced the third operation of open reduction and bone implantation with panel internal fixation, who got bony healing after half year and showed joint instability and limited knee flexion. The mean ISOLS graft score was 31 (87%) (range 28-34). The mean MSTS function score was 23 (77%) (range 19-28).

Conclusion
With the strict indication, it is a favorable operation for alcohol-inactivated autograft replantation with articulation preservation in treatment of osteosarcoma in distal femoral metaphysis, with the advantage of preserving important joint structure, good matching between host bone and inactivated bone, and no immunologic rejection.
Session Name: **Poster Session**
Theme: **Biological reconstruction**
Abstract Number: **138**
Abstract Title: **Pedicled iliac crest bone graft vascularized by the deep circumflex iliac artery for femoral neck tumor**
Authors: Michiyuki Hakozaki, Hitoshi Yamada, Takahiro Tajino, Akira Takeda, Soichi Ejiri, Ryoichi Kawakami, Nobuyuki Sasaki, Yoichi Kaneuchi, Shinichi Konno
Presenter: Michiyuki Hakozaki, Fukushima Medical University, Japan.

Purpose: The purpose of this study was to clarify the clinical outcome of pedicled iliac graft after curettage for femoral neck tumor.

Methods: The 4 patients with benign femoral neck tumor, mean age of 36.5 (20-50) years, who underwent a curettage followed by pedicled iliac graft vascularized by the deep circumflex iliac artery (DCIA) between 2001 and 2016 were enrolled. Three patients were males with giant cell tumor of bone and the remaining one patient was female with fibrous dysplasia.

Results: All the patients presented with pain, but pathological fracture was not observed. The mean longest diameter of tumor was 57.8 (40-84) mm, and all the tumors were involved in the femoral neck. After the curettage of tumor and adjuvant treatment with phenol or liquid nitrogen, bony defect was filled with pedicled iliac crest continuing DCIA. Postoperative follow-up period was 18-60 months. Pathological fractures caused by accidental weight bearing were occurred in two cases within one month postoperatively. In these cases, one patient was judged unable to keep non-weight bearing because of his mental retardation and underwent bipolar femoral head arthroplasty. Another patient was treated conservatively, and full-weight bearing was permitted 8.5 months after his fracture. Femoral head necrosis had not been observed in all the cases.

Conclusions: Filling the bony defect with living bone keeping mechanical strength had advantages in shortening of the period of limited weight bearing as a result of early bone union, preserving blood flow of the femoral head, and unnecessity of vascular anastomosis.
INTRODUCTION/OBJECTIVES:
Amputation and Biological Reconstructions (BR) are two common methods of reconstruction in musculoskeletal tumours. We present the time-based functional outcome for our patients in both these categories.

METHODS:
All patients who underwent BR or amputations in the last 10 years were evaluated using MSTS scores.

RESULTS:
Total number of patients for BR are 42 (17 males; 25 females) with mean age 31 years (8-48). Majority diagnosis are GCT (26), followed by osteosarcoma (10), Ewing’s sarcoma (3), and one case each of chondrosarcoma, MPNST, and fibrous dysplasia. 33 cases were upper limbs, and 9 cases were lower limbs. The average follow up period is 48 months (3-120), with mean total MSTS score of 79.85% (43%-100%).

Total number of patients for amputations are 23 (14 males; 9 females) with mean age 46 years (18-71). Majority are osteosarcoma (9), followed by squamous cell carcinoma (4), liposarcoma (3), epitheloid sarcoma (3), and one case each for Ewing’s sarcoma, pleomorphic sarcoma, myofibrosarcoma, and MPNST. 20 cases were lower limbs, and 3 cases were upper limbs. The average follow up period is 68 months (4-120), with mean total MSTS score of 65.17% (20%-100%). Majority of BR were autografts (93%), with vascularized fibula graft giving the best function (84.29 ± 73.33). The functional scores progressively improved and plateaued at 8 years (Figure 2). In amputation group, the functional score reached plateau early after 24 months and remained stagnant. The lower limb amputations scored better than upper limb amputations (64.63% vs 53.33%). The time - based MSTS scores is as shown in Figure 1.

CONCLUSION:
Biological reconstructions generally took longer time to attain maximum functional scores, whereas the amputations attained maximum at an earlier period. In general, the long term functional outcome of BR is better than amputation group.
Background: Methods of bone reconstruction by callotasis have been widely used in traumatology for the treatment of large segmental defects. Orthopedic oncology is not the exception due to the fact that tumor resections can generate massive bone losses. Although it is not classically taken as a first-line reconstruction method and it has a high rate of complications, we consider that these are the cases where a true biological reconstruction is carried out, stimulating the formation of the patient's own bone. The patient must be carefully selected, according to survival expectancy and bone consolidation potential taking into consideration the fact that oncological patients are subjected to various external factors that can generate failure of this technique.

Patients and Methods: We present a series of 9 patients, between 4 and 14 years old, with diagnoses of osteosarcoma, Ewing's sarcoma and 1 adamantinoma, treated by distraction of ossification callus with, monolateral or circular, according to the case, external tutor; 7 as primary treatment, and 2 as a response to previous failed treatment. All the patients were treated between 2008 and 2013 and the mean follow up was 4.4 years.

Results: Functional results ranged from good to very good, according to the MSTS scale, with a consolidation rate of 90% and an average transport of 8 cm. There were 2 consolidation delays, attributed to adverse effects of adjuvant therapy, resolved upon termination of chemotherapy protocols. In three cases, superficial infection of nails was presented, solved with specific antibiotic therapy and change of income spot of the pins o Schanz's nails.

Conclusion: On selected patients, with a good life expectancy and growth potential, and knowledge and acceptance of the characteristics of this type of treatment, callotasis generates a viable therapeutic option with good to very good functional results, generating a true biological reconstruction.
Objective: To evaluate the potency of bone strength scoring system (BSS) in facilitating the surgical selection for diaphyseal malignancies.

Method: Retrospective analysis was conducted on 30 patients with diaphyseal malignant tumors surgically treated from Dec 1996 through Dec 2015 (18 male cases and 12 female), the average age was 34.0 (8-82 y). Tumor locations included femur in 21 cases, humerus in 4, tibia in 3 and radius in 2. Osteosarcoma in 13 subjects, metastasis in 4, Ewing’s sarcoma and chondrosarcoma in 3 respectively, undifferentiated pleomorphic sarcoma in 2, periosteal osteosarcoma, lymphoma, Langerhans cell sarcoma, malignant giant cell tumor and rhabdomyosarcoma in 1 respectively. Alcohol inactivated bone re plantation in 18 subjects, segmental prosthesis in 4, in situ microwave ablation, autografting and total femur replacement in 2 respectively, allografting and rotating hinge knee arthroplasty in 1 respectively. Twenty patients underwent inactivated bone reconstruction (IBR) fixed with plates (11) and nails (9).

Outcome: Follow-up was available in 29 cases with a mean duration of 61.0±49.9 months. Infection occurred in 2 patients, metastases in 9, death in 7, recurrence in 4, one case finally had amputation. Fracture of the inactivated bone happened in 4 cases. Fracture incidence in nail fixation was 37.5%, slightly greater than that of plate fixation (9.1%). BSS measures for fractures were higher than those for other cases (11.0±1.2 vs. 8.3±1.8, P=0.01). ROC analyses revealed BSS is effective in predicting postoperative fracture (P=0.02). Logistic regression analysis showed the fracture risk percentage was 22.7% for 10 points, the false positive rate was 6.7%.

Conclusion: BSS was efficacious in predicting the fracture risk of the inactivated bone, BSS≥10 indicates IBR is inappropriate, mechanical reconstruction are segmental bone grafting are preferable in this scenario. Metastases, hematological malignancy and giant tumors are ideal candidates for mechanical reconstruction.
Objective: To evaluate the efficacy of antenna microwave radiofrequency in treating aggressive and malignant bone tumors, and to discuss the optimal indications for this technique.

Method: 33 patients with aggressive and malignant bone tumors treated from December 2013 through December 2016 were reviewed (17 male patients and 16 female) with an average age of 37.6 years (6-76 years). Osteosarcoma in 12 subjects, giant cell tumor in 8, metastases in 7, chondrosarcoma in 4, Ewing’s sarcoma and plasmacytoma in 1 respectively. Tumor locations included proximal tibia in 11 cases, distal femur in 10, proximal humerus in 5, distal radius in 3, humeral diaphysis in 2, distal tibia, mid-femur, and tibial diaphysis in 1 respectively.

Outcome: Follow-up was available in all subjects with a duration of 12-36 months. No evidence of recurrence, metastases, and death were found in 8 cases with giant cell tumor, 4 with chondrosarcoma, 1 with Ewing’s sarcoma and 1 with plasmacytoma. Three out of 7 cases with metastases showed no recurrence and death, 4 subjects lived with tumor. Recurrence occurred in 4 cases among those with osteosarcoma (33.3%), there were 3 lung metastases and 2 deaths, 1 subject took apatinib for 12 months and lived with tumor. Complications comprised distal femoral articular surface collapse in 3 cases, fracture and nonunion of the inactivated femoral diaphysis in 2, at the last interview 28 cases survived, limb functionality measured by MSTS revealed 30 in 23 cases, 24 in 4, and 20 in 1.

Conclusion: Antenna microwave radiofrequency technique is a procedure providing in situ inactivation of tumor cells. However, local recurrence incidence is considerable due to intraoperative maneuvers, therefore we suggest the optimal indications for this technique include adequate isolation of the neurovascular structures, non-weight-bearing positions, intraosseous lesions.
Aim:
The scapula is a relatively common site for malignant bone tumours. Total scapulectomy is an oncologically acceptable alternative to amputation when the whole scapula is invaded with tumor and the neurovascular bundle can be preserved during tumor resection. The aim of this study was to investigate functional outcomes using a Prolene mesh for reconstruction after total scapulectomy.

Methods:
The study comprised 10 patients, 6 of them were Ewings sarcoma, 3 were Chondrosarcoma and 1 was Osteosarcoma, operated between 2013 to 2017. All of them underwent excision in form of Total scapulectomy following Oncological principles and Prolene mesh was used for reconstruction. With an average follow up period of 30 months (12-48), functional outcomes were evaluated.

Results:
Mean MSTS functional score was 55%. Prolene mesh helped in getting good shoulder stability that helped in gaining preservation of elbow, wrist and finger motion and having an acceptable level of postoperative limb function.

Conclusion:
Total Scapulectomy and reconstruction with Prolene mesh is a feasible alternative to amputation in Scapular tumours as it preserves an acceptable elbow and hand function with good shoulder stability.
Session Name: Poster Session
Theme: Biological reconstruction
Abstract Number: 200
Abstract Title: Mid- to long-term clinical outcome of tumor-devitalized frozen autograft for malignant bone and soft tissue tumors of long bone
Authors: Akihiko Takeuchi, Norio Yamamoto, Katsuhiro Hayashi, Shinji Miwa, Kentaro Igarashi, Kensaku Abe, Yuta Taniguchi, Yoshihiro Araki, Hirotaka Yonezawa, Hiroyuki Tsuchiya
Presenter: Akihiko Takeuchi, Department of Orthopaedic Surgery, Kanazawa University Graduate School of Medical Sciences, Japan.

Aim/Objective
This retrospective study was aimed to investigated the mid- to long-term clinical outcome of tumor-devitalized frozen autograft treated with liquid nitrogen for malignant tumors of long bones.

Methods
We reviewed 165 patients reconstructed with frozen-autograft after tumor excision from 1999 to 2014. The inclusion criteria were the reconstruction with segmental frozen-autograft (Group S) (Fig. a) or frozen-autograft prosthesis composite reconstruction (Group C) (Fig. b) of long bone with a follow-up period longer than 2 years. Functional outcome, union time, complications and oncological status were investigated.

Results
Sixty-eight cases (35 male and 33 female) met the inclusion criteria. The mean age was 37 (range, 6 to 78) years and the mean follow-up period was 76 (range, 25 to 218) months. The reconstruction method was 39 in Group S and 29 in Group C. Mean MSTS score was 88.9% in Group C and 86.1% in Group S. Thirty-one of thirty-nine cases achieved the graft union in group S and the mean union time was 11.1 months. There were nine local recurrences from soft tissue, five infections, five implant failures, four graft fractures and four limb length discrepancies. The Group C showed the significant better event-free survival (89.4% in 5 and 57.5% in 10 years) compared to Group S (41.4% in 5 and 10 years). The cumulative graft survival was 92.8% (5 years) and 62.0% (10 years). There was no significant difference in two groups. The overall survival was 82.6% in 5 years and 71.4% in 10 years.

Conclusions
The incidence of complications in Group S was higher than in Group C, however those were managed by the additional treatment. The graft survival was eventually similar in both groups. Moreover, the both group showed the favorable limb function. Although further analysis is necessary, tumor-devitalized frozen autograft could be a useful biological reconstruction.
Purposes
Surgical treatment for giant cell tumor (GCT) around the knee joint is challenging. Common treatment options include bone grafting after intralesional curettage, tumor marginal excision and reconstruction with either hemicondylar osteochondral allograft or allograft-prosthesis-composite (APC). This study aimed to report our cases and analyzed factors affecting outcomes.

Methods
Fifty-three patients with follow-up longer than 6 years (28 distal femur, 25 proximal tibia) were enrolled into the study. Thirty-three patients were treated with intralesional curettage and bone grafting (group A). Eighteen patients received marginal excision of the tumor, while 14 patients were reconstructed with hemicondylar osteochondral allograft (group B) and 4 patients were reconstructed with APC (group C). The mean follow-up was 137.4 months in group A, 136.5 months in group B, and 78.5 months in group C.

Results
Recurrence and lung metastasis were 8/33 (24.2%) and 2/33 (6.1%) in group A, 1/14 (7.1%) and 1/14 (7.1%) in group B, 0/4 (0%) and 1/4 (25.0%) in group C. Nine patients in group A (27.3%) and 6 in group B (42.9%) developed advanced osteoarthritis at follow-up, but only 2 patients in group A (2/33, 6.1%) and 2 patients in group B (2/14, 14.3%) were converted to total knee arthroplasty. Risk factors for secondary osteoarthritis were related to tumor size and tumor-cartilage distance in group A and late complication of allograft in group B. The mean MSTS score was 87.7 in group A, 84.3 in group B and 95.0 in group C.

Conclusions
Though higher risk to develop advanced osteoarthritis at follow-up, marginal excision of the tumor and reconstruction with hemicondylar osteochondral allograft had better oncological outcomes than those treated with intralesional curettage and bone grafting. The risk of converting to total knee arthroplasty was similar in both groups. Though better functional performance at follow-up, APC should be preserved to those with severe deformity and concomitant joint destruction.
Introduction: Reconstruction after resection of bone tumors is a challenging job and wide array of implants are available in the market which may be out of the reach of Indian poor. We have devised some of our innovative, simple and long lasting solutions.

Methods: In the last 15 years we have treated 96 patients of aggressive bone tumours with different innovative and need based cost effective methods of reconstruction. These include: nail cement spacer for proximal humeral reconstruction, for the lower end of femoral reconstruction, for the upper tibial reconstruction, diaphyseal reconstructions, for the salvage of the infected knee mega prosthesis, certain biological reconstructions and innovative rotation-plasties and straight-plasties. These reconstructions were performed in view of the large size of the tumors, their difficult locations, and poor skin conditions with fungation.

Results: The results have been very much impressive and we now routinely performing these type of reconstructions for the given. Many of these reconstructive procedures are surviving for more than 7 years and the patients are doing well.

Conclusions: As our needs, expectations & circumstances are different from the western world we have innovated these methods of reconstruction. Many patients report quite late with large masses with poor skin conditions where amputation can be avoided using these simple and low cost procedures.
Session Name: Poster Session
Theme: Biological reconstruction
Abstract Number: 270
Abstract Title: Surgical treatment of recurrent giant cell tumors of the bones in extremities: should we be more aggressive?
Authors: Zile Singh Kundu
Presenter: Umesh Yadav, PGIMS, Rohtak- Haryana, India.

Background: Giant Cell tumor is the commonest surgically treated tumor. There is recurrence rate of 10-20% after extended curettage and <10% after resection. There are certain questions to be answered in regard to their further treatment after recurrence.

Patients and Methods: There were 24 recurrences and the age of patients ranged between 24 to 38 years. Eighteen patients were treated outside by general orthopedic surgeons. Four recurrences were in the soft tissues and 20 in the bone. Six lesions inside the bone presented as Campanacci grade 2 and 14 as grade 3 with extension in the soft tissues. The distal radius (eight patients) was the commonest site for recurrences. Six lesions within the bone were treated with the further extended curettage and cementation. Four grade 3 lesions were treated with the resection-arthrodesis. Four soft tissue recurrences were treated with excision. Two patients with massive recurrences required amputation.

Results: The patients treated with further extended curettage with had good functions with their Musculoskeletal Tumour Society (MSTS) score ranging from 24-28 and those treated with arthrodesis had MSTS score from 18-22. The follow-up ranged from 1-8 years.

Conclusions: We conclude that local recurrence of giant cell tumours of grade 1 and 2 lesions after curettage can be treated with further curettage and cementation or other filler with minimal further morbidity. The soft tissue local recurrences are easily re-excised. The grade 3 lesions with extensive soft tissue extent are treated with resection and reconstruction like primary lesions in the same grade and extent. The recurrent lesions are not histopathologically different from primary lesions and need not to be taken as malignant transformation. These should be treated by orthopedic oncologist.
Aim: Sometimes limb salvage become difficult after resections of very large bone tumors and in the situation of fungations. In these cases we can plan to salvage partial limb or some of its parts so that amputation can be avoided. Thus a sensate limb with reasonable good functions can be achieved. We shall discuss these cases in this presentation in detail.

Patients and methods: There were 27 patients (from 2003 to 2016) of large tumors; some of them with fungation where we saved partial parts of the limb like foot, hand and forearm and leg. There were cases of giant cell tumors (10), very large osteochondroma (2), angiomatoid malignant fibrous histiocytoma (1), osteosarcomas (11), fibrosarcoma (1) and Ewing sarcoma (2). Wide resections with clear margins were performed and the reconstructions were done with novel and innovative methods so that functionally better than amputation and cosmetically acceptable limb can be salvaged. The chemosensitive tumors received chemotherapy as per hospital protocol. The follow up ranged from 2-14 years.

Results: All the patients were satisfied with salvaged limbs. One patient had neuropathic pain which was controlled with neurotropic drugs and had pain relief. Two patients of osteosarcoma and one patient with Ewing sarcoma died of distant metastasis. The functional scoring was done with MSTS score which ranged from 19.50-24.00 (Average: 21.50)

Conclusions: In our country late presentations of tumors are very common and limb salvage with full function after adequate wide resection becomes uphill task. Amputation remains the option. But it can be avoided by planning the resection and salvaging some part of the limb though it may require sacrificing some nerve, musculotendinous or osseus structure. This salvaged limb can function better that amputation and prosthesis fitting; with added psychological feeling of salvaged limb part.
The resection of pelvic bony tumours and that too of malignant ones is a challenge. There is a need to obtain clear margins and prevent tumor recurrence along with preservation of limb function whenever feasible. Challenges include both tumor resection and pelvic reconstruction.

The reconstruction after pelvic tumor resection must be individualized for each patient as per the needs and requirements. One must consider the age, expectations, functional status, and the extent of the lesion. As there are circumstances where patient expects functions of hip including squatting and cross leg sitting which is very much essential for their daily needs. Keeping in view of these requirements of the patients we have done pelvic resections for malignant and locally aggressive bone tumours with no reconstruction. Some of the tumours involving the part of ring can be easily excised without disturbing the stability of the ring as an expendable bone like in the iliac wing and ischium. There are others with peri-acetabular involvements requiring difficult resection and reconstruction or flail hip.

We have treated 24 patients in last 10 years without any reconstruction after resection of tumours at different locations in the innominate bones with no reconstruction. We are presenting our experience with these novel techniques suitable for a subset of the patients with a particular indication and there results in this presentation. How could we get good results; and the techniques are described.
Introduction: Bone tumors occur most commonly around the knee joint. There are different modalities of the treatment for these sarcomas; including amputation or limb salvage procedures and rotation-plasty.

Method: Fifty-two tumors were treated by this method in the last 15 years including osteosarcoma, chondrosarcoma, malignant fibrous histiocytomas and other malignant and benign aggressive tumors. There were 38 male and 14 female patients. The surgery included the wide resection with adequate margins after innovatively applying the tourniquet in the supra-trochanteric area for the lower femoral tumors. Rotation-plasty was performed and the fixation was done using intramedullary nail instead of plate. A trough in the broad metaphyseal tibia allowed more contact area for union. Chemotherapy was given as per hospital protocol.

Results: As far as the fixation and union of the site is concerned we had no case of non union. The nailing was easy to perform and retrieve without damaging the loop of neurovascular structures. The overall procedure related results had been quite encouraging.

Discussion: Rotation-plasty is described method for young patients for the sarcomas around the knee and is better than amputation as there are no phantom sensations, no neuromas and there is preservation of the proprioception and the psychological feeling of the salvaged foot. This procedure needs lot of counseling.
Aim / Objectives: Limb salvage procedures in patients with immature skeleton afflicted with bone tumours present a unique challenge in that the reconstruction of the defect must be dynamic so as to accommodate future growth. We present a case of biologic reconstruction of a large defect following resection of a femoral diaphyseal Osteosarcoma in a 11 year female child.

Methods: A female child age 11 years presented with swelling in the right thigh. Plain X ray revealed a sclerotic growth in the diaphyseal area. She was investigated and biopsy was done. The diagnosis was a non metastatic High Grade Osteosarcoma of the right femur diaphysis. She underwent Neo Adjuvant protocol 3 cycles of anterior chemotherapy. The reconstruction options after en bloc resection were Intercalary Autologus Bone graft, Allograft and Metallic Intercalary prosthesis. After detailed counseling it was decided that the 12 cms defect be reconstructed with Periosteal ensheathed Non Vascularised Autologus Fibula graft. The graft was fixed by means of a specially designed distal femoral plate. Care was taken not to violate the distal femoral epiphysis. Specimen revealed > 95% necrosis. Further chemotherapy was continued for 3 more cycles. The patient healed uneventfully.

Results: At follow up of 6 months the graft showed good union and incorporation at both resection ends. Currently at 3.25 years of follow up the disease is loco regionally controlled. There is no limb length discrepancy. The grafted fibula has hypertrophied. The patient has returned to full function and normal life.

Conclusion: Periosteum ensheathed fibula graft used in selective cases offers an excellent biologic reconstruction option. Advantages are it can be easily done in any set up, is cheap, readily available. After osteosynthesis the graft hypertrophies (almost to host bone diameter) and offers a good mechanically strong biologic reconstruction option.
Purpose: The aim of our study was to evaluate the functional outcome in patients undergoing ECRT for tumors of lower limb

Methods: Prospective observational study carried out between January 2010 and January 2016. A total of 37 patients who underwent ECRT for malignant tumors of the lower limb were evaluated. Patients received chemotherapy wherever required. Post tumor resection we debulked the tumor and irradiated specimen with one dose of 50 Gy. Plain radiography was used in assessing union while functional outcome was evaluated using MSTS scoring.

Results: There were 23 males and 14 females in the study. Avg age was 18.6 years. Average follow-up was 3.7 years (range 3-6 years). Femur was the commonest bone involved (20 patients) followed by Tibia (n=13), Calcaneus (n=2) and Pelvis (2). Ewings sarcoma was the commonest histopathological diagnosis (n=20) followed by Osteosarcoma (n=6), MFH (n=3), Chondrosarcoma (n=4), Pleomorphic sarcoma of bone (n=2), Hodgkins Lymphoma of bone (n=1) and Clear Cell Sarcoma (n=1). Union was assessed at the osteotomy site using plain radiography and at least three cortices should have been united on AP and Lateral views to qualify as complete union. The average time to union was 8.6 months (6-17 months). Union was achieved in 21 patients. 9 patients underwent non union and required some form of intervention. Average MSTS score at the end of 3 years was 25.4. Infection was the commonest complication (n=12). 11 patients died due to disease (at an average of 13.2 months after surgery) and 2 patients were alive with disease. The Knee Society Score was done on 13 patients at the end of 3 years. The average Knee Society Score was 88.4 (range 70-94). There were 2 local soft tissue recurrences.

Conclusion: ECRT is an effective biological and cost effective method of limb reconstruction following tumor resection.
INTRODUCTION:
Sacrectomy is a procedure performed to remove sacral tumors. The techniques of sacrectomy were popularized by Gunterberg. It poses unique challenges to surgeons due to complex biomechanical properties of spinopelvic junction. We are sharing our sacrectomy experience over a decade of follow up to 68 months. The main objective is to evaluate the functional and oncological outcomes.

MATERIALS & METHODS:
It is retrospective study of 5 patients who underwent spinopelvic reconstruction for various sacral tumors from 2006-2017.

RESULTS:
There were 2 patients with sacral chordoma, 2 patients with sacral schwannoma and one patient with sacral chondrosarcoma. Fig 1 and Fig 2 represent X-ray and MRI showing in heterogeneous mass from L5 finding from a patient suffering from sacral schwannoma. 2 patients had iatrogenic rectal injury during the procedure. Only one patient had normal bowel and urinary movement while the rests developed urinary and bowel incontinence post-operatively. 4 patients developed wound dehiscence post-operatively, however all healed with dressing and antibiotic. 4 patients had recurrent while the other one is still under observation. Of all 4 patients with recurrent, only 1 patient underwent radiotherapy. 1 of the patients were lost during follow up.

CONCLUSION:
Resection is associated with neurological deficit in 4 cases. Blood loss is significant consideration cases ranging from 2 -13 units. Preoperative embolization or intraoperative ligation of internal iliac decreased the blood loss. Surgical complications including superficial or deep infection cause significant morbidity. 40% of patients developed superficial and 40% deep infection. Treatment of sacrectomy for sacral tumor is crucial and requires proper pre-operative planning. Despite well-planned surgery, intra and post-operative complications are unavoidable. Negative surgical margin is difficult to achieve especially in advance cases. Sacrectomy may reduce the tumor bulk and offers possible long term disease freedom.
Session Name: **Poster Session**  
Theme: **Biological reconstruction**  
Abstract Number: **317**  
Abstract Title: **Wide Resection Giant Cell Tumor of Distal Ulna and stabilization ulnar stump with extensor carpi ulnaris tendon (Three Case Reports)**  
Authors: Mujaddid Idulhaq, Savero Iman Harisuko, Pamudji Utomo, Handry Tri H, Ambar Mudigdo  
Presenter: **Mujaddid Idulhaq, Prof Soeharso Orthopedic Hospital/ Sebelas Maret University, Indonesia.**

**Background:** Giant cell tumor (GCT) of bone occurred in the distal end of the ulna is extremely uncommon. Wide resection is usually indicated in such cases and at times it may be necessary to remove of a long segment of the distal ulna. The functional reconstruction of the defect after resection has been a challenge. Wide resection of the distal ulna with or without reconstruction or stabilisation of the ulnar stump is the recommended treatment for GCTs in such locations.

**Patient and Method:** A total of 3 cases of giant cell tumor of distal ulna. They treated with wide resection and stabilization of ulnar stump by extensor carpi ulnaris. We evaluating outcome use Musculoskeletal Tumor Society (MSTS) Score for upper extremity.

**Result:** There were 3 patients. all of them present with lump of their wrist and the pain over the lump. Patients treated with wide resection and stabilization of ulnar stump by extensor carpi ulnaris. The result from evaluation of Muscoskeletal Tumor Society (MSTS) Score were average 24 point.

**Conclusion:** Giant cell tumor of bone is a rare, generally benign, locally invasive tumour. The ulna distal extremity is an unusual site for a primary bone GCT. Any ulnar resection proximal to the insertion of pronator quadratus can lead to instability in the form of radio-ulnar convergence and dorsal displacement (wining) of the ulnar stump. This can result in diminution of forearm rotation and weakness with grasp. The main goal of the stabilization is to stable, pain-free and functional outcome of wrist. In this case report our patient with giant cell tumour were treated with wide resection and stabilization of ulnar stump by extensor carpi ulnaris. All of the patient satisfied with our treatment.  
Keywords: giant cell tumor, wide resection, stabilization of ulnar stump, Musculoskeletal Tumor Society Score
Rotationplasty is a salvage procedure that has been in existence for almost a century. Inopportune,
it has not been maximized due to the unconventional cosmesis of a rotated foot. Patients and
caregivers tend to veer away from the procedure in favor of the more novel endoprosthetic
reconstruction (EPR). However, emergence of complications associated with EPR and other limb-
slavage techniques has reestablished rotationplasty as a viable, time-tested, and time-honored
biologic reconstruction. It is a rare procedure, mostly done among the skeletally immature, and
seldomly, in skeletally mature patients. Current literature is scarce on its outcome and
generalizability to mature patients. We report two cases of rotationplasty in patients ages 18 and 46.
Results have been promising with radiographic union achieved and patient ambulating on prosthesis.
Furthermore, preliminary data on the outcome in a 46-year old patient opens avenue on the utility
and functionality of rotationplasty even in advanced age. The data from this report can add to the
limited fund of knowledge on rotationplasty in skeletally mature patients.
Introduction: Reconstruction of periacetabular defects is possible with non-anatomical total hip arthroplasty approach, which places the acetabulum in a variably high position and extends the femur with tumor prosthesis to match the acetabular position.

Patients and Method: The procedure was performed in 10 patients (M/F: 5/5), who underwent internal hemipelvectomy with extraarticular resection of hip joint for various primary malignant bone tumors between 2005-2018. Mean age was 33 (16-54) years and follow-up was 35 (2-111) months. Multihole acetabular cups ranging between 38-44 mm in diameter were implanted cementless with screws and non-constrained polyethylene liners were used in all patients. Cups were implanted in iliac wing in one, S1 vertebral body in one, ala sacrum in 3 and sacroiliac joint in 5 patients. Cups were augmented with fresh-frozen femoral head allograft in one patient and with structural iliac autografts in 5 patients. Femoral head component was 22 mm in 9 patients and 28 mm in one patient. Mean proximal displacement of femoral head rotation center was 84 mm. Femoral osteotomy was performed at pertrochanteric level in 9 patients and proximal shaft in one patient. Mean total femoral extension was 124 mm. Capsular reconstruction was done with polypropylene mesh and suture anchors in all patients. Abductor arm was substantially spared in 2 and partially preserved in 2 other patients. Maintaining joint stability was the major reconstructive challenge.

Results: Most important complications were deep infection with 4 (40%) patients and dislocation with 2 (20%) patients. All infections were managed successfully by retaining the implants. While dislocation was treated successfully in one patient with proximal femur and capsule revision, the other patient was lost due to disease progression. Mean MSTS score was 19.8 (7-25 out of 30).

Conclusion: This reconstruction technique provides a mobile and durable solution for periacetabular defects with minimal hardware possible.
Introduction: The most problematic aspect of surgical management in recurrent aggressive fibromatosis cases is usually the difficulty in identification and atraumatic dissection of neurovascular structures. We use synthetic (polytetrafluoroethylene-PTFE or polyurethane) vascular grafts to prevent invasion and to provide guidance for dissection of major neurovascular structures in cases where recurrence is highly anticipated.

Patients and Methods: Ten patients (M/F: 5/5), who underwent index surgical treatment for extra-abdominal aggressive fibromatosis by the senior author and were applied synthetic vascular graft following resection between 2009-2016 were identified and retrospectively evaluated. Mean age was 22.2 (4-41) years, tumor volume was 537 (110-1324) cm³ and follow-up was 54 (20-100) months. Four (40%) patients were primary cases and tumor location was lower extremity in 8 (80%) cases. Synthetic vascular grafts were applied primarily around 4 sciatic, 4 tibial, 4 fibular nerve segments, 2 femoral and 1 popliteal artery segments, 1 axillary nerve and posterior circumflex artery bundle, 1 ulnar and 1 median nerve segments. The mean length of protected segments was 25 (5-45) cm. Local recurrences were observed around 4 sciatic, 1 tibial and 1 fibular nerve segments in 5 (50%) patients. Extreme care was taken to adapt the sheath diameter to that of neurovascular structure to prevent both strangulation and ingrowth.

Results: All recurrent masses were removed successfully without any sacrifice or accidental injury of the involved nerve segment. Except for one case, the recurrent lesions were dissected together with the sheath from inside. Removed sheaths were replaced in same session. No clinically significant neural complication was observed after either primary vascular graft application or secondary graft application following dissection of recurrent masses.

Conclusion: Synthetic vascular grafts are effective tools as tumor barrier and dissection guide in aggressive fibromatosis cases where surgery involving major neurovascular structures cannot be avoided and recurrence is highly probable.
Aim/Objective: Osteosarcoma which is the commonest primary bone tumour affects mainly children in the second decade. The aim of the study was to find out the demographic spread of the patients with the help of data of patients coming for treatment for Osteosarcoma at Regional Cancer Centre (RCC), Trivandrum which is the nodal centre for cancer treatment in the state of Kerala. The second part of the study was to find out any attributable cause if any for the higher incidence of the disease in any district if the data proved it to be true.

Method: in this retrospective study the data of patients who came for treatment for Osteosarcoma at RCC Trivandrum between 2010 and 2015 were assessed. 107 cases from 14 districts of Kerala had come for treatment at RCC for osteosarcoma during the study period. The district wise distribution of these patients, age at presentation and socioeconomic status were assessed.

Results – Majority of the patients were in the 10 – 20 year age group with majority of patients from south Kerala. There was no significant difference in the distribution of patients through the 14 districts in Kerala. The majority of patients coming for treatment were from the lower socioeconomic group but this could not be extrapolated as osteosarcoma was more common in this group as the patient distribution in other treatment centres were not assessed

Conclusions Osteosarcoma in Kerala is almost equally spread over its 14 districts with no predilection to any particular area
Aim: Diagnosis and treatment of grade 1 chondrosarcoma remain controversial. We performed a review of a single-center series with the aim of assessing the oncologic outcome of these patients, verifying if intralesional curettage can be adequate treatment, and defining clinical criteria to support the surgeon and the oncologist in decision-making for surgery and subsequent follow-up.

Material and Methods: A retrospective study of 8 cases of grade 1 chondrosarcoma of long bones of lower limb which were treated with intralesional curettage was performed. Intralesional curettage with high speed burr was supplemented with fibular strut graft taken from opposite side. Standard clinical follow-up contained regular visits to the orthopaedic department, physical examination and radiological follow-up with plain X-rays and CT-Chest.

Results: Minimum follow-up was 24 months. No patients developed local recurrence. No distant metastases were observed. Radiologically the fibular graft incorporation within the defect was successful. Functionally all patients are doing well, no skin problems, no joint stiffness were observed. All of them were started on touchdown weight bearing by six weeks, partial weight bearing by 12 weeks and full weight bearing without support by 16 weeks.

Conclusion: Grade 1 Chondrosarcoma of the appendicular skeleton with no aggressive imaging features can be treated with intralesional curettage with high speed burr and fibular strut grafting. However, when aggressive biologic behavior is evident on imaging, segmental resection following surgical principles of malignant bone tumors seems more appropriate. This technique is a viable option in the reconstruction of cavitary bone defects following intralesional curettage of grade 1 chondrosarcoma.
Session Name: Poster Session
Theme: Biological reconstruction
Abstract Number: 392
Abstract Title: Reconstruction using sterilised tumour bone for primary malignant tumours of upper limb
Authors: Subin Sugath, Shrijith Nair
Presenter: Subin Sugath, Aster Medcity, Kochi, India.

Delivery of lethal dose radiation to resected tumour bearing bone, and re-implantation of the resultant dead autogenous graft, is a selectively used option for limb preservation. We report an analysis of 6 patients treated likewise in our institution.

Methods:
This is an analysis of 6 patients from a prospectively maintained database from Aster Medcity Kochi & Regional cancer centre, Trivandrum, who underwent extra-corporal radiation therapy between March 2012 and December 2015. After en-block resection, the bone was cleared of tumour, subjected to 50 Gray single dose radiation and re-implanted. Bone cement was used to fill the medullary canal. Adjuvant, neoadjuvant therapies and follow up were as per institution protocol. Patients were evaluated for surgery related complications, resultant delay in adjuvant therapy, bone union, recurrences, functional outcome using Musculoskeletal Tumour Society (MSTS) scoring system and deaths.

Results:
The median age of study patients was 12 years (1-34). There were 4 males and 2 females. 5 had osteosarcoma and one patient had Ewing’s sarcoma. The involved bone was humerus in all the cases. Trucut biopsy was used for tissue diagnosis in all patients. All patients received neoadjuvant chemotherapy. The mean length of bone resected was 10.57cm (9-18). Bone and marrow margins were free of tumour in all cases. One patient had surgery related complications, wound hematoma, which required wound wash out. Bone grafting as a second surgery was done in 2 patients. Adjuvant chemotherapy was started within 3 weeks of surgery in 5 (83.83%) patients. There were no local recurrence. One patient developed lung metastasis. The mean MSTS score of study population was 26.33.

Conclusion
Extra corporal radiation therapy is an oncologically safe option with satisfactory functional outcome for selected cases. It ensures effective tumour kill and spares surrounding tissues of radiation.
Session Name: Poster Session
Theme: Biological reconstruction
Abstract Number: 401
Abstract Title: Primary flap reconstruction for tissue defects in Musculoskeletal Oncology: Experience from a tertiary cancer care centre in India
Authors: Sohan P R, Pramod Chinder, Srinath Doddarangappa, Utkarsh Pal, Suraj Hindiskere
Presenter: Sohan P R, Health Care Global Hospital, India.

Background: Significant tissue defects may result from sarcoma excisions with exposure of tendons, bones, joints, vessels and prosthetic material, making substantial coverage crucial. Delay in healing places undue stress by delaying adjuvant therapies.

Aim: Analysis of the outcomes and benefits of tissue reconstructions in sarcoma cases

Material and Methods: 64 patients operated for soft tissue and bone tumours (benign and malignant) between November 2013 to Feb 2018, needing soft tissue coverage were included in the study. Pedicled and/or free flap reconstruction was performed. Postoperative pathological margins and patient functionality were studied. Donor and recipient sites were serially monitored. Revision, complications, disease progression and patient survival were analysed.

Results: Of 64 patients, 42 (67.74%) were men, mean age was 43.6 years. 69% of the operated patients had primary sarcoma. Wide resection was performed in 78% of the patients, segmental resection in 17%, extended aggressive curettage in 3% and segmental amputation in 2%. 46 pedicled flaps, 12 free flaps and 6 combined (pedicled + free-flaps) were performed. In 81% of the patients flap reconstruction was performed on the same day as tumour resection. The success rate was 92% for the pedicled flap group, 94% for the free-flap group, and 100% for the pedicle + free-flap group. 5 developed deep infections. Two patients underwent subsequent amputation in view of disease progression. Satisfactory functional outcome was achieved in 71% of the patients. Overall survival rate at final follow-up was 83.5%.

Conclusion: Adequate marginal excision and prevention of infection by coverage of implants with better preservation of functions are easier with flaps and thereby result in a better quality of life. The role of multidisciplinary approach has been hereby stressed. Good results are attributable to meticulous workup, assessment of limb vascularity and a preconceived plastic reconstruction plan, prompt rehabilitation and proper counselling.
Introduction and Aim: Calcaneal tumour and its reconstruction is challenging as the heel plays an important role in weight bearing and maintaining a stable gait. The aim of reconstruction is to achieve a pain-free ambulation and return of normal daily activities.

Methods: We present 2 cases of benign calcaneal tumor and its reconstruction with vascularized and a non-vascularized iliac bone graft respectively. The first case was a young man with calcaneal chondroblastoma. He had a total calcaneectomy and retain heel pad and free composite vascularized iliac bone flap.

Results: Functional outcome was excellent with full weight-bearing at 5 months. The second case was a recurrent giant cell tumor of calcaneus in a young lady, who underwent total calcaneectomy with heel pad and reconstruction with non-vascularized iliac bone graft and pedicled sural flap. She had minimal ankle pain and ambulates with forearm crutches for a year, then ambulating without aid since then till now.

Conclusion: Iliac bone graft with the present of original heel pad produce superior result compare to non vascularised iliac crest with fasciocutaneous cover of heel pad.
Purpose:
The main goals of surgical procedures for bone metastases patients are stabilization of impending or established pathological fractures for good functional result and better quality of life.

Methods:
A review of a prospectively maintained surgical database identified patients for whom surgery was done for diaphyseal metastases. Of these 168 patients, 114 were operated for limb salvage and 54 had not have surgeries because bad general condition. We performed 48 modular endoprosthesis replacement, 38 plate or nail osteosynthesis + bone cementation, 28 palliative intramedullary fixation without segmental bone resection.

Results:
There are three groups of patients according American Anaesthesiology Scale.

Conclusion:
The final decision for a certain surgical procedure bases on patients survival rate, that could be predict according data of our created PC program and ASA stage. Right selected indications and correct surgery are a low morbidity procedure that provides immediate restoration of function, pain relief, durable stability and better quality of life.
Background: benign bone tumors and tumor-like bone lesions occur most frequently between the ages of 5 to 25 years. Surgical resection, curettage and cavity filling are most common treatment options for this lytic bone pathology. The autogenous cancellous bone graft is considered the gold standard. The allograft has osteoconductive properties, but limited osteoinductive potential. Calcium phosphate is the primary ceramic that is osteoconductive to reconstruction, as are hydroxyapatite, tricalcium phosphate and the combination of these two. We report 20 years outcome surgical resection, curettage of benign bone tumors and tumor-like lesions with mix ceramic-bone grafting filling the cavity.

Methods: we have retrospective reviewed the results of 184 patients with benign bone tumors and tumor-like lesions between 1996 and 2016 treated by curettage and implantation of different proportions of calcium phosphate ceramics and auto-allo-bone grafting. The mean follow-up was 10,5 years (1 to 20).

Results: at follow-up evaluation, the radiographs demonstrated complete incorporation of the implants and new bone formation in the cavity in 92% of the patients. Local complications occurred in 22 cases.

Conclusion: very few studies have addressed the ceramic-bone grafting of skeletal defects after benign bone tumor excision. We conclude that this graft matters combination is a useful and safe bone substitute for the treatment of benign bone tumors and tumor-like lesions.
**Objective**

Rib resection is not a common surgical procedure for orthopaedic surgeons. To obtain a better view of thoracic space, we used video-thoracoscopy during resection of rib sarcoma in collaboration with a thoracic surgeon. The aim of this study is to review the initial experience of rib sarcoma resection with video-thoracoscopic assistance (VTA).

**Methods**

We retrospectively analyzed perioperative and oncological outcome data of 5 patients who underwent rib sarcoma resection with VTA between 2015 and 2018 in our institute.

**Results**

The mean age of the patients was 57 years, and the mean follow-up period was 11 months. The histological diagnosis was 3 chondrosarcomas, 1 metastatic bone tumor of renal cell carcinoma and 1 osteosarcoma. Of the 5 patients, 4 patients underwent thoracic reconstruction. The mean operative time was 166 min (range, 112 to 235 min), the mean blood loss was 104 ml (range, 40 to 240 ml), and the mean hospital stay after operation was 12 days (range, 7 to 16 days). All patients had a clear surgical margin and no complication related to surgery. At the time of final observation, all patients were alive and no local recurrence and distant metastasis was found.

**Conclusions**

Rib resection with VTA is a safe and feasible procedure even for less experienced orthopaedic surgeons.
Session Name: **Poster Session**  
Theme: **How I do it!**  
Abstract Number: **46**  
Abstract Title: **New technologies in reconstruction of bone defects in children and youth with primary malignant bone tumors - own experiences**  
Authors: Andrzej Szafranski, Magdalena Rychlowska-Pruszynska, Bartosz Pachuta, Justyna Dusinska, Tomasz Walenta, Iwona Malesza  
Presenter: Andrzej Szafranski, Institute Of Mother & Child, Poland.

**Purposes:** to improve the results of reconstruction after pelvic malignant bone tumours surgery.

**Methods:** To resolve the problem of reconstruction after resection the primary bone tumors in inconvenience localization or the big mass of the tumor we can to take advantage of new concept of using existing solutions or innovation technology for replacement of massive bone defects after excision of primary bone tumor. Originally Lumic endoprosthesis was dedicated for hemipelvectomy type II and II+III by Ennekings classification. In specific situation we can using Lumic for reconstruction i.e. after hemipelvectomy type I, II and III by Enneking classification. In another situation we need innovation technology for replacement of massive bone defects after excision of primary bone tumor, for example Stratos system to reconstruction in the cases with thorax bone tumor localization. Complete new technology is 3D printer. We can produce the implants of any localization, any shape. We need only a good CT scan and computer software to produce the needed replacement for young patients.

**Results and Conclusions (by the clinical experience)** Chance for reconstruction of bone defects in children and youth with primary malignant bone tumors depends on: localization and extent of the tumor, tumor reaction on neo-adjuvant chemotherapy, patients determination, surgeon determination in using of new concept of existing technology or in using of new technology. Custom made endoprosthesis is very useful in the case of atypical tumor localization and it is possible to implant it after good response for neoadjuvant chemotherapy. Personal experience of operating surgeon and being faithful to success is of more importance for successful results.
The paper presents a case of a 6-month-old girl with a large left arm tumor detected after birth. After the biopsy, Ewing's sarcoma was diagnosed. The performed imaging examinations showed a large tumor comprising 2/3 of the left humerus with a large tumor in soft and exalted tissues. In addition, a metastatic lesion was visible in the proximal left humerus. There were no metastatic lesions in the remaining bones and in the lungs. Chemotherapy treatment was introduced. After applying 6 neoadjuvant chemotherapy treatments according to The Euroewing 2008 program has been significantly reduced. The tumor volume decreased 3 times. This allowed to plan the removal of the tumor along with the entire humerus and soft tissue tumor. In order to reconstruct the resulting cavity, the humeral endoprosthesis was made using the 3D printing technique. The procedure was performed on 5/12/2017. No complications were observed after the procedure. Currently, the patient continues adjuvant chemotherapy. The treatment was radical surgically. Intensive rehabilitation was applied. A full range of movements was achieved both in the shoulder and elbow joints. There were no movement and sensory deficits in the left arm. We consider the treatment effect as very good.

Conclusion: the 3D technique allows the preparation of even whole bone implants for a particular patient. This allows you to restore full operative efficiency of the operated limb. It was the first such treatment in the world.
Herein we present a rare case of solitary giant neurofibroma of sciatic nerve in 15 years old girl. She presented with soft tissue swelling in posterior compartment of thigh, easily confused with soft tissue sarcomas, as this patient has undergone for open biopsy somewhere else and diagnosed as neurofibroma. Magnetic Resonance Imaging (MRI) studies of affected limb, sciatic nerve fibers cannot be differentiate from tumor, although sensory and motor functions are normal but significant flexion deformity at knee, inabilities to weight bear, intermittent pain and infected biopsy scar and sinus. The limb salvage surgery is possible in those situations, where only few fascicles are involved rather than complete trunk. The microscopic dissection enables preservation of sciatic nerve and functional limb.

Conclusion; Solitary giant neurofibromas of major peripheral nerve with poor presentation can involve few fascicles rather than complete nerve trunk. Surgical intervention with careful planning can leads to dissected off the tumor from nerve fascicles and provides good functional outcomes.

Keywords; sciatic nerve, giant neurofibroma, infected open biopsy scar, limb salvage
Abstract Title: Navigation Assisted Geographic Resection and Allograft Reconstruction for Extremity Bone Tumors

Authors: Weifeng Liu, Lihui Xu, Bin Li, Yuan Li, Lin Hao, Qing Zhang, Xiaohui Niu

Presenter: Lin Hao, Beijing Jishuitan Hospital, Peking University, China.

Objectives The aim of this study is to evaluate the precision of navigation assisted surgical geographic resection and allograft reconstructions for bone tumors, facilitate resection and improve the allograft matching rate and reduce the gap.

Methods We retrospectively analyzed 19 consecutive extremities primary bone tumors, including distal femur 13, proximal tibia 5 and 1 distal tibia. The mean and median ages were 35.2 and 31 years respectively. Mostly were parosteal osteosarcoma, periosteal osteosarcoma, and periosteal chondrosarcoma. Import the patient’s data into the Stryker navigation system for preoperative bone cutting design, geographic resection line according to the tumor morphology. With the intraoperative data and preoperative image fusion, geographic line could be real-time guided by navigation system and we could execute accurately and more conveniently in tumor margin, allograft geographic taking out and transplant matching.

Results: With a mean and median follow-up of 40 and 38 months respectively, 1 patients developed LR (1/19, 5.3%), 2 metastasis and dead (2/19, 10.5%). All patients received satisfactory margin resection and accurate allograft matching. All transplanted allograft mean longitudinal length was 83.7 mm, the mean diameter was 40.2 mm, compare to the preoperative design for the tumor resection longitudinal length 83.1mm and diameter 40.2mm, it has good matching rate and no significant difference (P>0.05). Comparison of the mean gap space for free-hand group (3.3±2.0mm) and navigation group (1.8±1.2mm) between the host bone and allograft, it has significant difference (P=0.024). The mean and median allograft healing time was 10 and 9.5 months. The mean of functional scoring with MSTS for this group were 97.2±4.8%.

Conclusions (1) Computer navigation assisted accurate tumor resection and safe margin. (2) Navigation guided precise excision and reconstruction, facilitate bone healing and functional recovery. (3) Compared to the limitations of free hand, navigation technique is good choice for geographic resection and allograft reconstruction.
Objective: To evaluate the efficacy of intraoperative threedimensional(3D) Iso-C C-arm-navigated percutaneous radiofrequency ablation (RFA) of osteoid osteomas.

Methods: 35 patients (20 males and 15 females) with osteoid osteomas underwent treatment with intraoperative 3D Iso-C C-arm navigation-guided RFA. The tumour was first biopsied for pathological examination, the core needle was removed and the RFA needle was inserted into the nidus.

Postoperative X-rays and CT scans were performed to evaluate the degree of ablation and to assess for recurrence at 3-month follow-up. Patients also completed a visual analogue scale (VAS) both preoperatively and 3 days post-operatively to subjectively assess pain.

Results: Pathological diagnosis confirmed osteoid osteoma in 19 cases. The other 16 cases were not pathologically diagnosed owing to inadequate biopsy specimens. In all cases, localized pain was immediately relieved following RFA. Patients reported significantly decreased pain, with mean preoperative VAS scores of 3.4 reducing to 0.80 at 3 days postoperatively and further to 0.06 at 3-month follow-up (p < 0.05). The mean follow-up time was 15.5 months (range: 3–38 months).

Conclusion: 3D Iso-C C-arm navigation-guided RFA is a safe and effective option for the treatment of osteoid osteomas and may be considered in place of intraoperative CT-guided and open resection. Advances in knowledge: C-arm image-guided percutaneous RFA mitigates the need for preoperative CT as well as intraoperative scintigraphy, provides real-time imaging of the anatomy, facilitates accurate resection of the tumour and enables immediate confirmation of excision.
Background: Wide resection margins of osseous tumors are associated with a low incidence of local recurrence, making accurate measurement of the intraosseous extent of primary malignant long bone tumors is crucial. We compared the intraosseous tumor extent assessed by magnetic resonance imaging (MRI) with the gross specimen to evaluate the accuracy of MRI.

Methods: A total of 255 patients with primary malignant tumors in the long bones were included. Using MRI, we defined the length of tumor as the distance from the articular surface to the boundary between abnormal and normal marrow signal. The extent of the abnormal intraosseous signal was measured on unenhanced T1-weighted (T1WI) magnetic resonance images after chemotherapy. All gross surgical specimens were sectioned, and tumor extent was measured. Wilcoxon signed-rank test was used to test the differences between MRI and gross specimen findings. Spearman’s correlation analysis was used to test the correlation between groups.

Results: Median tumor length by gross specimen (112 mm; range, 45–300 mm) was longer than that by MRI (108 mm; range, 45–304 mm; Z = −6.916, P < 0.001). Of 255 images, tumor length was accurately represented on 27 T1WI magnetic resonance images, overestimated on 79 images, and underestimated on 149 images. The median difference between imaging and gross specimen measurements was 2.0 mm (range: 1.0–15.0 mm) for the 79 cases where tumor length was overestimated, and 5.0 mm (range: 1.0–18.0 mm) for the 149 cases where tumor length was underestimated. The Spearman correlation demonstrated a high correlation of tumor length on gross specimen with the tumor length on MRI (R = 0.99, P < 0.01).

Conclusions: We conclude that preoperative MRI could be a useful method in determining intramedullary malignant bone tumor boundaries and may serve as an accepted assessment method of long bone tumors before limb-sparing surgery.
Removal tumor and implanting prosthetic implant is the main surgical approach for the treatment of osseous sarcomas in proximal humeral bone. However, dislocation of shoulder joint often happens after reconstruction surgery. Synthetic mesh is a viable method for achieving instant and long term stability, but there are few reports on the biomechanical and biocompatible properties of synthetic meshes when reconstructing glenohumeral joint capsule. We did this study to investigate the biomechanical and biocompatible properties of synthetic meshes when reconstructing glenohumeral joint capsule. 2 patients who underwent glenohumeral joint capsule reconstruction due to proximal humeral sarcoma were included in the study. Two years after the reconstruction, biomechanical and histological tests were carried out on the amputated extremities to test the stability of the joint and the biocompatibility of the synthetic meshes. The result is stability of the reconstructed joint was better than, or similar to that of normal control group in different direction in a patient. According to this study, we think that reconstruction of glenohumeral joint with artificial mesh is a viable method to increase its stability. But the properties of reconstructed joint capsule can be varied according to the type of material and surgical method.
Session Name: **Poster Session**  
Theme: **How I do it!**  
Abstract Number: **152**  
Abstract Title: **Various approaches for percutaneous CT guided biopsy of vertebral Lesions: Anatomic and Technical considerations with outcome in 209 patients**

Authors: Amit Janu, Kunal Gala, Suyash Kulkarni, Nitin Shetty, Ajay Puri, Ashish Gulia  
Presenter: Amit Janu, Tata Memorial Hospital, India.

**Objectives:**  
To highlight appropriate safe access route planning and approaches for CT–guided biopsy of vertebral lesions to optimize the diagnostic yield.

**Methods:**  
Retrospective analysis of 209 consecutive percutaneous CT guided biopsy procedures of vertebral lesions was done using various approaches (Transpedicular, Anterolateral, Transcostovertebral, Paraspinal and Para laminar approach) from Jan 2014 to Dec 2014. To recognize the advantages of using different coaxial needles for getting better tissue for histopathology. The efficacy of the biopsy was confirmed with histo-pathological correlation.

**Results:**  
The location of the lesions were cervical in 11(5%), thoracic in 60(29%), lumbar in 63 (30%), and sacral in 75 (36%) patients, respectively. The diagnostic accuracy of the primary biopsy procedure was 97% (202 of 209). Of the 7 patients who had a negative biopsy result, four had sclerotic lesion, two had permeative lesion and one had lytic lesion. All the seven patients who had negative biopsy results underwent repeat procedure with diagnosis obtained in 4 patients making overall accuracy of 98.5%. One patient underwent open biopsy and two lost to follow up. Three patients had minor complications.

**Conclusion:**  
Our results of CT guided biopsy confirm that the procedure is safe and accurate. Familiarity with the cross-sectional anatomy, careful planning and technique with knowledge of hardware and pitfalls results in low complication rates and successful outcomes.
Scoliosis Caused by Giant Cell Tumour of Costae

Authors: Mouli Edward, Mohamad Hardian Basuki, Ferdiansyah Mahyudin, Sjahjenny Mustokoweni, Paulus Rahardjo, Rosy Setyawati
Presenter: Mouli Edward, Airlangga University, School Of Medicine, Dr Soetomo General Hospital, Indonesia.

Background: Giant cell tumour of bone, also known as osteoclastoma, is a type of benign (non metastatic tumour) which is arising from metaphysis and often extending into the epiphysis of the body’s long bones. Giant cell tumour of bone is uncommon case and costae is a rare site for giant cell tumour involvement.

Objective: Reporting a rare case of Giant Cell Tumour and the tumour involvement in costae.

Material and Method: A 7-year-old girl presented with localized left back pain and changes in spinal curvature since two years before hospital admission. Diagnosis of Giant Cell Tumour is based on history taking, physical examination, laboratory test, chest X-ray, thoracic MSCT and biopsy findings which were conducted in RSUD Dr. Soetomo Surabaya in August 2016 – July 2017.

Result and Discussion: First radiographic examination of thoracic spine was performed in patient as a further investigation of chronic localized back pain. The chest x-ray showed lytic lesion in costae IX geographic type with narrow transitional zone, no matrix with cortical thinning, no periosteal reaction, no soft tissue involvement, indicating a development of primary bone tumour. Multiple slices CT of the Thorax demonstrated localized intraosseous mass causes widening and erosion of cortex IX left posterior with no expansion to soft tissue located in chest wall. CT guided FNAB then confirmed the diagnosis of giant cell tumour.

Conclusion: Most giant cell tumour occurs typically at the epiphyses of long bone such as femur, and giant cell tumour in costae is a rare case and there is no case reported during the past decade. Further investigation is needed to improve a good prognosis of patient’s treatment.

Keywords: Scoliosis, Giant cell tumour, primary bone tumour
Session Name: **Poster Session**  
Theme: **How I do it!**  
Abstract Number: **204**  
Abstract Title: **Robotic surgery assisted en-bloc sacrectomy for sacral chordomas: Our preliminary experience with a novel technique**  
Authors: Suraj Hindiskere, Pramod Chinder, Raghunath S.K, Jagannath Dixit, Srinath Doddarangappa, Utkarsh Pal  
Presenter: Suraj Hindiskere, HCG Hospital, India.

Aim: En-bloc sacrectomy is a technically demanding procedure and to obtain adequate margins during malignant and aggressive tumours resection in challenging. It is also associated with significant post-operative morbidity considering the extent of the procedure and proximity of crucial anatomical structures. We want to report our early experience with robotic surgery assisted en-bloc sacrectomy.

Methods: Two male patients aged 37 years and 39 years, both diagnosed with sacral chordoma underwent robotic-assisted preparatory approach to release the adhesions from the anterior aspect of the tumour and following successful dissection a Gore-Tex spacer was positioned in between the anterior tumour surface and the rectum. The following day, en-bloc sacrectomy (trans S1-S2 in one patient, trans S2-S3 in the other) was performed by the posterior approach. Peri-operative details were collected and both patients were followed up for a minimum of one year.

Results: The average total operative time was 484 minutes (anterior docking + anterior console + posterior) and mean blood loss was 580 ml (anterior + posterior). Both patients were mobilized on the first day following posterior resection and no significant post-operative complications were encountered. Neither of the patients had signs of tumour recurrence by the end of one year of follow-up and were able to ambulate without support. Bladder control was obtained in both patients and bowel control in one.

Conclusion: In the combined knowledge of the authors, there has been just one reported incidence of such a technique. Robotic-assisted surgery is a valid minimally invasive technique which drastically reduces the associated surgical complications of sacrectomy.
Objective: To compare the feasibility and applicable characteristics of computer navigation system applying in bone tumor based on intra-operative and pre-operative CT scan data.

Methods: Bone model is total left femur bone (saw bone model), punching from one side of knee joint to proximal, diameter 1.5mm, space 10mm. Intra-operative CT scans were performed with Siemens ARCADIS Orbic 3D and Ziehm Vision FD Vario 3D. CT scanned the model before operation and 3D coordinates of observation points were recorded as standard data. Siemens ARCADIS Orbic 3D and Ziehm Vision FD Vario 3D scanned the model intra-operation and 3D coordinates of observation points were recorded as experimental data. 3D coordinates of observation points during operation were obtained by using initiative infrared ray computer navigation system (Stryker) and were compared with intra-operative 3D coordinates.

Results: The two intra-operative CT scans both had advantages in image definition, intra-operative position and navigation registration method. Compared with pre-operative CT, error was lower in intra-operative CT data navigation based on ARCADIS Orbic 3D and Vision FD Vario 3D. As long as the observation points could be recognized, the accuracy of intra-operative navigation would be satisfied and error was greater as the distance from scan area is farther. Meantime, Vision FD Vario 3D variable isocentric design might lead to images partial deletion in scan area.

Conclusion: Intra-operative CT data navigation could be applied in bone tumor surgery. Combination with pre-operative CT images could enhance image quality and expand intra-operative CT data navigation area. While with distance from scan area being farther, the error is greater. Vision FD Vario 3D variable isocentric design might lead to images partial deletion in scan area, which could affect intra-operative navigation.
Purpose: The purpose of this study was to describe our experience with computer-navigation aided excision of osteochondromas in the proximal femur and our outcomes of this technique.

Methods: Seven patients who underwent computer-navigation aided excision of proximal femoral osteochondromas were studied: 3 males and 4 females; mean age 25.4 (18 ~ 38) years; mean follow-up 18 (7 ~ 36) months. Computed tomography images of the patient’s and a size-matched normal proximal femur were fused on a commercially available navigation planning software. The intended resection margins were then plotted using the normal proximal femur as a template, and the plan executed using intra-operative navigation guidance. Patients were permitted partial-weight-bearing ambulation in the immediate post-operative period, with full weight bearing after the first month. Patients were followed up at patients were followed up at 3, 6, 12, 18, and 24 months with radiographic imaging as well as scoring of the Musculoskeletal Tumor Society (MSTS) score.

Results: Five patients had isolated exostoses, while two had tumors associated with multiple hereditary exostoses. A posterolateral approach was used for tumors projecting posteriorly or posteromedially, while an anterior approach was used for anteriorly and medially based tumors. Prophylactic fixation was performed in the four patients that required anterior approaches. No intra-operative fractures or post-operative complications occurred, and no secondary procedures were necessary. The mean MSTS score at last follow up was 28.8 (27~30).

Conclusions: This series is the first report of this novel application of computer-navigation, and demonstrates favorable post-operative functional scores and a low complication rate. It demonstrates the applicability, safety and efficacy of this technique, and is particularly applicable in resections involving particularly large tumors that obscure anatomical landmarks and in patients with associated proximal femoral deformity.
OBJECTIVE: Functional outcomes of cement spacer - a cost effective method for reconstruction of defect left after tumor resections around knee.

DESIGN: Retrospective analysis

METHODS: 24 patients of osteoarticular resection around knee and reconstruction with cement spacer were identified with the help of surgical data base over period of 8 years from March 2008 to March 2016. Out of these, 5 patients presented with fungating mass. For cement spacer, intramedullary Kuntschner nail was used with cement bridging resection gap. Additional 4.5 DCP anchored to bone ends and incorporated in cement was used for rotational stability. All cases imaging records were analyzed for stability of construct and complications at follow-up. Clinical data like date of last follow-up and date of death were considered to evaluate survival of construct. MSTS scoring was done for functional evaluation.

RESULTS: At median follow up of 57 (24-110 months), 19 patients were alive (available for functional evaluation), 4 had died of disease and 1 was lost to follow up. The mean MSTS score was 23 (range 21 to 27). Median construct survival was 69 (range 2-110 months). Nine patients had construct related complications (7 infection, 1 wound dehiscence, 1 breakage). Out of these 4 were revised with similar construct, two with live fibula arthrodesis and 3 had amputation. Infection rate in patients presenting with fungation was 100% (5/5) and in others it was 11% (2/19). 5-years survival of construct, by Kaplan-Meier analysis, was 50%.

CONCLUSION: When evaluating a reconstruction technique, we need to consider the ease of procedure, its complications, functional outcome, and durability of the construct. This technique provides an inexpensive, easy-to-use reconstruction option, to reconstruct defects after osteoarticular resection around the knee, with good functional results.
Session Name: *Poster Session*
Theme: **How I do it!**
Abstract Number: 327
Abstract Title: **IMSC+HDPE Modular Ring Spacer construct for Pathologic Femur fracture due to Primary Pleomorphic Liposarcoma of Bone (A Rare Tumour)**
Authors: Haresh Manglani, Sunil Shetty
Presenter: Haresh Manglani, Anmmol Orthovision - Orthopaedic, Cancer And Eye Hospital, India.

Aims / Objectives: A 73 year old female presented with a fracture of the shaft of the Right Femur. Plain x ray was suggestive of a pathologic fracture. Further investigations including biopsy revealed Non Metastatic Primary Pleomorphic Liposarcoma of the femur. Since the outcome in these patients is poor with or without adjuvants like Chemotherapy and radiation (mean survival of 13 months in more than 60% of cases), the challenge here was to do a cost effective rapid rehab functional surgery for the pathologic fracture.

Methods: The total femoral length as measured on scans was 365mm, with 111mm bone proximal and 59 mm bone distal to the lesion. Options available were total Femur replacement, Intercalary graft, Intercalary spacer and Amputation. Patient opted for Intercalary spacer. The measurements necessitated use of a custom made spacer. Since that entailed huge cost and time it was imperative that some mechanism be devised that is cost effective and readily available. It was decided to use IMSC Femoral nail alongwith HDPE spacers to reconstruct the resection defect of 220 mm. The patient underwent an uncomplicated surgical resection and reconstruction with IMSC nail mounted with HDPE spacers.

Results: The post operative recovery was uneventful with return to function (cross legged sitting, SLR, bedside exercises and active quadriceps) and ambulation within 2 weeks after surgery (as can be seen in videos). She was happy to be able to carry out all the activities of daily living immediately after surgery, within 3 days of the injury. She however developed pulmonary metastasis at 10 months, surviving only 5 months thereafter.

Conclusions: HDPE ring spacers, due to its properties of load bearing can be immensely helpful in salvaging difficult situations. Both Titanium IMSC and HDPE are scan friendly.

Keywords: HDPE ring spacers, Pleomorphic Liposarcoma, Bone, Malignant, Primary tumour
Aim:
The scapula is a relatively common site for malignant bone tumours. Total scapulectomy is an oncologically acceptable alternative to amputation when the whole scapula is invaded with tumor and the neurovascular bundle can be preserved during tumor resection. The aim of this study was to investigate functional outcomes using a Prolene mesh for reconstruction after total scapulectomy.

Methods:
The study comprised 10 patients, 6 of them were Ewings sarcoma, 3 were Chondrosarcoma and 1 was Osteosarcoma, operated between 2013 to 2017. All of them underwent excision in form of Total scapulectomy following Oncological principles and Prolene mesh was used for reconstruction. It was anchored with remaining capsule and lateral end clavicle. Remaining soft tissues were double wrapped over it providing a relatively stable shoulder joint. With an average follow up period of 30 months (12-48), functional outcomes were evaluated.

Results:
Mean MSTS functional score was 55%. Prolene mesh helped in getting good shoulder stability that helped in gaining preservation of elbow, wrist and finger motion and having an acceptable level of postoperative limb function.

Conclusion:
Total Scapulectomy with Prolene mesh is a novel technique for reconstruction in Scapular tumours as it preserves an acceptable elbow and hand function with good shoulder stability.
Title: Can we avoid venous reconstruction in vascular resections for extremity sarcoma management? A Retrospective Study

Background: Limb salvage without compromising oncologic safety is the prime goal in extremity sarcoma management. Sometimes to achieve safe oncological margins, vascular resection is required. We assessed the necessity for venous reconstruction by comparing the results of arterial reconstruction alone with reconstruction of both artery and vein.

Methods: We assessed patients from January 2004 to December 2016. 51 patients were identified who underwent vascular resections. 5 patients were excluded due to incomplete surgical data and 7 were excluded as they only had arterial resection. Of 39 patients 10 patients had arterial reconstruction only and 29 had reconstruction of both. The postoperative complications (arterial thrombosis, anastomosis disruption, infection, limb edema and amputation) were compared between both the groups.

Results: Overall complication rate was 54% with no significant difference of complication rate in both the groups [60% (artery only) vs 51.7% (artery and vein), p=0.157]. 6 patients out of 10 patients in arterial reconstruction had complication as compared to 15 patients out of 29 patients in artery and vein reconstruction group. Overall limb salvage rate was 87.1% with similar amputation rates in both the groups (10 % vs 13.7%). Method of reconstruction (PTFE vs Saphenous) did not affect the incidence of arterial thrombosis. Subivariate analysis is seen in the image uploaded.

Conclusion: There is no significantly higher incidence of complication in arterial reconstruction only with similar limb salvage rates in both the groups. We conclude that venous reconstruction in conjunction with arterial reconstruction may not be necessary.
A novel technique: Liquid nitrogen pedicled sterilisation - expandable prosthesis composite to achieve limb salvage in a paediatric sarcoma case.

Authors: Vivek Verma, Akshay Tiwari, Rajat Saha, Rooma Ambasta, Saugata som
Presenter: Vivek Verma, Max Institute Of Cancer Care, India.

Aim: There are inherent challenges for limb salvage in paediatric sarcomas like short and small bones, lesser bone stock after tumor resection, limb length discrepancy for which most of them have to undergo amputation. Cryotherapy with liquid nitrogen is a novel technique of sterilisation in bone malignancies – mostly preferred in intercalary resections.

Method: We describe case of a 8 year old girl with non metastatic osteosarcoma of distal femur with distal 2/3 bone involvement, who was referred to us after neo adjuvant chemotherapy. Traditionally the choice would have been amputation or rotationplasty, both of which were discussed with the parents and were not acceptable to them. In view of short proximal stump (5 cm), an expandable total femur replacement was the natural choice for endoprosthetic reconstruction, which again had its own limitations of use of prosthetic hip replacement in a very young child. Instead, after detailed counselling, we used a customised expandable endoprosthesis with a 12 cm stem, by retaining a 14 cm proximal stump and sterilising it with liquid nitrogen to preserve the bone stock along with adequate oncological clearance for holding the stem of customised expandable prosthesis

Result: Patient was mobilised one week after surgery and at 8 month follow up, patient is doing well with no disease and good functional outcome.

Conclusion: Liquid nitrogen pedicled sterilisation of bone can enhance bone stock for endoprosthetic reconstruction in young children, without the need for waiting union of osteotomy as in case of allograft use or ECRT.
INTRODUCTION:
Parosteal osteosarcoma is a low grade, well differentiated fibroblastic tumor that arises from the surface of the bone. The prognosis is relatively good as compared to conventional osteosarcoma and wide excision is the preferred treatment.

MATERIAL & METHODS:
Here we present a case of parosteal osteosarcoma on distal posterior aspect of left femur in a 18 year old male and our experience of using CAD and 3D printing for tumor resection. The current challenge was to resect minimum tissue with tumor free margin from a difficult to approach site, thereby salvaging the joint. The whole process was a complex one the first step was imaging. A CT scan with 0.625mm slice thickness and 0.35mm in plane resolution along with a MRI were done. Data from CT and MRI were merged for delineation of tumor and a better bone – soft tissue resolution. Then 3D reconstruction was done with help of reverse engineering software (Osteo3d®). A lateral approach with a diaphyseal osteotomy was used for easy manipulation of distal femur. PCL femoral attachment was cut, zig were secured with k wire and cuts were made. Cuts were extended to remove the tumor en bloc. Distal femoral allograft customized for the defect with help of the same zigs. Allograft fixation was done and plate applied. PCL reattached to host femur with suture anchor.

RESULTS: In our experience 3D printing and the customized resection with PSI zigs has provided us a contemporary and unconventional tool in precision oncology. It helped us immensely in resecting out the tumor from a challenging site without damaging the neurovascular structure and achieving negative margins-R0 resection and thereby salvaging the joint.
5,10-Methylenetetrahydrofolate reductase (MTHFR), a key enzyme for folate metabolism, catalyses the irreversible conversion of 5,10-methylenetetrahydrofolate to 5-methyltetrahydrofolate, which is located at the end of the short arm (1p36.3). Two common non-synonymous variants, the C677T (Ala222Val) and A1298C (Glu429Ala), were mainly described with decreased enzymatic activity and an alteration of intracellular folate distribution. Osteosarcomas are currently treated with high dose of methotrexate (MTX). The decreased enzyme activity of MTHFR theoretically could increase the drug action of MTX and at the same time increase toxic and side effect. Germline variants of C677T and A1298C were studied in 59 osteosarcoma patients, with whom the A1298C is detected with particularly low rate of mutant genotype (N=1, 0.8%) and could not proceed with statistical calculations. 15 patients were wild type of C677T (CC, 25.4%), 20 were heterozygous mutant genotype (CT, 33.9%) and 24 were homozygous mutant genotype (TT, 40.7%). Patients harboring the TT/CT genotype had the same progression-free survival and tumor necrosis rate in comparison with patients having the CC genotype (P=0.349 and P=0.465 respectively). And the C677T polymorphisms had no significant correlation with MTX initial plasma concentration (P=0.867; r=0.024) and delayed elimination (P=0.305; r=-0.136). However patients with mutant genotype of C677T were associated with higher degree of liver toxicity (P=0.043) and fever reaction of MTX (P=0.050) while G3/G4 hematologic toxicity were more likely to be noticed with TT than CT/CC (P=0.095). The study suggests that genetic polymorphism of MTHFR C677T in the MTX metabolic pathway seems to be associated with the trend for more side effects statistically, but has no obvious effect on histologic response and survival.
Background: Post-operative delirium (PD), characterized by acute onset of global impairment in consciousness and cognition, is a common complication following major surgeries and is often associated with adverse outcomes. Because of the multiple comorbidities of the patient along with extensive nature of the surgery, patients undergoing surgery for bone metastases may be prone to developing PD. However, no study exists regarding PD in patients who undergo surgery for bone metastases.

Objective: This study investigated the incidence, outcome and associated factors of PD in patients who underwent surgery for bone metastases.

Materials and methods: 276 consecutive patients with a mean age of 64 years who underwent surgery for bone metastases of the extremities at our institution were reviewed. The diagnosis of PD was made by the psychiatrist, according to the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders. Possible peri-operative clinicopathologic factors that may be associated with the development of PD were investigated.

Results: Among the 276 patients, 25 patients (9%) developed PD. Patients with PD had higher rate of post-operative complications (p=0.004) and lower survival (log rank, p=0.001) than patients without PD. On multivariate logistic regression analysis of the possible factors associated with PD, history of psychiatric disorders (OR=1.129, p=0.004), high pre-operative serum CRP level (OR=1.117, p=0.002), low pre-operative serum albumin level (OR=0.349, p=0.009) and high dose of opioid analgesics received in the immediate post-operative period (OR=1.019, p=0.002) were independently associated with the development of PD.

Conclusion: Our study suggests that the incidence of PD is considerable in patients undergoing surgery for bone metastases. History of psychiatric disorders, pre-operative serum albumin and CRP levels and the dose of post-operative opioid analgesics are associated with the development of PD. These results would be helpful in the prevention and treatment of PD in bone metastases.
Lower back pain is occasionally observed in the advanced stage of cancer patients with spinal metastasis. However, the treatment is challenging since the origin of symptoms may be complicated. In this study, we examined the effect of sacroiliac joint block (SIJB) on cancer patients with spinal metastasis.

Methods
The patients who pointed to the posterior superior iliac spine (PSIS) during the one-finger test, were included in this study. These patients were diagnosed with SIJ disorder, and administered Lidocaine injection in the painful side of the SIJ. Symptomatic changes before and after the injection were examined. Changes in lower back pain were assessed using the visual analog scale (VAS).

Results
Eleven patients (6 men and 5 women) participated in this study. The primary diagnoses were: multiple myeloma (4 cases), breast cancer (2 cases), lung cancer (2 cases), prostate cancer (1 case), thyroid cancer (1 case), kidney cancer (1 case). The average age was 62 years (range: 37–79 years). Lumbar and SIJ metastases were confirmed in 7 and 8 cases, respectively. The Newton test was positive in 5 cases. Local tenderness was observed in PSIS (8 cases), long posterior sacroiliac ligament (3 cases), sacrotuberous ligament area (3 cases), and iliac muscle (4 cases). The average VAS score before/after injection was 8.2/4.7, and subjective improvement in lower back pain was confirmed in 8 patients. Two cases showed prompt improvement in symptoms.

Discussion
SIJB is useful for the diagnosis and treatment of SIJ-related pain. However, there are no reports on the effect of SIJB on patients with cancer. In this study, the symptoms improved after SIJB in most of the cases. However, the beneficial effect of SIJB was partial and limited. We concluded that in many cancer patients, lower back pain was the consequence of SIJ-derived as well as lumbar metastasis-derived symptoms.
Session Name: **Poster Session**
Theme: **Metastasis**
Abstract Number: **80**
Abstract Title: **Rotationplasty for Unplanned Fixation of Pathological Fracture Distal Femoral Osteosarcoma**
Authors: **Chindanai Hongsaprabhas, Wittavat Chenboonthai Phoomchai Suvaraksakul Chris Charoenlap**
Presenter: **Chindanai Hongsaprabhas, Faculty of Medicine, Chulalongkorn University and King Chulalongkorn Memorial Hospital, Thai Red Cross Society, Thailand.**

**Aim:** Rotationplasty had been reported as a salvage procedure for many decades. However, it had not been reported as the salvage procedure to the unplanned fixation for pathological fracture of osteosarcoma.

**Methods:** We report a case of a 22-year-old female patient whom sustained a supracondylar fracture at distal femur 6 months ago and underwent a surgical treatment by open reduction and internal fixation with distal formal locking plate and screws. Follow-up radiographic imaging revealed abnormal osteolytic lesions and the conventional high-grade osteosarcoma was made from pathological study. There were no distant metastases from Computed Tomography (CT) scan or Technitium-99 m bone scintography. After discussion with patient for options of treatment, rotationplasty was chosen for her definitive treatment after 3 courses neo-adjuvant chemotherapy. All the contaminated tissues were removed while preserving neurovascular bundles and standard rotationplasty type A-1 according to Winkelmann Classification was performed. Postoperative imagings were satisfied and the wound healed uneventfully. The patient was able to move her ankle as a knee and external prosthetic fitting was made. Adjuvant chemotherapy was given after a free margin with good tumor necrosis was achieved from pathological study.

**Results:** Now the patient was alive with disease at 2 year follow up with stable size of lung nodules. She could manage to walk with external prosthesis with slightly limping. Her new knee could move as expected and she was satisfied with the result of the treatment.

**Conclusions:** This is the first case report of rotationplasty for the indication of unplanned fixation of osteosarcoma with pathological fracture. This is the complex procedure with difficulty of patient acceptance but offering a good functional result. However, awareness of pathological fracture should be taken to account initially to prevent inappropriate fixation which might ended up with unnecessary amputation.
Session Name: **Poster Session**
Theme: **Metastasis**
Abstract Number: **95**
Abstract Title: **Modified unipolar hemiarthroplasty for the treatment of metastatic bone disease: Case series of 6 patients**
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**Aim:**
Proximal femur is commonly affected by metastatic bone disease. In patients with favourable prognosis, proximal femur resection and endoprosthetic reconstruction is the preferred option. However, due to the high cost of endoprosthesis, we devised a much cheaper reconstruction method which we named "modified unipolar hemiarthroplasty” (MUH) when the treatment was solely for palliation in patients with very unfavourable prognosis.

**Methods:**
This is a retrospective case series. From 2013 to 2017, six patients who had bone and multi-organ metastases with pathological fracture of proximal femur underwent MUH surgery in our hospital. Following proximal femur resection, MUH was then used for reconstruction. The MUH was constructed by using Austin-Moore hip prosthesis which was secured to the Küntscher nail using 1.2mm cerclage wire. The strength of the construct is further augmented by slotting in a smaller size K-nail into the larger nail; or by adding a large Rush rod to the construct. The MUH was secured to the femoral canal by cementing technique. The remaining cement was then molded circumferentially to coat the whole length of the prosthesis which was remained outside of the canal.

**Results:**
The patients aged range from 56 to 73 years old. Four patients had pathological subtrochanteric fractures, and 2 patients sustained pathological neck of femur fractures. The total cost of each MUH construct was below RM2,000 (about USD 500) only. Two patients managed to ambulate with walking frame while 4 patients were on wheelchair ambulation almost immediately post-surgery. Two patients are currently still alive with disease, while four patients had passed away within 36 days to 3 months after operation. The histopathological examinations revealed metastatic lesions with primaries from the lung, thyroid, renal and rectum.

**Conclusions:**
MUH for the treatment of pathological fracture in proximal femoral metastases is a feasible palliative surgical treatment modality.
Objective: Surgical treatment of spinal metastases are mostly palliative, and it is still controversial whether patients with short life expectancy should perform such surgeries. We retrospectively investigated data of patients with Tomita VII type spinal metastases, and explored the effect of palliative posterior spinal stabilization surgery with postoperative multidisciplinary treatment on survival time and activities of daily living (ADL).

Methods: We have identified 51 spinal metastatic cases who underwent palliative posterior-only instrumentation surgery in the Cancer Hospital of Tianjin Medical University between January 2013 to December 2016. The parameters studied include postoperative survival, early paralysis improvement, ADL improvement, pain levels pre/postoperative.

Results: The mean Tokuhashi score was 7.1 while the spinal instability tumor score (SINS) averaged at 8.5 points. 23 patients (45.1%) encountered epidural spinal cord compression with a mean ESCCS (epidural spinal cord compression score) of grade 3. ADL was 45.6 for all patients. The mean postoperative survival time was 15.0 months. Frankel grade improved was 63.6%. Improvements in paralysis: The modified Frankel’s grade was improved by at least one grade. Regarding Surgical operation, anterior cervical lesion resection with titanium plate internal fixation were performed in 5 patients (9.8%), and posterior decompression with screw rod internal fixation in 46 patients (90.2%). Thirty-one (60.8%) patients received postoperative chemotherapy, 18 (35.3%) patients received postoperative radiotherapy, and 12 (23.5%) patients were administered with postoperative targeted drugs. Activities of daily living: The average Barthel index of patients improved from 45.6 preoperative to 76.2 postoperative.

Conclusion: Palliative surgery combined with postoperative adjuvant therapy effectively improved patients' ADL and their quality of life expectancy have been extended in the majority of patients. Patients with Tomita type VII spine metastases benefited from multidisciplinary treatment including palliative posterior spinal stabilization surgery and postoperative adjuvant therapy.
Background: Radiation therapy (RT) is the common treatment for painful uncomplicated vertebral bone metastases (without paralysis by malignant spinal cord compression). However, no studies have focused on the time course of pain after RT. Then, we investigated the change of pain after RT for painful uncomplicated vertebral bone metastases.

Methods: Participants included consecutive 101 patients who received RT for painful uncomplicated vertebral bone metastases in our institution between 2012 and 2016. All patients were treated with RT and pain response was evaluated by Numeric Rating Scale (NRS). Follow-up assessments were performed just before the start of RT and every month for six months after RT. Pain response was classified as complete response (CR), partial response (PR), pain progression (PP), and indeterminate response (IR) based on the response criteria of International Bone Metastases Consensus Working Party. Responders were classified as either CR or PR, and non-responders as either PP or IR.

Results: Median NRS scores for pain were 5 before RT, decreasing to 0 by one month after RT and remaining zero until last follow-up, representing a significant decrease over time (P < 0.001). The rate of responders at each month from one to six months was 93, 96, 95, 100, 98, and 96%, respectively. Multivariate analysis revealed that Spinal Instability Neoplastic Score (SINS) was the only risk factor for response to RT at one month. At one month pain disappeared in 88% of the patients with spinal stability (SINS < 7), although pain disappeared 58% of the patients with spinal instability (SINS ≥ 7) which was significant (P = 0.002).
Proximal region of the femur is one of the most frequently affected sites by metastatic bone tumor. Pathological fracture of the proximal femur causes serious deterioration of the patient’s quality of life due to severe pain and loss of locomotive function played by the hip joint. Therefore, aggressive treatment is usually recommended for this disease.

Purpose: The purpose of the study is to report the clinical outcome of the surgical treatment by means of endprosthetic replacement of the proximal femur for metastatic bone tumor of this site.

Patients and Methods: From 2006 to 2017, there were 17 consecutive patients at our institution who were treated by hemiarthroplastic endprosthetic replacement of the proximal femur against actual or impending fracture of the proximal femur due to bone metastasis. The mean length of prostheses is 122.9 (ranging from 90 to 220) mm. Seven were male and 10 were female. The mean age of the patients was 66.2 (ranging from 48 to 91) years. Eleven patients were treated for impending fracture and remaining six were treated for actual fracture. Origins of metastatic tumor were five breast, three liver, two kidney, and others. The functional state of the lower extremities was evaluated by the International Society of Limb Salvage (ISOLS) scoring system.

Results: The mean follow-up time was 8.6 (ranging from 0 to 42) months. There was no material failure during the follow-up period. The mean functional score was 55.7 (ranging from 20.0 to 86.6) percent. Of these, pain control score was excellent and the mean score was 85.9 percent. All the patients except three recovered their ambulatory ability with or without aids.

Conclusion: Excellent pain control and good recovery of ambulatory ability was achieved by endprosthetic replacement for metastatic bone tumor of the proximal femur.
Aims and background: There are limited options for curative treatment of refractory bone and soft tissue sarcomas. Although dendritic cells (DC)-based immunotherapy has been used for the treatment of various malignant tumors, there are few reports on DC-based immunotherapy against bone and soft tissue sarcomas. The purpose of this phase I/II study was to assess the immunological and clinical effects of DCs pulsed with autologous tumor lysate in patients with advanced bone and soft tissue sarcomas.

Patients and methods: Thirty-seven patients with metastatic or recurrent sarcomas were enrolled in this study. Peripheral blood mononuclear cells obtained from the patients were suspended in media containing interleukin-4 and granulocyte-macrophage colony stimulating factor. Subsequently, these cells were treated with tumor lysate, tumor necrosis factor-α, and OK-432. The DCs were injected in the inguinal or axillary region. One treatment course comprised 6 weekly DC injections. The toxicity, clinical response (tumor volume, serum interferon-γ, and serum interleukin-12), and oncological outcomes were observed.

Results: In total, 47 courses of DC therapy were performed in 37 patients. No severe adverse events or deaths associated with the DC injections were observed in the study patients. Increased serum interferon-γ and interleukin-12 levels were observed 1 month after DC injection. The clinical responses were assessed in 45 courses of DC therapy; 38 cases showed tumor progression, 6 cases had stable disease, and 1 case showed a partial response 3 months after DC therapy. Of the total 37 patients, 13 patients were alive and 1 patient was progression-free at the final follow-up. The 3-year overall and progression-free survival rates of the patients were 42.3% and 2.9%, respectively.

Conclusions: Taken together, DC therapy may represent a feasible, generally well-tolerated therapy in patients with refractory sarcoma, owing to its safety and immunological responses.
Background: Primary bone lymphoma (PBL) is a rare primary bone malignancy. Good prognostic factors for primary bone lymphoma included younger age, combined treatment modalities, lower stage of disease at diagnosis, complete remission after initial treatment, unifocal disease and no present of pathological fracture. The most of studies have been reported from Western countries and Eastern Asia, but no study have been conducted in Thailand.

Objective: Study the clinical features, pathology, efficacy in each treatment modalities, calculate 5 year overall survival and identified prognostic factors in primary bone lymphoma patients.

Methods: We retrospectively analyzed 20 consecutive patients diagnosed with PBL initially treated at our hospital between 2010 and 2017. Kaplan-Meier was used in calculation of 5 years overall survival. A log-rank test was used in a univariate and multivariate analysis to identify factors affecting overall survival.

Results: Nine (45%) patients were male and 11 (55%) were female with a mean age of 43.1 (range: 22-78). Sixteen (80%) patients had diffuse large B-cell lymphoma (DLBCL), three anaplastic large cell lymphoma and one Hodgkin lymphoma were included. The sacrum was the most frequently involved site (30%). Ten(50%) of patients had stage IV disease. Nineteen(95%) patients recieved chemotherapy, nine(45%) patients receiving radiotherapy as their treatment. The 5-year overall survival rates were 74%. LDH level less than 700 mg/dL (p value =0.001) and complete remission after treatment (p value =0.006) are good prognostic factor in Kaplan-Meier analysis. After univariate and multivariate analysis, LDL level less than 700 mg/dL was the factors significantly affecting overall survival (p= 0.006)

Conclusions: The detailed clinical data analyses presented here revealed several new characteristics of primary bone lymphoma in Thai patients. LDH level less than 700 mg/dL is factor affected to survival in primary bone lymphoma patients.
Purpose
Giant cell tumor of bone (GCTB) is an intermediate tumor with a low incidence of pulmonary metastasis. However, the definite risk factors for lung metastasis from GCTB and the efficacy of denosumab for pulmonary metastases remain incompletely understood. We investigate the risk factors and therapeutic effect of denosumab for pulmonary metastasis of GCTB in our institution.

Methods
We retrospectively evaluated GCTB patients at our institution from 1989 to 2016. All patients had chest radiography or pulmonary CT for surveillance of metastases. We excluded the two patients with malignant GCTB from this study.

Results
Eight (7.9%) of 103 patients developed lung metastasis. The average age of patients with pulmonary metastases was 29.6 (17-57) years old. Median interval from local treatment to metastasis was 23.8 months (11.8-49.2), although no patients had pulmonary metastases at the initial presentation. Among them, five patients experienced local recurrence (LR) of the primary tumor. Two patients underwent metastasectomy for pulmonary metastases. Six patients who did not undergo metastasectomy, one showed spontaneous regression of pulmonary lesions and three patients showed progression of them. No patient died of metastases. In five patients treated with denosumab, disease control rate was 100% (PR in three and SD in two). LR was the only predictive factor (p = 0.018).

Conclusions
LR is a risk factor for pulmonary metastasis in GCTB patients. Pulmonary metastases have been found within 5 years after initial local treatment, and periodical lung surveillance is warranted for GCTB patients, especially with LR. Denosumab is an effective agent to control pulmonary metastases as well as unresectable LR of GCTB.
Objective
Upfront metastatic Ewing Sarcoma (except isolated lung metastasis) has dismal outcome and patients are often offered upfront palliation in low resource settings. We evaluate the outcome of limited metastatic disease challenged with aggressive protocol.

Materials and Methods
After evaluation in tumour board, patients were treated with curative intent multimodality treatment comprising of EFT-2001 multi-agent chemotherapy protocol and definitive radiotherapy to the primary as well as sites of metastasis.

Results
Twenty patients with limited metastatic disease (except isolated lung metastases) between 2010-2016 were retrospectively analysed. Median age was 22 years (10-43 years) with majority being extrapelvic primary tumors (n=12; 60%). Size of primary tumor ranged between 5.8–18.1 cms. Majority of them had oligo metastatic disease [≤3 bone metastasis=5(25%); ≤3 marrow metastasis=4(20%); lung+marrow+-bone/node=4(20%); node=2(10%); soft tissue+-node=2(10%); >3 marrow metastasis=1(5%); lung+ bone+-node=2(10%)]. Single and multiple site of metastasis was present in 10(50%) and 10(50%) patients respectively. Complete response based on whole body FDG PET-CT was present in 6(30%) patients post induction chemotherapy. After local radiation, complete response at primary and metastatic site was seen in 12(60%) and 15(75%) patients respectively.

At median follow up of 31.5 months (5-70 months) none of the patients had died due to disease. Two patients (10%) died of chemotherapy-related toxicity. Relapse was seen in 3 out of 12 patients (16.7%) with complete response post local radiation and in 5 out of 7 patients (57.1%) who did not have complete response. Relapse was seen in 4 out of 10 patients (40%) with single site of metastasis and 4 out of 10 patients (40%) with multiple site of metastasis. The 3-year Event Free Survival (EFS) and Overall Survival (OS) was 49.9% and 89% respectively. EFS was significantly different in patients with complete response (p=0.07).

Conclusion
Select patients of Ewing sarcoma with limited metastatic disease can be offered curative intent treatment for optimum outcomes.
Session Name: **Poster Session**  
Theme: **Metastasis**  
Abstract Number: **231**  
Abstract Title: **Radical Intralesional Curettage for large campanaci III GCT with systemic Zoledronate therapy – Have we hit the Bull’s eye?**  
Authors: Mandip Shah, Chetan Anchan  
Presenter: Mandip Shah, Sparsh Orthopedic Oncology Clinic, Ahmedabad, India.

**Aims:** High local recurrence rates have been reported after Intralesional surgery for large Campanaci grade III giant cell tumors. Resection is considered safer option but leads to disability and long term issues. We analysed oncological safety of very extensive intralesional curettage for campanacci III Giant cell tumors (GCT) of appendicular skeleton.

**Methods:** Between 2010 and 2015, in 47 patients (28 males, 21 females, median age 27 years) underwent radical intra-lesional curettage for campanaci III GCTs by a single surgeon. Entire soft tissue mass was excised enbloc with the cortical window. Variety of scoops, high speed burr, Electrocauterization of all the walls with spray mode and phenol – alcohol irrigation was used in all cases. Postoperatively all received 6 injections of Zoledronate 4 mg at monthly interval. Suitable reconstruction was done. Oncological outcome and functional results were analyzed. Data of all 47 patients is available.

**Results:** Most common site involved was the distal femur (n=24). There were 17 recurrent and 30 virgin cases. 7 patients had intra-articular pathological fractures at presentation. Reconstruction was done using only cement in 32, only bone graft in 5 and both in 10 cases. Implants had to be used in 35 patients for better stabilization. Mean follow was 58 months (Range - 36 to 90 months). There were 3 recurrences (6.3%). No infections were noted. 1 patient had to undergo total knee joint replacement for severe arthritis. Functional scores were excellent in 34, good in 6, fair in 4 and poor in 3 patients (1 lower femur, 2 proximal humerus).

**Conclusions:** Combination of radical surgery (enbloc removal of soft tissue mass, high speed burr, phenol – alcohol irrigation, electrocautery) and zoledronate seems to consistently give excellent local control even in campanacci III GCTs. We strongly recommend this treatment for select Campanaci III and all other GCTs.
Session Name: Poster Session
Theme: Metastasis
Abstract Number: 232
Abstract Title: Core Needle Aspiration Biopsy - A novel, highly effective technique for sampling musculoskeletal lesions
Authors: Mandip Shah, Chetan Anchan
Presenter: Mandip Shah, Sparsh Orthopedic Oncology Clinic, Ahmedabad, India.

Introduction:
Needle biopsy for suspected musculoskeletal neoplasms has many advantages over open biopsy. However its effectiveness in form of yield and accuracy has been debated. We report a novel but simple needle biopsy technique – Core Needle Aspiration Biopsy (CNAB) which is highly effective.

Method:
From 2010 to 2017, 931 patients underwent CNAB. A Jamshidi needle, a 20 cc syringe, and a bowl with saline were heparinised with 5000 IU of un-fractionated heparin. Through a stab incision, Jamshidi needle was inserted into the lesion. The syringe was then attached to it. Maintaining a negative pressure, the needle was moved back and forth to reach all the areas of the lesion. The aspirate was emptied in the heparinised saline. Procedure is repeated twice. The saline is then filtered. The sediment material contains the tissue for histopathology.

Results:
Of 695 bone and 236 soft tissue lesions, 167 required CT scan guidance and 122 needed image intensifier. 203 required general anaesthesia. 887 specimens were representative samples (Yield = 95.3%). An average of 3.4 paraffin blocks could be prepared (range 1 – 9). A musculoskeletal pathologist could differentiate malignant and benign in 97% (bone 99.7%, soft tissue 94%) cases and make a specific diagnosis in 94% (98% bone, 90% soft tissue) of adequate biopsies. Diagnosis remained unchanged after treatment in 860/887 patients (accuracy = 97.9%). Cystic and fibrous lesions were most difficult for adequate yield. 1 patient had deep infection. Any artifact due to the use of heparin wasn’t observed. Average procedure cost was 5000 Indian Rupees.

Conclusions:
CNAB is a safe, easy and cost effective procedure with high yield and accuracy. Presence of heparin does not allow clot formation eliminating entanglement of representative tissue within clots. Definitive therapy can be started early without patient having to undergo a major surgical procedure for diagnosis.
Management of physiotherapy is very difficult for patients with bilateral femoral fractures, especially pathological fractures due to metastases. We must consider not only rehabilitation but also surgery and systemic therapies, such as radiotherapy and chemotherapy. A 65-year-old male patient presented with severe back pain and bilateral thigh pain, and was diagnosed with adenosquamous lung cancer with multiple bone metastases, including to the bilateral femur and vertebral bodies. The patient underwent bilateral intramedullary nailing for impending fractures, and then radiotherapy to the whole femur bilaterally. Nab-paclitaxel was also administrated as first line chemotherapy for three months, but there was disease progression, and X-ray showed lytic lesions with no calcification. When the patient started nivolmab as a second line therapy, he could not walk without a gait aid. One month after starting nivolmab, X-ray showed calcification around the lytic lesions. He was relieved of bilateral thigh pain and could attend the outpatient clinic without any gait aid at 9 months postoperatively. Finally, after one year postoperative, there was complete union on X-ray, and the patient had satisfactory clinical improvement. In conclusion, multidisciplinary cooperation between attending doctors, orthopedic doctors and physiotherapists is needed for patients with cancer to ensure coordinated provision of systemic therapies and rehabilitation.
Introduction:
In Giant cell tumor (GCT) of bone, though intralesional surgery is considered standard of care, high local recurrence rates have been reported after curettage. Resection is safer option but leads to disability and future issues. We analyzed oncological outcome of more extensive “Radical” intralesional curettage for GCT along with systemic Zoledronic acid injections.

Methods:
Of 242 evaluable GCT patients (148 males, 94 females, median age 27 years), 180 patients underwent radical intralesional curettage meaning by en-bloc excision of non articualr soft cortices, high speed burring, phenol – alcohol irrigation and spray mode electrocauterization. Postoperatively 210/242 patients received 6 injections of 4 mg zoledronate. Reconstruction was done with bone graft / cement / both. 62 patients not suitable for curettage underwent enbloc segmental resections.

Results:
62% of the GCTs were localized around the knee. There were 94 recurrent cases. 21 patients had pathological fractures. 124 had grade III GCT. After curettage, the reconstruction was done using only cement in 136, only bone graft in 24 and both in 20 cases. Implants were used in 45 patients. At mean follow-up 71 months, recurrence happened in 2 patients in resection group (3%) and in 9 patients in curettage group (5%) (P>0.01). Recurrence rate was 2.7% in primary and 7.4% in recurrent cases (P > 0.01); 20.8% in bone grafted patients and 2.5% in cementing group (P<0.001). Administration of zoledronate reduced local recurrence and metastasis rates significantly (p<0.001). 6 patients (2.4%) developed metastasis.

Conclusion:
Combination of radical intralesional surgery and zoledronate injections consistently gives excellent local control in GCTs. Cavity filling with cement helps reduce the recurrence rates further. Zoledronate seems to have significant effect evident by reduction in local recurrence and negligible metastatic rates in our study. We strongly recommend this treatment for GCTs.
Purpose: While limb salvage is the norm for small or medium size tumors, there is still no clarity in literature on the large tumors. In this paper we have analysed retrospectively 126 very large tumors where limb salvage was attempted and tried to find out the safety, function and disease control rates.

Methods: Between 2010 and 2016, 126 patients with very large tumors underwent limb salvage surgery. The judgment of “very large” was made on 3 objectives. (1) Tumor size of >12cm in at least two dimensions &/or (2) tumor diameter >/= 2/3rd of the limb diameter on axial MRI &/or (3) marrow extent of the tumor >/= ½ of the bone length on coronal or sagittal MRI. An analysis was done as to the surgical morbidity, disease and functional status.

Results: complications In 126 patients (92 malignant, 34 benign), included 1 perioperative mortality, 2 infections (1.5%), 3 major skin necrosis and 5 nerve palsies. 13 repeat surgeries were needed for dealing with complications. 3 patients had to be amputated later. Resection margins were adequate in 110 and inadequate in 16 patients. At a mean follow up of 48 months, Local recurrence (LR) developed in 9 patients (7.1%). Distant metastasis developed in 46 patients. All 34 benign tumor and 13 low grade sarcoma patients are disease free. Of 92 malignant tumor patients, 39 have died of disease, 7 are alive with disease and 46 (50%) are disease free. Functional scores were good/excellent 116 patients.

Conclusions: For very large benign tumors or low grade sarcomas the disease control rate of almost 100% justifies all attempts at extremity preservation. For high grade sarcomas, where it is possible to get technically tumor free margins and with good adjuvant treatment, results for limb salvage may be similar to an amputation.
INTRODUCTION: we looked at Van Ness rotationplasty as an option to Amputation in otherwise non-salvageable limbs and evaluated their surgical morbidity, oncological and functional outcomes.

PATIENTS AND METHODS: Between May 2010 and May 2016, 20 such not amenable to conventional salvage patients underwent Van – Ness rotationplasty. Indications were fungated large tumor, long segment involvement in kids, ill performed open biopsy, post radiation relapsed and infected failed megaprosthesis. There were 15 males and 5 females with a mean age of 12 years at time of surgery (range 5-25 years). Histology was osteosarcoma (12 patients), Giant cell tumor (3 cases), Ewing’s sarcoma (4), chondrosarcoma (1) and liomyosarcoma (1). Location was lower femur (14) and upper tibia in 6. Implants used were LCP, DHS, DCS and bipolar prosthesis. Mean follow up period was 40 months (range 24 -83 months).

RESULTS: 3 patients developed vascular compromise within 24 hours of surgery necessitating re-exploration. 2 recovered while 1 ended up in amputation. There was no infection or non-union. Convincing union was seen after average 2.5 months (range 1 – 9 months). Overall average MSTS score for whole series was 21 /30 (range: 18 – 26). MSTS scores were better for distal femoral resections (avg 23; range 19 – 25) and with children. At last follow up, all 3 GCT patients and 12/ 17 primary sarcoma patients were alive without any disease. 5 patients have died due to systemic spread to lungs, bones and brain of their disease. No patients developed local tumor recurrence.

CONCLUSION: Very low surgical complications and excellent oncological safety even in otherwise nonsalvageable situations makes Rotationplasty a reliable option which should be offered to such patients. Children are the best candidates. Vedio assisted counseling of the patient and family is mandatory before undertaking this procedure.
Aims:
Tibialization of fibula (TOF) is a well documented modality for reconstruction of long tibial defects. We analysed surgical morbidity and functional outcome of this procedure.

Method:
Between 2010 and 2016, 24 patients underwent tibial diaphyseal or distal epimetaphyseal resections. Ipsilateral fibula was osteotomized at a suitable level and translocated medially keeping all its muscular attachments intact, to bridge the defect. All patients required plate fixation for stabilization (from upper tibia to lower tibia in diaphyseal resections and from tibia to talus for lower tibial resections). Surgical complications, time to union and weight bearing, additional procedures and oncological outcome were noted.

Results:
Commonest Histology was Osteosarcoma in 14. Resection was diaphyseal in 10 and lower tibia in 14 patients. Average length of defect was 12.5 cm. Additional avascular fibula strut was used in 7 cases. Average time to radiological union was 10.5 months in single fibula and 6 months in double fibulae group. Non union leading to implant failure occurred in 3 cases (2 distal tibia, 1 diaphyseal). Delayed union (>9 months) was noted in 11 cases. Average time to full weight bearing was 12 months in single and 9 months in double fibulae group. Complications included superficial skin necrosis (n = 8), common peronial nerve palsy (n = 3), Sudeck’s osteodystrophy (n = 2) and significant malpositioning (n = 3). At mean follow up of 50 months 6 /14 osteosarcoma and both Ewing’s sarcoma patients have died due to metastasis. 1 osteosarcoma patient had local recurrence. Rest are mobile and functional.

Conclusions:
TOF is a very useful option for reconstruction of lower tibial and select diaphyseal defects. Addition of another avascular strut of fibula enhances the union allowing early weight bearing. Delayed union is quite frequent with this surgery. Once united, this procedure gives excellent function to the patient.
Introduction & aims:
Late presentations with large volume tumor is not uncommon in India. However, amputation is not well accepted by many of these patients. We analysed the oncological safety and functional outcome of limb salvage surgery done in these very large but non-metastatic high grade osteosarcoma patients.

Method:
Between 2010 and 2015, in 34 nonmetastatic osteosarcoma patients (18 males, 16 females, median age 17 years), amputation was the obvious choice due to massive size of tumor but salvage was done as patients did not accept an amputation. Minimum tumor size was 12 cm in at least 2 dimensions. Salvage seemed technically possible. Reconstruction which would allow the patient immediate function was chosen. All patients underwent neoadjuvant chemotherapy. All completed treatment. Surgical morbidity, oncological outcome and functional results were analysed. Data of all 34 patients was available.

Results:
Commonest tumor location was distal femur (n-11). Reconstruction was done using megaprosthesis in 18, nail - cement spacer in 8, rotationplasty in 2, fibula/ulna translation in 2 and none in 4 cases. 7 superficial necrosis and 2 nerve palsies were the only complications. Tumor free margins could be achieved in 33 patients. Follow up ranged from 36 – 92 months. 27 patients have died of metastatic disease (20 lung, 3 bone, 3 lung + bone, 1 brain). 6 local recurrences were observed. Average time to weight bearing was 4 days in prosthesis / spacer/ fibulectomies. Average MSTS score was 23 for lower limb patients. 7 patients are disease.

Conclusions:
Patients with large tumor volume are at very high risk of systemic relapse and have a poor prognosis. Very low surgical morbidity, acceptable local recurrence rate and decent functional outcome in our series justify the attempt for limb salvage in large high grade non-metastatic osteosarcoma.
Session Name: Poster Session
Theme: Metastasis
Abstract Number: 246
Abstract Title: Escaping an orthopedic quagmire - the orthopedic oncology lifeline!! - A Retrospective analysis of 44 cases.
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Aims: It is routine in Orthopaedic Oncology to conduct massive skeletal resections and reconstruct the resultant defect in the best possible way. We have evaluated application of such radical resection and reconstruction techniques to non-oncologic orthopedic situations where there seemed to be no other promising solution.

Methods: Orthopedic oncosurgery principles were applied for treating resistant non-unions (10), infected non-unions (6), primary non-reconstructable trauma (3), large segmental defects (5), periprosthetic fractures (11), failed arthroplasties (3) and resistant osteomyelitis / myositis (6). Desired end point was to avoid amputation and give the patient a stable mobile reconstruction without any infection. We analyzed whether the aimed end point was achieved or not in 44 such patients.

Results: There were 34 males and 10 females (Mean age = 52). Megaprosthetic reconstruction (n =26; 20 knee, 3 hip, 2 elbow, 1 total femur) was mainstay of reconstruction in clean cases. In cases with bone – soft tissue infections (n = 10), enbloc resection of infected mass (following principles of sarcoma surgery), High speed burring, phenol - alcohol wash were done. Combination of customized plates, massive bone grafting and variety of flaps was used to reconstruct a segmental defect (n = 5). 2 patients underwent Rotationplasty. All patients with megaprosthetic arthroplasty became immediately mobile. Long term control from infection could be achieved in 10/12 patients. Segmental gap could be successfully reconstructed in 4/5 patients. The desired end point could be reached in 39/44 patients (88.6%). Amputation could be avoided in 27/30 potential patients. Average MSTS functional score was 22/30 in this study.

Conclusion: Ortho-Oncosurgery principles offer very predictable reconstruction options successful most times as evident from very high rates of achieving desired end point in this series. These modalities should be kept in mind as viable options, before suggesting unpredictable and/or complex procedures, or recommending an amputation.
AIMS: Arthrodesis of wrist is a documented and popular method for reconstruction after complete resection of lower radius Giant cell tumors. We have analyzed functional outcome of wrist fusion done with translocation of segment of ulna to bridge the defect.

PATIENTS AND METHODS: Between 2010 and 2016, 43 patients having campanaci III GCTs (23 primary, 20 recurrent) of lower radius were candidate for enbloc resection, ulnar translocation and wrist fusion. There were 15 males and 28 females with a mean age of 29 years at time of surgery (range 22-54 years). After resection, ulna was osteotomised and translocated in the defect with all its muscle attachments intact, thus making it a vascularised graft. The wrist was fused with a long 3.5 locking plate from MC II / III to radius in midprone position and 15 degrees of dorsiflexion. Mean follow up period was 50 months (range 24-90 months). Bony union was assessed radiographically on regular basis. Functional limb results were reported according to MSTS scores.

RESULTS: The mean length of bony gap bridged was 5.5 cm (range of 4 - 8 cm). Mean union time at ulnocarpal area was of 2.5 months (range 2-5 months) and 4 months (2 – 9 months) at radioulnal area. Average MSTS scoring was 24 (range 21 – 28). All but 1 patient has (who developed radio – ulnar synostosis) excellent range of pronosupination. No patient had local recurrence. No patient had surgical site infection. One patient underwent removal of implant at 4 years after surgery for impending skin breakdown.

CONCLUSION: Translocation of ulna and wrist arthrodesis is a useful, simple, inexpensive and predictable reconstructive option. It is readily acceptable to the patient due to excellent function, preservation of pronosupination, cosmesis, longevity of the construct and low rate of complications.
Background:
We analysed oncological and functional outcomes of Extracorporeal radiotherapy (ECRT) and reimplantation done for bone sarcomas.

Patients and Methods:
27 patients (14 osteosarcoma, 10 Ewing’s sarcoma, 3 others; mean age 13 years) were treated with ECRT between 2010 and 2016. Femur was commonest bone (18) followed by tibia (6) and humerus (3). 26 had a metadiaphyseal while 2 had osteoarticular resections. A single dose of 50 Gy was delivered to the resected bone segments. The irradiated bones were reimplanted immediately as a biological graft. Construct was stabilized with long locking plates. Osteoarticular ECRT was coupled with joint replacement. Patients were treated with chemotherapy as per standard protocol.

Results:
The mean resected length of bone was 17 cm (9 to 26). All 27 patients were available at a mean follow-up of 34 months (24 to 74). The mean time to union for all osteotomy sites was 6 months (2 to 17): metaphyseal osteotomy sites united quicker than diaphyseal osteotomy sites (3.8 months (3 to 6) versus 9.5 months (4 to 17)). 3 nonunions needed bone grafting. 1 deep infection necessitated removal of the ECRT segment. There was 1 local recurrence in soft-tissue. At the time of final follow-up, 19 patients were free of disease, one was alive with disease and 7 had died of disease. The mean Musculoskeletal Tumor Society Score at the last follow-up was 26 (18 to 30).

Conclusions:
The radiated bone acts as a size matches allograft and has very good union rates. The complication rates are very low. Extracorporeal irradiation is an oncologically safe and biological reconstruction technique for limb salvage in sarcomas and has good functional results. It should be recommended to all the suitable patients.
Session Name: Poster Session
Theme: Metastasis
Abstract Number: 252
Abstract Title: To determine the factors influencing extended length of stay in patients undergoing metastatic spine tumour surgery, retrospective cohort study
Authors: Jahangir Riaz, Naresh Kumar, Ravish Patel, Govindaraja Vijayaraghavan, Nivetha Ravi Kumar, Vishaal Thabadi, Gurpal Singh
Presenter: Vishaal Nanik Thadani, National University hospital, Singapore.

Summary of Background Data
Patients with spinal metastases are elderly, high-risk patients with a shorter predicted survival. Deeper understanding of the factors influencing eLOS in these patients will assist both physicians and patients alike to better weigh the costs and benefits of spinal tumour surgery and aid in making an informed decision regarding admission and discharge as well as preoperative planning of surgical procedure. Extended LOS is well studied for elective surgeries; however, there is paucity of literature regarding LOS in patients undergoing MSTS.

Methods
We included all patients who underwent MSTS at our institution between 2005 and 2015. Data were retrieved by manually searching the case notes and hospital electronic records which included preoperative, intraoperative and postoperative variables as well as socioeconomic factors. The outcome measure was eLOS that we defined as positive when the LOS exceeded the 75th percentile for this cohort. Univariate and multivariate logistic regression analyses were performed to determine the predictive factors of eLOS.

Results
A total of 220 patients were included in the final analysis. The overall median LOS was 7 days (1-30 days) and 25% of patients had extended LOS (LOS≥11 days). Multivariate analysis revealed that significant variables independently associated with extended LOS were 9 or more spinal segmental levels instrumentation (OR 2.89, 96% CI 1.1-7.5, p 0.031) and presence of postoperative complications (OR 3.68, 95% CI 1.85-7.30, p <0.001). Metastatic tumour other than breast, prostate and lung have less risk of eLOS (OR 0.31, 95% CI 0.14-0.70, p, 0.005).

Conclusions
Patients with breast, prostate and lung are at higher risk of eLOS. Risk of eLOS increases by 2.8 fold for instrumentation spanning more than 9 segments and 3.6 fold in patients with postoperative complications.
The management of wound complications following Metastatic Spine Tumour Surgery (MSTS) remains a formidable task. Plastic coverage procedures after MSTS are challenging due to unhealthy donor site following previous radiotherapy and prolonged non-ambulation. Negative pressure wound therapy (NPWT) is usually not recommended after MSTS due to fear of tumour seeding and excessive blood loss. However, in certain patients post-MSTS, who may be considered as receiving palliative treatment, NPWT can be effective in managing wound complications. We describe our initial experience with the use of NPWT in a 57-year-old lady diagnosed with non-small cell lung carcinoma which metastasized to multiple lumbar and cervicothoracic vertebrae. She underwent two cycles of pre-operative radiotherapy followed by decompression and posterior instrumentation of lumbosacral and cervicothoracic regions succeeded by another cycle of radiotherapy. The patient developed wound dehiscence and polymicrobial surgical site infection that was not responding to regular debridements and antibiotics. Hence, we applied NPWT as an alternative treatment to plastic procedures. Patient clinically improved with a reduced quantity of wound discharge, increased granulation tissue and a downward trend in the inflammatory markers. Subsequently, wound was secondarily closed after 14 days. The patient was discharged after a total hospital stay of 41 days. The intravenous antibiotics (Piperacillin/Tazobactam) were changed to oral (Ciprofloxacin) after 6 weeks and continued for 4 months. The patient survived for three years without any wound complications. Our case report suggests that negative pressure wound therapy can be a potential treatment option for managing wound complications following MSTS.

Key-words:
Metastatic Spine Tumour Surgery; Surgical site infections; Wound complications; Negative pressure wound therapy; Vacuum assisted closure
We describe a case of a lung adenocarcinoma that metastasized to a pre-existing lipomatous tumour.

Patient was a 60 year lady who was diagnosed with adenocarcinoma of the lung following biopsy of a left upper lobe lung lesion. The computed tomography (CT) study for the staging of disease showed a well-defined circumscribed intermuscular lipomatous lesion in the right gluteal region. At the time, this lipomatous lesion was homogenous in appearance with attenuation of -50 to -100 HU in keeping with fat content (figure 1). No enhancement was demonstrated within the lipomatous lesion. Seven months into the chemotherapy treatment, a repeat CT study revealed new findings of two enhancing nodules within the right gluteal lipomatous lesion (figure 2). Subsequent Magnetic Resonance Imaging (MRI) study, within 1 month, showed the enhancing nodules had progressed to 3 in number with no enhancement in the rest of the lipomatous lesion (figure 3 and 4).

Biopsy of the nodules was reported to be metastatic adenocarcinoma. By this time the disease had progressed with multi organ involvement and soon after she succumbed to the disease.
Background
Cure rates of osteosarcoma is around 60% with multimodality management. Around 40% relapse most frequently to lung. Pulmonary metastasectomy for osteosarcoma is a widely accepted practice. Prognostic factors predictive of post-metastasis survival (PMS) and overall survival (OS) in metastatic osteosarcoma are poorly understood. Our aims were to evaluate PMS and OS in patients with high-grade osteosarcoma in extremities, and to identify prognostic factors related to PMS.

Materials and methods:
This is a retrospective analysis of 37 patients with pulmonary metastatic osteosarcoma treated with curative intent at our institute between Jan 2005 to Dec 2016. Statistical analysis was done using SPSS. There were 28 males and 9 females with a median age of 19 years. The median duration of follow up was 32 months. All patients received chemotherapy according to institution protocol.

Results:
The median overall survival was 38±2.7 months. The 5-year OS was 20.7% . The median post-metastastectomy survival was 23±5.7 months and 5-year PMS was 18.8% . Only presence of local recurrence (p=0.04), second pulmonary recurrence (p=0.0001), inadequate chemotherapy dosage (p=0.001) and metachronous metastasis (p=0.04) had statistically significant effect on OS. Only presence of local recurrence and inadequate chemotherapy had statistically significant effect on PMS. Size, site, number, laterality of metastasis, percentage necrosis of primary, histologic subtype of primary, VATS vs open surgery and second line chemotherapy had no effect on OS and PMS.

Conclusion:
OS and PMS in our series is comparable to that described in literature. Presence of concurrent local recurrence and inadequate chemotherapy dosage were poor prognostic factors in this study.
Aims
Metastasis of high-grade sarcomas has been reported to influence the survival. We retrospectively investigated the cause and effect of delaying treatment for malignant bone tumors.

Methods
We enrolled 68 patients with malignant bone tumors. Their common histologies were osteosarcoma in 20 cases, giant cell tumor of bone in 19 cases and chondrosarcoma in 11 cases. The average follow-up period was 32 months. A total of 11 patients had metastases during the course. We retrospectively examined the period between their symptom onset and their previous doctor visit (A period), the period between their previous doctor visit and the referral to a specialized institution (B period) and the period between referral to a specialized institution and starting treatment (C period). We analyzed these factors using the Mann-Whitney test (p<0.05) in the patients with and without metastasis.

Results
The respective median A, B and C median periods were 2 months, 11 days and 11 days in the patients with metastasis and 3 months, 15 days and 31 days in those without metastasis. The p-values for the A, B and C periods were 0.5, 0.7 and 0.07, respectively.

Conclusions
There were no significant differences in A, B and C periods, irrespective of the presence of metastasis. Pain due to bone lesion was easily noticed by patients because it directly disturbed their activities of daily living, and they immediately consulted a doctor. Furthermore, the need for making an early diagnosis and to provide timely treatment for bone tumors at specialized institutions has been well-recognized by the doctors associated with our institution and all patients were promptly referred to us. However, new treatment strategies to prevent metastasis may be required because some patients developed metastases, even though their C periods were shorter than those without metastasis.
Introduction
Lymph node metastasis is an important prognostic factor for all skin cancer and some sarcoma. More than 20 years ago, lymphoscintigraphy was most useful tool for lymphatic mapping and preoperative sentinel lymph node(SLN) identification. In the last decades, a new generation of diagnostic tools such as single photon emission computed tomography/Computed tomography (SPECT/CT) and positron emission tomography (PET)/CT enabled detection of SLN. This study is designed to evaluate the diagnostic ability PET/CT to detect regional lymph node metastasis.

Materials and Methods
From 2008 to 2018, PET/CT 44 skin cancer or sarcoma patients who diagnosed as some lymph node involvement in whole body PET/CT reading among 203 patients. Patients suspected lymph node metastasis in PET/CT were sent to biopsy and suspected as reactive lesions were observed. Then, the final results were analyzed.

Results
The average age of the group was 56.3(14-88) years old, and male patients were 30 and female 14. The mean follow up periods was 3.2 years. The sensitivity of result of PET/CT itself was 55.8%. But, with clinical information and opinions of nuclear medicine doctors, the sensitivity was 91.7%, and the specificity was 89.5%.

Conclusions
The diagnostic accuracy of PET/CT for the detection of regional lymph node metastasis was debatable according to the investigator. But with cooperations of orthopedic oncologist and nuclear medicine doctor it would be increased.
Background: Malignant melanoma is an aggressive cancer and bone metastasis from malignant melanoma is underreported.

Question/Purpose: Our primary purpose was to describe the prevalence, clinical features, complications and treatment of bony metastasis from malignant melanoma.


Results: 370 patients were included in the study. 78 patients (21.08%) were identified with bone metastasis. 27 had bone only metastasis and 51 had additional metastasis. Mean time for development of metastasis was 26 months (8-73 months). 60 (77.92) had only axial metastasis, 5 and 13 patients had appendicular and combined axial and appendicular metastasis. 51 patients (65.38%) had bone single bone metastasis and 27 (34.61%) had metastasis in multiple bones. 56 (71.79%) patients developed skeletal related events which included fractures (n=28) and hypercalcemia (n=43). Most patients were offered supportive/palliative care, bisphosphonates was offered in 4 patients and 6 patients underwent surgery for fractures. The median survival for bone metastatic melanoma is 12 weeks.

Conclusion: Bone metastasis in malignant melanoma results in significant morbidity, with poor survival. Early institution of bisphosphonates may decrease skeletal related events.
Background. Long term outcome of vascularised bone-grafts depends on the micro-vascular anastomotic viability, which is difficult to monitor in buried flaps. Various invasive and non-invasive options exist but are not imbibed into routine practice. Three-phase bone-scan with Technetium99m-Methylene-diphosphonate(MDP) is a simple, effective method for monitoring of these grafts in a resource constrained setting.

Question/Purpose:
Evaluate the value of triple phase bone scintigraphy for the assessment of graft viability following vascularized fibular bone grafts for reconstruction after limb salvage surgery.

Methods:
Protective study: 10 patients.
All patients underwent three phase bone scans within 24 hrs. Scan done using MDP. Blood perfusion phase and blood pool images of the graft site was taken by dual head gamma camera after 2 and 5 mins. Three hours after injection, whole body acquisition counts were acquired. SPECT was also performed. Evaluation of the bone grafts was done using four grade system proposed by Jonas et al, comparing uptake in bone graft with the normal contralateral limb. Grade 1-2 and 3-4 denoted ischaemic and viable grafts respectively.

Results:
10 patients, all patients underwent scan within 24 hours of surgery. 7 and 3 patients had Jonas score of 3 and 4 respectively, denoting patent anastomosis and good viability of the grafts. Follow up scans at 3 months revealed good graft viability. Good clinical outcome has been correlated in all the patients without complications like infection, bone resorption, fracture, and delayed wound healing in any. Radiographic correlation has shown good bone union in 9 patients. One patient had delayed bone union.

Conclusion:
Triple phase bone scan is a cheap, inexpensive, reliable, reproducible and easy to perform investigation assessing the viability of buried free flaps, especially in a resource constrained setting. First bone scan should be scheduled within the first 24 hours, when most of the anastomotic thrombosis occurs.
Background: Immunotherapy has been established as the standard of care in metastatic melanoma. However, there is limited experience and no published data in India owing to the rarity of the diagnosis and unavailability of the drugs. Pharmacogenomic differences can augment the responses and toxicity in varied population and hence, we conducted a feasibility study in real world Indian setting.

Patients and Methods: All consecutive patients who received immunotherapeutic drugs for metastatic malignant melanoma from August 2015 till December, 2017 were included in this prospective data base. Standard staging investigations, PDL1 staining (SP263 clone), and BRAF mutation status was carried out.

Results: There were a total of 11 patients who received immunotherapy; 9 patients received nivolumab, 1 patient received ipilimumab and nivolumab combination in metastatic setting. One patient received nivolumab in recurrent but adjuvant settings along with concurrent radiotherapy. The median age of the patients was 61 (43-78) years. On response assessment, 1(10%) patient was in complete metabolic response (CMR), 2 (20%) patients had partial response, 3 (33%) had stable disease, 1 (10%) had progressive disease while 1 (10%) patient had psuedo-progression. The toxicities included myalgia in 5 (55%) patients, hypothyroidism in 2 (20%) patients, fatigue in 5 (50%) patients; grade 2 skin rash in 1 (10%) and pneumonitis with hepatitis occurred in 1 (10%) patient. However, in a background of rapidly progressive disease with liver and lung involvement, the immune toxicity versus disease was a diagnostic challenge. The median follow up duration was 7 months (range 2-11). The median progression free survival was 8 months (95% CI: 6-10) while median overall survival was not reached.

Conclusions: Immunotherapy has changed the landscape of metastatic malignant melanoma and our limited experience prove its feasibility in Indian scenario. However cost, different metric for response assessment and management of toxicities are challenging.
Background
The new Katagiri score is a very useful score as a prognostic prediction in metastatic bone tumors. However, out of the 808 patients, only 59 people underwent surgical intervention, thus it is not clear whether Katagiri score is correlated with prognosis in the patients after surgical intervention. On the other hand, surgical intervention to spinal cord injury due to spinal metastasis is well known to prolong survival.

The purpose of this study is to clarify the usefulness of the new Katagiri score in predicting the survival time of patients who underwent surgical intervention for metastatic bone tumors.

Methods
Patients who underwent surgery for metastatic bone tumors in Montefiore Medical Center (USA), department of orthopaedic during the 2005 to 2015 years were scored 0-10 points according to the New Katagiri score. They were classified into three groups of low score (0-3 points), medium score (4-6 points), and high score (7-10 points), and survival rates were examined at 6, 12 and 24 months after surgery.

Results
Totally 129 patients (58 males and 71 females; average 65.9 years) underwent surgery. The primary organs were 25 breast cancers, 21 lung cancers, 19 multiple myeloma, 12 prostate cancers, 11 kidney cancers, and 41 others. The surgical sites were 75 lower legs, 44 upper limbs, 5 spinals, and 5 others. The survival rates at 6 months, 12 months, and 24 months were 84, 79, and 59% in the patients with low score; 67, 46, and 39% with medium score and 72, 56, and 44% with high score respectively. The survival rate with high score were significantly different between our surgical cohort and the Katagiri cohort (27, 6, 2%).

Conclusion
It suggests that surgical intervention might improve not only activity of daily life and quality of life but also survival periods.
Introduction
Longer-term follow-up data of lung metastasis of giant cell tumor of bone (GCTB) has been rare. We report two cases of over 20 years follow-up for lung metastases of GCTB.

Materials and Methods
We treated six patients of lung metastases among total 92 cases of GCTB from 1978 to 2017. Among these cases, two cases were followed up over 20 years.

Results
Case 1. 20-y-o female, distal femur, grade 3 (Campanacci). At seven months after initial surgery (curettage, bone cement packing), multiple lung metastases occurred and followed by segmental resection of the left lung. Since then, multicycle pneumothoraces occurred and were treated conservatively. Then lung metastases were stable state with respiratory insufficiency under home oxygen therapy (HOT).

Case 2. 40-y-o male, distal femur, grade 3. At thirteen months after initial surgery (curettage, artificial and auto bone graft), multiple lung metastases occurred which was managed conservatively. At two years after initial surgery, local recurrence occurred, followed by curettage and bone cement packing. At nine years after initial surgery, soft tissue recurrence was detected, followed by marginal excision. Since then, lung metastases had significantly decreased in size and regular follow-up was concluded at twenty years after initial surgery.

Discussion
GCTB is known for lung metastasis and local recurrence. We changed standard procedure of curettage for GCTB as extensive curettage with intraoperative anhydrous ethanol therapy at 2000. After that, no lung metastases occurred. For control of lung metastasis, it is most important to control local recurrence. Sometimes lung metastasis of GCTB is difficult to diagnose radiologically. We recommend biopsy (CT-guided needle biopsy etc.). There is no difference in prognosis between surgically and conservatively treated cases in our series. At present, administration of denosumab is considered first choice for lung metastasis of GCTB.
Introduction:
Surface osteosarcomas are a rare form of osteosarcomas accounting for around 3-6% of all osteosarcomas. Three major groups of surface osteosarcomas are parosteal(cPOS), periosteal(PerOS) and the high grade surface osteosarcomas(HGSO).

CASE REPORT:
We reported a case of 44 years old woman, presented with 2 years history of left knee spontaneous painless swelling, increasing in size and causing her difficulty in squatting. Otherwise she has no systemic symptoms of cancer. Examination reveals a fixed, hard mass over left popliteal fossa. Open biopsy reported as CPOS. CT thorax showed no lung metastasis. Wide resection was performed with megaprosthesis reconstruction. Histopathological exam of resected tumor reported PerOS with clear margin. No adjuvant chemotherapy was given.

DISCUSSIONS:
cPOS has predilection for posterior cortex, distal metaphysis of femur[1] and present as ossified exophytic tumor on bone surface as in this case. A lucent cleavage plane (string sign) is seen between the tumor and the underlying cortex differentiating it from a osteochondroma. Meanwhile, PerOS commonly occurs at meta-diaphyseal portion of tibia[1] Microscopically, cPOS has low grade spindle cells with trabeculae, while PerOS has moderately high grade spindle cells and cartilage island[2]. Wide resection was planned due to the tumor involving the lateral collateral ligament. There is uncertainty in role of chemotherapy for PerOS[1]. As our case has typical clinical and radiological features of cPOS, we did not subject her to chemotherapy although the final HPE was perOS.

CONCLUSION:
cPOS is usually low grade, well differentiated surface osteosarcoma and has good prognosis unless become dedifferentiated. It can be confused with PerOS, which are moderately high grade. However, treatment entity remain the same (wide resection), and justification to start chemotherapy for PerOS remain controversy.
Session Name: Poster Session  
Theme: Non-biological reconstruction  
Abstract Number: 27  
Abstract Title: Clinical outcomes of sandwich technique augmented with anatomical locking plate in GCT around knee.

Authors: SAIKAT SAU  
Presenter: SAIKAT SAU, Medical College Kolkata West Bengal. India.

Background-Gold standard technique for campanacci grade 3, GCT is extended curatage and bone grafting. Around knee if we used to do sandwich we can’t allow early weight bearing in fear of pathological fracture. As a result stiffness if inabitable. In this study we have done sandwich after extended curatage in GCT around knee for 10 cases and further augmented by locking plate in every cases.

Aims and objectives-To evaluate clinical outcomes of the results of this non-biological construction without sacrifice the joint.

Material and methods-In between August 2013 to August 2016 we have selected 10 case of GCT around knee campanacci grade 3 at IPGME&R KOLKATA. we use core needle biopsy for confirm histopathology. in every case we use locking plate after extended curatage and sandwich operation. we evaluate clinical outcomes after the index surgery.

Result-we have done prospective observational study. Among all case no recurrence till date. Functional outcomes evaluate by MSTS system. Most of the case have above 23 score on avarage. Mean follow up period 18 months.

Conclusion-locking plate augmentation in sandwich technique for GCT has a beneficial role around knee.
Abstract Number: 44
Abstract Title: Advantages and disadvantages of growing endoprosthesis – in Children and Adolescents after Malignant Bone Tumour Resection
Authors: Andrzej Szafranski, Magdalena Rychlowska-Pruszynska, Bartosz Pachuta, Justyna Dusinska, Iwona Malesza, Tomasz Walenta
Presenter: Andrzej Szafranski, Institute Of Mother & Child, Poland.

Purposes: metaanalysis of the patients treated in the Institute of Mother and Child in last 17 years.

Methods: In the period 2000-2017 283 children with primary bone tumors were treated. They were 143 boys and 140 girls. The age of the patient was from 4 to 25 years old. Median was 13 yrs. old.

The treatment was begun from neoadjuvant chemotherapy. After achievement the regression or stabilization of primary lesion, the patients were qualified to surgery procedures. It was excision of the tumor end reconstruction by the using of the growing endoprosthesis in spite of young age of the patients. After that adjuvant chemotherapy was used with or without metastasis treatment.

Results: In this study the own department experience in implantation of variety types of expandable endoprosthesis were shown. The defects and advantages of each type of expandable endoprosthesis were introduced. The all data were displayed as peer analysis of the patients with variety types of endoprosthesis.

Conclusions: As the summary the authors published the guidelines according the handling of, service the variety types of expandable endoprostheses.

Instead of conclusions (authors’ experience)

Recommendations for non-invasive limb lengthening:
- careful qualification to operation
- implantation receiver in soft tissue no more 2 cm depth
- start with lengthening procedure quickly after operation
- repeated procedures in short time intervals (50 impulses)
- Lengthening procedure in ambulatory manner
- avoiding of general narcosis
- risk minimalization of infection in endoprosthesis area
INTRODUCTION:
Proximal ulna is a rare site for osteosarcoma. A review over 27 years of 1650 osteosarcoma cases from Royal Orthopaedic Hospital in Birmingham revealed only 2 cases to originate from proximal ulna⁴. We discuss the challenges of treating osteosarcoma at this rare site.

MATERIALS & METHODS:
A previously healthy 21 years old gentleman presented with a painful swelling over his left elbow for 5 months duration. He progressively lost the ability to fully extend the elbow and limitation in pronation and supination. After imaging studies, an open biopsy was done to reveal a conventional osteosarcoma. He underwent neoadjuvant chemotherapy with Doxorubicin and Cisplatin.

RESULTS:
Our patient had good clinical response to neoadjuvant chemotherapy. He underwent wide resection of proximal ulna with custom made endoprosthesis reconstruction. As the pre chemotherapy MRI showed soft tissue extension around the radial head, enbloc resection of proximal ulna with proximal radius was done.

DISCUSSIONS:
Proximal ulna is an extremely rare site for osteosarcoma. A review of 1650 osteosarcoma cases revealed only 2 cases of proximal ulna osteosarcoma⁴. A 23 years multicenter review of osteosarcoma over upper limb, showed only 3 cases arising at proximal ulna². Being extremely rare, managing a proximal ulna osteosarcoma poses several challenges. 1)The surgical technique is not well described. 2)The implant need to be custom made and requires detailed planning in manufacturing it. 3)We assume it should behave as any other osteosarcoma although our patient presented at later age of 21 years old. 4)Long term oncological and reconstructive outcome of such tumour is not documented in the literature.

CONCLUSION:
Proximal ulna osteosarcoma poses challenge to the treating surgeon as it is extremely rare. Treating it as any other osteosarcoma is probably the best treatment for proximal ulna osteosarcoma.
Aim:
The aim of this study was to retrospectively review the outcome of our surgical treatment strategies based on proposed modified Harrington classification.

Methods:
We proposed adding 3 subgroups to the Harrington class III lesions. Class IIIa: The bony destruction is below the level of sacroiliac joint. Class IIIb: The bony destruction is above the level of sacroiliac joint. Class IIIc: The bony destruction is associated with large soft tissue component. We managed our patients as follows: Class I lesions - Intralesional procedure & cemented total hip arthroplasty (THA). Class II lesions - Intralesional procedure & cemented THA with flanged anti-protrusio acetabular cage. Class IIIa lesions - Intralesional excision & Harrington/ modified Harrington procedure plus THA. Class IIIb lesions - Either intralesional excision & Harrington/ modified Harrington procedure plus THA, or en-bloc resection & modular hemipelvic endoprosthesis (MHE). Class IIIc and IV lesions - En-bloc resection & MHE.

Results:
We surgically treated 217 patients with peri-acetabular metastases from July 2002 to July 2016. There were 18 cases of surgical site infections and 3 cases of hip dislocation. The mean follow-up duration was 13 months. The local recurrence rate was 12.3%. The mean pre-operative pain score was 7.2. Post-operative mean pain score was 3.5. The overall mean MSTS functional score post-operation was 20.7 points for all patients. Among the patients with Harrington class III lesions, patients who underwent Harrington/ modified Harrington procedure & THA had mean MSTS score of 17.6, while patients who underwent en-bloc resection & MHE had slightly higher mean MSTS score of 18.9.

Conclusions:
We proposed further sub-classification for Harrington class III lesions to help in the surgical planning for peri-acetabular metastases. For larger bony destruction in peri-acetabular metastatic cases, MHE provided better functional restoration in comparison to Harrington or modified Harrington procedures in our case series.
Aim:
Good local disease control can be achieved by wide resection of sacral tumors; however, patients may end up with neurological deficits due to loss of sacral nerve roots. Adjuvant high dose irradiation to the sacral region can lead to radiation enteritis of the rectum. This study aimed to evaluate the safety and efficacy of separation surgery followed by adjuvant intensity modulated radiotherapy (IMRT) in patients with recurrent or refractory sacral tumor.

Methods:
We retrospectively reviewed 12 patients suffering from recurrent or refractory sacral tumors. All patients were treated with separation surgery, following which silicone soft tissue expander filled with gentamicin saline was inserted at the residual dead space to displace the rectum anteriorly. Post-operative adjuvant IMRT (46-74 Gy) was administered to all patients. Surgery and radiotherapy related complications were recorded, and sacral nerve root functions were evaluated by MUD scoring system.

Results:
Twelve patients aged between 16-75 years old were enrolled in this study within the period of January 2015 to December 2016. There were 7 cases of chordoma, 3 cases of chondrosarcoma, 1 case of Ewing’s sarcoma, and 1 case of malignant peripheral nerve sheath tumor. Seven patients had history of previous surgery at other hospitals. All patients underwent partial sacrectomy with preservation of part of the sacral nerve roots. The mean follow-up period was 23.8 months. We had two recurrences, one patient had post-operative wound complication and 2 patients had post-radiation wound complications. The average post-operative MUD score was 22.7.

Conclusions:
IMRT following separation surgery with silicone soft tissue expander insertion is a safe and effective strategy for establishing durable local tumor control in patients suffering from recurrent or refractory sacral tumors. The complication of radiation enteritis had been reduced following this treatment modality, and the sacral nerve root functions were preserved at the same time.
Aim
We aimed to analyse the clinical outcome of using recycling autograft to reconstruct pelvis after primary malignant tumor resection.

Methods
Our case series included 15 patients who were treated by en-bloc pelvic resection and reconstruction using recycling autograft for malignant pelvic tumors from 2003 to 2011. The operative technique consisted of excision of the pelvic tumor, removal of soft tissue, curettage of the tumor, sterilization of bone in preheated 60°C 10% hypertonic saline for 30 minutes, reimplantation of recycling bone and internal fixation with plates, screws, rods and/or total hip replacement. Graft healing and lower limb function were evaluated with the International Society of Limb Salvage (ISOLS) allograft-prosthesis composites evaluation system and Musculoskeletal Tumor Society (MSTS) score respectively.

Results
The mean age was 33.07 (range 15-62) years old, and the most common diagnosis was chondrosarcoma, followed by Ewing’s sarcoma. The mean follow-up duration was 37.7 months. Six patients were alive without disease, 2 patients survived with disease, 5 patients died of disease, 1 patient died during perioperative period and 1 patient was lost to follow-up. There were 3 cases of implant-related complications. Infection was seen in 7 cases (superficial 4 cases and deep 3 cases). The mean ISOLS score and MSTS score were 71.4% and 56.8% respectively.

Conclusions
Reimplantation of recycling autograft is a viable option for patients with low-grade chondrosarcoma of the pelvis and those with soft tissue sarcoma eroding the bony pelvis. This treatment option offers acceptable complication rate and it is an important pelvic reconstruction armamentarium especially when high cost of hemipelvic prosthesis is a major concern. The use of 10% hypertonic saline in combination with pasteurization technique is a cheap, easy, and reliable technique to sterilize tumor-bearing autograft.
Abstract Title: Iliosacral reconstruction with a 3D-printed prosthesis after type I resection for pelvic tumors: a pilot study
Authors: Haijie Liang, Wei Guo, Tao Ji, Yidan Zhang, Yi Yang, Xiaodong Tang
Presenter: Wei Guo, Peking University People's Hospital, China.

Aim:
We performed a retrospective study to evaluate the results of a 3D-printed iliac prosthesis in iliosacral reconstruction after type I resection for pelvic tumors.

Methods
Five patients with tumors located at the ilium were treated by en bloc resection and prosthetic replacement with a 3D-printed iliac prosthesis during the period between 2014.02 and 2016.02. Baseline characteristics, oncological and prosthetic outcomes were reviewed and analyzed.

Results
The mean follow-up was 34.0±14.5 months. One patient died of disease, one was alive with pulmonary metastasis, and three remained disease-free at last follow-up. The mean MSTS-93 scores of the survivors was 25.0±4.1. Most of the survivors regained a normal gait. Radiological signs of osseointegration at the sacral interface were observed in all cases at 12-month follow-up. Symptomless subsidence at the acetabular interface was seen in two cases at 6- and 12-month follow-up respectively, of which one patient experienced breakage of the lower screws but finally achieved osseointegration at the acetabular interface. Recovery of muscle mass of glutei could be observed during follow-up.

Conclusions
Application of this 3D-printed iliac prosthesis can restore immediate stability, preserve the functions of glutei, and facilitate osseointegration at the bone-prosthesis interface. Further modifications of this prosthesis are still needed in the future.
Aim: To define patients, tumor characteristics and therapy results of high-grade pelvic osteosarcoma treated with chemotherapy and surgical resection in Peking University People’s Hospital in the last 15 years.

Methods: We retrospectively reviewed data from 2000 to 2015 with high-grade pelvic osteosarcoma. 77 patients were eligible for this analysis. The minimum follow-up was 3 months (mean, 35 months; range 3-152 months). Survival analysis was performed with Kaplan–Meier and Cox regression (Wald test) in SPSS software package (SPSS, Inc., Chicago, IL).

Results: The estimates of 5-year overall survival (OS) rate and event-free survival (EFS) rate were 30.6% and 20.8%, respectively. 22 patients (28.6%) had metastatic disease at diagnosis. The 5 year OS was 11.0% and 45.4% in patients with and without metastasis. Primary metastasis, sacrum infiltration and large tumor size were important predictors for a worse prognosis. For patients with non-metastatic disease, only 9.3% (4/43) patients had a tumor necrosis more than 90%. However, no significant difference in OS was observed in the group of patients with 60-90% necrosis, whereas patients with necrosis less than 60% definitely showed an extremely worse prognosis with a 5 year OS rate of 21.3%, compared with a rate of 62.7% in the group of higher necrosis. Based on this result, we believe that a necrosis rate of 60% is more appropriate criteria than 90% in pelvic osteosarcoma. Finally, in patients without metastasis at diagnosis, the 5-year OS rate was 17.5% and 59.7%, respectively, according to whether there was a local recurrence. Good local control is essential in non-metastatic pelvic osteosarcoma.

Conclusion: The prognosis of high-grade pelvic osteosarcoma remained poor despite modern multimodality treatment. A necrosis rate of more than 60% is more appropriate as the criteria of responders than 90% in pelvic osteosarcoma. Patients with non-metastatic disease had a relatively promising prognosis on the basis of good local control.
Aim:
The aim of this study was to investigate the radiological characteristics and predisposing factors of tumor thrombus in pelvic osteosarcoma.

Methods:
We retrospectively reviewed data of 115 cases of pelvic osteosarcoma treated in our center from 2006 to 2016. Diagnosis of tumor thrombus was made based on radiological and pathological findings. We summarized the radiological manifestations of tumor thrombus in regard to CT, MRI and PET/CT. We also compared the demographical, oncological and radiological data between cases with or without tumor thrombus in order to figure out its predisposing factors.

Results:
17 cases (14.8%) were diagnosed with venous tumor thrombus. Manifestations and its frequencies of tumor thrombus on CT included increased caliber (64.7%), calcification (47.1%), low density on plain scan (100%), filling defect (100%) and streak-like enhancement (35.7%) on contrast enhancement. For MRI scan, the tumor thrombus could be hypointense on T1WI (100%), iso- or hyperintense on T2WI (100%), and filling defect on contrast enhancement (100%). PET/CT scan showed high metabolic activity of the tumor thrombus. The ranges of the tumor thrombus included unilateral external iliac vein (2 cases), unilateral internal iliac vein (1 case), unilateral common and internal iliac veins (5 cases), unilateral common and external iliac veins (2 cases), inferior vena cava (IVC) and unilateral common and external iliac veins (1 case), IVC and unilateral common and internal iliac veins (4 cases), IVC and bilateral common and internal iliac veins (2 cases). Multi-variable analysis indicated that chondroblastic subtype (OR: 5.265, P=0.029) and involvement of L5/S1 intervertebral foramen (OR: 11.037, P=0.010) might predispose to venous tumor thrombus.

Conclusion:
The incidence of venous tumor thrombus in pelvic osteosarcoma was 14.8%. Comprehensive studies of enhanced CT, MRI and PET/CT helps radiological diagnosis of tumor thrombus. Predisposing factors included chondroblasic subtype and involvement of L5/S1 intervertebral foramen.
Session Name: Poster Session
Theme: Non-biological reconstruction
Abstract Number: 78
Abstract Title: Could presacral giant benign neurogenic tumors be resected through a single posterior approach?
Authors: Jie Zang, Wei Guo, Yi Yang, Xiaodong Tang
Presenter: Wei Guo, Peking University People's Hospital, China.

Aim: To describe our experience of performing resection of giant benign sacral neurogenic tumors by a posterior-only approach with a “fishing” method and to assess the outcome of patients who underwent this procedure in our center.

Methods: We retrospectively reviewed the records of 165 patients (81 men, 84 women; mean age 46.3 ±12.5 years) with giant benign sacral neurogenic tumors who underwent resection by a single posterior approach in Peking University People’s Hospital from Feb 2006 to Feb 2016.

Results: Operations lasted for a mean of 182±37 minutes (range, 125–230 minutes). The mean estimated blood loss was 1106±893 ml (range, 600-4100 ml). Of all patients, 155 patients were followed up and the mean follow up time was 64±40 months (range 12-118 months). At last follow up, the local recurrence rate was 7.1% (11/155). 20 patients (20/32, 62.5%) with tumors originating from S1 nerve roots had weakness of plantar flexion of corresponding ankle joints. This had minor effects on their motor function of lower limb and they were able to walk without any canes or crutches. Fifteen (15/123, 12.1%) patients in whom S2-S4 nerve roots were affected experienced different degrees of difficulties in defecation and urination, but none required vesicostomy or colostomy. Total symptom remission rate was 91.1% (123/135). The total complication rate was 30.3% (47/155).

Conclusion: The giant benign sacral neurogenic tumors could be resected by a posterior-only approach with “fishing” technique, which is reliable and safe method.
Objective
The treatment of malignant bone tumors around the distal tibia has always been difficult due to limited healing potential. The limb salvage procedures are possible with the usage of modular oncological implants, allografts or other techniques. However, the long term results are still poor relating to survival rate of the modular implants. The aim of the study is to present the novel option of reconstruction following en bloc tumor resections in the distal tibia.

Method
The authors presented a new concept of a custom made implant based on an inverse idea of porous coating comparing with standard or modular oncological implants. The individual designs reflected anatomical shape of the resected part and had a deep, transparent EPORE® layer. The central, axial part consisted of a solid rod to resist the acting forces. Proximally, the rod was connected with the uncemented MUTARS stem. The treatment concept for the distal transparent articular part and talus was primary desis and stable fixation with a modular porous stem. Two cases diagnosed with bone sarcomas were treated with that method at The Department of Orthopaedic Oncology of Pomeranian Medical University of Szczecin, Poland. The follow up controls were performed every four week after surgery.

Results
We achieved good functional results with no complications in that early observation period. The patients were able to put full weight bearing after four weeks since the surgery was performed. No early infection or skin necrosis were detected.

Conclusions
The presented method showed the unique, individual possibilities of implants design that not only give mechanical stability but can potentially stimulate biology of healing. The deep EPORE® semms to pay a crucial role in stimulating fibroblast ingrowth from soft tissue into the implant what can reduce pathological skin movements over the implant and lower the risk of periprosthetic infection.
OBJECTIVE
Limb salvage operations using endoprostheses is the treatment of choice for malignant bone tumors and some aggressive lesions around the knee. However, resection-arthrodesis offers a satisfactory solution in few subsets of patients. We studied the functional outcome of resection arthrodesis done for tumors around knee joint by use of bone cement, intramedullary K-nail, and locking plate

STUDY DESIGN
A retrospective observational study was done at All India Institute of medical sciences, New-Delhi, India.

METHOD
A total of 20 patients treated by this technique from 2012 to 2017 were reviewed. In these patients, arthrodesis after tumor resection was done by wrapping bone cement around K-nail. Firstly the femur and the tibia canals were prepared by sequential reaming. K-nail with diameter 1 mm less than the last size reamer used was chosen. In cases requiring longer nail, two nails were stacked on each other. The nail was inserted in antegrade fashion in the tibia followed by pushing the nail retrogradely in the femoral canal by hand or by the help of a plier. To provide additional stability locking plates with unicortical locking screw were used. Bone cement was then wrapped around K-nail and attempt was made to make a collar of cement around the cement-bone junction at both the ends

RESULT
Out of 20 patients, two underwent a/k amputation for recurrence of the tumor, three patients had infection, four patients died due to metastasis and other complications. One patient underwent endoprosthesis reconstruction after two year. The mean follow-up period was 36 months. All patients had a noticeable limp, and inconveniences in doing activities of their daily living. However, some of them were able to return to their previous occupations.

CONCLUSION
This technique of resection-arthrodesis can be attempted in tumor with extensive soft tissue involvement, irreparable extensor mechanism and in poor patients.
Objective We developed a novel technique named “homolateral femur Rotation and allograft lengthening technique” to reconstruct huge defects after tumor resection in the pelvis as well as to restore the limb length. The objective of this research is to introduce and evaluate the outcome of this treatment.

Methods After the tumor is resected, the proximal femur is rotated and lengthened with “Z” osteotomy, and then the lower limb is lengthened with allograft transplantation. And the early outcomes of nine patients were reported using the survival status, local recurrence rate, Musculoskeletal Tumor Society (MSTS) Score, limb length discrepancy and complications. There were 3 males and 6 females with a mean age of 39.9 years (Range, 23 to 48). There were two dedifferentiated chondrosarcoma, two low-grade chondrosarcoma, two undifferentiated polymorphic sarcoma, one grade 2 chondrosarcoma, one low-grade osteosarcoma, and one recurrent giant cell tumor of bone.

Results With a mean follow-up of 23.4 months (range, 12 to 44), six patients (66.7%) were free of disease. The overall survival rate was 75% at 2 years. One patient had pulmonary metastasis and had complete response after chemotherapy. Three patients (33.3%) had local recurrence. The mean discrepancy of the lower limb length at the last follow up was 12.8 mm (range 0 to 30). The mean Musculoskeletal Tumor Society score 18 (range, 14 to 24).

Conclusions This challenging procedure provides satisfactory mechanical results, while restoring the femoropelvic continuity and keeping the lower limb length. The authors conclude from this early experience that the “homolateral femur rotation-lengthening with allograft transplantation technique” provides acceptable complication rate and satisfactory function outcome.
Objective
Due to the three-dimensional anatomy of the scapula, precise resections of the scapula with antiquate surgical margin, could be very difficult. The computer navigation system has the advantage of pre-operative surgical planning. The purpose of this research is to evaluate the efficacy of computer assisted pre-operative surgical planning for the resection of bone tumors in the scapular.

Patients and Methods
This was a retrospective research. A total of six patients were surgically treated with this technique between 2013 and 2017. There were 3 males and 3 three females. All the patients were histologically diagnosed as low grade chondrosarcoma. The tumor edge was determined in CT images. With the virtual scapula specimen, the planned margin of the tumor resection was 1-2 cm from the tumor edge. The surgical margin was evaluated for each case. Distances between the osteomy planned and the osteomy by free hand were measured. For each case, at least two distances were calculated.

Results
All tumors were removed en bloc with a cuff of normal soft tissue completely surrounding the mass. Histological examination of all specimen showed a clear margin in all cases. The minimum of surgical margin width in bone varied from 7 to 13 mm in this series. The differences between the osteomies preoperatively planned and the osteomies achieved by navigation was in a global mean of 2.36 mm (SD: 2.09) in a total of 14 planes. No patient experienced local recurrence or distant metastasis in the 4 of 6 patients, who were evaluated with more than 3 years’ follow-up. The functional MSTS score were 100% for all 6 patients.

Conclusion
3D preoperative planning and surgery using a virtual specimen provide a reasonable premise for partial geographic scapulectomy of the scapular chondrosarcoma.
Objective: The present study was designed to review the epidemiological characteristics, and outcomes of surgical management in large series of patients with giant cell tumor who were treated at a single institution.

Methods: The cases of 732 patients with extremity benign giant cell tumor between 2009 and 2016 were treated at our institution. 670 Patients were reviewed retrospectively according to the including criteria.

Results: There were 348 males and 322 female patients. The mean age at first diagnosis was 30.0 (10-77) years. 86.57% of the affected sites were in the limbs, and the remaining 13.43% occurred in the spine, pelvis and other sites. 99.7% (668/670) of the patients received surgical treatment. 0.3% (2/670) of the patients received non-surgical treatment alone. Until the last follow-up, 13.3% (89/670) of patients required artificial prosthesis replacement surgery, 3.4% (23/670) of patients received other functional disability surgery, and 1 patient received amputation. Lung metastases occurred in 1.8% (12/670) of patients and the prognosis was good. The incidence of malignant transformation after recurrence of primary giant cell tumor of bone was 0.6% (4/670). In addition, 2 patients showed multiple giant cell tumors of the bone.

Conclusion: Giant cell tumor of bone has its own epidemiological characteristics. Surgical treatment is still the most important treatment method. The incidence of lung metastasis, malignant transformation, and multi-center giant cell tumor of bone is low, and the overall prognosis is good. However, surgery eventually leads to a certain proportion of severe functional impairment.
Objective: Malignant tumors in the proximal ulna are very rare. It is difficult to reconstruct bone defects after resection. This study provides a new way to reconstruct elbow joint function.

Methods: From 2014 to 2017, a total of 4 patients were treated with the technique of radio-humeral elbow arthroplasty in our hospital. Among them, there were 1 male and 3 females, with an average age of 35.6 years. There were 1 case of osteosarcoma, 1 case of epithelioid hemangioendothelioma, 1 case of osteoblastoma, and 1 case of complex hemangiomas of bone. According to the surgical plan, proximal ulna was removed en bloc. The distal humerus and the proximal radius were trimmed to fit together. The radio-humeral elbow arthroplasty was done. Wide margin was achieved in 3 cases and marginal margin in 1 case. Plasters were externally fixed for 8 weeks after surgery. Patients were encouraged to actively move their hands. After 8 weeks, the patients started to exercise elbow joints. Regular follow-up was performed on all patients and the survival, metastasis, recurrence, function, and complications were recorded. Patients' postoperative function was assessed using the Mayo Elbow Functional Score (MEPS) and the Musculoskeletal Oncology Association (MSTS) functional scoring system.

Results: All patients were followed up. Four patients were followed up for 47, 33, 12 and 3 months. At the last follow-up, there were no recurrences, no metastases, and no complications. The average MEPS score was 92.5 (90-95) points. The mean postoperative MSTS score was 27.8 (27-29) points.

Conclusion: Radio-humeral elbow arthroplasty as a biological reconstruction method for the tumors in the proximal ulna provides a new limb salvage method. The postoperative functional is good. It is worth further study to evaluate its long-term outcome.
Objective: - Giant cell tumor (GCT) of bone is a distinct, locally aggressive neoplasm, one of the most obscure and intensively examined tumors of bone. Malignancy in Giant Cell tumor of bone is a rare entity and is further divided into two groups namely Primary Malignant Giant Cell Tumor (PMGCT) and Secondary Malignant Giant Cell Tumor (SMGCT).

Methods: - We reviewed all cases of GCT from the All India Institute of Medical Sciences and filtered cases in which a diagnosis of giant cell tumor was related synchronously or metachronously to a diagnosis of sarcoma. We found total four cases of malignancy in GCT, retrospective evaluation of all the four cases was done for confirmation of the histopathological findings and clinical assessment was done to evaluate the outcome of the treatment offered to the patients.

Results: - Total 4 cases of malignancy in GCT were found, out which one case was of primary malignant giant cell tumor and other three were of secondary malignant giant cell tumor. All four patients underwent wide resection and endoprosthetic reconstruction as a definitive treatment. Three patients received chemotherapy according to histopathological grading. All four patients were males and the mean age of patients was 38.5 yrs. (range 25 - 47). The primary malignant GCT case had a rapid and aggressive clinical course as compared to secondary malignant GCT cases.

Conclusions: - There is no fixed protocol for the treatment of malignancy in GCT, Primary malignant GCT are clinically aggressive and should be treated aggressively. Chemotherapy should be planned according to the histological grade. Large sample studies are required to formulate a proper protocol for the management of Malignancy in Giant Cell Tumor.
Objective
Postoperative complications of thoracic wall resection include respiratory complications, skin necrosis, and infection. The purpose of the present study is to examine postoperative complications in patients who required combined thoracic wall resection during the surgical removal of a tumor.

Methods
This study included 69 patients who underwent thoracic wall resection between 2002 and 2016. There were 50 patients with lung tumors and 19 patients with musculoskeletal tumors. The two groups were compared to examine the clinical factors associated with complications. Preoperative and postoperative pulmonary function testings were conducted to examine residual pulmonary function in 14 patients.

Results
The mean age of the 69 patients (59 males and 10 females) was 62 years at the time of surgery, and the mean follow-up period was 36 months. The number of resected ribs was one rib in 14 patients, two ribs in 21 patients, three ribs in 24 patients, and four ribs in 5 patients, with sternotomy performed in five patients. Thoracic cage reconstruction was performed in 47 patients. The 5-year survival rate was 49.0% in patients with lung tumors and 85.7% in patients with musculoskeletal tumors. Postoperative complications occurred in 30 patients (43.5%). Compared with preoperative testing, postoperative pulmonary function testing showed a decrease in the mean percentage of vital capacity and an increase of 1.0% in the mean forced expiratory volume.

Discussion
In the present study, the 5-year survival rate was comparable to survival rates in recently published reports for both patients with lung tumors and those with musculoskeletal tumors. In patients with lung tumors, pneumonectomy can result in an increased rate of complications following thoracic wall resection. Residual pulmonary function is affected by impaired thoracic cage expansion and removal of the lung.
Session Name: **Poster Session**  
Theme: **Non-biological reconstruction**  
Abstract Number: **141**  
Abstract Title: **Endoprosthesis Replacement Surgeries at University Malaya: Time-based functional outcome evaluation (MSTS and TESS)**  
Authors: Rupini Devi Santharalinggam, Vivek Ajit Singh, Azura Mansor, Faissal Yasin  
Presenter: Rupini Devi Santharalinggam, University Malaya Medical Centre, Malaysia.  

**PURPOSE:**  
Endoprosthesis replacement (EPR) is a form of limb salvage surgery. We present a time-based functional outcome evaluation using MSTS (clinician-reported-based outcome) and TESS (patient reported-based score).

**METHODS:**  
All patients with EPR in the last 10 years were evaluated. 160 patients for MSTS and 118 for TESS from May 2006 to November 2017. The scores were analysed and the Mode of failure identified (E.R Henderson classification).

**RESULTS:**  
The age range from 7-82 years (mean:32.78±16.39). Mean duration of follow-up: 40.21 months (3-120 months). 50.6% were male and 49.4% female.-*  
The mean total MSTS score: 74.90% (last follow up); [upper limb: 74.90±16.12 (30-100%) and lower limb: 76.16±18.72 (23.33-100%). The mean TESS score: 81.57% (25-100%); upper limb was 79.25±14.30 (44.7-100%) and lower limb: 81.96±17.41 (25-100%). The mean MSTS score for proximal femur, distal femur, proximal tibia, distal tibia, proximal humerus and distal humerus are 73.95%, 83.73%, 74.88%, 75.63%, 76.45% and 72% respectively. The mean MSTS score for proximal femur, distal femur, proximal tibia, distal tibia, proximal humerus and distal humerus are 72.84%, 77.50%, 76.32%, 69.60%, 77% and 68.02% respectively. Hence, the highest score is distal femur and the lowerst score is distal humerus.  
For the lower-limb, MSTS plateaued in first and TESS in second year whereas the upper-limb, MSTS stabilised at 18 months and Tess at 5 years (Figure 1).  
The highest mode of failure was tumor progression (33.49), followed by infection (22.2%), aseptic loosening (17.7%), soft tissue failure (15.5%) and structural failure (11.11%).  
There are no significant differences in MSTS and TESS score for both upper-limb and lower-limb (p= 0.093).

**CONCLUSION:**  
EPR has good functional outcome in both clinician-based and patient-based scores. The lower limb function stabilized faster compared to the upper limb (12 months for upper-limb and 18 months for Lower-limb).
Background: The total replacement of the femur in pediatric patients is an exceptional surgery and classically of certain morbidity. Many cases of tumors, due to their large volume, require complete resection of the bone. In other cases, the presence of skip metastasis may force the same surgical gesture. In other cases, in primary femoral partial resections, the patient's physical growth (and the resulting discrepancy), the high level of activity, and the failure and/or loosening of the implant, may generate the need for a revision whose only reconstructive option is the total replacement of the femur.

Patients and Methods: A series of 7 patients with total replacement of the femur is presented. 5 as primary surgery and 2 as revision due to failure of the original reconstruction method. The sample consists of 4 male patients and 3 female patients, with an average of 13.4 years of age. The final functional result was evaluated by the MSTS scale.

Results: The functional results range from good to very good, with an average follow-up of 2 years. Currently, 6 patients are alive and disease free and 5 present preservation of the implant and correct functioning without signs of loosening. One patient had to have the implant removed due to late infection and 1 patient died due to systemic disease.

Conclusions: The total replacement of the femur is a valid alternative, with good functionality, for those critical cases where the only other viable therapeutic option corresponds to a hip level disarticulation.
Session Name: Poster Session
Theme: Non-biological reconstruction
Abstract Number: 162
Abstract Title: Nail Spacer or Plate Spacer: Implant spacer in reconstruction of proximal and diaphyseal humeral tumors
Authors: Abhijeet Salunke, Jaymin Shah, Jyotindra Pandit, Rahul Parmar, Shashank Pandya
Presenter: Rahul Parmar, Gujarat Cancer Research Institute, India.

Aim:
The aim of the study to evaluate which modality of reconstruction will be suitable for proximal and diaphyseal humeral tumor resections reconstructed with implant spacer.

Methods:
The study included 22 patients treated with wide resection and implant spacer during period of 2013 to 2018. The histopathological diagnosis was Osteosarcoma in 11 cases, Ewing’s sarcoma in 7 cases and Giant cell tumor in 4 cases. There was dominant hand affection in 14 patients. The reconstruction modality used was Kunstcher nail in 12 patients and dual plate in 7 patients and single plate in 3 patients.

Results:
The mean distance between distal humerus and proximal edge of olecranon fossa after tumor resection in nail spacer group and plate spacer group was 8 cm and 3.0 cm respectively. The mean distance between proximal edge of olecranon fossa and trochlea was 3 cm. The mean age of patients was 26 years (8 to 54 years). The mean follow-up was of 24 months (3 to 46). The mean forward flexion and abduction was 18 degrees (0-30) and 20 degrees (0-30) respectively. The mean total MSTS score was 18 out of 30 (10-22) and mean DASH score for all patients was 37. Six patients died from pulmonary metastases. Wrist drop was in two patients due to radial nerve neuopraxia in two patients. Aseptic loosening was seen in two patients with nail spacer group at 3 year and 4 year follow-up. There was no implant breakage.

Conclusion:
Reconstruction with implant spacer in proximal and diaphyseal humeral tumors provides optimal functional outcomes and is a cost effective method of treatment. Nail spacer can be used in cases with sufficient distance between distal humerus and proximal edge of olecranon fossa for fixation and stability. Plate spacer can be used in patients with suboptimal length of remaining distal humerus.
Introduction: Limb salvage using endoprosthesis for primary bone tumours is the treatment of choice. In this study, we sought to assess the functional outcomes and early complications associated with endoprosthetic reconstruction for tumours around knee.

Material and methods: 20 patients who underwent tumour resection and endoprosthetic reconstruction around knee were followed up at 6 weeks, 6 months and 1 year from surgery. Functional outcomes were evaluated using Musculoskeletal Tumour Society (MSTS) scoring system, Toronto Extremity Salvage Score (TESS) and Short Form-36 (SF-36) questionnaire. Complications were also recorded and analysed.

Results: In 8 patients proximal tibia, in 12 patients distal femur endoprosthetic reconstruction was done. At 6 weeks, mean MSTS % scores was 71.29 % and 57.86%, TESS was 55 and 23 and SF-36 questionnaire had significant differences in physical functioning, social functioning and pain scores for distal femur and proximal tibia group respectively. All three scores improved over 6 months and 1 year but difference between two groups remained with better outcome in distal femur group which was statistically significant (p<0.01). There were 2 cases of local recurrence from the biopsy tract, 1 each in case of distal femur and proximal tibia osteosarcoma. In both the mass was excised with clear margins.

Conclusions: We conclude that endoprosthesis replacement for primary bone tumours around knee have early good to excellent functional outcome, better in distal femur compared to proximal tibial reconstruction. Parallel recording of the MSTS score, TESS and SF-36 scores provide a better measure by combining objective and subjective parameters.
Aims and objectives: Reconstruction of the distal humeral defects following resection of primary or secondary aggressive bony lesions has always been a challenge. Reconstruction comprises of the skeletal defect, restoration of the motor vector and management of the soft tissue defects. We tried to evaluate the short term results of distal humeral defect reconstruction with total elbow megaprosthesis in our institute.

Patients and Methods: Eleven patients were followed up with maximum follow up period of 2 years 4 months and the minimum follow up period of 1 year. Out of the eleven patients, four patients of Campanacci stage 3 GCT, three cases of osteosarcoma, two cases of chondrosarcoma, one patient with high grade fibromyxoid sarcoma and one case from metastatic renal cell carcinoma were operated from September 2015 till February 2017. Cases operated after February 2017 were not included so that a minimum of one year follow up period can be recorded.

Results: Out of eleven patients, till last recorded follow up, none had any local recurrence or distant failure. Two patients had surgical site infection, one of them opted for above elbow amputation due to intractable infection even after two consecutive debridements and for the other patient, implant removal and functional elbow brace was applied till definitive secondary reconstruction. The average MSTS score in the rest was 26/30.

Conclusion: Total elbow megaprosthesis is one of the viable options in large bony defects following distal humerus resection. The results are optimum with judicious patient selection and meticulous preoperative planning.
Session Name: **Poster Session**  
Theme: **Non-biological reconstruction**  
Abstract Number: **227**  
Abstract Title: **Injectable Bone Cement (Cerament) in Benign Bone Tumors**  
Authors: **Jerzy Nazar, Radomił Binek, Bartosz Łukaszewski**  
Presenter: **Jerzy Nazar, Department of Orthopaedic Surgery & Musculoskeletal Trauma, Clinical Hospital No. 2 In Poznań, Poland, Poland.**

Key words: injectable bone substitute, biomaterial, articular fracture, benign bone tumors.

Abstract:  
Treatment of unstable articular fractures and benign bone tumors requires the use of bone substitute material to replenish bone defects. Traditional methods of using auto- or allograft of bone are an effective treatment, but they have some limitations. Bioavailability Cerament provides an effective method of bone substitution and, most importantly, distinguishes it from the traditional auto- or allograft, it can be applied by the minimally invasive method - transdermal.  
Idea: Presentation of indications and method of treatment with Cerament including minimally invasive method.

Material: 43 cases of benign bone tumors, 3 cases of articular fractures

Methods: cases series.

Results: 39 cases (remodeling of bone substitute after 12mc), 7 (slow remodeling), 28 cases total absence of pain in 3 months after surgery.

Complications: 10 cases - local soft tissue irritation, dermal reaction up to 3 weeks after surgery.

Conclusion:  
The use of Cerament bone substitute gives the possibility of effective treatment of bone defects resulting from articular fracture or presence of benign osteolytic bone tumors. The percutaneous x-ray administration method reduces the pain of the operative site, shortens the time of surgery, enables effective orthopedic treatment.
Objective: To evaluate oncologic and functional outcome of stage 3 giant cell tumor of bone (GCTB) that managed under our simple guideline of treatment.

Study design: Retrospective study of stage 3 GCTB of appendicular bone excluding pelvis that managed under our guideline, based on location (expendable bone or not), bone stock including cortical thickness and containment, and response to anti-resorptive drugs. Minimal follow-up periods were not less than 12 months.

Methods: Thirty-four patients were included in this study, who were managed under guideline. Patients with GCTB in non-expendable bone, adequate bone stock including response to anti-resorptive agent were performed extended curettage with PMMA augmentation. Patients with GCTB in expendable bone and in non-expandable bone who had inadequate bone stock despite received anti-resorptive agent were performed wide resection. Oncologic outcomes include local recurrence, pulmonary metastasis and oncologic status. Functional outcome was assessed by MSTS score at latest follow up.

Results: Mean follow-up period was 30 months (12-93). Twenty-seven patients were treated by extended curettage (6 of 27 were received pre-operative bisphosphonate). Seven patients were performed wide resection. Four patients had local recurrence (2 in curettage group and 2 in resection group). Pulmonary metastasis occurred in one case. Average MSTS score was 25.5 or 84.9% (87.2% in curettage group and 76.2% in resection group).

Conclusion: Overall oncologic and functional outcomes were satisfied especially in curettage group. In this study, we can shift 6 from 8 patients with inadequate bone stock back to curettage group to reduced morbidity from resection. Stage 3 GCTB has varied extension of disease and no definite conclusion for optimal treatment procedure. Evaluation of location, cortical containment and thickness, response to anti-resorptive agents are important parameter to make a decision of treatment.
Objective: This study aims to determine whether giant cell tumor of bone of the foot (GCTB-F) is more aggressive than GCTB at other sites using data from a single institution.

Methods: We reviewed all patients with GCTB seen by our Unit from 1993–2012. Patients with GCTB-F were compared with all other patients with GCTB in terms of demographics and presentation. This group of GCTB-F was then compared with patients with GCTB of the appendicular skeleton (GCTB-AS) in terms of treatment and oncologic outcome at follow-up of at least 2 years.

Results and Conclusion: There were 7 patients with GCTB-F (2.6%), most consulted over 12 months after symptoms. Compared to other GCTB (n=262), a bigger proportion of patients (28.5%) presented as recurrent lesions. All 7 patients were classified as Campanacci III but none had lung metastasis at presentation or on follow-up. Compared to the group of 124 GCTB-AS, no GCTB-F patient received intralesional surgery. The 14% recurrence rate can be explained by contaminated non-intralesional surgery due to the advanced presentation and the technically challenging architecture of the foot. It would seem the aggressive tag of GCTB-F is not due to aggressive biologic behavior, but to a combination of delayed presentation, delayed diagnosis and difficult surgery.
Aim: The purpose of this paper is to describe the functional and oncologic outcomes of endoprosthetic reconstruction of bone tumors treated with limb salvage procedure.

Methods: In our study, 7 patients underwent limb salvage surgery. All patients are still undergoing follow-up at the time of this report. The patient’s medical record, surgical notes, radiographs, and pathologic records were retrospectively reviewed. Written informed consent was obtained from all of the patients included in this study.

Results: all patients were evaluated using the Musculoskeletal Tumour Society (MSTS) Scoring System. Numerical values from 0 to 5 points were assigned for each of the following 6 categories: pain, function, emotional acceptance, use of supports, walking ability and gait. These values were added and the functional score was presented as a percentage of the maximum possible score. Of the 7 patients evaluated, two had a diagnosis of Giant Cell Tumour (GCT); two patients had osteosarcoma; one was diagnosed PNET, one had chondrosarcoma and last one was diagnosed as ewings sarcoma. All underwent wide local resection with endoprosthetic reconstruction depending on the site of the lesion. The MSTS functional scores calculated were 67%, 70%, 86%, 60%, 75%, 72% and 78% respectively. No major complications were encountered during and postoperative rehabilitative time period.

Conclusion: Endoprosthetic reconstruction was shown to be a safe and reliable technique of reconstructing a large bony defect, providing good functional and oncologic outcomes in most patients. Although primarily used in the treatment of primary bone sarcomas, endoprosthetic reconstruction also can be used in the treatment of metastatic bone disease and nononcologic diagnoses. In our opinion, endoprostheses should be considered as a treatment of choice for bone tumors. Advances in limb salvage surgery are and will be for a long time a great challenge for surgical oncologists of the 21st century.
Objective
Peri acetabular resections are complex surgeries in view of the difficult location and proximity of critical structures. Reconstruction following peri-acetabular resection poses greater challenges, and most of the techniques used were not either stable or could not provide good range of movements and function.

Methods
We retrospectively analysed 5 patients between 2014 – 2017 who underwent periacetabular resections for sarcomas and reconstruction with custom-made coned prosthesis. The complications and the surgical outcome were analysed. The functional outcome at one year was assessed using the MSTS scoring system.

Results
The age ranges from 11 – 49 years. Male: female 2:3. The histology was Chondrosarcoma in 2 patients, Ewing’s sarcoma in 1 patient, Osteosarcoma in 1 patient and Synovial sarcoma in 1 patient. Three patients had type II + III resection, 1 patient had type II resection, and 1 patient had type II + proximal femur resection. One patient required proximal femoral reconstruction also along with custom-made coned acetabular prosthesis. One patient had deep infection requiring exploration and lavage, while one patient developed superficial surgical site infection requiring resutting. Two patients developed lung metastasis on follow up. The average MSTS score was 23. All the patients had good functional outcome at 1 year. The Gait and hip ROM were more stable and better than patients who underwent no reconstruction/saddle prosthesis.

Conclusion
Pelvic reconstruction with the custom-made coned acetabular prosthesis following periacetabular resections yielded better functional results at short term follow up than other reconstructive alternatives such as no reconstruction or saddle prosthesis. It can be used even in patients with proximal femoral resections along with acetabular resection.
Objectives
Many reconstructive methods have been used after internal hemipelvectomy. Reconstruction with Ice-cream cone acetabular cup has been invented since 2008. The objective of this study is to identify the functional and oncologic outcomes of this group of patients.

Methods
Between 2013-2016, twenty-nine patients had undergone internal hemipelvectomy and four (14%) were treated with an Ice-cream cone implant (pedestal cup; LUMiC®, Implantcast, Buxtehude, Germany). Indication for surgery included pelvic tumor affecting peri-acetabular area (at least P2 resection).

Results
All four patients were available for follow-up for more than 2 years (median 3.2; ranged 2.1-4.8 years). Mean age of the patients was 40.8 (range 21-65) years. Three of which had chondrosarcoma and one had osteosarcoma of the pelvis. Complications occurred in three patients (75%). Of which dislocation was the most common, affecting two patients (50%). One patient (25%) developed deep infection and was initially treated with intravenous antibiotics and multiple debridement. The process was unsuccessful and eventually, the prosthesis was removed. Mean MSTS score was 69% (range; 47-86). The cumulative of implant failure was 25% (95% CI, 1.37-4.48) for septic loosening. No patients presented with local recurrence, progression of the disease or metastasis.

Conclusions
Pelvic reconstruction with Ice-cream cone prosthesis associated with fair functional outcome at short-term follow up.
Aim: To evaluate the feasibility and effectiveness of the use of hypertonic saline as an adjuvant treatment for giant cell tumors (GCT) of extremity.

Methods: We retrospectively compared the effectiveness of treating giant cell tumors of extremity with two different adjuvant therapies from Jan 2000 to Jan 2016. Treatment cohorts included curettage with use of high speed burring combined with hypertonic saline and bone graft (n=105) and use of high speed burring combined with anhydrous alcohol and bone graft (n=41). Basic characteristics, oncological result, complication and limb function were reviewed and compared.

Results: The local recurrence rate was 11.4% (12/105) and 26.8% (11/41) for patients received hypertonic saline and anhydrous alcohol as adjuvant treatments respectively (p=0.022). Recurrence-free probability at final follow-up was 84.4% and 71.7% respectively by Kaplan-Meyer analysis (p=0.044). The recurrence risk was increased by the soft-tissue extension (hazard ratio [HR] = 2.8, 95% confidence interval [CI] = 1.2 to 6.4, p = 0.014) and use of anhydrous alcohol as an adjuvant therapy (hazard ratio [HR] = 0.4, 95% confidence interval [CI] = 0.19 to 0.99, p = 0.046). The nononcological complication rate was 16.2% (17/105) and 12.2% (5/41) respectively (p=0.54). The mean MSTS score was 27.0 (20 to 30) and was comparable among the two groups (p=0.25).

Conclusions: The use of hypertonic saline as a safe and convenient adjuvant therapy for GCT of extremity can provide better local control rate with low rate of complication and comparable limb function.
Session Name: Poster Session
Theme: Non-biological reconstruction
Abstract Number: 400
Abstract Title: To determine the results of patellar wiring extensor mechanism reconstruction after a proximal tibial mega-prosthesis for proximal tibial sarcomas.
Authors: G T SAI PRASANTH, VIJAY T K TITUS
Presenter: G T SAI PRASANTH, Christian Medical College, Vellore, India.

AIMS/OBJECTIVES:
To determine the total knee ROM at follow up, the time duration needed for re-establishment of effective knee extensor apparatus post operatively, the time taken for the patient to go from crutch walking to unaided walking and to document the presence of patella alta.

METHODS:
The use of patellar SS wire to the tibial shaft for extensor apparatus reconstruction in patients with proximal tibial sarcoma excision and mega-prosthesis has been used in our institute for the past ten years. One end of the wire is passed through the patella and the other end through the tibial shaft/mega-prosthesis. This prevents patella migrating proximally. The use of a medial gastrocnemius cover helps in better wound healing and it remains a barrier between the wound and the prosthesis in case of breakdown. We looked at the time duration needed for the patients to have complete knee ROM, unaided walking, extensor lag at follow up, patella alta. Patella alta was measured with a knee x ray in 90 deg flexion.

RESULTS:
A total of 20 patients were included in the study. 12/20 were males. 8/20 patients had left proximal tibia involved. The time for complete active knee extension in our patients was 4-7 months. Only 2 patients had a residual extensor lag. Most of our patients went to unaided activity in 3 months. We did not find any major change in patellar position on lateral X rays.

CONCLUSION:
Use of patella to tibial shaft wire after proximal tibia mega-prosthesis helps in development of an effective extensor mechanism with complete ligament healing in approximately 5 months. Use of a medial gastrocnemius flap in these patients helps in better wound healing.
Aims: Osteosarcoma is the most common malignant bone tumor in childhood. Although a poorer prognosis has been described in older patients, there are few reports solely on primary osteosarcoma. We evaluated the clinical features of elderly patients with osteosarcoma.

Methods: One hundred patients were included in this retrospective study, and we divided them into two groups based on a cut-off age of 40 (Older and Younger groups). The patients’ information, including age, tumor type, location, presence of metastasis, AJCC stage, treatment-related factors, local and distant relapse, and outcome, was collected. We compared the clinical courses between the 2 groups in all and only deceased patients.

Results: In all patients, the frequency of chemotherapy in the older group was significantly lower than in the younger group (P<0.01), and the tumor was significantly more frequent in the axial bone in the older group (P<0.05). The older group showed a significantly poorer prognosis (P<0.05). The 10-year OS of the older group revealed a significantly poorer prognosis than that of the younger group (P<0.05). The 5-year OS in the older group showed a significantly better prognosis than that of the younger group only in deceased patients (P<0.05). Only the existence of metastasis affects the prognosis in older patients (P<0.01).

Conclusions: Primary osteosarcoma in elderly patients showed a high incidence of axial bone involvement and low rate of chemotherapy. Although the final life prognosis is poor, the survival may be relatively prolonged. The presence of distant metastases markedly influenced the prognosis.
Introduction & Objective: The family members of patients are usually under profound psychological stress and anxiety when the patient is undergoing major oncological surgery. We tried to evaluate the effectiveness of periodic intraoperative text messages regarding the status of ongoing surgery in reducing the anxiety levels among the caregiving family members of the patient.

Material & Methods: This is a randomized single-blinded prospective study. Respondents less than 16 years of age, history of psychiatric or mental illnesses, and those who are not willing to give consent for the study were excluded. Accompanying family members or relatives of the 60 patients (1 family member for each patient) undergoing major oncological surgery lasting for more than 1 hour were recruited and were randomized into two groups of 30 each. Group 1 (No SMS group) didn’t receive any text messages, whereas Group 2 (SMS group) received periodic intraoperative text messages. Anxiety among family members was assessed using Visual Analogue Scale for Anxiety (VAS-A) and Anxiety component of Hospital Anxiety & Depression Scale (HADS-A) at five different periods; (P1) one day prior to surgery, (P2) at separation of patient from the family at the operation theatre, (P3) one hour after commencement of surgery, (P4) immediately after completion of surgery, and (P5) one day after surgery.

Results: The mean VAS-A & HADS-A scores during different periods of assessment are summarized in the table below. Our results showed that anxiety levels among both groups were comparable during pre-operative and postoperative periods. However, the anxiety scores were significantly lower for SMS group during P3 & P4 assessments i.e. during intraoperative period.

Conclusion: Periodic text messages regarding the status of ongoing surgery significantly help to reduce the anxiety among the accompanying family members of patients undergoing oncological surgery especially during the intraoperative period.
Abstract Title: Prediction of muscle strength and postoperative function after knee flexor muscle resection for soft tissue sarcoma of the lower limbs

Authors: Atsushi Tanaka, Yasuo Yoshimura, Takaaki Ishida, Kaoru Aoki, Masanori Okamoto, Munehisa Kito, Shuichiro Suzuki, Akira Takazawa, Hiroyuki Kato

Presenter: Atsushi Tanaka, Department Of Orthopaedic Surgery, Shinshu University School Of Medicine, Japan.

Objective:
Oncological margins and prognosis are the most important factors for operative planning of soft tissue sarcomas, but prediction of postoperative function is also necessary. The purpose of this study was to predict the knee flexion strength and postoperative function after knee flexor muscle resection for soft tissue sarcoma of the lower limbs.

Materials:
Seventeen patients underwent knee flexor muscle resection for soft tissue sarcoma of the lower limbs between 1991 and 2015. The type of resected muscles was surveyed, knee flexion strength (ratio of affected to unaffected side) was evaluated using the Biodex System isokinetic dynamometer, and differences between the type of resected muscles were examined. The Musculoskeletal Tumor Society (MSTS) score, Toronto Extremity Salvage Score (TESS), European Quality of Life-5 Dimensions (EQ-5D), and Short Form 8 (SF-8) were used to assess postoperative function and examine correlations with flexion strength. The cutoff value for flexion strength to predict good postoperative results was calculated by a receiver operating characteristic (ROC) curve and Fisher’s exact test.

Results:
Median flexion strength decreased in the resection of sartorius (97.8%), gracilis (95.4%), gastrocnemius (85.2%; interquartile range (IQR), 85.0-86.2), medial hamstrings (semimembranosus and semitendinosus, 76.2%; IQR, 73.3-78.0), lateral hamstrings (long and short head of biceps femoris, 66.1%; IQR, 65.9-70.4), and bilateral hamstrings (27.3%; IQR, 26.6-31.5). A significant difference was observed between lateral and bilateral hamstrings resection (p=0.049). Flexion strength was associated with lower functional scales (MSTS score, p=0.021; TESS, p=0.008; EQ-5D, p=0.034). Satisfactory function was obtained at a flexion strength cutoff value of 65.7%, and strength remained above the cutoff value up to unilateral hamstrings resection.

Conclusions:
Greater knee flexor muscles resection can result in functional deficits that are associated with decreased flexion strength. If continuity of unilateral hamstrings is maintained, good postoperative results can be expected.
Aims/Objectives: Our aim was to evaluate and compare anxiety & depression among patients with various musculoskeletal tumor conditions during preoperative, postoperative and follow up assessments.

Material & Methods: All the patients over 16 years of age diagnosed with musculoskeletal tumor who underwent surgery at our hospital between 1st October 2016 and 30th September 2017 were included. Patients who refused to give consent for the study and those with altered mental status or psychiatric illness were excluded. Patients were divided into 4 groups: Group 1 (Soft tissue minor: benign soft tissue mass undergoing simple excisional biopsy as a definitive treatment), Group 2 (Soft tissue major: Malignant soft tissue sarcomas undergoing wide resection ± reconstruction), Group 3 (Bone Minor: Benign bony tumors undergoing intralesional curettage or excision) and Group 4 (Bone Major: primary or secondary bone sarcomas or locally aggressive benign lesions undergoing wide resection and reconstruction or amputation as well as metastatic bony lesions undergoing resection & reconstruction or fixation). Anxiety among patients was assessed using Visual Analogue Scale for Anxiety (VAS-A) and Anxiety component of Hospital Anxiety & Depression Scale (HADS-A) whereas depression was assessed using Depression component of Hospital Anxiety & Depression Scale (HADS-D) during preoperative, 2 weeks postoperative and 3 months follow up periods.

Results: Total 104 patients were enrolled in our study (30 in Group 1, 35 in Group 2, 12 in Group 3 and 27 in Group 4). Anxiety as assessed by VAS-A & HADS-A and depression as assessed by HADS-D are significantly higher for patients undergoing bone surgeries (Group 3 & Group 4) as compared to patient undergoing soft tissue procedures (Group 1 & Group 2) during the entire course of treatment.

Conclusion: Bone tumor patients are at more risk for anxiety and depression as compared to soft tissue tumors.
INTRODUCTION
Giant cell-rich osteosarcoma (GCRO) is a rarer variant subtype of conventional osteosarcoma that has very closed resemblance and overlapping clinicopathologic features with invasive giant cell tumour (GCT) of bone. The occurrence of GCRO is reported to varies from 0.3% to 13%.

Case:
A 55-year-old lady, presented with 3 years history of painful swelling at her left ankle, affecting her ambulation and daily living activities. Examination revealed a non-tender large lobulated bony-hard swelling of left ankle. Plain radiograph revealed asymmetrical expansile, lytic bone tumour involving bimalleolar. Local MRI showed heterogenous, features of aggressive bony lesion involving both the distal tibia and fibula. Histopathology of incision biopsy was reported as GCT. Repeated X-ray of the left ankle, 7 month later showed further expansion of the bone lytic lesion with fracture over the distal left tibia and fibula. Subsequently, she underwent left below knee amputation and biopsy of the left femur, the HPE result of both biopsy revealed similar features as the first biopsy and strongly suggestive of giant cell-rich osteosarcoma. Thus chemotherapy was started and we are closed monitoring of her current condition to see the outcome.

CONCLUSION:
GCRO is a rare subtype of osteosarcoma, it’s clinical presentation as well as radiological features are almost similar to that of giant cell tumour of bone (75%); except that histologically, presents of nuclear atypia, atypical mitosis with osteoid matrix formation besides abundant of osteoclast-like giant cells are in favor of GCRO. Treatment with Denosumab (XGIVA) other than chemotherapy will give limited focal necrosis with reduction in the number of giant cells and giant osteoclast. The main stay of treatment is still surgical excision sandwich with chemotherapy.

Thus, this case report serve as an awareness regarding the entity of GCRO whenever dealing with a large osteolytic lesion that resembles of a giant cell tumour of bone.
Session Name: Poster Session
Theme: Others
Abstract Number: 49
Abstract Title: A rubber model for closed needle biopsy in musculoskeletal tumors: Innovative training simulator for skill improvement in orthopedic oncology
Authors: Suthi Pattarasupalerk, Phutsapong Srisawat, Thipachart Punyaratabandhu
Presenter: Suthi Pattarasupalerk, Phramongkutklao Hospital, Thailand.

Objective: The diagnostic yield of closed needle biopsy (CNB) can achieve the definite diagnosis when comparing with open biopsy. This procedure is technically demand and improper technique resulting in missed diagnosis and complications. We create innovative training simulator to improve skill in CNB for orthopedic residents before perform this procedure on the patients.

Method: Rubber model simulator was replicated from the actual extremity soft tissue tumor patients. It consisted of 4 different layers: skin, muscle, pseudo-capsule and tumor. Each layer had different consistency. We conducted CNB workshop for orthopedic residents. 85 participants attended the workshop. All participants completed pre-workshop questionnaire and attended the lecture that taught the principle and technique of CNB. Then all participants had practiced the hand-on workshop with training simulator under supervision by well-trained orthopedic oncologists. After the workshop, all participants were completed post-workshop questionnaire, using a 5-point Likert score, about the educational value of training simulator.

Results: The forty-nine participants with previous experience in this procedure and 36 without the experience. The 69 participants (81.18%) agreed or strongly agreed that training simulator was realistic in gross appearance and consistency. The mean of Likert score was 4.18±0.73. The 73 participants (85.88%) agreed or strongly agreed that simulator session helped in enhancing their confidence to perform this procedure in the future (4.14±0.74), there were no significant different in novice and experience group (P-value = 0.249). The 79 participants (92.94%) agreed or strongly agreed that simulator session helped to improved their skill to performing this procedure (4.28±0.67) and there were no significant different in novice and experience group (P-value =0.353)

Discussions: Our training simulator for CNB in soft tissue tumor is low cost and valuable. The orthopedic residents had reported the significant level educational value of this training simulator to enhance their confidence to perform this procedure.
Objective
The current study was to evaluate the profile of morbidity and short-term outcomes in patients with large sacropelvic malignant tumor treated by extended hemipelvectomy (combined with total pelvic exenteration, TPE) by a multidisciplinary team approach.

Methods
Six cases were retrospectively viewed between June 2015 and Dec 2016. The average age was 44.6 years old (20-66 yo). There were 4 males and 2 females. The diagnosis was chordoma (n=2), osteosarcoma (n=2), chondrosarcoma (n=1) and epithelioid angiosarcoma (n=1). Four were recurrent tumors and two were primary. Extended hemipelvectomy combined with TPE was performed on three patients and extended hemipelvectomy for the other 3 patients with visceral uninvolved. A 2-stage procedure was used for resection and reconstruction.

Results
The average operation time was 8.2 hours (6-10 h) and the average estimated intraoperative blood loss was 4000ml (range, 2000-6000ml). Aortic balloon was used to decrease intraoperative blood loss in all the 6 patients. Anterior thigh flap was used in 2 patients and glutaeus flap in 4 patients. There was no case of mortality related to surgery. R0 resection was achieved in 5 patients and one patient had R1 resection. Wound dehiscence occurred in two patients and debridement was performed. All the six patients were alive at a mean follow-up of 16.7 months (range 6-27 months) with four were free of disease. One local recurrence was observed and one patient had lung metastasis. All the patients were able to walk with crutches at the most recent follow-up. ECOG score improved from 4 preoperatively to 2 in three patients and to 3 in three patients. The average MSTS 93 score was 31.1±4.0%.

Conclusion
Extended hemipelvectomy combined with TPE is a feasible technique with potential cure possibility. However, indication and careful patient selection should be emphasized. A dedicated multidisciplinary team approach is essential for acceptable morbidity rate.
Introduction
With a few exception, osteosarcoma is readily diagnosed. Here we report a rare case of tibia osteomyelitis where all clinical, laboratory and radiological aspects suggested a diagnosis of osteosarcoma. This case reflects the other side of the picture where, in certain cases a correct diagnosis holds life, incorrect diagnosis death.

Case scenario: (history and clinical examination):
A 34-year old female who presented with H/O non-traumatic dull aching mechanical pain over her left leg for a duration of 6 months. Further detailed history revealed neither constitutional symptoms nor contact with TB infected patient. Clinically well build lady ambulating with mild limping otherwise generally looks normal. Locally, mild tenderness just below tibia tuberosity. The rest of her examination was unremarkable.

Her inflammatory markers and basic blood investigation were normal. Radiologically, the malignant bone tumor diagnosis was made with deferential diagnosis of osteosarcoma and lymphoma. Histopathology was challenging as the morphology is bland. Initially the low grade central osteosarcoma was made with request of second opinion. Subsequent 2 opinions (local and international) suggested inflammatory lesion rather than tumour.

Management:
Multidisciplinary decision was made to observe her, 4 months later, a repeated MRI showed shrinking in the lesion size and clinically she has no more pain.

Discussion & Conclusion:
Differential diagnosis for bone neoplasm must be done in consideration of infections as well, even in presence of a malignant-like imaging. Laboratory tests and the clinical examinations can be helpful but biopsy is the only instrument assuring a reliable diagnosis.
INTRODUCTION: Forequarter amputation (interscapolborahacic amputation) is regarded as one of the most debilitating surgical procedure in modern times. In Malaysian setting, where patients do present late for medical treatment, its role is significant in selected cases especially in the palliative setting. We review indication, technique and outcome of palliative forequarter amputation in Penang General Hospital.

METHODS: A retrospective review of all cases that underwent forequarter amputation from January 2016 to December 2017 were reviewed. There were 4 cases of forequarter amputation during the period. All the amputations were done for palliative reason. We use the ‘racquet’ incision and secure the anterior neurovascular bundle 1st before completing the posterior resection via scapulothoracic joint. 1 patient had a long lateral arm flap as his tumour involved the chest wall.

RESULTS: Mean age for our cases is 40 (16-56) years old. All patients died at with a mean survival of 4 months. At 2 weeks, all the patients had significant improvement in pain and quality of life post amputation.

DISCUSSIONS: Limb salvage surgery has replaced the role of amputation since the advent of neoadjuvant chemotherapy and radiotherapy in the management of shoulder girdle malignancies. However, in certain condition, amputation is still required to provided oncological margin be it for curative or palliative reason. An anterior first approach gives good and early control of the neurovascular bundle making surgery fast and possibly minimize bleeding.

CONCLUSION: Despite being a debilitating surgery, palliative forequarter amputation provides quality of life in selected cases.
Introduction
The shoulder girdle is the third most common site of predilection for bone tumors, the proximal humerus is the most common site followed in descending order by scapula and clavicle. With advancement in imaging techniques, the availability of effective adjuvant chemotheraphy and with tumor prosthesis, 80-98 % of these tumors can be safely resected through some limb salvage procedures. Two cases of malignant scapular tumor treated by Tikhoff-Limberg procedure are described.

Case Report
We report two cases, first a 39-year-old male who presented with lump on right shoulder region since 3 years before, became bigger slowly and the diameter 35 cm. The results of clinical examination, imaging and histopathology study shows low grade chondrosarcoma. Patient was treated with limb salvage surgery (shoulder girdle resection by Tikhoff-Limberg Procedure type III). The second case, 45 years old female presented with the huge lump on left shoulder region since 6 month before and getting bigger. The diameter was 25 cm and result of imaging and histopathology study shows Rhabdomyosarcoma phleomorphic type. Patient was treated with limb salvage surgery (shoulder girdle resection by Tikhoff-Limberg Procedure type IV).

Result
Post operative has good elbow and hand function but limited in shoulder function with no neurologic deficit.

Discussion
Patients with sarcoma of the shoulder girdle can be treated safely by limb sparing resection such as the Tikhoff-Limberg procedure. In our cases, we did not put prothese after resection, proximal humerus is left hanging because it still has good muscles. Although the function of the shoulder can not return to normal, but with good shoulder stability and good elbow and hand function can improve the quality of life of the patient .

Conclusion
Sarcoma in scapular region can be treated with limb salvage surgery with Tikhoff-Linberg procedure with satisfactory result.

Keywords: Sarcoma, Scapular, Tikhoff-Linberg procedure
Purpose: The efficacy of PET scan for early evaluation of chemosensitivity in various malignancies has been recently reported. In this study, we analyzed the relationship between the SUVmax of $^{18}$F-FDG PET/MRI and the effects of neoadjuvant chemotherapy in osteosarcoma.

Methods: Ten patients with primary osteosarcoma of the extremity without distant metastasis at presentation, who received neoadjuvant chemotherapy and surgery in our hospital from 2013, were enrolled. There were 4 males and 6 females with a median age of 18.5 years (range 8-41 years). Chemotherapy regimens used in this study were NECO-95J (2 cases), JCOG0905 (2 cases) and K2 without caffeine (6 cases). All the patients underwent whole-body $^{18}$F-FDG PET/MRI before and after the neoadjuvant chemotherapy (after 3 cycles and preoperatively). The metabolic response of neoadjuvant chemotherapy was calculated and compared with the histological response of the surgical specimen (Huvos grading system).

Results: The mean SUVmax was 7.6 (range 5.2-10.4) before therapy. The metabolic response after 3 cycles was -78.5% in the histologic responders (tumor necrosis ≥ 90%) (3 cases) and -31.0% in the nonresponders (4 cases). The preoperative metabolic response was -82.3% in the responders (4 cases) and -35.6% in the nonresponders (5 cases).

Conclusions: The results of this study indicated the efficacy of PET/MRI for early evaluation of chemosensitivity in osteosarcoma as with PET/CT. Compared with PET/CT, PET/MRI has the advantage of lower radiation exposure and higher contrast resolution. Since this study is preliminary and investigating only small number of patients, further study with larger number of patients is necessary.
Giant cell tumor (GCT) seldom occurs in the vertebrae above the sacrum and its occurrence in the cervical spine is rare. We describe a case of recurrent GCT in the cervical spine that was managed using denosumab. A 43-year-old male patient with C5 giant cell tumor (GCT) underwent tumor resection and anterior bone fusion of C4–C6. The tumor recurred locally 9 months after surgery with the patient complaining of neck and shoulder pain similar to his preoperative symptoms. The patient did not wish to undergo the second surgery that we considered.

Denosumab was administered subcutaneously on days 1, 8, 15, and 29, and subsequently every 4 weeks, and his pain disappeared after a two-month administration, with a sclerotic rim formation seen at the tumor site on computed tomography. He has been followed for 18 months with no evidence of tumor recurrence. Complete resection is generally recommended, but is not easy for many patients with cervical GCT because of the existence of neurovascular structures.

Some patients suffer from recurrence and treatment becomes more difficult. As such, denosumab may be an efficacious option for treatment of recurrent GCT of the cervical spine, although there is no defined endpoint for use of denosumab as a treatment for GCT, and there have been cases of recurrent GCT following the cessation of denosumab therapy. We think that it would be appropriate to administer denosumab with careful observation while tapering a dosage.

In conclusion, we consider that if possible, complete resection is optimal for recurrent cervical GCT, but that denosumab is an efficacious treatment option as shown in the present case.
Abstract
Aims/Objectives Clear-cell chondrosarcoma is a rare low grade variant of chondrosarcoma. The tumor is most frequently found in the epiphysis of the proximal femur. We discuss the pathogenesis, imaging features, surgical treatment and prognosis of the clear-cell chondrosarcoma of the femoral head and neck.

Methods
The clinical data of 12 cases of clear-cell chondrosarcoma of femoral head and neck from July 2000 to June 2017 are reviewed in our hospital. Through the analysis of the patient’s surgical records, imaging data, pathological data, and follow up the patients, the conclusion is obtained.

Results
There are 11 males and 1 female in the 12 cases. The age of the patients is from 16 to 55 years, with a median age of 36 years. 9 of 12 patients show calcification in the lesion matrix, accounting for 75% of all cases. 4 of 12 cases in other hospital after curettage and recurrence were wide resected. 8 cases are the first visit to our hospital. 4 of 8 patients have undergone preoperative biopsy, 3 cases of patients with preoperative pathology report: clear-cell chondrosarcoma, given tumor wide resection. The other 1 case with pathology report: benign neoplasm, have curettage and follow up. The other 4 of 8 cases were misdiagnosed with chondroblastoma, and no preoperative biopsy was performed, and curettage was performed. 8 of the 12 cases were treated with wide resection. The 8 patients had no recurrence or metastasis. The follow-up period was carried on from 10 to 140 months, with an average of 68 months.

Conclusions
The clear cell chondrosarcoma of the femoral head and neck is easily misdiagnosed as chondroblastoma, leading to curettage and a certain recurrence. Wide resection is the first choice of treatment for both patients who are newly diagnosed or relapsed.
INTRODUCTION
Bone tumor surgery can be more accurate under the computer assisted navigation. The aim of this study was to compare the accuracy for bony resection under navigation and by free hand in limb salvage surgery around the knee.

MATERIALS AND METHODS
Thirty-nine cases of bone tumors around the knee joint were resected under navigation in our department from 2008 Sep to 2017 Nov. All the cases were performed intercalary resection in femur or tibia. The initial aim to use navigation was to make the resection more close to the pre-operative planning. We used intraoperative navigation to find the cutting plane and use the jig saw to cut the bone. The post-operative specimen was used for verification and compared with the pre-operative plan. The length difference was defined as specimen length minus planning resection length. The control group included 117 cases of tumors around the knee performed limb salvage surgery when bony cutting was achieved by free hand. The length difference was detected in this control group. Then the differences in two groups were compared and analyzed.

RESULTS
The resection lengths in navigation group ranged from 85-282mm and in the free hand group the length ranged from 90-330mm. The length difference between post-operative verification and pre-operative plan was detected. In the navigation group, the length difference was 0.5±2.5mm (range, -5~5mm), while in the free hand group the length difference was 3.4±9.6mm (range, -20~29mm), P<0.01. For the absolute value differences analysis, the difference was 2.0±1.6mm and 8.3±6.0mm for navigation and free hand group respectively, P<0.01.

CONCLUSIONS
Tumor resection around the knee is more accurate when using navigation than by free hand. Computer assisted navigation can make a role in limb salvage surgery if the precise resection is required.
Introduction Many studies had demonstrated that MRI T1-weighted imaging is the most accurate method to evaluate the intramedullary extent of extremity osteosarcoma. However, we found that after neoadjuvant chemotherapy new low signal of MRI T1 imaging was detected near tumor, which mimicked the tumor progression. The aim of this study was to describe the incidence and type of this new signal, to reveal the pathological correlation with this imaging change.

Methods. We included 74 extremity osteosarcomas in this study. The T1-weighted MRI images of the affected extremity before and after neoadjuvant chemotherapy were reviewed and compared. The subjects were then classified according to the appearance of the border between the area involved by osteosarcoma and the normal marrow. The study population was classified into one of four classifications: ‘clear’, ‘continuous diffuse’, ‘discontinuous island-like’ and ‘discontinuous diffuse’. 11 patients underwent MRI of bilateral extremities, and for these patients we assessed the appearance of the uninvolved extremity. Following surgical resection of the tumor, the pathologic appearance was compared with the pre-operative MRI findings.

Results According to our classification system, all 74 subjects were ‘clear’ before neoadjuvant chemotherapy. After neoadjuvant chemotherapy, 30 subjects (40.5%) were still clear. Of the 44 subjects (59.5%) not classified as ‘clear’, 22 (29.7%) were classified as continuous diffuse, 4 (5.4%) as ‘discontinuous island-like’, and 18 (24.3%) as ‘discontinuous diffuse’. Of the subjects with MRI of bilateral femurs, no radiologic difference was noted in the narrow marrow bilaterally. No significant difference in overall survival and relapse free survival was noted between patients grouped according to the subtypes of MRI noted.

Conclusions: Neoadjuvant chemotherapy for extremity osteosarcoma can result in a variety of changes of the MRI appearance of tumor and adjacent marrow. Areas of signal change beyond the tumor that represent marrow conversion and not tumor progression.
OBJECTIVE:
To assess the accuracy of initial biopsy of musculoskeletal lymphoma primarily presenting clinically as a bone lesion or soft tissue mass.

METHODS:
Consecutive patients with histologically confirmed musculoskeletal lymphoma from 2010 to 2017 were included. Patient records were reviewed. Tumour location (bone or soft tissue), Histological Subtype and the histological findings of initial biopsy were obtained.

RESULTS:
There were 20 osseous lymphomas and 9 soft tissue lymphomas. The most common histological subtype of osseous lymphomas was diffuse large B-cell lymphoma (DLBCL) (N=11), followed by Anaplastic large cell lymphoma(ALCL)(N=4). Two cases of Follicular lymphoma(FL), 1 marginal zone lymphoma(MZL), 1 Hodgkin's lymphoma, and 1 B lymphoblastic leukemia also were seen. The histological subtype of soft tissue lymphomas was 4 DLBCL, 2 FL, 1 MZL, 1 peripheral T-cell lymphoma, and 1 T-cell lymphoblastic lymphoma. The ultrasound-guided core biopsy was performed in 9 patients, CT-guided core biopsy was done in 20 patients as initial biopsy. The diagnostic accuracy of initial biopsy was 70% (14 out of 20) in osseous lymphomas and 78% (7 out of 9) in soft tissue lymphomas.

Seven core biopsies were inadequate tissue to make a definitive diagnosis. the inflammatory infiltrate was observed in all these biopsy specimens. There was no atypical cell proliferation in these materials.

CONCLUSIONS:
Even there was some cases could not lead to confirm the diagnosis, collection of abnormal tissue from the lesion site was achieved in these cases. Temporary Spontaneous regression can be seen in 10-20% of malignant lymphoma. There are some reports that the disappearance of the abnormal cells and massive infiltration of reactive small lymphocytes was seen in the residual tissue after the regression of malignant lymphoma. In our cases, there is a possibility that the initial biopsy was carried out at the time of temporary spontaneous regression.
Clinical characteristics and risk factors analysis of lung metastasis of benign giant cell tumor of bone

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Objectives Pulmonary metastasis of benign giant cell tumor of bone is very rare, and its biological behavior is difficult to predict. The purpose of this study is to find the clinical characteristics of and related risk factors for pulmonary metastasis of this tumor.

Methods Forty-six cases of benign giant cell tumor of bone with lung metastasis were collected. The clinical characteristics of and related risk factors were analyzed.

Results 60.9% of the primary tumors were located around the knee joint. The Campanacci stage of all tumors was stage 3. Surgery of the primary tumor included curettage in 37 patients, resection in 8, and amputation in 1. Local recurrence after the primary surgery occurred in 34 patients. The recurrence rate, Campanacci stage, and surgical method were significant risk factors for lung metastasis. The median postoperative metastasis time in the lower limbs, upper limbs, and axial skeleton was 20.1, 7.9, and 1.4 months, respectively (p = 0.010). The median metastasis time in patients with and without recurrence was 13.7 and 43.2 months, respectively (p = 0.018). Eighteen patients had unilateral metastasis and 28 had bilateral metastasis. Most lesions (n = 38) were located in the peripheral lung. Nineteen patients received treatment, and 12 of them underwent tumor resection. The 5-year overall survival rate was 94.4%.

Conclusions This study showed that local recurrence, a high Campanacci stage, and curettage were possible high-risk factors for pulmonary metastasis. The primary lesion site and local recurrence may be related to the metastasis time. The survival rate of patients with pulmonary metastasis was high.
Session Name: **Poster Session**  
Theme: **Others**  
Abstract Number: **114**  
Abstract Title: **Recurrence and survival factors analysis of 171 cases of sacral chordoma in a single institute in China**  
Authors: **Yongkun Yang, Yuan Li, Hairong Xu, Werfeng Liu, Xiaohui Niu**  
Presenter: **Fajun Yang, Beijing Ji Shui Tan Hospital, China.**

**Objectives:** To evaluate post-operative recurrence, survival and metastasis results and related factors of sacral chordoma.

**Methods:** Between 1978 and 2013, a total of 171 patients with sacral chordoma were diagnosed at our institution and 162 cases underwent operation. The clinical characteristics, treatment and outcomes of all these patients were reviewed.

**Results:** The 3-year recurrence free survival rate was 83.1%. The median recurrence free survival time was 73 ± 7.8 months. Tumor level in sacrum and surgical margin were significant factors influencing recurrence. Recurrence was significant factor influencing metastasis. One hundred and fifty-seven cases were followed up for an average of 55.6 months. 135 cases (86%) survived, 37 cases (23.6%) developed recurrence, and 17 cases (10.8%) developed metastasis. The overall 5-year and 10-year survival rate was 88.3% and 59.6%, respectively. Age (p=0.037) and metastasis (p=0.001) were significant factors influencing survival. The 3-year recurrence free survival rate was 80.1%. The median recurrence free survival time was 69 ± 12.7 months. Tumor level in sacrum (p=0.035) and surgical margin (p=0.009) were significant factors influencing recurrence. Seventeen cases (10.8%) had metastasis. Recurrence (p=0.016) was significant factors influencing metastasis.

**Conclusions:** Sacral chordoma tended to occur in elderly male patients and locate below sacral 3 level. The recurrence rate was high, especially for tumor above sacral 3 level. Wide surgical margin is very important for good local control. The patients with metastasis had poor prognosis.
Objective: To determine the value of diffusion-weighted imaging (DWI) in the preoperative evaluation of peritumoral contrast enhancement on standard magnetic resonance (MR) imaging in patients with soft tissue sarcoma at 3 T.

Methods: The institutional review board approved this retrospective study and informed consent was waived. Twelve patients who underwent 3-T MR imaging including DWI and had soft tissue sarcoma with circumscribed margin at pathology were included in this study. Two independent musculoskeletal radiologists retrospectively reviewed standard MR imaging. Then, they assessed a combination of standard MR imaging and DWI.

Results: Among 12 soft tissue sarcomas with circumscribed margin at pathology, peritumoral contrast enhancement was observed in 83% (10/12) and 75% (9/12) of circumscribed soft tissue sarcoma on standard MR imaging for each reader, respectively. Among cases that showed peritumoral contrast enhancement on standard MR imaging, 10% (1/10) and 22% (2/9) cases showed impeded water diffusivity (diffusion restriction) on DWI. Overall, impeded water diffusivity that could suspect the peritumoral invasion was observed in 8% (1/12) and 17% (2/12) of patients at DWI, respectively. Specificity of peritumoral invasion was increased with addition of DWI to standard MR imaging: 17% vs 92% and 25% vs 83% for each reader, respectively.

Conclusions: The addition of DWI to standard MR imaging improves the preoperative determination of peritumoral invasion in patients with soft tissue sarcoma at 3 T.
Session Name: Poster Session
Theme: Others
Abstract Number: 133
Abstract Title: Musculoskeletal Tumor Profile in Saiful Anwar General Hospital Malang, Indonesia, a Seven Years Experience

Authors: Satria Pandu Persada Isma, Istan Irmansyah Irsan,
Presenter: Satria Pandu Isma, Saiful Anwar General Hospital, Indonesia.

Introduction
Primary tumors of musculoskeletal tissues are relatively uncommon, they represent only 1% of all malignancies in all age groups, but the incidence is arising each year. Malang is a small city (145,28 km2) in East Java province of Indonesia, and by mid 2018 it is home to 915,707 residents with a population growth rate of 1,58% per year. The greater Malang area consists of 33 smaller districts and is populated by around 2,6 million people. In Saiful Anwar General Hospital, as a learning center for orthopaedics, musculoskeletal oncology is an integral part of the system and we have been collecting data as early as 2011.

Objectives
To share our profile and experience and to compare it to other existing centers

Methods
This is a descriptive study done by extracting data from our database

Results
During the last 7 years, we managed 531 patients, with 27% of that number coming in 2017. Most of the cases were bone tumors (72%), with malignant cases being mostly encountered. Metastatic bone disease is the most common bone tumors, and still the leading cause of death in our data. Osteosarcoma (92 cases) and liposarcoma (15 cases) is the most common malignant tumors for bone and soft tissue respectively.

Conclusions
Our database has been helping us to evaluate our patients throughout the years, and it gives us the basic needs for future researches. Our numbers grow, and so did our experience. The main problem is that we are not the only department treating musculoskeletal tumors, there are still patients being treated without consulting our department. Financial problems, governmental and hospital support, and patients’ mindset regarding operations are some other problems restricting us from delivering the ideal oncology service.

keywords: musculoskeletal tumors, database, orthopaedics oncology services, east java
Fibrous dysplasia is a benign intramedullary fibro-osseous lesion which was first described by Lichtenstein in 1938. It accounts for 2.5% of all bone tumors and 5-7% of all benign tumors. It develops during skeletal formation and growth and has variable natural evolution. We describe our experience of treating four cases of fibrous dysplasia, monostotic type (3) and polyostotic type (1) between 2014-17. The most common site involved was proximal femur (2) followed by distal femur (1) and polyostotic involving whole of femur and tibia on one side. The polyostotic type was diagnosed as Mazabraud’s syndrome as there was association of intramuscular myxomas. Most common complaint was pain followed by swelling and deformity in the affected region. Radiologically, all the cases were diagnosed as Fibrous dysplasia and subsequently confirmed with biopsy. Three patients were treated surgically and one patient with zoledronic acid alone. At latest follow up, all the patients were pain free with gradual consolidation of the lesion. Fibrous dysplasia can behave differently and requires individualized management.
Objectives: Tumour like lesions of the bone is a frequently used term but has not yet been clearly defined. There are no definite guidelines regarding their management. Tumour like lesions are generally treated aggressively like osteoclastoma if not like osteosarcoma. Author believes that as they are not tumours, the basics of tumour surgery need not be applied to them. The present study was aimed to evaluate behavior of tumour like lesions managed by conservative methods.

Methods: Cases of tumour like lesions managed in the Cancer Institute during the last two decades shown in the table were systematically analyzed. By and large non aggressive non operative treatment was given in all conditions. Simple bone cyst especially in humerus, presented with pathological fracture was treated by simple immobilization. Aneurysmal bone cysts were treated by intralesional injection of polidocanol. Fibrous dysplasia and osteofibrous dysplasia was left alone accepting the swelling and deformity. Biopsy had induced healing in eosinophilic granuloma. But in peritrochanteric lesions pure conservative methods is not followed. They are stabilized with fibula in most of the cases. Here also no attempt is made to remove the lesion.

Results: One hundred and twenty seven cases of tumour like lesions managed. Outcome of conservative management of tumour like lesions was very encouraging on long term follow-up.

Conclusion: Tumour like lesions need not be treated as aggressively as other bone tumours. Most of the cases with lesser interventions produced better results. They need to be treated only if they are symptomatic or likely to produce a pathological fracture. Even in such situations, one need not take a radical approach.
Session Name: **Poster Session**  
Theme: **Others**  
Abstract Number: **146**  
Abstract Title: **Intracortical Osteosarcoma of the femur**  
Authors: **Alejandro Fernandez Novoa, Ana Maria Lamelas, Lucero Saa Francisco**  
Presenter: **Alejandro Fernandez Novoa, Hospital De Niños Ricardo Gutiérrez Buenos Aires, Argentina.**

**Introduction:** Intracortical osteosarcoma is the most rare variant of osteosarcoma. The literature describe about 20 cases. It is typically confined to the cortex. Generally diaphyseal, frequently involves tibia or femur. It generates delays or diagnostic errors by simulating benign injuries. Differential diagnosis is especially with osteoid osteoma, bone abscess and osteofibrous dysplasia or Campanacci disease.

**Methods:** We present the case of a 17-year-old patient with pain in the right leg for 6 months, predominantly at night, with partial relief from the use of NSAIDs. In the Rx, an image with significant sclerosis and central radiolucency was observed in tibial diaphysis. Magnetic resonance imaging and CAT scan show the classic "nidus image" described for osteoid osteoma. Matching scintigraphy for that diagnosis. En bloc resection is indicated. The patient’s mother decides to take him to an other medical centre for a second opinion. They return to our practice with increased swelling and pain, so it is decided to perform new imaging studies, showing an exophytic lesion that invades soft tissues. It is decided to take a surgical biopsy.

**Results:** The histopathological study reveals the diagnosis of intracortical osteosarcoma. The neoadjuvant protocol is initiated. The tumor behaves very aggressively during chemotherapy. Due to the circumferential extension in the tibia and compromise of neurovascular structures, supracondylar amputation is indicated. Anatomic sample showed 30% of necrosis. Currently, the patient finished the chemotherapy plan without evidence of local or systemic disease.

**Conclusions:** Intracortical osteosarcoma is an extremely unusual entity that can mimic benign pathology. It should be considered as a differential diagnosis in other lesions of cortical location, especially osteoid osteoma, in which there is sometimes a tendency to dispense pathological anatomy with due to the characteristic images and the difficulty to obtain representative material. We emphasize the need to perform a biopsy in all cases.
Introduction
Synchronous multicentric osteosarcoma (SMOS) is a rare type of osteosarcoma with extremely poor prognosis. Although most cases are treated with chemotherapy, they pass away within 2 years from initial diagnosis. We report a long-term survival case of SMOS treated with topical treatment with proton beam therapy (PBT) as well as systemic chemotherapy.

Case report
A 42-year-old man was referred to our hospital with a 1-year history of right knee pain. Plain radiographs of the right knee showed a moth-eaten appearance with periosteal reaction in the proximal metaphysis of the tibia. MRI revealed intraosseous tumor displaying homogeneous low intensity on T1-weighted imaging, heterogeneous high intensity on STIR sequence, and uniform enhancement on gadolinium-enhanced T1-weighted fat-suppression imaging. Whole-body 18F-FDG PET/CT revealed increased FDG uptake in the right proximal tibia, skull base, sternum, thoracic and lumbar vertebras, right rib, and right acetabulum, but lung metastasis was absent. Since the needle biopsy specimen of the right tibia was histologically diagnosed as osteosarcoma/undifferentiated pleomorphic sarcoma, multidrug chemotherapy was performed based on diagnosis as SMOS. In addition, PBT for all the skeletal metastases were performed in tandem with chemotherapy. Thereafter, several lung metastases and bone metastases to the 6th cervical vertebra and left humeral shaft were found. The patient received additional chemotherapy, radiotherapy for each bone metastasis, and partial lobectomies. Now, five-year after the initial treatment, the patient is still alive with disease.

Discussion
Although SMOS is known as extremely poor prognostic disease, aggressive topical treatment together with systemic chemotherapy have been reported to prolong survival interval of the patient with SMOS. Though conventional radiotherapy cannot show efficacy for SMOS, novel radiotherapy such as PBT or carbon-iron radiotherapy may alternate surgical treatment in the patient with SMOS.
Objective: To analyze the essentials in diagnosis of distal femoral malignancies involving the whole knee, and to summarize the key points and efficacy of extraarticular excision of the knee.

Method: 3 patients treated from January 2016 through January 2018 were reviewed (1 male and 2 female), the mean age was 70 years (65-78 years). All cases had X-ray, CT, MRI examinations of the surgical location and underwent articular aspiration, the diagnosis was determined by histologic findings. The etiologies included chondrosarcoma complicated with pathological fracture, malignant fibrous histiocytoma with fracture and rhabdomyosarcoma. All subjects experienced extra-articular excision of the knee and prosthetic reconstruction. An anteromedial incision was used, osteotomy of the femoral diaphysis was carried out 3cm proximal to the tumor boundary while preserving the rectus femoris, a coronal osteotomy of the patella was conducted to insure the integrity of the capsule. Osteotomy of the tibia was located proximal to the tibial tuberosity. The bone defect was reconstructed with modular prosthesis.

Outcome: Image findings all illustrated bone destruction and periphery soft tissue mass, MR images revealed articular effusion and irregular lumps. All 3 cases underwent core biopsy of the bone tumor and articular aspiration, histologic findings determined the diagnosis of intraarticular tumor. All surgical procedures were uneventful without iatrogenic neurovascular injuries, 1 case had a delayed wound healing while the other 2 subjects experienced no wound complications. Follow-up revealed favorable functionality with no evidence of recurrence, metastases, and death.

Conclusion: Meticulous evaluation of preoperative imaging findings aids in determining whether the tumor invades the joint, MR manifestations implying articular effusion and articular aspiration are potent for determining the diagnosis. The key points regarding extraarticular excision of the knee include keeping the integrity of the capsule, coronal osteotomy of the patella, and osteotomy proximal to the tibial tuberosity (in the subpatellar fat pad).
Objective: To evaluate treatment response and prognostic factors for patients of non-metastatic Ewings sarcoma (ES) of the head and neck region treated with curative intent at the Tata Memorial Hospital (TMH).

Materials and methods: From January 2009 to December 2014, 40 patients with histologically proven ES in the age group of 2 months – 50 Yrs (Median 17 Yrs) were retrospectively evaluated. Prognostic factors like age at diagnosis, sex, skeletal/extra-skeletal origin, primary site (PNS/non PNS), tumor size, nodes, performance status, hematological & biochemical parameters (hemoglobin, total count, lactate dehydrogenase, alkaline phosphatase and albumin), response to chemotherapy (CTh) and type of local treatment were evaluated.

Results: Out of total 40, 26 (65%) were males and 21 (52.5%) patients had extra-skeletal disease with a mean tumor size of 6cms. All patients received multimodal treatment in the form of EFT 2001 systemic CTh and local treatment comprising of surgery (Sx) or radiation therapy (RTh) or both. RTh alone was offered in cases where Sx was either not feasible or was deemed to be associated with significant morbidity. After a median follow-up of 51 months, the 5-year local control (LC), disease free survival (DFS) and overall survival (OS) were 72%, 79% and 74% respectively. At last follow up, 26 (65%) patients were alive & disease free. Three patients had local relapse only, 3 had distant metastases only, while 4 had both local relapse & distant metastases. Three patients died of treatment related toxicities. On univariate analysis patients undergoing Sx+RTh had similar LC, DFS & OS compared to RTh alone. None of the prognostic factors were statistically significant.

Conclusion: Multimodality treatment using a combination of CTh, Sx & RTh results in optimal disease control with acceptable toxicities. Radiotherapy alone gives outcome similar to combined surgery and adjuvant radiotherapy.
Aim
Tumor induced osteomalacia (TIO) which induces hypophosphatemic osteomalacia via FGF23 secretion from the phosphaturic mesenchymal tumor (PMT) is rarely encountered in our clinical practice. The purpose of this study is to retrospectively analyze six cases of TIO focusing on its clinical manifestation and outcome of surgical treatment.

Methods
From 2002 to 2017 we have 6 cases of TIO surgically treated. The patients consisted of five males and a female with a mean age of 57 years old (range 40-69) at first presentation and of four were soft tissue tumors and two were bone tumors. Average follow up period was 34 months (range 6-219).

Result
Back pain, knee pain, chest pain was present in all cases. The average period from onset to diagnosis was 59 months (range 12-219). The average number of visited hospitals prior to our referral was 2.3 institutions consisting of department of orthopedic surgery and internal medicine. Average tumor size was 39mm (23-70). The average serum P level was 1.6mg/dl (range 1.5-1.8) and the low level of serum P level normalized in 4.6days (range 4-6) after tumor resection. All cases were successfully cured except for a case second surgery needed. In five cases en-block resection was done and one case curettage was done. A case performed curettage needed re-excision then cured.

Conclusions
One of the clinical symptoms of TIO is multiple pain. It is important to check serum phosphate level to get diagnosis of TIO. Tumors causing TIO vary in size and are sometimes hard to detect by radiographic examinations.

PMT could arise both soft tissue and bone and detection of the PMT is essential. Surgical resection of the tumor was highly effective for TIO and en-bloc resection is recommended if it possible. TIO should be taken into consideration and the serum phosphate level should be examined.
Introduction
Curative treatment of osteoid osteomas entails completely intralesional excision of the nidus. Intraoperative localization of the nidus can be difficult, and may involve wide resection of the surrounding normal bony structure.

Objective
The aim of this study is to report our experience for the precision osteoid osteoma resection using computer navigation system.

Methods
Between September 2008 and December 2017, 232 surgical resections were performed for 232 patients who had osteoid osteoma with computer navigation system. There were 182 males and 50 females with an average age of 19 years (5 to 52). Tumors were located at femur 129, tibia 48, vertebral appendix 14, fibula 6, humerus 6, radius 6, ulnar 6, calcaneus 5, sacrum 4, acetabulum 3, pubis 1, rib 1, talus 1, metatarsus 1 and patella 1. Pre-operative CT of each patient was performed. Intraoperatively, Iso-C/Orbic three-dimensional navigation was successful in accurate nidus localization. For all cases, the pointer was helpful to localize the lesion and precisely resect the lesion without removal of any excess bone. The pointer could make intraoperative confirmation of adequacy of excision.

Results
All cases were follow-up. Postoperative computer tomography scan done in 213 patients confirmed complete extirpation of the nidus. All cases had histopathology diagnosis. All patients had immediate relief of the characteristic pain after surgery.

Conclusions
The navigation system is very helpful for the precision tumor resection. Especially for the patients with osteoid osteoma located diaphysis, Intraoperative Iso-C/Orbic three-dimensional navigation is very useful.
Aim: The aim of this study is to reveal the postoperative respiratory function after chest wall resection.

Methods: Between 2005 and 2016, we performed chest wall resection on 19 patients (13 males and 6 females) for malignant bone and soft tissue tumors. The average age at the time of operation was 51 (21-85) years old. We investigated the respiratory function of these patients.

Results: Eights cases were chondrosarcoma. UPS/MFH of soft part, bone metastasis of cancer, locally active fibrous dysplasia were two cases each. Ewing’s sarcoma, leiomyosarcoma, myxofibrosarcoma, UPS/MFH of bone and MPNST were one case each. The average follow-up period were 29 (2-134) months. The oncological outcome of the malignancy (16 cases) were CDF 9 cases, NED 3 cases and DOD 4 cases, and the 5 year survival rate of these patients was 65.9%. The average preoperative % forced vital capacity (%FVC) was 99.1%, the average postoperative %FVC was 91.3%, and the decline rate was 8.2%. The decline rate of the %FVC of the patients who were resected less than two ribs was -2.3%, and that of patients who were resected more than 3 ribs was 16.6%. The average preoperative forced expiratory volume in 1 second as percent (FEV1.0%) were 77.6%, and that of postoperative FEV1.0% was 77.5%. The decline rate of the FEV1.0%.

Conclusions: In our study, the %FVC was decreased depending on the number of ribs that were resected in the operations.
Objectives. Postoperative deep infection associated with implants remains a serious complication after malignant bone tumor resection. We developed a new technique of coating titanium implant surfaces with iodine to prevent infection. This retrospective study aimed to evaluate the efficacy of iodine-coated implants for preventing deep infection after malignant bone tumor resection.

Methods. We reviewed data from 302 patients with malignant bone tumors who underwent surgery. Associations between the following variables were evaluated: age, tumor histology (primary/metastasis), recurrent tumor, pathological fracture, surgical site (pelvis/other), chemotherapy, radiation therapy, biological reconstruction, augmentation of artificial bone or bone cement, intraoperative blood loss, operative time, additional surgery for complications, the use of iodine-coated implants, and postoperative deep infection.

Results. The frequency of postoperative deep infection was 10.9% (33/302 tumors). Pelvic tumor (odds ratio [OR]: 7.4, 95% confidence interval [CI]: 1.5–35.1) and an operative time ≥5 hours (OR: 3.5, 95% CI: 1.1–11.3) were independent risk factors for deep infection. An iodine-coated implant significantly decreased the risk of deep infection (OR: 0.2, 95% CI: 0.1–0.8).

Conclusions. The present data indicate that iodine coating is promising for preventing infection after bone tumor surgery that requires implants.
Purpose
The purpose of this study was to discriminate a better tumor volumetry with precise prognostication in osteosarcoma.

Materials and Methods
A total of 272 MRIs were analyzed from 199 patients, 135 of that were MRIs before neoadjuvant chemotherapy and 137 of that were MRIs after neoadjuvant chemotherapy. Each tumor volume was measured by ellipsoid formula method and three-dimensional region-of-interest (3D ROI) respectively. The volume measurement values by the two methods were compared to evaluate which of them is more correlated with the prognosis on osteosarcoma.

Results
The volume measurements by ellipsoid formula and 3D ROI were highly correlated (Pearson coefficient=0.879, P=<0.000), but measurements by ellipsoid formula (208±214.07ml) were bigger than those by 3D ROI (140.17±155.37ml) (P=0.007). This tendency was highly affected by the shape of tumors. The tumors with concentric location to affected bone (P=0.013), long longitudinal length (P=0.004), and less extended soft tissue mass size (P=0.004) showed bigger volume measurements by ellipsoid formula. However, histologic subtypes, types of affected bones and chemotherapy did not make differences. Index of coincidence for volume increase or decrease after chemotherapy was very poor (Kappa value=0.149, P=0.452), suggesting the two methods should show a proficient difference on prognostication. After chemotherapy, volume increased group and decreased were compared on overall survival. Volume decreased group estimated by 3D ROI showed superior overall survival to increased group (Log Rank P=0.039). There was no difference on overall survival between volume increased group and decreased estimated by ellipsoid formula (Log Rank P=0.791).

Conclusion
3D ROI method is superior volumetry to ellipsoid formula in osteosarcoma.
Objective
Giant cell tumor of bone (GCTB) in the femoral head has a higher recurrence rate. We investigated the treatment results of BCTB in our institute.

Methods
We retrospectively evaluated the file records of patients of GCTB in the femoral head who received operation in our institution between October 2006 and November 2017. A total of 7 patients (4 males and 3 females) were included in this study. The median age was 38 years (range, 22–61 years). Median follow-up period was 51 months (range 11–117 months). The Campanacci’s grades of the tumors were I (n=3), II (n=3), and III (n=1). We performed curettage and bone grafting for five patients (joint-preservation group), and bipolar hip arthroplasty after resection for two elderly people (BHA group). In joint-preservation group, the number of patients of Campanacci’s grades I, II, III were, 3, 1, and 1, respectively. We evaluated the recurrence-free survival rate, joint-preservation rate and use of denosumab.

Results
Local recurrence occurred in 3 cases (60%) in the joint-preservation group, and the median interval between the first surgical treatment and local recurrence was 8 months (6-11 months). Two of them underwent BHA. Denosumab was used preoperatively in one patient and after the recurrence in two patients in joint-preservation group. There were no recurrences in the BHA group. Recurrence-free survival rate was 59% (4 cases) and joint-preservation rate was 43% (3 cases). In joint-preservation group, the recurrence rate of Campanacci’s grade I, II, III were, 33%, 67%, and 100%, respectively.

Conclusions
The recurrence rate of GCTB in the femoral head was high, especially in patients of Campanacci’s grade II and III. Joint preservation should be considered in conjunction with the age and activity of the patient.
Background: Giant Cell Tumors are relatively common, with a reported incidence of 20% among Asian adults. In the pediatric population however, GCTs are rare, with limited literature reporting rates from 1.8% to 10.6%. We sought to determine the incidence of GCT among skeletally-immature Filipino patients, and to identify any variations in terms of location, recurrence, and approach to management.

Methods: From January 2013 to December 2017, 12 patients (5.7%) with open physes on radiographs were histopathologically identified as having GCT. Majority of the cases were managed with extended curettage and bone grafting, except 3 who were admitted for pathologic fractures and underwent appropriate surgical fixation.

Results: Eight out of 12 patients (66.67%) were female. Fifty percent of the lesions were located around the knee joint (3 involving the distal femur and 3 involving the proximal tibia). One case each was located in less-common locations (talar body, spine, and an isolated distal ulna). All lesions presented with characteristic histologic findings for GCT. Among the 8 patients available for follow-up, 2 recurrences were noted (25%).

Conclusion: The incidence of Giant Cell Tumors among our pediatric population is consistent with existing literature. Our series showed a slight female predominance, which was slightly lower than reports from other Asian countries. The areas of predilection are similar to adult variants of GCT, as was the preferred approach to management. A more consistent follow-up period to identify local recurrence and possible pulmonary metastases is recommended for holistic long-term approach to management of GCT among Filipino pediatric patients.
Background
Granular cell tumors are soft tissue tumors, generally benign. These tumors are rarely found with a prevalence of 0.5% of the entire soft tissue. The highest incidence is found in the head and neck region, especially on the tongue, intraoral mucosa, and palate. In this case, granular cell tumors were found in the crus region.

Objective
Reporting a rare case about granular cell tumor in the crus region at Soetomo General Hospital Surabaya.

Material and method
Case report on female patients, 47 years with granular cell tumor of dextra crus region at Soetomo General Hospital Surabaya. Data were taken retrospectively from medical records through anamnesis, physical examination, radiological examination, and laboratory.

Result and Discussion
47-year-old female patient with mass on right lower limbs since 2 years ago. On MRI examination, there are solid masses, unresolved borders, irregular edges of the lateral compartment of crus accompanied the destruction of proximal diaphysis of the fibular bone. Histopathologic features were obtained in accordance with granular tumor cells. Multinodular thorax X-rays in both lung fields were found to be a sign of tumor metastasis to lung organ.

Conclusion
The case of granular cell tumors in the crus region is a rare case with a poor prognosis due to malignant degeneration with high local recurrence and metastatic rates. Until now there is no standard in the treatment of this tumor.
OBJECTIVE: To assess the value of a bone scan in the metastatic workup of a patient diagnosed with chondrosarcoma of bone

DEIGN: Retrospective analysis

METHODS: 487 patients of extremity chondrosarcomas were identified with the help of nuclear imaging records and pathology department database over a period of 12 years. Their clinical, radiological and histopathological details were retrieved from case files and electronic medical records. All cases were staged with a CT scan of thorax and bone scan or a whole body PET-CT. All reported and suspicious cases of metastasis were reviewed again by an experienced radiologist for this study. 52 patients had to be excluded from the study due to incomplete staging modalities.

RESULTS: 435 patients were available for final evaluation. No grade I chondrosarcoma (51) had evidence of metastasis. In the remaining high grade chondrosarcomas (384), isolated lung metastasis was seen in 9% (35 cases) (grade II-31, grade III-4), combined lung and bone metastasis was seen in 1% (4 cases) (all grade II) and isolated bone metastasis was seen in 0.8% (3 cases) (grade II-2, grade III-1).

CONCLUSION: The present study shows that the incidence of bony metastasis in extremity chondrosarcomas is extremely low. A non contrast CT thorax would be adequate for staging in conventional chondrosarcomas. In light of the present results we feel bone scan may be omitted from the staging work up of conventional skeletal chondrosarcomas. It may be reserved for only symptomatic patients.
Session Name: **Poster Session**  
Theme: **Others**  
Abstract Number: **221**  
Abstract Title: *Extremity Chondrosarcomas with Lymph Node Metastasis: A Series of 4 Cases*  
Authors: Vineet John Kurisunkal, Ashish Gulia, Ajay Puri, Bharat Rekhi, Amit Janu  
Presenter: Vineet John Kurisunkal, Tata Memorial Hospital, India.

Objective: Primary bone sarcomas mainly metastasise through the haematogenous route and rarely metastasise to lymph nodes due to paucity of lymphatics in bone. Few reports of nodal metastasis in osteosarcoma are described however it is extremely rare in chondrosarcomas. Here we describe 4 cases treated at our institute & evaluated for probable reasons of nodal metastasis

Design: Retrospective analysis using surgical audit data base and pathology data base

Results: All 4 patients presented to outpatient department in primary sitting. Nodes were detected intraoperatively in 1 patient, on imaging in 2 patients and on clinical examination in 1 patient. 3 patients had grade 2 tumour and 1 patient had grade 3 disease. 1 patient with scapular disease had pulmonary metastasis at presentation. 1 patient with pelvic disease had lymph node clearance at the time of the primary surgery. The other 2 patients had undergone lymph node clearance as an additional procedure. One of the patients had presented with a pathological fracture hence was converted into a forequarter amputation with axillary node clearance. 2 patients have died due to the disease, 2 patients developed LR & were managed appropriately. All cases had large soft tissue component with infiltration of adjacent muscles and cortical breach. Intraoperative tumor spillage, presence of a pathological fracture, or a previously operated field could be possible risk factors for lymph node metastasis.

Conclusion: The exact impact on disease prognosis of the lymph node metastasis can’t be commented upon due to limited follow up. The rarity of occurrence of lymph node metastasis in chondrosarcoma & paucity of literature highlights the need for a global multicentric collaboration in an attempt to pool knowledge regarding overall prognosis in these patients.
Aim/Objective
We report on our multi-disciplinary experience in a series of 90 patients who underwent chest wall primary sarcoma surgical resection from 1996 to 2017.

Material and methods
In our retrospective review there are 59 male and 31 female patients with an average age at diagnosis of 51 years (19-87). 39 patients had previously undergone tumour resection in other centres and required further intervention. There were 28 cases of primary bone tumours and 62 cases of primary soft tissue tumours. Before surgery 49 patients with soft tissue sarcoma received radiotherapy (RT), 7 patients with bone sarcoma (Ewing’s and Ostesarcoma) chemotherapy (CT) and 3 both CT and RT. In 88 cases we have done a en-bloc resection and in 2 cases an intra-lesional excision.

Results
The average follow up is 47,6 months. At follow-up 63 patients were alive without disease, 6 alive with disease and 16 died from disease, 13 (20,9%) from soft tissue sarcoma, 3 (10,7%) from bone sarcoma, 6 died for other reasons. There were no mortalities as a result of surgical complications in this series. Negative margins were obtained in 85 cases and marginal resection in 5 cases. 19 patients, during follow-up, were found to have metastatic disease, 15 (24,2%) from soft tissue sarcoma and 4 (14,2%) from bone sarcoma, in all this patient’s surgery was with a wide margin.

Discussion
In our retrospective study of the surgical management of primary chest wall sarcoma, we have demonstrated good surgical results but higher mortality and higher number of metastases in patients with soft tissue sarcoma. Furthermore, our study, highlights the importance of pre-operative neo-adjuvant treatment modalities.
Introduction:
Benign bone tumors of the femoral head and neck are mostly seen in young adults and often warrant treatment for pain, impending fracture or established fracture. It becomes challenging to treat them effectively while attempting salvage of the femoral head and yet achieving long term disease control with minimum complications. We describe our technique and experience in dealing with these tumors which can achieve the above-mentioned goals and can be easily replicated.

Materials and Methods:
We analyzed 15 cases of surgically treated, biopsy proven benign, locally aggressive tumors affecting the head and neck of femur in skeletally mature individuals. All cases were treated with extended curettage through antero-lateral modified Smith-Petersen approach along with tricortical iliac crest bone graft (combined with fibular graft in some cases) reconstruction with or without suitable internal fixation.

Results:
All, except one, patients were available for follow up. The age ranged from 18 to 43 years (average 26 years) and the follow up ranged between 24 to 132 months (average 84 months). These included Aneurysmal bone cysts (10) and Giant cell tumors (5). The indication was pain (8), with impending (2) or established pathological neck femur fracture (5). In all cases, there was satisfactory healing of lesion and timely rehabilitation. Non-union, avascular necrosis or local recurrences were not seen. The MSTS functional score was good or excellent in all (range: 26-29, average: 28).

Conclusion:
The benign aggressive lesions affecting femoral head and neck in young and middle aged adults pose a treatment challenge. A sturdy, lasting reconstruct with acceptable functional outcome and minimal recurrence rate can be achieved by salvaging the femoral head and neck using curettage and reconstruction, obviating the need for replacement at such an early age.

Key words:
Femoral neck, benign aggressive tumor, treatment.
Session Name: Poster Session
Theme: Others
Abstract Number: 237
Abstract Title: Epidemiology of primary bone tumor in Dr. Soetomo General Hospital as Indonesian top referral hospital from 2001-2016
Authors: Mohammad Hardian Basuki, Ferdiansyah Mahyudin, Mouli Edward, Yunus Abdul Bari, Sjahjenny Mustokoweni, Paulus Rahardjo, Rosy Setiawati, Hizbillaah Yazid
Presenter: MOHAMMAD HARDIAN BASUKI, Airlangga University/ Dr. Soetomo General Hospital, Indonesia.

The low incidence of primary malignant bone tumors from all malignancies with 25 types of variations causing difficulties in tumor diagnosis. Primary malignant bone tumors are the third leading cause of death in the under 20 age group. This study aims to provide an epidemiological view of primary malignant bone tumors in East Java, especially Surabaya.

Data were taken retrospectively from the databased musculoskeletal tumor of Dr. Soetomo hospital from 2001 to 2016, as a top referral hospital in East Indonesia. All diagnoses were established through multidisciplinary discussions and completion into databased by registra doctors and verified by supervisors.

From 764 patients were collected, 278 patients were excluded because of incomplete data(171), metastatic tumors(66) and mimicking tumor(28), resulting in a final sample 486 patient. Primary bone malignant tumors are more common in male sex(58.8%) and age group 11-20 years(39.3%). The majority of the tumor is malignant tumors(52.5%) dominated by primary malignant bone tumors 43.8%(213). Osteosarcoma was the most common tumor with 116 cases(23.8%), followed by chondrosarcoma 37 cases(7.7%), plasma cell myeloma 23 cases(4.8%), Ewing sarcoma 12 cases(2.5%), pleomorphic undifferentiated sarcoma 10 cases(2%), malignant lymphoma 5 cases(1%), fibrosarcoma and chordoma respectively 4 cases(0.8%), and malignant GCT 2 cases(0.4%). The incidence of osteosarcoma was highest at age 11-20 years(71.5%), male(58.6%), distal femur(40.5%), proximal tibia(22.4%), and proximal humerus(9.5%). Chondrosarcoma was highest at age 31-40 years(35%), male(62%), pelvic (24.3%), proximal femur(24.3%), distal femur(10.8%). Plasma cell myeloma was highest at the age of 61-70 years(34.7%), male(34.7%), proximal femur and humerus respectively(10%), and femoral diaphysis(8%). Ewing sarcoma was highest at the age of 11-20 years(41.6%), male(58.4%), femoral diaphysis(25%), tibial and humeral diaphysis respectively(16.7%).

Mostly primary bone malignant tumor in East Java, especially in Surabaya found in the age group of 11-20 years, male sex, and dominated by osteosarcoma, chondrosarcoma and plasma cell myeloma.
Session Name: Poster Session
Theme: Others
Abstract Number: 259
Abstract Title: A BIZARRE entity called Bizarre Parosteal Osteochondromatous Proliferation (BPOP)
Authors: Manish Agarwal, Rajeev Reddy, Manit Gundavda, Yash Wagh, Rajat Gupta
Presenter: Rajeev Reddy, P D Hinduja Hospital, India.

AIM: To differentiate BPOP [Bizarre Parosteal Osteocartilaginous Proliferation] as a distinct entity and to prevent recurrence by proper surgical management.

METHODS: A 34 year old lady with swelling in the distal fibula, who underwent excision at an outside hospital and was reported on histopathology as an osteochondroma, presented with a recurrent growing swelling at the same site. As clinically, this was not consistent with an osteochondroma and the radiological picture did not show corticomedullary continuity, trucut biopsy of the lesion was done by us, which was reported as a bizarre parosteal osteocartilaginous proliferation [BPOP].

RESULTS: Wide excision of the lesion along with hemicortical excision of the underlying fibula cortex followed by iliac crest tricortical bone grafting and fibula plating was done to obtain wide margins. Final histopathology confirmed the lesion as BPOP. Patient had complete pain relief and full function of ankle. At her most recent follow up of 15 months, there was no evidence of recurrence.

CONCLUSIONS: BPOP is a distinct entity which is often mistaken for osteochondroma or parosteal osteosarcoma. Intralesional excision seems to have a great potential for local recurrence, but it preserves stability without decortication of the affected bone. En bloc negative margin excision by the excision of the pseudocapsule over the lesion and any periosteal tissue beneath the lesion along with the decortication of any areas in the underlying host bone that appear abnormal has been shown to be beneficial in preventing local recurrence. Owing to high local recurrence rates and a lack of adjuvant therapy options, this lesion will continue to pose a challenge for Orthopaedic surgeons and more awareness about this lesion will help identify and understand that a wide excision, with no compromise related to the margins is required for this benign appearing lesion.
Aim: Tuberculous infection of the long bones can mimic benign, locally aggressive tumors and at times even malignant tumors like osteogenic sarcoma or chondrosarcomas. A diagnostic protocol formulated by our institute aims to reduce these diagnostic dilemmas.

We retrospectively analysed 28 patients referred to the department of orthopaedic oncology over a period of 8 (2010 - 2018) years with suspected sarcomas at a tertiary referral center in Mumbai, India.

As a protocol in our institute, all samples were evaluated for histopathology and microbiology cultures. Imaging and tissue diagnoses that were performed outside our institute, were reviewed at our center by specialists in musculoskeletal radiology and pathology respectively and were ruled out as T.B. based on certain characteristic features on radiography peculiar to infectious conditions of the long bone rather than sarcomas.

Material and method: Demographic data, clinical presentation, radiological imaging and tissue diagnosis reports were analysed for these patients. All data was entered into a spreadsheet for analysis.

Results: Only 5 of the total 28 patients had a culture positive for tuberculosis. 26 patients had diagnosis of tuberculosis on histopathology, 2 patients required a second biopsy on account of poor slide fixation methods and inadequate material on biopsy. 2 patients with suspected metastatic lung nodules on biopsy were confirmed as tuberculosis. None of the patients had any close contact or constitutional symptoms suggestive of T.B.

Conclusion: A team approach towards diagnosis and treatment of sarcomas is essential. A protocol followed at our institute aims to reduce these diagnostic dilemmas in aggressive looking lesions [especially tuberculosis] that may masquerade almost any sarcoma. It is also important to stress upon the need for correct biopsy techniques as well as the need to have a radiologist and pathologist trained in sarcoma diagnosis and management, a delay and error in diagnosis adds to cost and ineffective management.
Aim: We are reporting our results of fine needle aspiration cytology FNAC for tumors and tumor-like lesions of the soft tissues.

Material and methods: This study included 150 patients of tumors and tumor-like conditions of the soft tissues. The patients with lesions of musculo-skeletal regions in extremities and other sites were included excluding body cavities. The FNAC was performed in out-patient department using 21 to 25 G needle and 20 cc syringe without local anesthetic. Aspirate was collected in the needle hub and syringe; and immediately slides were prepared. These were stained by Romanowsky stain (air-dried smears) and by Haematoxylin-eosin (H and E) stain (alcohol fixed smears) using the standard procedures. The cytopathological diagnoses were correlated with histopathological diagnoses in 70 cases where tissue was available either after open biopsy/ surgical resection. Various histochemical stains were employed wherever required.

Results: When we considered our diagnosis in view of benign/ malignant including the cases suspicious of malignancy, the sensitivity and specificity for a diagnosis of malignant lesions were 96% and 100% respectively with positive and negative predictive values 100% and 95% respectively. However, after exclusion of suspicious cases, the sensitivity and specificity was 94% and 100% respectively with positive predictive accuracy and negative predictive accuracy of 100% and 95% respectively.

Conclusions: FNAC distinguishes malignant from benign soft tissue lesions. However, the exact subtyping/ categorization of the tumors with FNAC alone are difficult. The sufficient cytological smears were difficult to obtain by aspiration of vascular, densely fibrous, cystic and very large necrotic lesions. FNAC can be used as a preoperative, primary diagnostic modality for soft tissue lesions and to diagnose the recurrences, but open biopsy may be required for inconclusive lesions. Diagnostic accuracy can be increased with the experience of pathologist and knowledge of the clinical history and the radiologic findings.
Abstract

Introduction
Primary leiomyosarcoma of bone is an exceedingly rare entity accounting for <0.7% of all primary bone tumours. It is one of the variants of the spindle cell sarcomas of the bone consisting of significant smooth muscle component but lacks malignant osteoid or chondroid matrix. A definitive diagnosis is based on biopsy and subsequent pathologic and immunohistochemistry review for markers such as desmin, smooth muscle actin (SMA) and h-caldesmon. Surgery forms the mainstay of treatment. Role of chemotherapy is debatable. Limb-salvage in the form of wide surgical resection and reconstruction should be attempted wherever feasible to obtain a good outcome.

Methods
Retrospective analysis from our database identified 6 cases of leiomyosarcoma of bone operated from May 2013 to April 2016.

Results
There were 5 males and 1 female with a mean age of 36 years and a mean tumour size of 9.42cms. The most common site involved was the tibia (n=4) followed by distal femur (n=2). Limb salvage surgery was done in all the 6 cases. Reconstruction with endoprosthesis was performed in 5 cases and with fibular grafting in one case with intercalary resection. Adjuvant chemotherapy was administered to 3 patients and adjuvant radiotherapy to 1 patient. Two patients developed local complications. Local recurrence was not seen in any patient, but 2 patients developed distant metastases. Mean follow up till date is of 36 months (Range 24 to 54 months). All patients were alive till last follow-up.

Conclusion
Leiomyosarcoma of bone is a rare primary malignant bone tumour and presents a diagnostic challenge. Despite being reported previously to have a high incidence of metastases and prognosis deemed dismal, early detection and appropriate management can lead to better survival and limb function.
Objective
The bone substitute materials are often used after bone tumor curettage. In recent years, we have been able to use the porous hydroxyapatite collagen composite (HA/Col) in Japan. The purpose of this study was to investigate the efficacy of HA/Col for bone regeneration after bone tumor curettage comparing with β-tricalcium phosphate (β-TCP) which has been used conventionally.

Methods
Bone tumors of patients which were performed tumor curettage in Tohoku University Hospital between January 2011 – December 2017 were included in this study. Cox proportional hazards analysis was conducted to calculate the hazard ratio (HR) and 95% confidence interval (CI) for the appearance of new bone at 6 weeks after surgery according to type of bone substitute materials and potential risk factors as follows: age, sex, pathological fracture, tumor length, tumor volume, area of fenestration, internal fixation, intraoperative anhydrous ethanol therapy, histological grade.

Results
The final study population was comprised of 38 cases (aged 6 to 70 years old, male 55.2%). The follow up period was 1 to 71 months. Among them, 50% (n = 19) of patients were in the HA/Col group and 50% (n = 19) of patients were in the β-TCP group. Appearance of new bone at 6 weeks after surgery was occurred in 47.3% (n = 18) cases. In HA/Col group, the new bone appearance rate was higher than β-TCP group significantly (Sex, age-adjusted HR [95% CI]: 36.01 [4.239-305.894], p=0.001). In young cases, new bone appearance rate was higher than old cases significantly (Sex, age-adjusted HR [95 CI]: 1.032 [1.004-1.060], p = 0.023).

Conclusion
HA/Col can induce new bone appearance earlier than β-TCP after bone tumor curettage.
Introduction: Osteoblastomas like osteosarcomas are rare tumors. These tumors pose a diagnostic challenge due to overlapping radiological and histopathological findings.

Case Report: Seventeen year old male patient had history of 1.5 years of pain, swelling left leg. He was operated 3 times before with the last surgery being 5 months back, all surgeries were intralesional curettage. Radiology review showed an anterior cortical based lytic lesion with anterior soft tissue mass with medullary involvement and previous artificial bone graft in medullary cavity. Histopathological review showed it to be osteoblastoma.

Curettage + fibular strut graft + gastrocnemius flap was done at our institute, but the final histopathological report showed an osteoblastoma like osteosarcoma (low grade). Patient was counselled for amputation but he initially refused. But, in next couple of months he developed increase in pain and local swelling, re-imaging was suggestive of disease recurrence. He underwent above knee amputation and the final pathology report showed a high grade osteosarcoma. His staging was negative for metastasis and he received adjuvant chemotherapy.

Conclusions: Our case was different from previous reported cases in literature as the primary radiological diagnosis in our case was osteoblastoma. It was only after the 4th curettage (done at our institute), a permeation of the host bony trabeculae was seen which led to the diagnosis of osteoblastoma like osteosarcoma. It should be stressed that this permeation is rarely seen in the curetted material and a high index of suspicion is required to diagnose this rare tumor.
Objectives
In patients with pediatric osteosarcoma, postoperative leg length discrepancy is a clinical problem. However, the impact of surgery on leg length is still unclear. The purpose of this study was to evaluate postoperative leg length discrepancy in patients with pediatric osteosarcoma and to assess the difference among the surgical procedures.

Method
Patients with primary osteosarcoma of the lower extremities treated at our department between 2006 and 2015 were examined; 21 patients (10 males and 11 females) aged 6–15 years were enrolled. The locations of the tumor were proximal femur (n = 2), distal femur (n = 9), and proximal tibia (n = 10). The patients were divided into femur and tibia groups based on the tumor location. Postoperative discrepancy in femur and tibia length was assessed using radiographs. Untreated bone was defined as ipsilateral femur or tibia not affected by the tumor. The differences in untreated bone length discrepancy associated with the use of frozen autograft and prosthesis were evaluated and statistically analyzed.

Results
The average follow-up period was 56 (range: 15–126) months. In the femur group, the average femur length discrepancy was 4.68 (range: 0.07–20.1) cm; in the tibia group, the average tibia length discrepancy was 0.78 (range: 0.09–1.78) cm. In the femur group, the average untreated bone length discrepancy associated with the use of frozen autograft and prosthesis was 0.32 cm and 1.89 cm, respectively, and the difference was found to be significant (P < 0.05). In the tibia group, the average untreated bone length discrepancy associated with use of frozen autograft and prosthesis was 0.62 cm and 1.36 cm, respectively, and the difference was found not to be significant.

Conclusions
Patients with osteosarcoma of femur may experience severe postoperative leg length discrepancy. Use of prosthesis in distal femur causes shortening of the tibial length.
AIMS/OBJECTIVES:
The impact of postoperative radiotherapy (PORT) on outcomes has been a matter of debate after adequate resection in Ewing's sarcoma of the pelvis. We evaluated our cases after surgical excision in pelvic Ewing's sarcoma and assessed local control and overall survival (OS) with respect to PORT and chemotherapy-induced percentage necrosis.

MATERIALS AND METHODS:
Forty-four surgically operated patients (June 2002-November 2014) of localized Ewing's sarcoma were retrospectively reviewed. There were 31 males and 13 females. Age ranged from 2 to 53 years. All patients received institutional chemotherapy protocol. No patient received preoperative radiotherapy. Specimen was analyzed for margins and chemotherapy-induced percentage necrosis. PORT was offered to patients on a case-by-case basis. Presence of a large preoperative soft-tissue component, margin evaluation, and percentage necrosis were factors considered. At time of the last followup, 29 patients were alive, 11 died, and 4 were lost to followup. Survivors had a minimum followup of 2 years (range: 31-118 months, mean = 69 months).

RESULTS:
One of twenty (5%) patients with PORT had a local recurrence as against 2 of 24 (8%) without PORT. OS of all patients was 76% at 5 years. Twelve patients with <90% necrosis had OS of 56% and 32 with >90% necrosis had OS of 83% (P = 0.040). OS of patients with PORT was 74%, without PORT was 78% (P = 0.629).

CONCLUSIONS:
The decision to offer PORT after surgical excision in pelvic Ewing's sarcoma is multifactorial; the absence of PORT in selected cases is not detrimental to local control. Poor responders to chemotherapy had poorer survival while PORT did not impact on outcomes.
Myositis ossificans (MO) is an inflammatory pseudotumor of the muscle that can be mistaken clinically and also histologically for malignant bone and soft tissue tumors. Acute or chronic repetitive muscular trauma appears to be etiology for MO. MO commonly present as rapidly-growing, painful muscular mass.

Over the years, Ultrasound has emerged as an initial assessment modality and MRI is the problem solving tool for soft tissue swelling and injuries. Hence, it is neccessary to know the imaging characteristics of MO on these modalities as these imaging findings can mimic those of soft tissue tumour on USG and also mimic sarcoma and infection on MRI due exuberant edema. This false interpretation can happen if imaging is done in acute stage (< 1 week). Standard radiographs do not disclose any abnormality in the early stages of MO. Radiographs repeated later, in the evolution of the disease (subacute phase < 2weeks to late phase 2nd to 5th week) may show de novo pathognomonic ossification (zonal phenomenon) surrounding a clear central area typically. It may imitate an osteosarcoma on needle biopsy as well.

We present a case series of MO to highlight the imaging patterns in various modalities, so that inadvertent biopsies can be avoided. CT scan was found to be more sensitive than radiography for detecting ossification and central fatty metaplastic area. MRI showed zone phenomenon much before the advent of ossification. Rim enhancement was common in the acute phase of MO. Most patients underwent biopsy on the basis of ultrasound and MRI findings rather than radiography and CT scan findings. CT scan best demonstrated the centrifugal pattern of ossification and clear plane with bone on bony window images.
Introduction: Lower-limb amputation is a permanent impairment that leads to significant participation restrictions and limitation in daily activity. Early rehabilitation is particularly important in children and adolescents with sarcomas because of the prolonged and unpleasant nature of the treatment and the uncertain prognosis. The most effective method of early rehabilitation after a lower limb amputation is equipping the patient with functional pylon prosthesis to offer earliest return to activities of daily living including functions supporting floor sitting apart from weight bearing activities offered by conventional above knee pylon prosthesis.

Objective: To evaluate the efficacy of functional above knee pylon prosthesis following tumour related above knee amputation.

Method: 15 patients operated for above knee amputation for middle third/ lower third femur malignancy were fitted with functional above knee pylon prosthesis after stitches removal. Patients received conventional Occupational Therapy interventions for improving and maintaining muscle power and range of motion, conditioning of the stump, gait training, balance, and functional training with pylon for 4-5 days. Patients were assessed with Musculo Skeletal Tumor Society Score (MSTS) at the end of 3 months.

Results: The mean MSTS score was recorded as 83.33%. The patients were able to satisfactorily ambulate, use stairs, sit bed side, squat, sit cross legged, use public transport, resume independent living and experience ease in using permanent prosthesis.

Conclusion: Functional above knee pylon prosthesis useful in improving the functional outcome in patient with above knee amputation.
Introduction: Although surgery is the standard initial treatment, denosumab, a monoclonal antibody drug that inhibits RANKL, has shown considerable activity in GCT of bone. We report a case of 29 year old young female who developed secondary sarcomatous transformation of benign GCT of bone post denosumab exposure.

Case Report: 29 year old young female presented to an outside institution in October’ 2012 with complains of pain and slowly progressing swelling right arm since 4 months and with a recent history of trauma. Bone biopsy was suggestive of giant cell rich lesion consistent with aneurysmal bone cyst. She was advised surgery she deferred.

She took on and off treatment with multiple consultation for a period of 1 year. In January’ 2014, she consulted a cancer hospital where review of previous biopsy was suggestive of giant cell tumour of bone with secondary ABC. She was advised 4 doses of subcutaneous denosumab injections 120mg at weekly interval and further 2 doses at monthly interval and was advised to review later. As patient was symptomatically better, she did not consult again on prescribed duration.

She remained asymptomatic for a period of 3 years and in September’ 2017 she presented to us with rapidly progressing swelling right arm with severe pain. Imaging was suggestive of aggressive neoplasm with a large soft tissue component. A core needle biopsy was suggestive of high grade sarcoma. She underwent forequarter amputation and is currently on adjuvant chemotherapy.

Conclusion: It is not clear if our patient’s malignant transformation of a giant cell tumor post denosumab treatment was caused by denosumab, but it is important to be aware of the possibility if more cases occur. Future studies should focus on the safety of high dose denosumab administration in patients with a benign resectable giant cell tumor of bone.
Introduction: Excision of radius following recurrent benign or malignant tumors of radius puts the hand in valgus position compromising hand functions. Stability at wrist can only be achieved with arthrodesis at skeletal maturity. We devised an innovative splinting technique to prevent manus valgus deformity till skeletal maturity.

Objective: To review the outcome of innovative splinting technique following resection of radius.

Methods: Three children with mean age 7 years, were put on splintage protocol post excision of radius with the objectives of providing stable wrist, preserving hand functions and prevention of development of valgus deformity. As per clinical presentation with reference to radial nerve, patients were fitted with Modified radial cock-up splint or Modified dynamic wrist splint. A Modified static cock-up splint was prescribed during demanding play activities. A dual stretch cock-up night splint was given for applying longitudinal and radial stretch at wrist for preserving length of soft tissue structures for future surgical interventions at wrist. Physical and functional evaluation for affected hand was done with and without splint.

Results: Patients were followed for mean 4.3 years. Mean Musculoskeletal Tumor Society score was recorded as 87.78% with splint and 65.56% without splint. Splint helped to enhance grip strength by 25%, and average pinch (pad to pad, lateral, tripod) strength by 28%.

Conclusion: Innovative splinting technique is successful in preventing manus valgus deformity. It keeps the wrist in supple position. Combination of splints with specific protocol, support the very purpose of limb saving radius excision surgery in pediatric patients.
Session Name: **Poster Session**  
Theme: **Others**  
Abstract Number: **311**  
Abstract Title: **Role of polypropylene mesh in hip dislocation and infection rates in proximal femur endoprosthetic reconstruction in bone and soft-tissue tumors.**  
Authors: Sandesh Thete, Ajay Puri Ashish Gulia Srinath Gupta  
Presenter: Sandesh Thete, Tata Memorial Hospital, Mumbai, India.

Introduction:  
Extent of tumor may necessitate resection of hip joint capsule during proximal femur tumor resection. Aim of study was to determine effectiveness of polypropylene mesh in reducing hip dislocation rate when used to reconstruct hip capsule after proximal femur reconstruction with mega-prosthesis and its influence on surgical site infection.

Material and method:  
There were 109 proximal and total femur replacement surgeries done for bone and soft tissue sarcomas between January 2006 and March 2016. 78 patients were analyzed in group A in which adequate capsule was available after tumor resection for purse string closure with sutures and 31 patients were analyzed in Group B in which polypropylene mesh was used to reconstruct hip capsule due to inadequate capsule. Dislocation rate were noted. Any patient who required operative intervention for wound discharge/infection was considered infected. Data was censored for 1year follow-up to determine SSI.

Result:  
Of 109, 3 patients were lost to follow up and one died due to disease within a year of surgery, 105 patients were available for analysis. Overall dislocation rate in study was 1 %. Group A had 3 % (3 out of 78) dislocation rate compared to 0% (0 out of 21) in Group B (p-value 0.45). Overall infection rate in study was 6%. 7% (3 out of 78) of Group A had infection compared to 12% (4 out of 31) in Group B (p-value 0.64).

Conclusion:  
Polypropylene mesh is a cheap and easily available armamentarium which can be used to reconstruct the hip joint when adequate capsule is not present to create a stable hip after proximal femur resection without impacting infection rates.
Introduction: Primary synovial sarcoma of the bone is a very rare entity with only a few cases reported in literature. We report 7 such cases. This study aims to evaluate patients diagnosed with intra-osseous synovial sarcoma and investigate the possible prognostic factors associated with duration of survival and detailed pathologic review.

Materials and methods: The study, which was conducted between January 1995 and December 2016 at our institute, included 592 operated cases of soft tissue sarcomas. Of which, 196 were diagnosed as synovial sarcoma and only 7 cases were identified as primary synovial sarcoma of the bone. Over a 21 year period, we identified 7 such cases that fulfilled the diagnostic criteria in 5 men and 2 women, with age ranging from 16 to 46 years (mean, 29.6 years).

We evaluated patients’ demographic features, location of the pathology, histological findings, surgical margins, and treatment modalities and investigated the effects of these parameters on survival.

Results: Lower limb was most commonly affected site followed by pelvis. We performed limb salvage surgeries in 6 patients and amputation in one patient. Surgical margins were negative in all patients. All patients received adjuvant chemotherapy and radiotherapy as per institution protocol. Although there was no local recurrence in these patients, distant metastasis developed in two patients. One patient had succumbed to disease while the other patients are still under regular follow up. Overall survival was 75% at 5 years and disease free survival was 61%.

Conclusion:
Synovial sarcoma of bone is a rare entity with only a few reported cases in literature and hence no standard management protocol. The survival rates were similar between soft tissue and intra-osseous synovial sarcoma in our series.
Session Name: **Poster Session**  
Theme: **Others**  
Abstract Number: **320**  
Abstract Title: **High velocity injury resulting into fracture through previously reconstructed limb salvage tumor surgery – An option of surgical treatment.**  
Authors: **Dev Padia, Wan Faisham Wan Ismail, Saharan Yahaya, Nor Azman MZ**  
Presenter: **Dev Padia, Universiti Sains Malaysia, Malaysia.**

**Aim**
To achieve pre-injury level of activities in these patients by providing stable reconstruction and union over the bone-endoprosthesis and bone-allograft junction by using a longer stem prosthesis or allograft in trauma patients with indexed limb salvage surgery.

**Method**
We present four cases resulting in a fracture through previous limb salvage surgeries. By avoiding early surgical intervention there was decrease in risk of impending soft tissue injury and decrease in risk of infection. Delaying surgical management by 3 weeks with temporary stabilization minimized the risk of infection and wound complication. Segments of comminuted bone were removed and reconstructed with new longer implant stem depending on the remaining viable intramedullary segment. Allograft were used whereby remaining bone is not adequate for cemented stem.

**Results**
Our study comprises of four patients previously managed with limb salvage surgery. They were followed up for 3 years each after revision surgery. Three out of four patients had no complications. Union was achieved at the body-prosthesis and bone-allograft junction and in all our patients. All our patients were able to walk unaided after their revision surgeries.

**Conclusion**
Due to advancement of chemotherapy, surgery and endoprosthesis technology there has been a significant improvement in the survival of bone tumor and a good limb function. Early surgical intervention will lead to more soft tissue injury and carry a high risk of infection. Delayed in surgical management for at least 3 weeks with temporary stabilization able to minimized the risk of infection and wound complication. Definitive management done by performing revision surgery involving removal of the comminuted bone segments resulted in a favourable outcome. Reconstruction with new segment of longer implant depending on the remaining viable intramedullary segment or by using allograft whereby remaining bone was not adequate for cemented stem seems to be an option in such cases.
Phosphaturic mesenchymal tumors (PMT) is a rare neoplasm which is frequently associated with tumor-induced osteomalacia (TIO), also known as oncogenic osteomalacia. TIO occurs as a result of expression of a biologically active substance by the tumor called FGF23 or fibroblast growth factor 23 which results in decrease in osteoblastic activity and ultimately generalized osteomalacia. Patients usually present with gradual muscle weakness and multiple bone pains due to pathological fractures. The diagnosis is delayed many a times, if suspected biochemical tests such as serum calcium, phosphorus and FGF23 testing can help in diagnosing tumor induced osteomalacia. The causative tumor itself (PMT) can occur anywhere in the body and 68Ga-DOTA PET-CT is the most sensitive imaging modality in localizing these tumors. It is necessary for radiologists and treating physicians to be aware of this condition and keep a diagnosis of phosphaturic mesenchymal tumors in mind when reviewing imaging of a patient with a clinical and biochemical picture of hypophosphatemic osteomalacia.

We are presenting a case series of 5 patients, where the location of the tumour was both in bone and soft tissue, left chest wall, inter-phalangeal soft tissue of left foot, left ethmoid sinus, right acetabulam and soft tissue near second metacarpo-phalangeal joint of right hand, respectively. Radiographs of all patients showed variable degree of osteopenia, coarse trabeculae, Looser’s zones, insufficiency fractures and bowing of long bones. Two patients had features of associated hyperparathyroidism.

Both radiologist and treating physician will require high index of suspicion, inclusion of serum phosphorus levels in routine blood chemistry testing, localising the location of the responsible tumour with help of 68Ga-DOTA PET-CT is paramount importance and consulting the case with pathologist invariably result in diagnosing this rare entity.
Aims/Objectives: To describe the series of patients encountered at the UP-PGH MuST presenting with primary bone tumors of the patella.

Methods: Records from the UP-PGH MuST were reviewed from 1997 to 2017 for patients presenting with primary bone tumors of the patella. Patient demographics, clinical presentation, histology, treatment and results were documented.

Results: Of over 1200 primary bone tumors seen at the UP-PGH MuST Unit from 1997 to 2017, only four patients presented with primary bone tumors of the patella. There were 3 males and 1 female, ages ranging from 24 to 33 years old. All patients presented with a complaint of pain or expanding mass. All patients underwent open biopsy with frozen section. The histopathology of the cases were 3 chondroblastoma and 1 osteoblastoma. All patients underwent extended curettage and were reconstructed with bone grafts (autografts and allografts). Two of the patients were available at 68 and 156 months follow up with good function, some crepitation at the patella-femoral joint, and no signs of tumor recurrence.

Conclusions: Primary patellar bone tumors are rare. Only benign bone tumors were seen in our small series. The most common tumor seen was chondroblastoma. These lesions can be satisfactorily treated with intralesional extended curettage and bone grafting.
Session Name: **Poster Session**  
Theme: **Others**  
Abstract Number: **341**  
Abstract Title: **Giant Cell tumors – Short term audit of 43 patients in tertiary care center.**  
Authors: **Kousik Nandy, Suman MB**  
Presenter: **Suman Byregowda, Narayana Cancer Institute, India.**

**Introduction:** Giant cell tumors (GCT) are the most common benign tumor affecting skeletal system. The treatment varies from extended curettage to wide local excision depending on the extent of disease and bone involvement.

**Material and Methods:** It is a small retrospective audit done at tertiary cancer care. 43 GCT cases were treated between October 2015 to October 2017 out of which 18 were male and 25 were females. Mean age is 30 years (range 13-45 years). 32 patients were treated with extended curettage, 8 underwent wide local excision and reconstruction, out of 3 nonresectable GCTs; 2 in sacrum and the other one in the ishial tuberosity were treated nonsurgically with denosumab+ serial angioembolisation.

**Result:** Follow up range from 6-30 months. No local recurrence is noted. Apart from surgical site infection in one distal humerus GCT excision, we had no other surgery related complications. That surgical site infection was managed with debridement. Sacrum GCT patient had hypocalcemia on denosumab which was managed medically. Patients who underwent joint salvage procedure had better functional outcome than those requiring excision of joint and reconstruction. Mean MSTS score of the study group is 27/30.

**Conclusion:** Early diagnosis and extended curettage will give excellent functional and oncological outcome. Sacral GCT is challenging to treat, require multimodality approach.
Session Name: **Poster Session**  
Theme: **Others**  
Abstract Number: **355**  
Abstract Title: **Osteogenic sarcoma of bone in patients older than forty years – Single institute study from tertiary cancer centre in India**  
Authors: Srinath Gupta, Ashish Gulia, Ajay Puri, Priyal Tomar  
Presenter: **Srinath Gupta, Tata Memorial Hospital, India.**

**Aim/Objective:**
Osteosarcoma demonstrates bimodal peak with respect to age, with low incidence in elderly age groups. We present oncological outcome of primary osteosarcoma of bone in patients older than forty years of age.

**Methods:**
Between January 2006 and December 2015, 50 patients (40 years or older) with high grade primary osteosarcoma bone were treated with curative intent (non-methotrexate based chemotherapy 4# NACT – Surgery – 4# Adjuvant CT). Patients treated elsewhere, recurrent and metastatic cases were excluded. The case file records, imaging and histopathologic records, oncologic and functional status were reviewed. 35 were men and 15 women with median age of 48 years (40 – 69 years) at presentation. 11 patients had pathological fracture.

**Results:**
Limb Salvage surgery was done in 39 patients (78%) where as 11 (22%) underwent amputation. Two patients had positive margins. Histological evaluation (available – 41 patients) showed 26 (63%) had poor response (Huvo’s grade - 1,2) and 15 (37%) had good response (Huvo’s grade – 3,4). The median follow for survivors is 47 months (24 – 134 months). At the last follow-up 24 patients were alive, 24 were dead (2 due to chemotherapy related complications) and 2 patients were lost to follow up. 2 patients had local recurrence, 18 had distance recurrence and 6 had both. The five-year OS is 55% and EFS is 43%. The OS and EFS were not significantly different when we compared the cohort with non-metastatic < 40 years of age patients (706 patients) (<40yr – OS - 53%, EFS - 47%, >40yr OS - 55%, EFS - 43%)

**Conclusion:**
Treatment protocol is similar in both age groups. Appropriately treated primary osteosarcoma in elderly can yield results comparable with younger than 40 years age group (comparison done with our own data of 706 patients).
Aim / Objective - Primary bone tumors around the elbow represent less than 1% of all skeletal tumors. Total elbow megaprostheses are an option for reconstruction following resection of lesions involving the elbow joint (malignant and locally aggressive). Prosthesis reconstruction of elbow helps in restoring a cosmetically acceptable, painless, functional and stable joint. Oncological and functional outcome of patients who underwent Total elbow replacement using indigenous megaprostheses were evaluated. There is a dearth of recent studies on total elbow replacement owing to the uncommon nature of the procedure.

Methods - Retrospective analysis of all our cases (n=9, 4 ewings, 1 osteosarcoma, 1 synovial sarcoma, 1 hemangioendothelioma and 2 gct) operated with Total elbow prosthesis between November, 2007 to December, 2016 was done. All cases were retrieved from our prospectively maintained surgical database. The mean resection length of the distal humerus was 10.75cm (6 cm to 18 cm).

Results – One patient succumbed to disease at 7 months, one patient developed infection and implant was removed at 7 months. One patient had local recurrence (LR = 11%) which was excised after 1 year, and later developed infection which led to implant removal after 31 months from primary surgery. The remaining 6 had a mean follow-up of 63 months (17 – 120 months). Two cases had asymptomatic radiologic aseptic loosening. Mean MSTS score was 24 (18 – 28).

Conclusion – In appropriately selected cases, Total elbow replacement is an oncologically safe procedure with acceptable morbidity and good functional results.
Session Name: **Poster Session**  
Theme: **Others**  
Abstract Number: **359**  
Abstract Title: **“Umbrella Construct” – An Innovative Technique for Locally Aggressive Benign Bone Tumors of Proximal Humerus**  
Authors: **Srinath Gupta, Ashish Gulia, Ajay Puri, Vineet John Kurisunkal**  
Presenter: **Srinath Gupta, Tata Memorial Hospital, India.**

**Aim / Objective:** Salvaging locally aggressive benign bone tumors of proximal humerus is a challenge. Resection is associated with high morbidity hence function preserving intra-lesional curettage is preferred. We present a novel biological reconstruction technique – “Umbrella construct” where a femoral head and a strut allograft are used to reconstruct the cavity. Graft incorporation time, functional (MSTS) and oncological outcomes were evaluated.

**Methods:** Retrospective analysis of locally aggressive proximal humerus cases operated between January 2009 and December 2016 was done. Out of 56 operated cases of aggressive benign proximal humerus lesions, a total of 11 cases (Campanacci grade 2, 3 or tumors with involvement of more than 75% of bone in subchondral region without involvement of articular surface) underwent curettage followed by reconstruction with “Umbrella Construct”. This included 10 giant cell tumors (Campanacci Grade 3 – 9 cases, Grade 2 – 1 case) and 1 case of chondroblastoma. Of these 2 patients received Inj. Denosumab and preoperative embolization was done for 6 cases. All cases were reconstructed using femoral head allografts and strut allografts and fixed with either k wires or screws.

**Results:**  
Two cases had developed local recurrence (LR = 18%) at 4 months and 14 months and the construct was revised to prosthesis in both the cases. The remaining 9 patients had a median follow-up of 44 months (5 to 87 months). The mean allograft incorporation time was 7 months (5 – 8 months). 1 patient had a graft fracture which was managed conservatively. The mean MSTS score for these cases was 27 (23 – 29).

**Conclusions:** In benign aggressive lesions even with involvement of upto 75% of subchondral bone, umbrella construct is a suitable modality for proximal humerus reconstruction with acceptable oncological morbidity and excellent function.
Primary non-Hodgkin lymphoma: A case of a vanishing bone
Authors: Marjorie Sierra
Presenter: Marjorie Sierra, Philippine Orthopedic Center, Philippines.

Primary lymphoma of the bone has been recognized as early as the 1920's. It is a rare disease entity that encompasses 3-7% of all primary malignant bone tumors. Its excellent response to chemotherapy has been vastly documented in literature. Reconstitution of bone lesions has been dramatic following treatment. However, questions arise as to what happens after. How does a reconstituted pathologic bone behave and fares in surgery? The dilemma of resection and reconstruction versus fixation surfaced. Unfortunately, very limited data was able to answer this query. We report a case of a 46-year old female diagnosed with primary non-Hodgkin lymphoma of the bone who presented with a huge osteolytic lesion over the epi-metaphyseal region of the distal femur that fully reconstituted following chemotherapy. Surgeons had to contend with residual varus deformity and implant failure from previous surgery. Corrective osteotomy and plating using a distal femoral lock plate was utilized and iliac bone grafting done to augment healing. Preliminary result at three months post-surgery reveals progression of bony healing and functional gains in the form of improvement in knee range of motion and mobility status.
Objective: Humeral involvement lowers the quality of life in patients with multiple myeloma. The purpose of this study was to investigate humeral involvement of multiple myeloma, including clinical characteristics and overall disease course.

Methods: 1,986 multiple myeloma patients treated in a single institute were reviewed. 1,131 of them had a radiograph of the humerus, and were reviewed.

Results: 228 of 1,131 multiple myeloma patients had radiographic humeral involvement of multiple myeloma. 29 patients had a pathologic fracture in the humerus. 16 patients underwent a surgery for the humeral involvement.

Conclusions: Radiographic involvement of the humerus is common in multiple myeloma patients. 1.5% of multiple myeloma patients suffer from a humeral pathologic fracture. About half of the fracture patients undergo a surgery.
Background
Tumour-induced osteomalacia (TIO) is a rare paraneoplastic syndrome. Accurate localization and surgical resection of the mesenchymal tumour results in cure. Surgical options include curettage or wide resection (WR). Our aim is to compare the recurrence rate of WR and curettage in surgical treatment of TIO.

Methods
Two independent reviewers systematically searched and assessed publications in the PubMed and Web of Science databases. All reported cases in English of appendicular, skeletal, unifocal and benign TIO with at least 6 months of follow-up were considered. A meta-analysis was performed examining local recurrence as the primary outcome of interest. We compared our experience of 2 cases with the results.

Results
A total of 4317 articles were reviewed and 32 articles were selected. One cohort study, 11 case series and 20 case reports were considered. In all, 87 patients were included; 65 treated with WR and 22 treated with curettage. Local recurrence rates were 7.7% (5 patients) and 54.5% (12 patients) in the WR and curettage groups respectively. Patients treated with WR as index operation had a lower relative risk ([RR] 0.49; 95% [CI] 0.31-0.78) of recurrence.
Of the 12 patients who initially underwent curettage with recurrence, 8 patients consented for second surgery. 25% (2 patients) underwent further re-curettage with cure rate of 0% and 75% (6 patients) underwent further WR with 83% cure rate (5 patients). The overall cure rate for patients who underwent curettage as index operation and patients who underwent curettage as index operation followed by WR for recurrence was 93.8%.

Conclusions
Wide resection has a lower recurrence rate than curettage in surgical management of TIO at index operation. Curettage at index operation followed by wide resection for recurrence has a cure rate comparable to wide resection at index operation.
Introduction:
Hydatid disease is still endemic in several parts of the world and is caused by the larval form of E. granulosus and E. multilocularis. Bone involvement is very rare with incidence of 0.2-4% of all cases. Spine is affected in nearly 50% of cases of osseous Hydatid disease. This condition is usually silent until a complication like paraplegia or pathologic fracture occurs.

Aims and Objective:
To report 2 cases of osseous Hydatid disease which mimicked primary bone neoplasia.

Materials and Methods:
Retrospective data analysis was done to look for mimickers of primary bone tumors. We found 2 cases of Hydatid disease.

Results and Conclusions:
Case 1: 65/Female presented with right thigh pain. Imaging showed a large lytic destructive lesion involving shaft of right femur with e/o calcifications. Possibility of chondrosarcoma was suggested. J needle biopsy revealed Hydatid disease of bone and was treated with complete resection.
Case 2: 35/Male presented with left hip pain. Imaging showed lytic cystic lesion involving left iliac bone. Possibility of Aneurysmal bone cyst was suggested. J needle biopsy revealed hydatid disease of bone with chronic granulomatous reaction. Patient is under medical management in view of multiple lesions.

A high index of suspicion is necessary for the diagnosis, especially in patients that live in or travel to endemic areas. Knowledge of this entity is also necessary to avoid mislabeling these lesions as primary bone sarcomas.

Clinical, Radiological and Pathological features of these cases will be discussed.
Osteofibrous dysplasia is a rare disease entity initially recognized in 1921 by Fragenheim as congenital osteitis fibrosa. It has then evolved into an ossifying fibroma as described by Kempson in 1966. It was only in 1976 that the name osteofibrous dysplasia (OFD) was coined by Campanacci. He described a benign tumor that is specifically located in the tibia and closely resembles fibrous dysplasia but is distinct histologically. Reports have been relegated to case reports and series due to its rarity. Generally, findings include a benign lesion that is exclusively found in the long bones with a high rate of recurrence. To the best of our knowledge, never was it reported outside of the long bones including the femur, tibia, fibula, radius, and ulna. We report a case of a 41-year old female who complained of right hip pain more pronounced during ambulation. Patient initially presented as a diagnostic dilemma because of the rarity of the condition (i.e. OFD) and peculiarity of the location (i.e. acetabulum). We believe that this is the first time that an osteofibrous dysplasia of the acetabulum is reported on literature.
Session Name: **Poster Session**  
Theme: **Others**  
Abstract Number: **390**  
Abstract Title: **Intra operative frozen section examination of marrow during limb salvage in sarcoma resections: Is it relevant ?**  
Authors: **Yogesh Panchwagh, Sujit Joshi, Ashok Shyam**  
Presenter: **Yogesh Panchwagh, Deenanath Mangeshkar Hospital, India.**

**Introduction:**  
The standard practice to send bone marrow from the level of resection for intra operative frozen section examination during resections of primary bone sarcomas to assess margin, is now being questioned with the advent of accurate, modern imaging modalities.

**Materials and methods:**  
At our centre, 125 frozen sections were done between 2012 and 2018 for 118 patients undergoing limb salvage for sarcomas. Of these, 99 were done for bone sarcoma resections. The operating surgeons impression about the gross appearance of marrow was compared to the intra op and final microscopic findings. This group was also compared, with regards to clinical outcome, with a smaller group of 19 cases treated by same surgeon at another centre without facilities of intra operative frozen section examination.

**Results:**  
On frozen sections, marrow was reported positive in only 2 cases of osteosarcoma. The gross appearance of the marrow was suspicious in only one of these. Salvage was abandoned and amputation was performed but patient had disease progression later. In the other case, salvage was done because gross appearance was normal. The final paraffin section was reported negative. This patient continues to be alive without disease. In the rest of the 97 cases, negative macroscopic impression correlated well with negative microscopy. The comparison regarding clinical outcomes between groups with and without frozen examination revealed no difference in disease related outcomes.

**Discussion:**  
Our study shows close correlation between gross marrow examination and microscopic picture in cases of involved as well as uninvolved marrow. The comparison with the smaller group operated without frozen section, revealed no difference in clinical outcome. A larger multi centric study with more cases, with macroscopic findings compared with microscopic examination may throw more light on developing guidelines about role of intra operative frozen during limb salvage in sarcoma resections.
Aim
To describe a rare case report of a patient with a metachronous multicentricity of osteoid osteoma.

Methods
A 14 years old boy presented to us three years back with complaints of pain in the left shoulder radiating down the arm. The pain used to occur typically at night, and was relieved by NSAIDS. X-ray revealed a lucency within an area of sclerosis and a solid periosteal reaction. A CT scan was obtained and a diagnosis of osteoid osteoma was made radiologically. The parents were counseled for CT guided radiofrequency ablation. However, in view of pain being managed well by intermittent use of NSAIDs, the parents chose to have conservative management. The child continued with intermittent pain that gradually reduced in intensity.

After three years, the child presented with recurrence/worsening of pain over the last three months. The pain was similar as before, but more in intensity this time. A repeat CT showed the previous lesion being unchanged and the development of another lytic lesion approximately 4 cm distal to the first lesion. There was continuity of the same dense sclerosis spanning from one lesion to the other, again with perilesional edema and no soft tissue component.

A working differential diagnosis of osteomyelitis vs multicentric osteoid osteoma vs eosinophilic granuloma was made. After detailed counseling the patient was taken up for surgical excision of both lytic lesions. An anterolateral approach was used to access proximal humerus and a marginal excision of the lesions along with surrounding reactive bone was done under image intensifier guidance.

Results
Post operative histopathology confirmed presence of an osteoid osteoma at both the niduses. At 6 months follow up, the patient is pain free and has been allowed full shoulder function.
Introduction:
“Spare part surgery” involves utilization of scavenged tissue from an amputated limb for reconstruction of the stump leading to an aesthetic, functional and better amputation stump and sometimes to enhance the functional outcome. Use of a composite flap harvested from the otherwise discarded part is well accepted. We present use of a free posterior leg myocutaneous flap raised from the amputated limb to provide adequate wound coverage. This type of “spare parts” surgery resulted in the maximal functional and aesthetic outcome possible for our patient.

Materials and Methods:
A 47 year old male presented with recurrent Malignant Peripheral Nerve Sheath Tumour of the left thigh with a surgical site infection. MRI showed an 8.6 x 4.6 x 17.3 cm large air containing and sinus forming post operative cavity in the medial compartment of left thigh and stable large heterogeneously enhancing mass lesions along the superior, inferior and the medial wall of the surgical cavity suggesting recurrence. After a multidisciplinary tumour board meeting, Hip disarticulation was planned for the patient. And he underwent reconstruction of the amputation stump using free ipsilateral calf flap containing almost the entire bulk of the posterior compartment of the leg along with popletial artery harvested from the salvaged limb, the popletial vessels were anastamosed to the femoral vessels. Post operative flap uptake was excellent.

Result
Two months Post op clinical condition is satisfactory with a well healed scar and excellent uptake of the flap. Patient is disease free and ambulatory with a prosthetic limb fitment.

Conclusion
Spare part surgery is a very useful tool in providing faster and more satisfactory rehabilitation while reducing morbidity by avoiding harvest of flaps from other regions of the body.
Background: The purpose of this study was to evaluate the morbidity, functional outcome and oncologic results in paediatric patients with malignant tumors of the pelvis treated with surgical resection as part of their multimodality treatment.

Methods: Fifty-four non metastatic patients with malignant tumors of the pelvis had surgical resection between November 2000 and December 2015. There were 40 males and 14 females with a mean age of 13.5 years (range 2 to 18 years). The diagnosis included Ewing's sarcoma (41), osteosarcoma (6), chondrosarcoma (2) and synovial sarcoma (5). Thirty-eight resections included resection of the acetabulum (T1 + T2 = 21, T2 + T3 = 11, T1 + T2 + T3 = 4, T1 + T2 + T4 = 2) and Sixteen did not include resection of the acetabulum (T1 = 10, T1 + T4 = 4, T3 = 2). No reconstruction done in 16 (resection excluded the acetabulum), arthrodesis in 4, extracorporeal radiation and reimplantation in 5 and a pseudarthrosis in 29.

Results: Forty-eight patients were available for follow up. Follow up ranged from 4 to 180 months (mean 61 months). Three of 54 patients had involved margins. Three patient had an intraoperative urethral injury while one had intraoperative bladder injury. Four patients had infection which settled after wound lavage. One patient had painless ankylosis. Of the 40 patients in whom histologic response to chemotherapy was assessed 33 had a good response to chemotherapy and 7 were poor responders. Thirty six patients are currently alive. There were two local recurrences. The overall survival was 68 % at 5 years. The Musculoskeletal Tumor Society Score ranged from 22 to 29.

Conclusion: the oncologic outcomes of paediatric patients with malignant tumors of the pelvis treated with surgical resection as part of their multimodality treatment are very encouraging. Though these are challenging surgeries with their inherent complications the ultimate functional outcomes are good.
Evidences have been put forth stating that patients with Osteosarcoma are taller than the normal population. There has been no study on the Indian population attempting on elucidating such a relationship. Retrospective data was collected from old hospital records and pertaining data recorded. Height of patients at the time of diagnosis was compared with expected height of patients of the same age with reference to the standardized growth charts provided by the Indian Academy of Paediatrics.

Out of 77 patients who received treatment at our center, 29.9% were female while 70.1% were male. Mean age was 17.97 ± 7.03 years. Minimum age at diagnosis was 5 while maximum was 50 years. 39 patients had osteosarcoma of distal femur, 22 proximal tibia, 8 proximal humerus, 2 proximal femur, 3 proximal fibula, 2 pelvis and 1 clavicle. Of these, 34 (44.2%) had pulmonary metastases at the time of diagnosis. Height of the patients at the time of diagnosis was 157.2 ± 15.4 cm with range of 115 cm to 184 cm. Overall, patients with Osteosarcoma were found to be shorter compared to the normal population. However, it was observed that no relation existed between height at age of diagnosis and occurrence of osteosarcoma in skeletally immature patients. But, in patients who had attained their final height, it was observed that they were shorter than they were expected to be.

The average height of patients with Osteosarcoma was significantly below the average height of the reference population. It was observed that in those with osteosarcoma diagnosed while they attained their final height, expected height was significantly higher than actual height of the patients. This could point to a different scenario in the Indian population and further studies need to be carried out with larger number of patients to further elaborate on this observation.
Aim/Objective
Musculo-skeletal tumors (MST) are a challenge to diagnose and treat. Though they are generally rare, referral bias exists in tertiary institutions. The objective was to study the types of MST presenting to an oncology Multidisciplinary Team in Northeast India.

Methods
An oncology Multidisciplinary Team (MDT) was set up in June 2016 at a tertiary hospital in Northeast India, which caters to a wide region comprising different ethnicities. In addition to patients diagnosed with MST, patients with suspected MST were also referred to the MDT. Data was collected prospectively, which was analysed upto March 2018.

Results
During the study period, a total of 2249 cases were discussed by the MDT, of which 126 were musculoskeletal and skin lesions. There were a total of 87 patients, of which 28 had bone lesions while 35 were soft tissue lesions. The benign lesions among the above were 12 and 4 respectively. Osteosarcoma (n=9) was the commonest malignant bone tumor. Among the 18 malignant skin lesions, 11 were malignant melanoma and 6 were Squamous Carcinoma. The majority (60.9%) were male, with a median age of 35 years (range 3 to 86). The intent of treatment was curative in 72.5% of the malignant lesions.

Conclusion
The accurate diagnosis of MST is aided by a MDT. Benign bone lesions may present to oncologists and these differentials need to be considered.
Liposarcomas are the second most common type of soft tissue sarcoma in adults, typically presenting as a single, well-circumscribed mass affecting the lower extremity. While local recurrence and metastases are not uncommon, multicentricity for liposarcomas particularly of low to intermediate histologic subtypes is rare. Less than 50 cases have been reported in literature since it was first identified in the 1940s.

We present the case of a 59 year-old male with a huge tumor affecting the right posterior thigh, and a concomitant mass on the left arm. The lesions occurred eleven years apart, with no signs of chest or abdominal metastasis at the time of consult.

After wide resection, histopathologic analysis revealed findings consistent with myxoid liposarcoma for both tumors. No evidence of recurrence has been detected at 1 year post-surgery.

Multicentric liposarcoma is an unusual presentation for a common type of soft tissue sarcoma, with a potentially more aggressive clinical course and poorer prognosis. Confirming the diagnosis remains a challenge due to varied reports regarding chronicity, differentiating between metastases versus multicentricity, and the overall rarity of this condition.

Keywords: metachronous liposarcoma; multicentric liposarcoma; myxoid liposarcoma; recurrent liposarcoma
Session Name: *Poster Session*
Theme: *Soft Tissue tumors*
Abstract Number: 15
Abstract Title: The prognostic significance of surgical treatment for excessive elderly patients with soft tissue sarcoma
Authors: Hiroyuki Tsuchie, Makoto Emori, Hiroyuki Nagasawa, Naohisa Miyakoshi, Yasutaka Murahashi, Emi Mizushima, Toshihiko Yamashita, Yoichi Shimada
Presenter: Hiroyuki Tsuchie, Akita University Graduate School Of Medicine, Japan.

Aims: Soft tissue sarcoma (STS) mainly occurs in middle-aged and senior citizens. Although a poorer prognosis has been reported for older patients, few studies have examined advanced elderly excessive older patients. We evaluated the clinical features of advanced elderly patients with STS.

Methods: One hundred and forty-four patients were included in this retrospective study, and we divided them into two groups based on a cut-off age of 85 (Older and Younger groups). The patients’ information, including age, tumor type, location, size, presence of metastasis, AJCC stage, FNCLCC classification, treatment-related factors, local and distant relapse, and outcome, was collected. We compared the clinical courses between the 2 groups.

Results: In all patients, the frequency of chemotherapy in the older group was significantly lower than in the younger group (P<0.01), and the follow-up period in the older group was significantly shorter than in the younger group (P<0.01). Surgical treatment was refused more frequently in the older group (P=0.01). The older group showed a significantly poorer prognosis (P<0.05). However, in patients with localized disease at presentation treated with surgery, there was no significant difference in prognosis between the 2 groups. Only surgical treatment affected the prognosis in older patients (P<0.01).

Conclusions: Although the prognosis of advanced elderly STS patients is generally poor, that of STS patients with surgical treatment is not poor. Only surgical treatment intervention strongly influences the prognosis, and so the prognosis may be improved with aggressive surgical treatment.
Aims/Objectives
In metastatic soft tissue sarcoma (STS), metastasectomy is a frequently practiced treatment strategy, although evidence in favour of this approach comes from non-controlled, retrospective single arm studies with a potential selection bias. By applying advanced comparative effectiveness methods, the aim of the present study was to evaluate the efficacy of metastasectomy vs. a “non-invasive” approach (i.e. best supportive care, radiotherapy, chemotherapy) in STS-patients with metachronous metastasis.

Methods
135 patients with metachronous metastasis of STS who had undergone surgery for localised disease, were retrospectively selected out of a population of over 1000 STS-patients treated between 1998 and 2015 at two tumour-centres. In order to compensate for prognostic factors differing between patients undergoing metastasectomy and those treated “conservatively” at time of treatment decision, a propensity score (PS) was calculated. Based on the PS, an inverse-probability-of-treatment-weight (IPTW) was generated in order to estimate the effect of metastasectomy on overall-survival (OS).

Results
Survival rates were significantly better in those 68 patients (44.4%) who had undergone metastasectomy in comparison to those 67 patients treated “conservatively” (55.6%; 10-year OS: 23% vs. 4%, log-rank test: p<0.0001; hazard ratio (HR): 0.34, 95% confidence interval (CI): 0.22-0.53, p<0.0001). At baseline, however, important positive prognostic factors prevailed in patients finally undergoing metastasectomy, including a better ECOG performance status, fewer number of metastases, better Haemoglobin- and Albumin-levels. After weighting the data for the IPTW and thus compensating for these imbalances, the positive association of metastasectomy regarding OS prevailed (adjusted 10-year OS: 17% vs. 3%, log-rank-test: p<0.0001; HR: 0.33, 95%CI: 0.20-0.52, p<0.0001).

Conclusions
In the present bi-centre study, metastasectomy was associated with a significantly better OS even after adjustment for positive prognostic factors prevailing in the group of metastasectomy-patients at baseline. Our results indicate that metastasectomy should be considered as first choice in patients with metachronous metastasis of STS.
Objective: Because of the demographic changes, proportion of elderly patients is rapidly increasing in Japan; by 2060, 40% will be older than 65 years compared to 26.7% in the current population. It is estimated that 1/3 will be comprised by 80 years or older. Due to the increased incidence of cancer with age, elderly patients with soft tissue sarcoma (STS) will likely increase. Elderly patients are more likely to have comorbidities and decreased performance status which pose significant problems for an effective treatment. In this study, we analyzed our management and clinical outcome of STS patients over 80 years old.

Materials: Between 1991-2017, 83 STS patients over 80 years of age were treated (40 male/43 female). The average age was 83.9. Tumors were localized in the upper extremity (n=19), lower extremity (n=46), and trunk (n=18). Histological diagnosis included UPS (n=21), myxofibrosarcoma (n=31), liposarcoma (n=13), and others (n=18).

Results: Wide resection was performed in 68 cases, marginal resection in 10 cases, and intralesional resection in 5 cases. 36 cases underwent plastic reconstruction and 7 cases underwent post-operative radiation. Oncological outcomes were 35 CDF, 16 NED, 15 AWD, 13 DOD and 4 DOC, and 5-year disease specific survival was 70.8 %.

Conclusion: Generally, STS patients older than 80 years receive surgery when feasible and rarely receive chemotherapy. In order to maintain as much pretreatment ADL as possible, less aggressive treatment might be implemented, but could lead to multiple operations and eventual amputation in some cases. There were no peri-operative deaths, and although there is a possibility of higher complication rate, aggressive surgery might be indicated. There have been reports of risk stratification tools for surgery in elderly patients, but there are still unknown factors that need to be elucidated. Further accumulation of data is needed to refine the treatment for elderly patients.
Introduction:
Angioleiomyoma is rare benign tumor that originate from smooth muscle of blood vessels. Although, the most common sit of such lesion is lower extremities, it rarely encountered in the foot. we presented a case of painful small swelling of foot that excised and pathological diagnosis came as angiolieomyoma.

Case scenario: (history and clinical examination):
A 36-year-old presented with a 2-year-old painful and slowly growing swelling lateral aspect of right foot. Detailed history revealed neither constitutional symptoms nor trauma. Clinically, 1x2cm painless mobile firm subcutaneous swelling just lateral to 5th MTB head with normal overlying skin. Radiological diagnosis (MRI) was a benign soft tissue tumor with deferential of GCT and neural tumor.

Management:
Surgical excision was done with clear margins and pathological diagnosis was angioleiomyoma. One year reviews showed intact sensation and no evidence of regrowth.

Discussion:
Although Angioleiomyoma is very rare tumor, it should be included in the differential diagnosis of foot soft tissue tumors especially of the subcutaneous painful nodule. Preoperative diagnosis is difficult as such lesion has neither specific clinical nor radiological characteristics.
Objective
Tumour services is increasingly challenging due to rapid development of medical and surgical treatment. The internet and mobile technology play pivotal role in disseminating medical knowledge to our advantage as doctors and patients. To educate the technology-savvy patients, leveraging a smartphone app to deliver information regarding tumour services, knowledge and experience of each centre may be the cornerstone in providing a realistic overview of the expectant treatment that patients will receive. To achieve our objective, we developed a mobile app with the purpose of educating users regarding orthopaedic oncology and provide information regarding the services available in the Orthopaedic Oncology unit, Lerdsin Hospital, Thailand.

Methods
We developed a hybrid mobile app entitled Orthopaedic Oncology Lerdsin Hospital (OOLH) that runs on both iOS and Android platform. The app consists of information regarding overview of our hospital, unit, staff, speciality, services and programmes available, our experience in treating orthopedic tumours, list of research, publications, presentations, projects and innovations. The information is available in two languages, i.e., English and Thai. The app also allows users, specifically medical personnel, to communicate with our doctors regarding tumour cases via built-in social messaging. The app is available for free in the Apple AppStore and Google Play.

Results
Since the inception of this app, we believe our services are more widely made known to the public especially patients around Thailand. We expect increased awareness regarding sarcomas amongst the public, patients as well as medical personnel and hope for earlier referral for prompt and specialised treatment.

Conclusions
Mobile app is an engaging and modern platform for delivery of medical knowledge. Provision of essential information and instantaneous communication via mobile app may hopefully result in a better-informed society with timely and optimised patient care.
Session Name: **Poster Session**
Theme: **Soft Tissue tumors**
Abstract Number: **97**
Abstract Title: **Digitalisation of patient data: how a FileMaker Go app can organise information and increase efficiency**
Authors: **Goh Kian Liang, Noor Rahin Mohd Shahidan, Awang Mohd Shukrimi**
Presenter: **Goh Kian Liang, International Islamic University Malaysia, Malaysia.**

**Objectives:**
In orthopaedic oncology, managing large amount of patient data using modern technology is crucial for efficient data storage and retrieval. To achieve this, we explored the intrinsic potential of FileMaker Go as the mobile digital platform.

**Methods:**
We created a custom app using FileMaker Pro version 16. The desktop interface requires FileMaker software to run and the iPhone interface require Filemaker Go app which is available on the Apple AppStore. We designed the main interface to have a curated list of patients which can be sorted by name, diagnosis, ward or the hospital number or retrieved with an integrated barcode scanner. The diagnosis, latest review, plan, haematology and pathology results, captured x-rays and MRI images with reports, clinical images and surgical reports are grouped into individual pages and entries can be made in chronological order. Integrated scoring systems such as Enneking classification, AJCC classification and Mirel's score are available for individual patients. MSTS score calculators are integrated for easy calculation and presented as a graphical chart for each patient during follow-up.

**Results:**
The FileMaker software is remarkably easy for surgeons to learn and to develop custom apps as many online resources are available. Wide range of development tools are available in the FileMaker software to create complex apps with the capability of capturing images and documents directly from the app, making calculations for different scoring systems and converting data to graphical representation instantaneously. As surgeons' requirement increase or change, improvements to the app can be made easily without dependence on professional service of software developers or involving huge budget.

**Conclusions:**
A complete, systematic and highly-capable mobile app built using FileMaker software can complement the services of orthopaedic surgeons in providing a complete data-management platform for monitoring patients and future data-reporting.
Session Name: **Poster Session**
Theme: **Soft Tissue tumors**
Abstract Number: **169**
Abstract Title: **Correlation between the lactose dehydrogenase level and prognosis in soft tissue sarcoma**
Authors: **Taketsugu Fujibuchi, Joji Miyawaki, Teruki Kidani, Hiromasa Miura**
Presenter: **Taketsugu Fujibuchi, Ehime University Graduate School Of Medicine, Japan.**

**Objective**
Several reports concerning the prognostic factors of soft tissue sarcoma have been published. Although lactose dehydrogenase (LDH) levels are reported to be associated with poor prognosis in Ewing sarcoma, it is unclear in other sarcomas. Thus, this study aims to evaluate the correlation between LDH level and prognosis in non-small round-cell sarcomas.

**Methods**
We reviewed 52 patients with primary non-small round-cell sarcoma between 2003 and 2012. Serum LDH levels were stratified as >253 IU/L vs. ≤253 IU/L according to the standard values at our institution. Survival curves were constructed using the Kaplan–Meier method and the log-rank test was used to compare the survival of the patients with high and normal LDH levels. A value of p < 0.05 was considered statistically significant.

**Results**
The most common diagnoses were liposarcoma (14 patients), followed by MFH/UPS (12 patients). There were 9 patients with high LDH levels and 43 patients with normal LDH levels. In patients with normal LDH levels, the 5-year disease-specific survival rate was 85.2%, whereas that in patients with high LDH levels was 62.5%. Patients with high LDH levels exhibited significantly worse disease-specific survival than patients with normal LDH levels (p = 0.034). There were 10 cases who had distant metastasis at diagnosis, 4 patients had high LDH levels, and 6 patients had normal LDH levels. Some correlation between distant metastases at diagnosis and LDH levels was suggested; however, it was not statistically significant (p = 0.057).

**Conclusions**
Regarding LDH in cancer metabolism, the Warburg effect has been known. High LDH levels have been reported to be associated with poor prognosis in many cancers and Ewing sarcoma. This study suggests that high LDH level is also associated with distant metastasis and poor prognosis in non-small round-cell soft tissue sarcomas.
Purpose
Liposarcoma in the retroperitoneum is often detected as a huge tumor because of an asymptomatic tumor. We conduct the treatment for liposarcoma in the retroperitoneum. Especially, we compared primary cases (PC) to recurrence cases (RC).

Methods
There were 82 cases of liposarcoma in the retroperitoneum who visited our hospital from January 1990 to December 2015. There were 45 males and 37 females. Mean age was 60.0 (24~84) years. Mean follow-up period was 54(1~209) months. There were 72 of PC and 10 of RC. There were 45 cases of well differentiated liposarcoma, 34 cases of dedifferentiated liposarcoma, and 3 cases of mixed type. Outcome were as follows; CDF in 35 cases, NED in 17 cases, AWD in 3 cases, DOD in 22 cases, DOO in 5 cases.
We compared the pathological surgical margin for primary site, the survival rate, the local free recurrence rate between PC and RC.

Results
Surgical margins were as follows: R0 in 47 cases, R1 in 32 cases and R2 in 3 cases of PC, and R0 in 5 cases, R1 in 5 cases of RC. Local recurrence rate was 42.1% in PC and 80% in RC. 5-year overall survival was 77.1% in PC and 50% in RC. There was not significant difference between them. (p=0.1888) 5-year local free recurrence was 56.8% in PC and 40% in RC. There was not significant difference between them. (p=0.1664) By surgical margins, there was not significant difference in 5-year overall survival and 5-year local free recurrence between R0 and R1 in PC. (p=0.1913, p=0.3490) But there was significant difference in them between R0 and R1 in RC. (p=0.0088, p=0.0018)

Discussion and Conclusions
In case of positive surgical margin, survival and local free survival in RC was significantly poor. It is considered that in RC, additional treatment is necessary in case of positive surgical margin.
Localized Dedifferentiated Liposarcoma in the Extremities

Objective: Clinical outcomes of Dedifferentiated liposarcoma (DDLPS) are poor with a local recurrence rate of 80%, a distant metastasis rate of 30%, and 5-year overall survival rate of 44%. But these reports include patients with retroperitoneal tumors in most cases and there are very few studies which focused on the clinical outcome of primary DDLPS in the extremities. We therefore investigated the clinical outcome of primary DDLPS in the extremities.

Methods: We retrospectively evaluated the file records of patients with DDLPS of the extremities who received surgery in our institution between 2003 and 2015. Twelve patients (6 men and 6 women) were included in this study. The median age at diagnosis was 72 years. The sites of the tumor were thigh (10), buttock (1), and forearm (1). No patient received preoperative or postoperative chemotherapy. Pre-operative radiotherapy was administered to no patient, and postoperative radiotherapy was administered to three patients. We analyzed disease specific survival (DSS), local recurrence rate, and metastasis rate. Survival rate was estimated using the Kaplan–Meier method.

Results: For all 12 patients, 1 patient (8%) had died of disease at last follow-up. The DSS rate 5-year was 81%. Three patients (25%) developed a local recurrence. Two patients (17%) underwent re-excision and could obtain local control. Two patients developed metastasis; one to the lung and one to bone. The patient with lung metastases did not undergo resection of the disease and died of disease at 28 months after the initial surgery. The patient with bone metastases underwent resection of the disease and had been keeping disease free at last follow up.

Conclusions: Clinical results of DDLPS in the extremities were relatively excellent. In patient with local recurrence, re-excision can lead to local control.
Session Name: **Poster Session**  
Theme: **Soft Tissue tumors**  
Abstract Number: **203**  
Abstract Title: **High dose chemotherapy and autologous stem cell transplantation improves survival of patients with osteosarcoma which respond poorly to neoadjuvant chemotherapy**  
Authors: Che Ry Hong, Kyung Taek Hong, Jung Yoon Choi, Han-Soo Kim, Yongsung Kim, Sung-Hye Park, Hyoung Jin Kang, Hee Young Shin  
Presenter: Yongsung Kim, Seoul National University Hospital, South Korea.

**Background:** Despite the great advancement in outcome for osteosarcoma, patients who respond poorly to neo-adjuvant chemotherapy show poor outcome with 5-year event free survival (EFS) of 35-45%. This study evaluated the role of high dose chemotherapy and autologous stem cell transplantation (HDCT & ASCT) in osteosarcoma patients with poor response to neoadjuvant chemotherapy as a sole risk factor.

**Methods:** A retrospective medical chart review was done on all the patients who were diagnosed with osteosarcoma between June 1997 and May 2015 and the patients with tumor necrosis below 90% after neoadjuvant chemotherapy as a sole risk factor were identified. The outcome of the patients treated with conventional chemotherapy only (Group 1) and that of those treated with HDCT & ASCT (Group 2) were compared.

**Results:** This review included 21 patients (17 male, 4 female) who were diagnosed at a median age of 11.7 years old and all of them had a single primary mass in the extremities and none of them had metastatic lesions. The EFS of the patients in Group 1 (n=11) was 63.6% at median 7.8 (range, 0.8-16.2) years from diagnosis whereas that of those in Group 2 (n=10) was 100% at median 5.6 (range, 1.7-8.9) years from diagnosis and at 5.1 (range, 0.7-8.0) years from ASCT (p=0.042). Of the patients in Group 1, 2 patients had lung metastases at median 0.8 years from diagnosis, and 2 patients had primary site relapses at median 1.4 years from off-therapy. The overall survival of the patients in Group 1 was 72.7% at median 8.3 (range, 2.2-16.2) years from diagnosis whereas that of those in Group 2 was 100% at median 5.6 (1.7-8.9) years from diagnosis and at 5.1 (0.7-8.0) years from ASCT (p=0.113).

**Conclusions:** HDCT & ASCT with melphalan, etoposide and carboplatin improves the EFS of the osteosarcoma patients with poor response to neoadjuvant chemotherapy as a sole risk factor.
Background
Reconstruction of a large bone defect following tumor resection is a challenging issue in tumor surgery. Among various options available, free vascularized fibular graft is one of the best biological reconstructions that maintains physiologic bone metabolism and therefore can promise stable bone union. We reviewed the clinical outcome of reconstruction with free vascularized fibular graft (VFG) fixed with locking plate.

Methods
Retrospective review of medical record was done for 21 patients who underwent reconstruction of the bone defect with microsurgical vascular fibular graft after tumor excision. Median follow up period was 44.0 months. The median age of the patients at the time of surgery was 14.0 years old. (range, 9-63) Tibia (n=11) and femur (n=6) were the most common sites for the graft. Three cases were on humerus and one case was on radius. The mean bony defect was 12.4cm and the mean length of the harvested fibula was 20.1cm. All grafts were stabilized to its host bone with locking plates.

Results
All patients were free of disease at final follow up and no local recurrence was reported. Nineteen of 21 patients recovered preoperative range of motion after the surgery. All VFGs were transferred successfully. Bone union was achieved in 16 of 21 patients. Two patients required additional autograft bone graft for nonunion, which eventually achieved bone union at final follow up. Stress fracture of the grafted fibula occurred in one patient, which was healed spontaneously with the support of locking plate.

Conclusions
Our data suggests that free vascularized fibular graft is a satisfactory option for reconstruction of massive bone defect after tumor resection.
Background
Even though technically challenging, Type II periacetabular reconstruction can benefit high level of activity. Therefore we believe this procedure can be a good option for selected patients such as young, active patients without metastasis. We reviewed our cases of periacetabular reconstruction using pasteurized or liquid nitrogen treated autograft, or allograft. We sought oncological outcome regarding patient survival, local recurrence, metastasis, and graft quality including complications.

Methods
Twenty three patients who underwent periacetabular resection (Type II) and reconstruction with THA using recycled autograft or allograft were reviewed retrospectively.

Results
The average follow up period was 69 months. Median age at the time of surgery was 46 years old. Chondrosarcoma (n=11) and osteosarcoma (n=6) were the most common diagnoses. Five cases were bone metastasis from carcinoma and one case was undifferentiated sarcoma. Eighteen patients (78.3%) underwent reconstruction of their pelvis with recycled autograft, seventeen of them were pasteurized, and one case was treated with liquid nitrogen. Allograft was used in five cases of reconstruction (21.7%). 5 year overall survival was 65.5% and that of patients without metastasis at the time of surgery was 73.9%. Local recurrence occurred in four of seventeen patients with primary sarcoma. Bone union was achieved in 13 of 23 patients at an average of 14.5 months. 15 grafts survived at the last follow up. Infection (5 cases) and graft fracture (1 case) were major complications and 4 cases of dislocation were reported. Eight patients (34.8%) could walk without assistive devices and twelve patients (52.2) were assistive ambulatory after the surgery.

Conclusions
We analyzed the outcome of 23 patients who underwent periacetabular resection and reconstruction with THA using recycled autograft or allograft. Our data suggest that periacetabular reconstruction with recycled autograft or allograft maintains its role as a reasonable option for reconstruction after pelvic malignancy.
INTRODUCTION:
Soft tissue sarcomas are rare tumours that accounts for 1% of all malignancies. We assessed complications associated with managing soft tissue sarcoma in our centre. Some of the major complications include wound breakdown, infection, local recurrence and injuries to surrounding structures.

METHODS:
We reviewed 35 cases of soft tissue sarcoma treated at Malaysian Hospitals from January 2012 to December 2016 over a period of 5 years. Data was extracted from patient records and phone call interviews. Data analysis was done using SPSS v23. All moderate and high grade sarcomas received standard dose of post-operative radiotherapy.

RESULTS:
Out of 35 cases, 18 were female and 17 were male with a mean age of 47 (6 -79) years. Out of 9 patients who had local recurrence, 7 eventually underwent amputation at various levels to achieve oncological margin. Out of the other 2 who did not have amputation, one died of lung metastasis, and the other underwent wider resection and is disease free at final review. 1 patient had planned radial nerve resection, with sural nerve grafting. At final follow up, patient had persistent wrist drop. 2 out of 4 patients who had infection ended up with amputation. One of the patients had superimposed local recurrence with infection. Infection was successfully controlled in the remaining 2 cases with wound debridement.

DISCUSSIONS:
Managing soft tissue sarcoma poses great challenge to the treating surgeon. Local recurrence is the leading cause of subsequent amputation3. This is followed closely by infection. Risk factors for local recurrence are large tumour volume, high grade tumours, pelvic tumours and close or positive resection margin

CONCLUSION:
Soft tissue sarcoma surgery is associated with significant risk of complications which calls for appropriate intervention whenever necessary. Local recurrence after a soft tissue sarcoma surgery is associated with high risk of amputation.
INTRODUCTION:
Soft tissue sarcomas (STS) are rare tumours that accounts for 1% of all malignancies. We assessed the relationship between margin and local recurrence rate associated with managing soft tissue sarcoma in our centre. Surgical margins are directly associated with local recurrence.

METHODS:
We reviewed 60 cases of soft tissue sarcoma treated at Hospital Pulau Pinang from January 2012 to December 2016 over a period of 5 years. 35 were included in our analysis and the rest had incomplete data. Data was extracted from patient records and phone call interviews. Data analysis was done using SPSS v23.

RESULTS:
Out of 35 cases, 18 were female and 17 were male with a mean age of 47 (6 -79) years. 23 patients had wide margin on histopathological examination. The remaining 10 had close margin, and another 2 did not have margin documented. Out of the 23 wide margins, 1 had primary amputation, and the remaining 22 had wide resection. None of the patients with wide margin had local recurrence. 10 cases had close (<2mm) or positive margin. 8 out of which had local recurrence, with 7 requiring subsequent amputation; another patient was counseled for amputation but he refused amputation and died of lung metastasis. Another 2 cases had no local recurrence despite having close margin. Analysis between margins and local recurrence is shown in table.

DISCUSSIONS:
Managing soft tissue sarcoma poses great challenge to the treating surgeon. Close and postive margins are associated with local recurrence. Local recurrence in our setting is associated with subsequent amputation. Our sample size is not big enough to assess risk of local recurrence between positive and close margin.

CONCLUSION:
Soft tissue sarcoma surgery with adequate margin is crucial in avoiding local recurrence. Local recurrence is associated with significant risk of eventual amputation.
INTRODUCTION:
Soft tissue sarcomas (STS) are rare tumours that accounts for 1% of all malignancies. We assessed the outcome of soft tissue sarcoma treated in our centre. Key prognostic factors for survival in soft tissue sarcomas include tumor stage, histopathologic grade, size, depth, and anatomic site.

METHODS:
We reviewed 35 cases of soft tissue sarcoma treated at Hospital Pulau Pinang from January 2012 to December 2016 over a period of 5 years. Data was extracted from patient records and phone call interviews. Data analysis was done using SPSS v23. Survival was calculated using Kaplan Meier curve.

RESULTS:
Out of 35 cases, 18 were female and 17 were male with a mean age of 47 (6-79) years. Kaplan mayer curve shows Mean survival is at 44.9 months. 75 % survive beyond a year post surgery.

DISCUSSIONS:
Survival in soft tissue sarcoma is dependent on several factors, namely age at presentation, size of tumour, location of tumour, grade of tumour, and presence of distant metastasis at presentation. In our series, 18 patients were alive, and 15 were dead at final review in January 2018. Out of the 18 patients alive, 2 had metastasis at presentation, and 2 had metastasis at follow up. Out of 15 patients who died, 4 had metastasis at presentation, and 5 at follow up. Of all the patients who died, 50 % had involved margins at resection. 82% of the survived group had clear margins. Although there is a direct correlation between margin and local recurrence, the correlation between local recurrence and survival s not well established.

CONCLUSION:
Survival at 1 year is 75% in our centre. Bigger sample size could establish a correlation between independent factors related to survival.
Purpose: To report the long term result of radial nerve reinnervation after wide resection of malignant peripheral nerve sheath tumor and repaired radial nerve using terminolateral neurorrhaphy technique.

Materials and Methods: We reported a 30-year-old woman who presenting with a soft tissue mass at her left arm. Open biopsy, which was done from outside hospital, revealed high grade soft tissue sarcoma. MRI demonstrated soft tissue mass size 1.7x1x3 cm around radial nerve. Wide resection of soft tissue sarcoma was performed. Radial nerve was cut measuring 5.0 cm in length. Terminolateral neurorrhaphy was used to repair radial nerve (the severed radial nerve was sutured in an end-to-side fashion to the intact median nerve). Postoperative care was including dynamic wrist splint, electrical stimulation daily and vitamin B 1-6-12 supplement. Serial EMG and functional assessment were used to determine nerve reinnervation.

Results: The final pathology reported malignant peripheral nerve sheath tumor. The surgical margins were free of tumor. No local recurrence and distance metastases within 15 years follow up. EMG at four months showed evidence of reinnervation to ECRL and ECRB muscles. Ten months after surgery, EMG showed evidence of reinnervation to EDC and EI muscles. Clinically, patient can actively extend her wrist and fingers at eleven months. She could use her hand function as good as normal

Conclusion: The functional assessment and EMG showed that voluntary motor control of the muscles innervated by the radial nerve was progressively recovered by terminolateral neurorrhaphy. This is another method to restore nerve function after wide resection of malignant peripheral nerve sheath tumor.
Session Name: **Poster Session**  
Theme: **Soft Tissue tumors**  
Abstract Number: **249**  
Abstract Title: **Results of no additional wide excision of soft tissue sarcoma after unplanned primary excision.**  
Authors: Ryu Terauchi, Toshiharu Shirai, Shinji Tsuchida, Naoki Mizoshiri, Yuki Mori, Daichi Hayashi, Toshikazu Kubo  
Presenter: Ryu Terauchi, Kyoto Prefectural University Of Medicine, Japan.

**Introduction:**  
Unplanned excision of soft tissue sarcomas is often performed without considering the possibility of malignancy, because sarcomas are rare. In these cases, additional wide excision should be performed at an early stage. However, in cases of patients declining an additional operation or were left untreated for a long period of time, observation without additional surgery may be selected. The purpose of this study was to investigate the risk of local recurrence for patients with inappropriate excision and no local residual tumor without additional wide excision.

**Methods:**  
We surveyed cases in which unplanned excision was performed at previous hospitals for which follow up was possible. The subjects were 14 cases where additional wide excision and chemotherapy were not performed for some reason after the first visit. The average age at first visit was 45.7 ± 5.4 years. Survival rates were estimated by using Kaplan-Meier methods with the local recurrence of the tumor as the endpoint. We evaluated differences in survival curves in terms of gender, the type of sarcoma, tumor size at the initial surgery, methods of anesthesia at the initial surgery with log rank test (p<0.05 was considered significant).

**Results:**  
The mean follow-up period was 118.0 ± 21.9 months (14 to 244 months), local recurrence was observed in 11 cases among 14 cases, and the 1-year and 3-year survival rates were 50.0% and 25.7%, respectively. The time to recurrence was 13.1 ± 5.0 months (1.0 to 57.9 months). There was no significant difference in the survival curve in terms of gender, the type of sarcoma, tumor size at the initial surgery, methods of anesthesia.

**Conclusion:**  
The local recurrence rate after unplanned excision in this study was obviously higher than the reported recurrence rates after planned excision. Prompt and wide excision is desirable in cases of unplanned excision.
Objectives: The adductor compartment of the thigh is the site where the main lymph duct of the lower limb anatomically exists and it is liable to cause wound complication with the soft tissue sarcoma (STS) resection. In this study, we aimed to analyze postoperative wound complications experienced at 4 institutions and to examine future countermeasures.

Methods: We reviewed 97 patients who underwent wide resection with STS in the adductor compartment of the thigh in 4 institutions between 2000 and 2017. Postoperative wound complications were investigated for wound dehiscence, infection and seroma.

Results: Wound complications occurred in 39 patients. There were 26 wound dehiscence, 19 infections and 29 seromas. Wound dehiscence was associated with high BMI and high blood loss. Infection was associated with male, high BMI and no use of vessel sealing system. Seroma was associated with high BMI, high blood loss. The mean hospitalization time for patients without complications was 21 days. On the other hand, in the patients for wound dehiscence, infection, and seroma, the hospitalization time was significantly extended to 36, 39 and 34 days, respectively. Infection contributed mostly to extension of hospitalization time.

Conclusions: Wide excision of the STS on the adductor compartment of the thigh occurred frequently with wound complication. In this study, suggesting that the use of vessel sealing system may reduce complications of infection. However, the group using vessel sealing system is fewer than the group not using, and the frequency of complications is still high. It is necessary to further accumulate cases and to consider new measures in the future.
Introduction: Leiomyomas are benign epithelial tumours with a female preponderance usually in the uterus, gastro-intestinal tract and skin. They are well capsulated tumours with no mitotic activity and little pleomorphism. Primary leiomyoma in the upper cervical spine region is rare and the occurrence of these lesions in young immunocompetent males is extremely rare.

Materials and Methods: 15 year old male had swelling over the nape of neck since 4 years with slight difficulty in neck movements since a few months. Asymptomatic 4 years back be developed a painless swelling at the nape of neck on the right side initially the size of a pea which gradually increased size. A 10x8cm firm, non-tender & non pulsatile swelling at the nape of neck on the right reaching the occipital nuchal line and crossing the midline with extension upto the posterior border of sternomastoid. Skin over the swelling wasn’t adherent and the swelling did not reduce on neck movements. Neck movements were terminally restricted with restriction on rotation towards the right. Routine Xrays and MRI were suggestive of a soft tissue mass in the inter-muscular plane on posterior aspect more on the right side with a cystic component and causing thinning of the C2 lamina with no intra spinal extension. Biopsy was done. Findings were suggestive of a spindle cell benign tumour.

Results: Posterior en bloc excision was planned and the lesion blog with the entire capsule was excised and sent for histopathology which revealed the lesion was a leiomyoma.

Conclusion: Primary cervical Leiomyoma should be considered as an important differential in upper cervical soft tissue tumors with or without bony extension and its early excision is advocated as they are locally aggressive.
Objective
The aim is to assess association between tumor volume, surgical margin, local recurrence and final survival of liposarcoma.

Methods
Record of 38 liposarcoma patients (28 male) with MRI less than one month before surgery were reviewed. The measurement of tumour volume was done based on tumour border on contrast enhanced axial T1 image using OsiriX programme. Three readings were taken and mean volume was calculated. All data were analyzed and tested using SPSS statistical software.

The mean age was 60.03 years. Tumour sites were lower limb (60.5%), upper limb (21.1%), pelvis (10.5%) and trunk (7.9%). Tumour subtypes were myxoid (42.1%), well differentiated (23.7%), pleomorphic (21.1%) and mixed subtype (2.6%). Wide resection were attempted in all, but due to high volume tumour, marginal resection achieved in majority of cases. Margin was positive in 28.9%. Radiotherapy was given postoperatively in 86.8% of patient. 5 Patients presented with metastases at presentation were started chemotherapy after surgery.

Results
The mean tumour volume was 1838.55 ± 2224.12cm³ with median 727.5cm³. Majority of tumours were of high volume with maximum of 8152 cm³ (67 to 8152 cm³). Mean for dedifferentiated subtype was 1921cm³ (110- 5241cm³), myxoid subtype was 1456.88 cm³ (402-2674 cm³) and pleomorphic subtype 1161.33 cm³ (133-4865cm³).

At 11 years, 22 patients (57.9%) survived. WDLPS had the best survival of 88.9%. Pleomorphic liposarcoma survival was 62.5%, myxoid subtype was 50%, and dedifferentiated type was lowest with 25%

Recurrence developed in 18 (47.4%), in which from myxoid subtype (44.44%), pleomorphic subtype (33.33%). 66% had positive margin and recurrence developed in 50% of myxoid subtype with negative margin. 5 patients developed recurrence with disseminated metastases and succumbed to the disease.

Conclusion
Tumour volume predicts positive surgical margin, but not local recurrence and final survival. Myxoid and dedifferentiated tumour subtype had highest local recurrence and worst survival.
Session Name: Poster Session
Theme: Soft Tissue tumors
Abstract Number: 276
Abstract Title: Long-term follow-up of giant cell tumour with pulmonary metastases
Authors: Y Sahran, MZ Norazman, BM Biswal, Zulmi Wan, WI Faisham, AMZ Rajaei, Dev Padia
Presenter: Sahran Yahaya, Universiti Sains Malaysia, Malaysia.

Objective
The aim is to describe the long-term outcome of progressive pulmonary metastases of GCT treated with courses of chemotherapy.

Methods
We reviewed data of all consecutive case of GCT with pulmonary metastases in our centre. Patients with progression of metastatic nodule underwent systemic chemotherapy; VAC (vincristine, cyclophosphamide and adriamycin) every 3 weeks for 6 cycles. Six monthly CT scan follow-up were done. In stable disease, X-ray was done annually unless in symptomatic patients.

Result
Pulmonary metastases occurred in 14 patients (age 22-48). All patients had local aggressive lesions with soft tissues involvement (stage III) and 6 patients presented with local recurrence (3 previously had curettage and 3 resection).

Pulmonary metastases occurred within 6 months to 4 years in all patients except for 1 case. He refused primary surgery and presented 10 years later with pulmonary metastases.

One patient presented after one year with the disease, and pulmonary metastases occurred 2 years later with metachronous tumour to distal end radius.

Seven patients with progression of pulmonary nodule were subjected to chemotherapy. Three patients that received chemotherapy had recurrence but the pulmonary nodule remained static. One patient presented with a metachronous lesion after chemotherapy, however the pulmonary lesion remained static.

Two patients underwent thoracotomy surgical resection remained disease free for 2 years before subsequent progression. HPE showed no evidence of malignant transformation.

Two patients refused chemotherapy showed progression of pulmonary nodules and both patients succumbed to the disease with massive pleural effusion and haemoptysis.

Four patients with small pulmonary nodules, which didn't show progression was managed by serial observation and remained static without symptoms. One patient received 6 courses of denosumab also was stable for 4 years.

Conclusion
Progressive lesion had favorable outcome with chemotherapy and resection of pulmonary nodule. Non-progressive lesions do not shown to cause problem in long term.
Aim/Objective
Few reports have investigated the correlation of pathological findings with prognosis of leiomyosarcoma cases. The purposes of this study are to investigate the presence of tumor infiltration into surrounding tissues in leiomyosarcoma by image and pathological evaluations, and to evaluate the relationship between pathological tumor infiltration and prognosis.

Methods
Twelve patients with surgically treated leiomyosarcoma were included in this study. There were 4 males and 8 females with mean age of 69 (51-87) years. We analyzed the relationships between infiltration on image and pathological findings by chi-square test, and between pathological infiltration and prognosis by log-rank test. We also analyzed the clinical factors (tumor site, size, depth, and infiltration on image) which affected pathological infiltration. The mean follow-up period was 36 (12-98) months.

Result
Tumor infiltration was suspected in 4 cases by image findings. Three cases of them showed pathological infiltration of tumors into surrounding tissues. Pathological infiltration was significantly associated with infiltration on image (p=0.018), but not associated with histological grade, tumor size, and tumor depth (p=0.618, 1.000, and 0.382).
Preoperative radiotherapy and chemotherapy were performed in 2 and 1 cases, respectively. Limb salvage surgery was performed in all cases except for one case of amputation. Pathological evaluation revealed 11 cases of negative margin. Postoperative radiotherapy was administered in the other case of positive margin. Three cases received postoperative chemotherapy. The oncological outcomes were CDF in 5 cases, NED in 1, AWD in 3, and DOD in 3. Local recurrence was not observed. Pathological tumor infiltration was not associated with overall survival (p=0.853).

Conclusion
Pathological infiltration into the surrounding tissues as typified by myxofibrosarcoma was observed in some cases of leiomyosarcoma. Tumor infiltration might not be associated with overall survival, nor poor local control if appropriate wide resection is achieved.
Session Name: **Poster Session**  
Theme: **Soft Tissue tumors**  
Abstract Number: **308**  
Abstract Title: **Amputation for Extremity Soft Tissue Sarcoma: the Experience of an East Asian Referral Center**  
Authors: **Woo Young Jang, Yongsung Kim, Han-Soo Kim, Ilkyu Han**  
Presenter: **Woo Young Jang, Korea University Anam Hospital, South Korea.**

**Aim/Objectives**  
With the advances in techniques facilitating limb salvage surgery, amputation is rarely performed for extremity soft tissue sarcoma (STS). Because of the Confucian influence in East Asia, the clinicopathologic characteristics of the East Asian patients undergoing amputation for extremity STS may differ from those of the Western patients. This study investigated the clinicopathologic characteristics in a series of extremity STS patients who underwent amputation at a large East Asian institution.

**Methods**  
Of the 652 extremity STS patients who underwent surgery at our institution, 36 consecutive patients who underwent amputation were reviewed.

**Results**  
Of the 36 patients, 21 patients had localized STS and 15 had metastatic disease. The amputation rate for localized STS was 3.5% (21/596). Of the 21 patients, 17 presented with recurrent tumors. Among the 596 patients with localized STS, the 5 year survival rates of the amputation group (n=21) and the limb salvage group (n=575) were 94.1 % and 83.1%, respectively (p=0.101). No significant differences were observed between the two groups, either in local recurrence free survival (78.0% and 83.0%, p=0.531) or in metastasis-free survival (75.1%, and 88.7%, p=0.266). For the 56 patients with metastatic disease, the 5 year survival rates of the amputation group (n=15) and the limb salvage group (n=41) were 32.3 %and 53.0%, respectively (p= 0.424).

**Conclusions**  
For localized STS, amputation rate of this study was lower than those of the Western studies. Oncologic outcome of the patients who underwent amputation was comparable to those of patients who had limb salvage surgery. With appropriate selection of patients, amputation is a viable option in extremity STS.
Introduction:
Large defects are created following resections of sarcomas involving the skin or in patients with prior surgical interventions. These defects are often not amenable for local flaps. We describe our experience with use of microvascular free-flaps for coverage of defects after excision of extremity sarcomas.

Materials and methods:
Retrospective study of 27 patients who underwent free-flap reconstruction between 2010 and 2016. The demographic data, imaging, operative details and follow up were collected and analysis was done using SPSS.

Results:
The mean age was 36 years with 19 males and 8 females. 20 patients had disease in lower limb and 7 in upper limb. Histologically, 10 patients had pleomorphic sarcomas, 7 had synovial sarcoma, 2 each had epitheloid, osteosarcoma, chondrosarcoma and low-grade sarcoma and 1 each with extraskeletal ewings and leiomyosarcoma. The mean duration of symptoms was 6.7 months. 10 had primary tumors and 17 were recurrent. Mean duration of follow up was 34 months range(12-75 months). 18 patients received adjuvant radiation and 20, adjuvant chemotherapy. 29 free flaps were done in 27 patients which was primary in 22 patients and local flap failure in 5. Donor site was anterolateral thigh in 20, radial artery forearm flap in 2, LD in 3, free-flap from amputated limb in 2 and 1 each with gracilis and transverse rectus-abdominus flap. The mean defect size was 10.5 cms. 7 patients(29%) had complete flaploss which was salvaged with another free-flap in 2, SSG in 2, amputation in 2 and abdominal flap in 1 patient. 30% patients had minor complications necessitating surgery and donor site morbidity was seen in 20% of patients. The overall 5 year survival was 65%. The mean MSTS score was 75% with only 2 patients having poor outcomes.

Conclusions:
Free flap as an excellent option for one-stage reconstruction of soft tissue defects.
OBJECTIVE
To assess outcomes and treatment strategy of synovial sarcoma

METHODS
This present observational study was conducted at our institute from 2015 to 2017. Total 27 patients were included in the study operated between January 2015 to December 2016. The diagnosis of all cases was confirmed by Immunohistochemistry. Follow up data was collected till December 2017. MRI was routinely performed for the initial assessment of the primary tumor, CECT thorax, USG abdomen & pelvis to rule out metastatic disease. Surveillance was done by history and physical examination, USG local part and CECT thorax every 3-6 months.

RESULTS
A total of 27 patients, 18 were males and 9 were females. Most common site was lower extremity. 52% were monophasic, 22% biphasic and 26% poorly differentiated. Four patients had stage IV disease at presentation, with lung metastasis. All had primary tumor size > 5.0 cm and poor differentiation on histology. 18.5% (5/27) patients received Adriamycin based neoadjuvant chemotherapy. Most common surgery performed was wide excision with or without reconstruction in 63% (17/27) patients while major amputation needed in 37% (10/27) patients. 26 patients had R0 resection while one patient had R1 resection. 51.8% of patients received PORT in a dose of 40-50 Gy.
On final evaluation at follow up of 1 year 77.7% patients alive out of which 66.7% were disease free and 11% with metastatic disease, 18.6% patients loss to FU and one patient died of disease.

CONCLUSION
Synovial sarcoma is high-grade soft tissue sarcoma. Local control with surgery alone in small tumors at good prognostic sites may be enough. Radiation, as well, is usually required for those with larger tumors. For those with localized “poor” risk tumors, as defined by biology or site, and for those with metastatic tumors, further therapeutic intervention needs to be considered alongside conventional “sarcoma chemotherapy”.

Background
Impending or pathological fractures of proximal femur can cause significant influence on the patient’s quality of life due to the associated pain and limitation of function and mobility. This study aimed to assess the difference in outcome (oncological and functional) and survivorship of patients treated by intramedullary devises (IMN) and reconstruction with endoprosthesis (PR) for proximal femur metastasis.

Methods
One hundred thirty five patients with mean age of 60.7 years who underwent surgery for proximal femur metastasis in our institute were reviewed. 73 patients underwent curettage and IMN and 62 patients underwent PR. Mean followed up period was 15.2 months.

Results
2 year overall survival of the patients was 23.6 % in total cohort, 19.4 % in IMN, and 28.6% in PR, respectively. Prior to surgery, 57.5% (n=42) of the patients treated with IMN and 40.3%(n=25) treated with PR had metastasis of other organs.(p=0.046) In local extent of the disease, patients who underwent PR, 71%(n=44) of the patients had destruction of more than two cortices at the involved site(p<0.001) and 66.1%(n=41) of the patients had pathologic fracture at the time of surgery(p=0.017). Postoperatively, 24.1% of the patients with PR recovered independent ambulation, 19.1% in patients with IMN.(p=0.094) The mean time took for patients to walk without assistive device was 4.9 months in PR, 5.3 months in IMN, respectively. On follow up, Complication rate of PR and IMN was 3.2% and 11.0%, respectively.(p=0.087) Implant revision was operated in 6 cases in PR, and 15 cases in IMN.(p=0.066) Local recurrence free survival was longer in patients treated with PR(p=0.002). However, both implants outlived the life span of the patients, and PR had better implant longevity than IMN(p<0.001).

Conclusions
Considering the superior functional outcome and complication rate of endoprosthesis, this procedure can be a better option than intramedullary nailing for selective cases.
Objective
Paraspinal sarcomas involving the spine are rare. Most of these tumours are managed with radiotherapy and chemotherapy as surgery is usually done for debulking. Enbloc spondylectomy and resection of the mass is a technique where the tumour is resected en bloc with involved vertebra and reconstructed so as to achieve cure.

Methods
We treated a 30 year old lady with synovial sarcoma of the left psoas muscle infiltrating the L1 and L2 vertebrae with resection of the mass and en bloc spondylectomy in May 2014. The surgical technique and the functional outcome are discussed.

Results
A 30 year old lady, 3 months postpartum presented with back ache of 2 months duration. Evaluation with CT scan and MRI revealed mass lesion in the left psoas muscle involving the L1 and L2 vertebrae. CT chest was normal. She was taken up for surgery. Thru posterior approach laminectomy and posterior stabilisation was done. The patient was turned supine, thru transperitoneal approach the tumour was resected en bloc with L1 and L2 vertebra after mobilising the left kidney medially and preserving the great vessels. As the defect was large, stabilisation with iliac crest graft and lateral stabilisation was done. She had an uneventful postoperative period. HPE showed synovial sarcoma infiltrating the L1 and L2 spine. She received adjuvant chemotherapy and radiation. She has good functional outcome and is free of disease.

Conclusion
Total en bloc spondylectomy is a highly effective, technically demanding procedure for management of spinal sarcomas. With adjuvant chemotherapy and radiation, it reduces the risk of local recurrence, improves survival and provides good quality of life. Due to its proximity to critical structures it needs a multidisciplinary team approach and careful planning and execution so as to make it successful.
Introduction: A low grade fibromyxoid sarcoma (Evans' Tumour) is a rare tumour, mainly in the young adult age group with potential for local recurrence and distant metastasis.

Patient and method: A 40-yr old lady with a past history three operative interventions done within a span of 2 years, presenting to us with a huge soft tissue swelling around the left elbow. In the previous two occasions, she was diagnosed to be having ‘bone cyst’ and ‘fibrous dysplasia’ for which she was operated, but this time our core biopsy proved to be an intermediate grade soft tissue tumour. Taking the clinico-radiological and histopathological discordance into account, MDT sarcoma board decision was taken for wide excision of the soft tissue component, intraoperative frozen section and decide accordingly. Intraoperative frozen section came out to be intermediate to high grade malignancy, tumour cells abutting the humeral anterior surface. The entire segment of distal humerus was excised and reconstructed with Total Elbow Replacement and pedicled Latissimus dorsi flap for providing the motor vector of the elbow joint. She had multiple surgical scar marks which were sacrificed with the final surgical soft tissue specimen, this soft tissue defect was managed with the skin pedicle over the latissimus dorsi muscle flap which also helped in the monitoring purpose of the underlying muscle flap viability. This reconstructive procedure for skeletal defect, motor vector defect and skin defect is unique in a single setting is relatively rare.

Result: She completed post operative radiotherapy and after 2 years of follow up, MSTS score is 27/30, no evidence of local recurrence and distant metastasis.

Conclusion: Evans tumour is a relatively rare tumour. Meticulous surgical planning and multidisciplinary team approach are needed for optimum results.
Aim
To correlate the MRI findings with intraoperative and histopathological findings in 30 patients operated for soft tissue sarcoma

Methods
A total of 30 soft tissue sarcoma patients operated by either of the two trained orthopaedic oncologists at our centre in the last one year will be included in the study. Patients previously operated elsewhere with currently no gross disease on MRI (scar excision), or those with no MRI / histopathology or intra operative records unavailable will be excluded. Two blinded musculoskeletal radiologists will be given an objective questionnaire with columns about size, volume, probable diagnosis and grade if any (optional and voluntary), involvement/ partial encasement / distance form neurovascular structure and bone, presence of necrotic areas, involvement of surrounding muscles, involvement of skin, involvement of periosteum. These questionnaires will then be corroborated with intra operative and histopathology results.

Results
The study is being carried out in the department of musculoskeletal oncology and the results will be ready by July 2018.

Conclusion
The conclusion will be updated in due course, soon after the study is finished.
Introduction and Objective: Verrucous carcinoma is an uncommon, locally aggressive, well-differentiated squamous cell carcinoma with minimal metastatic potential. We report a case of such entity involving the lateral two toes in a patient, treated with a transmetatarsal amputation followed by a medial flap of the foot for wound coverage.

Methods: A 64 years old Malay lady presented to us with a chronic swelling over her right 4th and 5th toes for over 2 years. Her case was referred to us following a confirmation of diagnosis of verrucous carcinoma following a biopsy. MR imaging revealed localized involvement with extension into the bones of the lateral two toes. To achieve optimum oncologic clearance, she was subjected for a transmetatarsal amputation. Since her medial toes were not involved, we decided to utilize the soft tissue including the skin of the medial aspect of the foot to cover the wound by raising a flap from the medial aspect of the foot.

Results: Post surgery, there were no infection and the wound healed well. She was able to ambulate well with the healthy stump that she has. Traditionally, wound coverage following a transmetatarsal amputation will utilize a local flap raised from the plantar aspect of the affected foot. In the current case, a local flap was raised from the medial aspect of the foot extending distally up to the base of the big toe. The advantages of this flap are the presence of the medial plantar artery and perforator, as well as the subcutaneous venous system, which has large caliber and much thicker walled that drains to the saphenous vein.

Conclusion: A medial flap of the foot is a potentially good option for wound coverage following a transmetatarsal amputation, provided that the medial aspect of the foot is not involved or compromised.
Aim
To describe the unusual clinical behaviour and therapeutic response of a patient with biopsy proven inflammatory myofibroblastic tumor with lung, brain and skeletal metastases

Methods
A 29 years old patient with an inflammatory myofibroblastic tumor of left humerus presented in 2011. He was advised proximal humerus resection and prosthesis, which the patient declined and opted for radiotherapy at some other hospital, with good clinical response. Recurrence seen after 4 years and he presented again with a bleeding fungating mass. Proximal humerus resection was done but had recurrence of multiple small nodules in the arm with wrist drop after a period of 1 year. In view of ALK positivity, he was started on Crizotinib. He showed progressive disease while on crizotinib and developed complete radial nerve palsy and a useless extremity.

In view of no systemic disease, he underwent left shoulder disarticulation. He developed chest pain after one year. Systemic evaluation showed lung, brain and bone metastases. A repeat biopsy from metastatic lesion showed absence of sarcomatous component and confirmed the diagnosis of metastases from IMT. After radiotherapy to brain metastasis, he was started on tablet ceritinib on which he showed progression within two months. He was then started on ifosfamide and etoposide based chemotherapy on which he showed complete clinical resolution of symptoms with stable disease on imaging.

Results
The patient is presently alive with asymptomatic disease. The ALK positivity but still being refractory to ALK inhibitors is unusual. Also, presence of brain metastases and the response to conventional chemotherapy are also unusual and are limited to few case reports in literature. We could not find a combination of all these rare features in literature.

Conclusion
Inflammatory myofibroblastic tumor may be resistant to ALK inhibitors, even if they are ALK positive, and may show response to conventional chemotherapy.
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<td>143, 149</td>
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