Abstract:
Osteosarcomas are high grade mesenchymal tumors, affecting mainly individuals in their second decade with a male to female ratio of 1.5 to 1. Though amputation was once the treatment of choice in these patients, with the progress in biomedical engineering along with better surgical and chemotherapy techniques, resection and reconstruction with custom mega endoprosthesis has become a well accepted treatment modality now. A 20 years old male patient presented with complaints of pain and swelling in the right thigh for the past 3 months. Investigations revealed it to be a case of diaphyseal osteosarcoma, for which resection of the entire femur and reconstruction with custom made mega prosthesis was done along with chemotherapy. The patient has been followed up for the past 6 months and has shown no signs of recurrence and is doing well with chemotherapy.

Keyword: CUSTOM MEGA PROSTHESIS, BONE TUMORS

INTRODUCTION
The femur is the most common site of malignant bone tumors particularly osteosarcoma. It mainly affects the metaphyseal region but diaphysis may also be involved in some cases. Historically, hip disarticulations and above knee amputations have been the mainstay of therapy in these patients. Recently, limb salvage procedures with novel custom made mega prosthesis have spared young patients from psychologic, anatomic and functional limitations associated with amputations. Although the use of allografts and allograft prosthetic composites (1) for reconstruction of bony defects after resection have been described, the complications associated with these, limit their use. The role of custom made mega prosthesis is pivotal in these situations.
Here we present a case of diaphyseal osteosarcoma of femur treated with resection and reconstruction with custommade mega prosthesis. CASE REPORT A 20 years old male patient came with complaints of pain and swelling over the right thigh for the past 3 months. There was no history of any trauma, no history of fever, history of progressive increase in size of the swelling, history of loss of weight and appetite and there were no history of any illness in the past.

Clinical Photograph showing mass in the diaphysis of right femur

X-ray right thigh - obliteration of corticomedullary junction at the diaphysis

On examination the patient was ill-nourished, a warm and tender swelling was found to arise from the diaphyseal region of right femur. It was variable in consistency, skin over the swelling was normal. Movements of right hip and knee were painful. Routine blood investigations, x-ray and MRI of right thigh, CT chest were done. MRI revealed osteosarcoma right femur, CT chest revealed extensive lung metastasis. Incisional biopsy was done and it turned out to be a case of chondroblastic osteosarcoma. Considering the age of the patient, we planned for resection of the entire right femur and reconstruction with custommade mega prosthesis. Neoadjuvant chemotherapy was given in the form of vincristine, adriamycin and cyclophosphamide.

Femur resected through lateral approach

RESECTION AND RECONSTRUCTION The tumor was resected through the lateral approach. Sciatic nerve was identified and preserved. A sleeve of vastus lateralis and rectus femoris were preserved to aid in hip flexion. Proximal tibia was osteotomised and reamed for press fit insertion of the tibial component. After securing haemostasis, the femur with tumor was removed in toto. The defect was reconstructed with a total femoral custommade mega prosthesis. The prosthesis was secured using PMMA cement in the tibia and a bipolar modular cup was used to articulate with the acetabulum.
The exact dimensions of the prosthesis were calculated with the help of radiographs and 3D CT of the local part. The prosthesis was used as a single monoblock system. The size of the femoral head was standard 28 size along with a bipolar acetabular cup. The prosthesis includes a bipolar cup, tubein tube mid shaft component and a rotating hinge knee.

Femur resected in toto along with tumor mass

Total femur custommade mega prosthesis Femur reconstructed with custom mega prosthesis Post op X-ray showing right hip joint with prosthesis in situ

Post op X-ray showing right knee joint with prosthesis in situ

DISCUSSION
“Walking is man’s best medicine”
Hippocrates

The aim of limb salvage in bone tumor management is to eradicate the disease, retain the integrity of the skeletal system and preserve a limb with useful function. Sir John Bruce, a cancer surgeon has said, “Drastic clearance and reconstruction surgeries, exact from the surgeon, the imagination of an artist, the courage and ruthlessness of a battle field soldier and technical virtuosity of a high order.” For a limb salvage procedure to be a viable alternative in the management of patients with bone tumor, it must meet two criteria.
First is the local control of the tumor. This requires that the recurrence rate must be comparable to that with ablative surgery. Second, the resection must be compatible with maintenance of a functional status that is an improvement over the status after amputation and fitting of a prosthesis.

(2) Reconstruction of the skeletal defect after resection of local tumor clearance can be by:

1. Bone Grafting - Autograft - Allograft

2. Custom made endoprostheses - cemented - uncemented

The use of structural cadaveric allografts for reconstruction of large bone defects after tumor resection is a common treatment option. Lewis et al. stated that for clinicians who do not have a ready supply of allografts, a valid option is to reimplant an autoclaved tumor-bearing bone. Khattak et al. reported on 19 patients with wide excision followed by reimplantation of the resected bone after autoclaving at 120°C for 10 minutes. The most common complication was infection. Other complications include nonunion and fracture that leads to failure in approximately 50% of cases.

The biological complications include skin necrosis, superficial and deep infections. Intraoperative complications include injury to vessels and nerves. The oncological complications include local recurrence and distant metastasis. Local recurrence is an indication for limb amputation. Chest metastasis will require aggressive excision of the metastatic nodule or lobectomy. The mechanical complications of the prosthesis include aseptic loosening, stress fracture of prosthesis, subluxation or dislocation of prosthesis. Mechanically failed implants can be revised with useful function. Flap necrosis can be avoided by adequate tissue coverage. Deep infection can be controlled in a staged procedure of debridement and removal of the prosthesis and later after control of infection, reimplantation. Failure will lead on to amputation.

CONCLUSION To conclude, achieving complete ablation of the tumor and preserving a functional extremity at the same time proves to be a daunting task. Custom mega prosthetic arthroplasty is effective in achieving the desired goals of reconstruction with good functional results and least complications in selected patients.

REFERENCES


2. Prof. Mayil V. Natarajan. Custom mega-prosthesis in Orthopaedics and


