Limb salvage in Osteosarcoma

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Abstract
A case of Osteosarcoma of the upper end of Tibia, treated with resection and replacement with a custom made prosthesis is reported by the authors.

A course of neoadjuvant chemotherapy was given before surgery. The steps of the surgical procedure are described in detail. Standard size tibial and femoral components were used.

The patient is under regular follow up. After a follow up of one year, the functional outcome is good and there is no evidence of recurrence.

Keywords: Osteosarcoma, limb salvage, Custom made prosthesis

Introduction
Osteosarcoma is an aggressive malignant neoplasm arising from primitive transformed cells of mesenchymal origin that exhibit osteoblastic differentiation and produce malignant osteoid. It is the most common histological form of primary bone cancer. Osteosarcoma is the eighth most common form of childhood cancer, comprising 2.4% of all malignancies in pediatric patients and approximately 20% of all bone cancers. There is a preference for origination in the metaphyseal region of tubular long bones, with 42% occurring in the femur, 19% in the tibia and 10% in the humerus. Complete radical surgical en bloc resection is the treatment of choice in osteosarcoma. Although about 90% of patients are able to have limb salvage surgery, complications such as infection, prosthetic loosening and nonunion or local tumor recurrence may necessitate further surgery or amputation.

Case Report
A 13 year old boy presented with pain left knee of 4 months duration, aggravated on exertion and relieved by rest. There was no history of night pain, trauma or any other constitutional symptoms. X-ray showed a lytic lesion in the upper end of left tibia (Figure 1). CT scan showed lytic lesion in the upper end of Tibia.

Figure 1. X-ray showing lytic lesion in the upper end of Tibia
Gastrosoleus flap was used to cover the prosthesis and reattached to the patellar tendon. Skin was closed in layers. A long leg slab was given. Post operative period uneventful. He is on regular follow up.

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An open biopsy was done and diagnosed as osteosarcoma. Treatment was started in consultation with the radiotherapy department. He was put on 4 cycles of neoadjuvant chemotherapy with injection Cyclophosphamide, Adriamycin and Cisplatin.

On examination, biopsy scar of 5 x 1 cm, over the medial aspect of the left knee healed by primary intention was seen. On palpation, there was no local rise of temperature or tenderness.

There were full range of movements of the joint. There was a palpable swelling 3 x 1 cm over the posteromedial aspect of the left upper tibia, which had a bony consistency and ill defined margins which merged with bone.

**Surgical Procedure**

Wide resection of tumour and custom made mega prosthesis was done under general anaesthesia.

Skin incision was planned based on the previous biopsy scar. It was excised in total. Patellar tendon was reflected from the tibial tuberosity. Proximal 13 cm tibia was in total with menisci and cruciate ligaments (Figures 3,4). Bifurcation of popliteal artery was identified and the anterior tibial artery was ligated. Fibular head was left intact. Femoral trough made according to the size of the femoral component. Standard size of the prosthesis was used for the femoral component.

Tibial prosthesis of a standard size of 8 cm was used. +4 cm tibial stem was inserted (Figure 5). Tibial and femoral components were fixed with bone cement and joined with a hinge. Stability of prosthesis was checked. Patellar tendon was reattached to the prosthesis.

**Figure 2.** CT scan showing the lytic lesion in the upper end of Tibia

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**Figure 3.** Femoral resection in progress

**Figure 4.** Distal end of the femoral stump is shown.
Discussion

Current standard treatment is to use neoadjuvant chemotherapy; a combination of high dose Methotrexate with Leucovorin rescue, intra arterial Cisplatin, Adriamycin, Ifosfamide with Mesna, BCD, Etoposide, Muramyl tri-peptite (MTP); followed by surgical resection i.e., limb salvage surgery when possible (or amputation in some cases) and rotationplasty. The percentage of tumor cell necrosis (cell death) seen in the tumor after surgery gives an idea of the prognosis and also lets the oncologist know whether the chemotherapy regime should be altered after surgery. Ifosfamide can be used as an adjuvant treatment if the necrosis rate is low.

References

1. S.Terry Canale and James.H.Beety, Campbell’s operative orthopedics, 11th ed, ch22, 901-907.

2. Rockwood and Green’s fractures in adults, 7th ed, ch 20. 551.


