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Case Report

Management of infected custom mega prosthesis by Ilizarov method

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ABSTRACT

A 26 year old male patient with an aggressive giant cell tumour of the left distal femur was managed by wide excision and insertion of custom mega prosthesis. Patient developed deep infection which did not subside with multiple debridements and antibiotics. Hence the custom mega prosthesis was removed and the bone gap was managed by Ilizarov method. Ilizarov fixation of the left femur and tibia was done. Femoral and tibial corticotomy was done and the bone segments were transported towards the knee to finally achieve a knee arthrodesis. The case illustrates the method and difficulties encountered during the treatment.

Keywords: Giant cell tumour, Custom mega prosthesis, Ilizarov ring fixator

INTRODUCTION

Giant cell tumor (GCT) also called osteoclastoma of bone is a common bone tumor encountered by an orthopedic surgeon. GCT generally occurs in skeletally mature individuals with peak incidence in the third decade of life. Less than 5% are found in patients with open physis and only about 10% of cases occur in patients older than 65 years.

Giant cell tumors (GCTs) represent 3-4% of all primary tumors of bone.[1] Distal femur and proximal tibia are the most common sites followed by the distal radius. The ideal aim in the management of GCT is to eradicate the tumor without sacrificing the joint. Current treatment modalities including a meticulous extended curettage with extension of tumor removal using high speed burrs and adjuvant local therapy. However, recurrence rate of 60% is seen. Wide resection should be the treatment of choice, especially for situations such as recurrences, pathological fractures and tumors which are frankly malignant tumors. En bloc resection of major joints creates a problem for the reconstruction of large defects. Recent advances in tumor resection defects involve the use of custom-made prosthetic joints for the replacement of defects near knee. In view of the complexity of the surgery, complication rates are also high. The most devastating complication is infection, which in many instances may require an amputation. Limb can be salvaged by the Ilizarov method of bone regeneration. This requires considerable expertise and patient co-operation as illustrated in this case.

CASE REPORT

This was a case report of a 26 year old male who came to our out-patient department with the chief complaint of swelling around left knee since 6 months. The swelling was insidious in onset and gradually progressive in nature. Patient was experiencing pain in the swelling since 1 month. The pain was insidious in onset and progressive in nature, throbbing in character and moderate in intensity,

aggravating on bearing weight on the affected limb. There was no history of trauma to the affected knee or leg.

X-rays of left knee with thigh in anteroposterior and lateral projections (Figure 1) were carried out, which showed an osteolytic lesion in the epiphysis involving the metaphysis and extending in the subchondral bone of the distal femur. Magnetic resonance imaging (MRI) of left knee with thigh (Figure 2) was carried out to get accurate tumor delineation and identify neurovascular involvement, which showed cortical destruction and extra osseous extension of the tumor with involvement of joint space without involvement of neurovascular structures around the knee. Percutaneous biopsy was done with a Jamshidi needle which confirmed the diagnosis of giant cell tumour. The tumor was in Stage 3 according to Enneking system for benign tumors. The patient was screened for metastasis with computed tomography of the brain and chest, ultrasonography of the abdomen and pelvis and there was no obvious evidence of any secondaries.

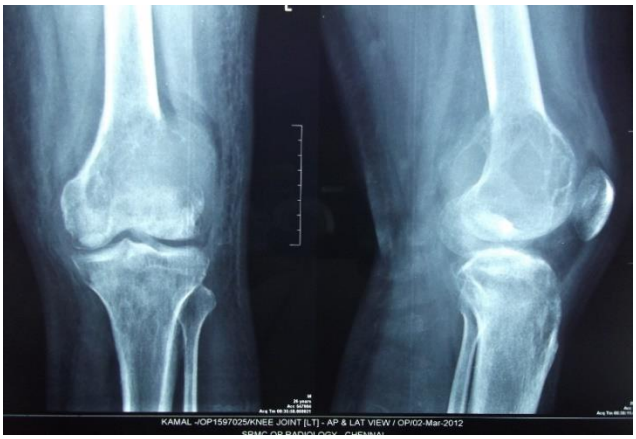

Figure 1: X-rays of left knee with thigh in anteroposterior and lateral projections.

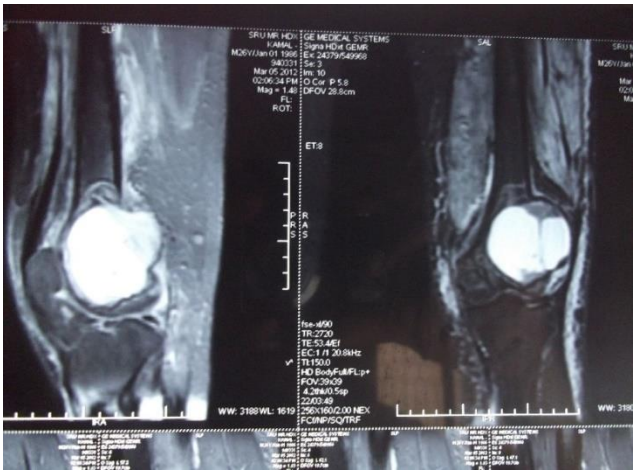

Figure 2: MRI of left knee with thigh.

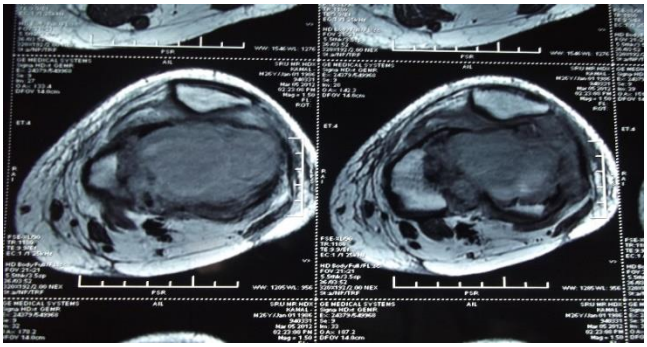

Figure 3: MRI of left knee with thigh.

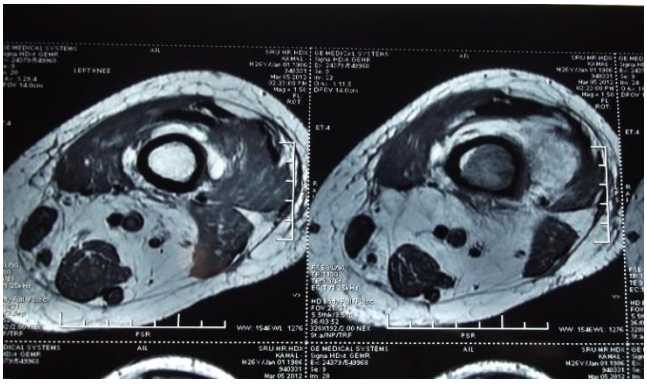

Figure 4: MRI of left knee with thigh.

Wide excision of the tumor and insertion of custom mega prosthesis was done (figure 5). Extended medial parapatellar approach encircling the biopsy scar was used.[2] This approach aids in vascular dissection - the popliteal vessels can be separated and tumor dissection carried out. We used the technique of sleeve resection of quadriceps musculature.

Figure 5: Wide excision of the tumor and insertion of custom mega prosthesis.

The main objective of this technique is to excise a sleeve of quadriceps musculature all around the tumor but retain the functioning rectus femoris tendon. The excision removes a portion of the vastus lateralis, medialis and intermedius, but preserves enough musculature to provide soft-tissue coverage for the prosthesis and retains adequate extension

power. By this technique, we were able to attain a balance between achieving adequate surgical margins and retaining sufficient musculature. The custom mega prosthesis contains a femoral condylar component, a pivot pin, a thrust-bearing pad made of high molecular weight polyethylene and tibial component. Measurement radiography and MRI were used to preoperatively estimate the size of the prosthesis to be used.

Patient began to develop discharge from the wound at around the 2nd week following surgery. Inspite of multiple debridement and intravenous antibiotics, infection could not be controlled. Deep cultures revealed the infective organism to be methicillin resistant Staphylococcus aureus. After multiple attempts, it was decided to remove the prosthesis as patient was having severe pain and unable to walk. Knee arthrodesis was planned by managing the bone gap by Ilizarov method as shown in Figure 6.[3,4]

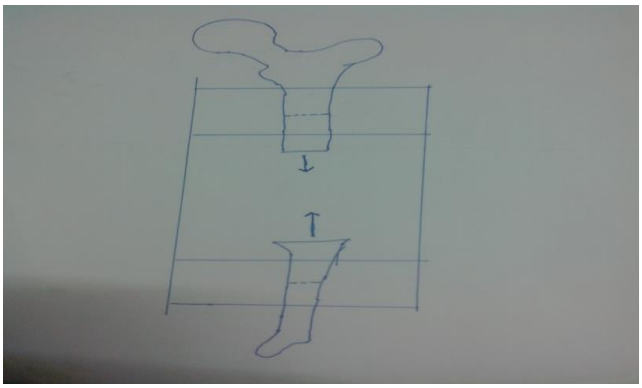

Figure 6: Knee arthrodesis was planned by managing the bone gap by Ilizarov method.

Figure 7: Ilizarov fixator was applied from the proximal femur to the distal tibia.

The prosthesis was removed as in Figure 6. Thorough debridement was done. Ilizarov fixator was applied from the proximal femur to the distal tibia as in Figure 7.[3,6]

Figure 8: Ilizarov fixator application.

There was a bone defect of 13 cm in the area corresponding to the distal femur and knee. Corticotomy of proximal femur and proximal tibia was done. Bone fragments were gradually transported towards the knee (transport was started on the 7th day after corticotomy and done at a rate of 0.25mm x 4 times/day). Once bone transport was complete, the defect was completely filled by the transported segments of bone. The regenerate was allowed to consolidate.

At the docked site / site of arthrodesis, it was noticed that the soft tissues had invaginated into the area preventing healing of the arthrodesis site as in Figure 11. Once the regenerate had consolidated to some extent, the Ilizarov frame was removed (8 months after application) to allow more working space. The invaginated soft tissue and skin was excised by a transverse incision around the furrow. The bone ends were freshened, stabilized and compressed with Charnley compression clamps and an additional external fixator in the anterior plane.

Figure 9: 8 months after Ilizarov fixation.

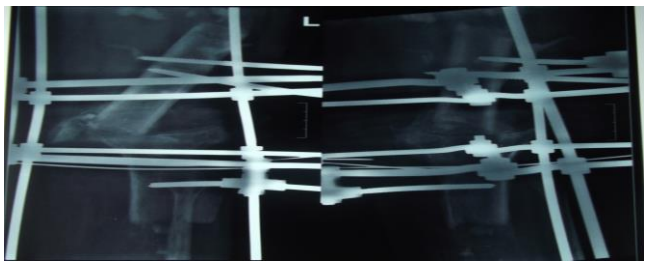

Figure 10: 8 months after application.

Figure 11: Soft tissue invagination at site of arthrodesis.

Charnley compression clamps and external fixator were removed after fusion of the knee joint had occurred. Patient still had a shortening of 5 cm (as we had compressed the fusion site with Charnley clamps after removal of Ilizarov fixator). But he had a stable knee with no abnormal mobility as shown in Figure 13. There was also no distal neurovascular deficit. He has been followed up to 2 years with no recurrence of tumour or infection.

Figure 12: Arthrodesis of knee joint.

Figure 13: Movements of the operated limb.

Figure 14: Movements of the operated limb.

CONCLUSION

Aggressive giant cell tumour of bone is a great challenge to orthopaedic surgeon. Wide excision and reconstruction of defect helps in tumour clearance and reducing the risk of recurrence in comparison with extended curettage and cementation. Infection is a devastating complication of custom mega prosthesis insertion. The case illustrates how infected custom mega prosthesis can be successfully managed by the Ilizarov method. The Ilizarov method is technically difficult, demanding and prolonged. When bone transport is performed for large defects, soft tissue invagination can occur which can impede the healing of bone. Excision of the invaginated soft tissue defect and compression of bone helps in bone healing as well illustrated in this case.

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