

Biological Reconstruction of Knee Joint by Pedicled Patellar Transplant in a Recurrent Giant-cell Tumor of Lateral Femoral Condyle: A Case Report

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Learning Point for this Article:

Reconstruction of articular surface around knee joint can be done with pedicled patella avoiding drawbacks of endoprosthesis and maintaining biology at the same time.

Abstract

Introduction: Giant-cell tumors (GCTs) are benign tumors of musculoskeletal system, commonly occur around knee. High-grade GCTs have a high tendency to recur after intralesional curettage. Reconstruction of joint after excision of such aggressive juxta-articular GCT has been challenging task. We describe a case of recurrence in GCT of lateral femoral condyle managed with tumor excision and pedicled patellar transplant to reconstruct the joint.

Case Report: A 25-year-old male patient reported to us after 22 months after he had undergone curettage and bone grafting for GCT of lateral femoral condyle of his right knee with recurrence of primary tumor. After tumor resection, we restored the lost articular surface with musculovascular pedicled patella and managed dead space with corticocancellous bone graft and fibular strut. 2-year follow-up exhibited good functional outcome without any sign of recurrence.

Conclusion: Biological reconstruction with patellar transplant can be a good option for young patients in whom endoprosthesis placement poses significant concerns about longevity, cost, and revision surgeries.

Keywords: Giant-cell tumor, recurrent giant-cell tumor, patellar transplant.

Introduction:

Giant-cell tumors (GCTs) are locally aggressive benign bone tumors which commonly seen in epiphyseal location in long bones of young adults (20–40 years) and rarely before puberty [1]. Aggressive tumors Grade 3 have a high tendency for cortical destruction and soft tissue extension, hence, higher chances of recurrence after surgical intervention in the form of intralesional curettage [2]. Recurrence in these cases indicates incomplete removal of tumor tissue and subsequent surgery needed in the form of complete excision of lesion. Articular defects hence created by excision of juxta-articular lesions need reconstruction in the form of endoprosthetic replacement or autogenic bone transplant [3]. A few cases of knee

reconstruction with autogenic patella reported in literature [4, 5, 6]. We assessed the results of pedicled patellar transplant for reconstruction of knee joint articular surface in a recurrent GCT of lateral femoral condyle.

Case Report:

A 25-year-old male presented to us with complaints of painful swelling of his right knee joint with inability to bear weight. He had undergone surgery (done elsewhere) for GCT of lateral condyle of femur 22 months ago in the form of curettage and bone grafting from iliac crest (Fig. 1: Pre-operative and Fig. 2: 3-month post-operative radiograph). The patient did not relieve his pain in knee joint (which he had before surgery) throughout

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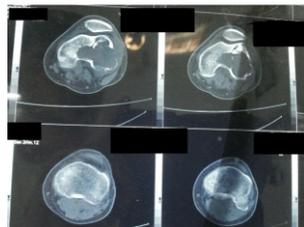


Figure 1: computed tomographya.



Figure 2: 3-month post-operative radiograph of the patient after the first surgery (curettage and cancellous bone grafting).



Figure 3: Radiograph of the patient at presentation showing osteolysis and cortical destruction.

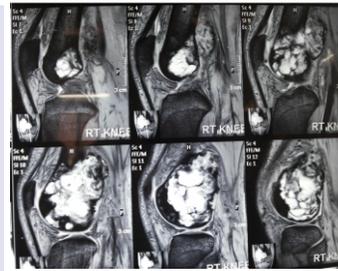


Figure 4: Magnetic resonance imaging of the patient at presentation depicting hyperintense signals on T2 images suggestive of diffuse osteolysis (sagittal view).

the course of the treatment. He consulted the primary surgeon for the same and advised active range of motion exercises. The pain kept on increasing, especially in last 6 months, and on examination, he had tenderness over lateral and posterior aspect of knee joint with diffuse swelling and limited range of motion (10–40°) when presented to us. Investigation in the form of radiograph (Fig. 3) depicted diffuse osteolysis and cortical destruction in lateral femoral condyle.

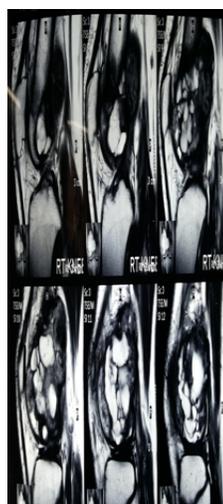


Figure 5: Magnetic resonance imaging of the patient at presentation showing T1W sagittal and axial images at presentation.

Magnetic resonance imaging MRI of the lesion illustrated the heterogeneous decreased signals on T1 sequences and areas of hyperintensities on T2 sequences with overall picture suggestive of recurrence (Fig. 4 and 5). Complete surgical excision of the tumor and articular surface reconstruction was planned as described by D’Aubigne [4]. A 15-cm long vertical incision was made over anterolateral aspect of distal thigh and right knee and quadriceps tendon, patella and patellar tendon exposed. A 3-cm wide, musculovascular pedicle separated at inferior border of vastus lateralis muscle, approximately 10-cm proximal from lateral border of patella. Patella was then enucleated from rest of its

attachments, releasing quadriceps tendon all around except the pedicle, leaving a rim of 4-mm soft tissue to spare vascular supply. Lateral condyle of femur was exposed and excised en bloc with whole tumor mass with the help of saw and osteotome. The deep articular surface and medial aspect of

patella were freshened. The anterior surface which was to be used as articular surface was rotated inferiorly, brought at the level of medial condyle and the patella was fixed with two lag screws as depicted in Fig. 6. The rest of the condylar defect was filled with fibular strut graft and bone chips from iliac crest. The extensor mechanism repair was done by turning down the aponeurotic flap of rectus femoris and suturing it to patellar tendon and vastus expansion. Wound closure done after hemostasis achieved. Bulky dressings with a long posterior plaster of Paris (POP) slab applied which were changed on the 2nd post-operative day. Knee was kept in posterior POP slab for immobilization up to 6 weeks and active mobilization exercises started subsequently. Patient was kept non-weight-bearing till adequate radiological strength achieved, i.e., 16 weeks (Fig. 7) and a knee brace was worn while walking with a stick support up to 1 year. Patient recovered uneventfully and at the end of 2 years there was no sign of recurrence or deformity with good function as he walks without support and performs his routine activities with fair range of movements (0–80°). Radiological evaluation suggested good healing of lesion without any evidence of osteolysis or collapse of reconstructed lateral femoral condyle (Fig. 8). The quadriceps strength was found to be of Grade 4/5. There was no laxity or instability. Musculoskeletal tumor society score [7] was found to be 25 suggesting gratifying outcome. The patient is to be followed up for the long-term results.

Discussion:

Recurrent GCT of femoral condyle in young patients presents a difficult clinical scenario to treat as the joint reconstruction options after resection of tumor has their own drawbacks. Endoprosthetic replacement, however, provides immediate stability and mobility but there are concerns about implant cost, wound breakage, early and late infection, implant wear, breakage, and osteolysis complicating further revisions in young patients [8]. Arthrodesis of knee also carries significant disadvantages in the form of decreased gait efficiency, accelerated degenerative changes in other joints, and poor functional outcome hence no longer a preferred modality, especially when a young male is in question.

D’Aubigne [4] first described the procedure of biological



Figure 6: Immediate post-operative radiograph of the patient showing patellar transplant and fibular graft fixed with two cancellous screws.



Figure 7: 16-week post-operative radiograph of the patient after patellar transplant.



Figure 8: 2-year follow-up radiograph of the patient showing good incorporation of the graft and no sign of recurrence.



reconstruction of knee joint with vascularized patellar transplant. Of the 11 patient, he operated on nine had femoral condylar destruction (six - due to GCT, two - post-traumatic, and one - postinfectious) and two patients had tibial condylar GCT. Excellent functional outcome was reported on long-term follow-up in terms of stability and mobility of knee joint in all the patients. Farooque and Sharma [5] and El-Gammal [6] also reported similar results with the procedure. Preservation of natural mobile knee joint in young patients is to be preferred as it avoids aforementioned complications of arthrodesis, endoprosthetic replacement, and subsequent revision surgeries.

Conclusion:

Biological reconstruction in the form of autogenic patellar graft not only can provide a natural, stable, and mobile joint but also the potential for proceeding over this to prosthetic replacement or a salvage procedure in the form of arthrodesis remains always

there. In Indian perspective, where the cost of endoprosthesis is also a major concern this procedure may be vital for patients from a low socioeconomic background. We believe that preserving biology initially and sacrificing natural joint only when it is inevitable, might be an appropriate approach for dealing with such situation. Studies involving group of subjects with long-term results can only prove or refute the concept for future quantifiable application.

Clinical Message

Simple curettage and bone grafting may lead to recurrence in cases of GCT; so, follow-up cases must be evaluated with a high index of suspicion. Furthermore, in cases requiring reconstruction of articular surfaces a biological reconstruction with pedicled patella can be a vital option in Indian perspective requiring low cost, preservation of biological joint, and less (practically nil) requirement of revision surgery.

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