Patellectomy without Extensor Reconstruction for Large Giant Cell Tumor of Patella Invading Soft Tissue - A Case Report

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ABSTRACT

A young female presented with swelling and pain in right knee joint with difficulty in functions for 9 months. There was a firm to hard and tender swelling of 10cmx8cm around the anterior and medial aspect of the right knee joint not separable from the patella. After radiological imaging and incisional biopsy, non-malignant giant cell tumor was diagnosed. We performed total patellectomy with complete resection of patellofemoral contents including quadricep tendon and inferior margins of muscles without any extensor reconstruction. Patient was walking without support after 6 weeks without any brace. X-rays showed periarticular osteopenia. After 2-years, she presented with pathological right supracondylar femur fracture that was managed with DFLCP and denosumab. GCT of patella with massive soft tissue extension can be managed with patellectomy and wide resection without extensor reconstruction. Periarticular osteopenia needs to be managed to avoid pathological fractures by giving denosumab.

Keywords: Giant cell tumor; orthopedic procedures; reconstruction surgery; tumor surgery.

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THE CASE

- GCT of patella with massive soft tissue extension in quadriceps, infrapatellar tendon, both retinaculum, and fat pad.
- Total patellectomy with resection of all patellofemoral contents without extensor reconstruction.
- Pathological supracondylar femur fracture after two-years of previous surgery due to postoperative periarticular osteopenia.
- Once-weekly two doses of Denosumab improved periarticular osteopenia.

LESSONS LEARNT

- Full weight bearing walking is possible with passive extension of knee joint without need for extensor reconstruction.
- Iliotibial band strengthening should be adopted for rehabilitation after patellectomy without extensor reconstruction.
- Patellectomy without neoadjuvant Denosumab may be associated with periarticular osteopenia and fractures.

INTRODUCTION

Giant cell tumor (GCT) is a rare, locally aggressive primary tumor of bone and soft tissue. GCT accounts for 5% of all primary bone tumors and usually affects the ends of long bones[(1)]. Patellar tumors are extremely rare representing 0.1% of primary bone tumors[(2)]. GCT is the commonest patellar tumor approximating up to 33% of the patellar tumors.[(3)] However, case of GCT of patella with large soft tissue extension has not been yet reported. Secondly, most of the literature supports the utility of extensor reconstruction after total patellectomy for better walking and mobility of knee joint. Therefore we report as case of giant cell tumor patella with extensive quadriceps tendon extension and treated with wide margin resection & with extensor tendon reconstruction.

CASE PRESENTATION

A young female presented with swelling and pain in right knee joint for past 9 months that has increased in the duration of past 8 months. Patient also reported difficulty in sitting, squatting, and walking. She did not report any fever, trauma, or bleeding disorder.

On examination, there was a non-pulsatile, firm to hard, and tender swelling of size 17 cm x12 cm around the anterior and medial aspect of the right knee joint as shown in Fig. 1. The lump was not separable from the patella. The range of motion of knee joint was between 20° to 90° with fixed flexion deformity of 20°.

Fig. 1: Appearance of swelling of right knee joint

On radiological investigation, osteolytic mass involving patella and suprapatellar soft tissue was evident as shown in Fig. 2 and Fig. 3. The lesion was thin-lined and septate. Distal femur and proximal tibia were unremarkable. After incisional biopsy, non-malignant giant cell tumor was diagnosed and patellectomy with quadriceps excision advised.

Fig. 2: X-ray of right knee joint in anteroposterior and lateral views showing septate cystic patella with soft tissue extension in suprapatellar, infrapatellar, and medial region

After consent & counselling , under general anesthesia with aseptic measures, incision was given on anterior aspect of knee and flaps were raised. Firstly, infrapatellar tendon was excised to mobilize the patella superiorly. Secondly, tumor was freed from medial and lateral sides by cutting of medial and lateral retinaculae respectively from its tibial insertion as shown in Fig. 4 while superiorly, the tumor was firmly adherent to quadricep tendon and muscles. Hence, the inferior margins of vastus lateralis, vastus intermedius, and rectus femoris were cut and excised with the patella and quadricep tendon. Drain was placed and site closed in layers.

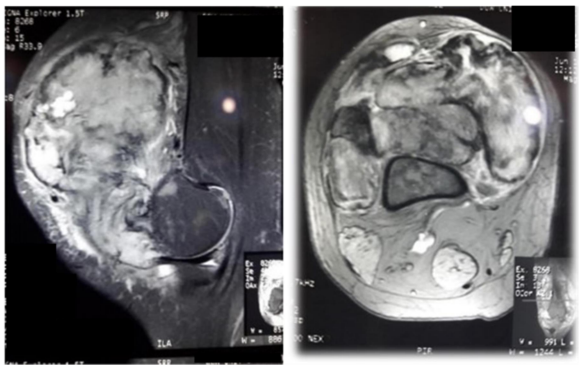

Fig. 3: MRI of right knee joint coronal and transverse slices showing GCT of patella with tumor extension into quadricep tendon and muscles superiorly, infrapatellar tendon and fat pad inferiorly, lateral retinaculum laterally, medial retinaculum medially, and femorotibial space posteriorly.

Fig. 4: Intraoperative picture of **(A)** inferior, lateral, and medial tumor resection **(B)** quadriceps resection superiorly **(C)** Resected patella with soft tissue

Postoperatively, knee was immobilized for 2-weeks with 5-days course of analgesics and antibiotics. Stitches were removed after 2-weeks and walking with support was initiated. Patient was able to walk without support after 6-weeks. She was followed-up monthly for one-year then six-monthly afterwards where her serial X-rays showed periarticular osteopenia. Her Musculoskeletal score was excellent that was 27. After 2-years, she presented with right supracondylar femur fracture after low-height fall as shown in Fig. 5 that was managed by open reduction and internal fixation with distal femoral locking compression plate (DFLCP) as shown in Fig. 6. She also had periarticular osteopenia for which 2- doses of Denosumab 120 mg was given weekly with Calcium supplements. She was followed-up for one year and she can walk with full weight bearing.

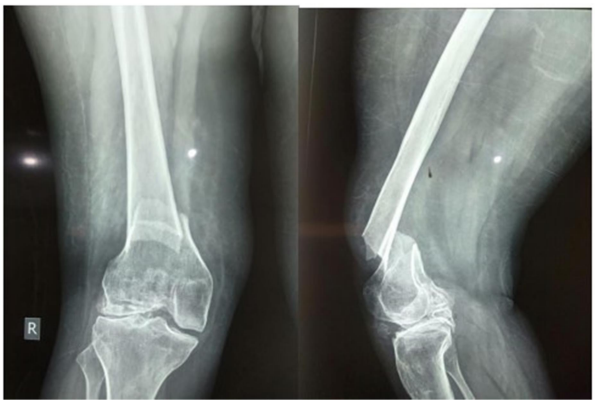

Fig. 5: X-ray of right knee joint in anteroposterior and lateral views showing periarticular osteopenia and displaced right supracondylar femur fracture without recurrence after 2 years

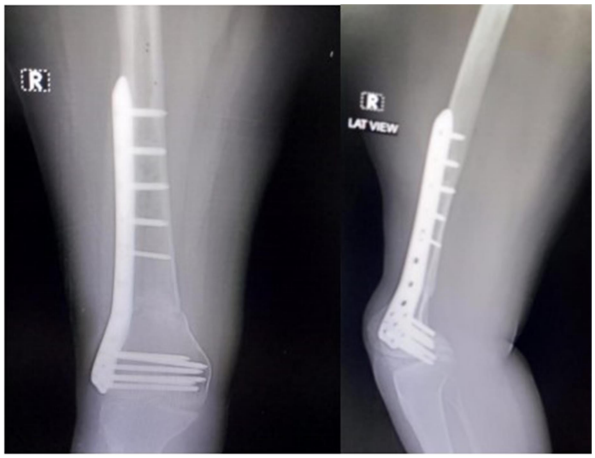

Fig. 6: Postoperative X-ray of right knee joint in anteroposterior and lateral views showing Distal femur locking compression plate (DFLCP) fixation

DISCUSSION

We report a unique case about GCT of patella where tumor has extensively involved the complete patellofemoral compartment of knee joint. We did not find any other case report in the literature regarding GCT of patella with massive soft tissue invasion and treated without quadriceps reconstruction.

We employed patellectomy with extensive resection of contents of patellofemoral compartment. However, we did not perform reconstruction for resected patella, quadricep tendon, or retinaculae. Hence, only passive extension of knee joint was possible. In previous literature, several techniques have been employed for reconstruction for active extensor mechanism by using Achilles' tendon transfer, patellar allograft, hamstring tendon transfer[4-6]. Our results show good range of motion with passive extension only where patient can walk with full-weight bearing with excellent MSTS Score of 27/30 and results are equivalent to previously shown case reports 29/30 and hence proving reconstruction not mandatory to restore knee functions after patellectomy[10]. We may postulate that with appropriate training and physiotherapy, iliotibial band may be helpful in restoring some active extension from 90 degree knee flexion to 0 degree due to its natural origin and insertion as extensor mechanism. Our surgical technique also provided good results in terms of recurrence after 3-years of follow-up.

Moreover, we also report long-term postoperative periarticular osteopenia and pain secondary to patellectomy for GCT of patella that has not been previously reported. Patient sustained fracture after a low-height fall after 2-years. She was already taking vitamin D and ossein mineral supplements in this duration for periarticular osteopenia. The periarticular osteopenia was most likely due to instability of knee joint after removal of contents of patellofemoral compartment. After DLFCP, denosumab was initiated which proved to be effective in decreasing the bone healing time, periarticular osteopenia, and pain. Hence, we may advocate the use of denosumab for postoperative pain and periarticular osteopenia after wide resection for GCT of patella.

In conclusion, we report unusual case of GCT patella with massive soft tissue extension treated with patellectomy and resection of patellofemoral contents without extensor reconstruction with excellent musculoskeletal tumor score. However, postoperative pain and periarticular osteopenia needs to be managed to avoid pathological fractures by

giving denosumab. We would request the researchers to conduct larger sample size studies to assess the role of denosumab in such patients.

Conflict of Interest: None

Grants/Funding: None

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