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Case Report

Patellar giant cell tumour treated with extended curettage, bone grafting and extensor mechanism augmentation: a case report

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ABSTRACT

Giant cell tumour of bone (GCTB) rarely involves the patella and can present with persistent anterior knee pain and progressive functional limitation. In patellar lesions, joint-preserving tumour surgery must balance local control with preservation of the extensor mechanism. A 21-year-old man presented with six months of left anterior knee pain, present at rest and worsened with activity. Imaging demonstrated an expansile lytic patellar lesion. After an unavoidable delay of approximately three months in early 2020, the lesion progressed clinically with increasing functional limitation. He underwent extended curettage of the patellar lesion and reconstruction with autologous cancellous iliac crest bone graft. To protect the extensor mechanism following tumour excision and reconstruction, patellar tendon augmentation was performed using an ipsilateral hamstring autograft and suture tape reinforcement secured to the tibia through a transverse osseous tunnel. Histopathology confirmed a GCTB. The patient achieved excellent recovery within one year and maintained near-normal function at five-year follow-up without evidence of recurrence. In selected patellar giant cell tumours where extensor mechanism integrity is threatened after joint-preserving surgery, hamstring autograft augmentation with suture tape reinforcement may provide durable functional restoration.

Keywords: Patella, Giant cell tumour, Extended curettage, Bone graft, Patellar tendon augmentation, Suture tape

INTRODUCTION

Primary tumours of the patella are uncommon, and most reported lesions are benign or intermediate. In larger radiologic and clinicopathologic series, giant cell tumor of bone (GCTB) is an important diagnosis in skeletally mature patients presenting with persistent anterior knee pain.[1-3] GCTB is histologically benign but locally aggressive and carries a risk of recurrence, making meticulous intralesional technique central to successful joint-preserving management.[4-7] Patellar GCTB presents additional reconstructive challenges because the patella has limited bone stock, and extensor mechanism integrity is paramount for functional recovery. We report a young man with progressive patellar GCTB treated with extended curettage and iliac crest grafting combined with extensor mechanism augmentation using hamstring autograft and suture tape reinforcement, with a durable outcome at five years.

CASE REPORT

A 21-year-old male presented with a six-month history of progressive left anterior knee pain. The pain was present even at rest and increased with activity, particularly stair climbing, squatting, and running, and had started to limit his daily function. He first reported to our outpatient service in early 2020, shortly before the onset of widespread COVID-19-related restrictions. Initial radiographs demonstrated an expansile lytic lesion involving the left patella (Figure 1 A and B), and MRI confirmed an intraosseous patellar lesion with features suggestive of an aggressive benign tumour, without any obvious distant disease. Based on the clinicoradiologic

picture, a patellar bone tumour was suspected, and definitive surgical management was planned.

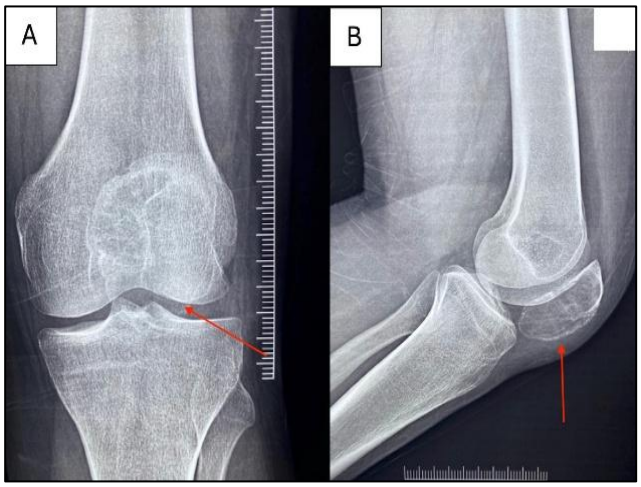

Figure 1: Preop radiographs obtained before COVID-19-related restrictions: (A) anteroposterior and (B) lateral views of well-defined lytic lesion confined to patella, with preserved cortical margins and no extension beyond inferior pole.

Due to pandemic-related restrictions, the planned procedure was delayed by approximately three months. When he returned for review, the patient reported worsening pain and increased functional limitation compared with the initial visit. Repeat radiological evaluation suggested interval progression of the lesion (Figure 2 A and B), and in view of the anticipated larger defect after tumour excision and the risk to extensor mechanism function, the surgical plan was revised to combine joint-preserving tumour surgery with extensor mechanism protection.

The patient underwent surgery under regional anaesthesia through an anterior approach to the patella. An extended intralesional excision was performed using thorough curettage with high-speed burring. The post-curettage defect (Figure 3 A) was reconstructed using autologous cancellous iliac crest bone graft. Given concern regarding vulnerability of the patellar tendon attachment and extensor mechanism integrity after excision and reconstruction, patellar tendon augmentation was performed using ipsilateral hamstring autograft combined with suture tape reinforcement (FiberTape), which was secured to the tibia through a transverse osseous tunnel to provide a load-sharing construct during healing and rehabilitation (Figure 3 B). Histopathological examination confirmed a GCTB (Figure 4).

Postoperatively, a protected rehabilitation program was followed, with gradual progression of knee motion and strengthening. The patient recovered rapidly and achieved excellent functional restoration with a Kujala score of 92/100 and Tegner Lysholm knee score of 93/100 at one year. He demonstrated painless straight-leg raise, comfortable squatting, and return to walking and running without limitation. At final follow-up of 5 years active knee extension was symmetric compared with contralateral side, with no extensor lag and also no difficulty in squatting and cross-leg sitting (Figure 5). He remained pain-free (VAS 0) with sustained excellent function, as evidenced by a Kujala score of 100/100 and a Tegner Lysholm knee score of 100/100. And there was no evidence of local recurrence on follow-up imaging (Figure 5 A and B).

Figure 2: Radiographs obtained after a 3-month interval: (A) anteroposterior and (B) lateral views demonstrating interval progression with inferior extension beyond the patella toward the patellar tendon/adjacent soft tissues, and (C) skyline view showing preserved articular margins and an intact anterior cortical outline.

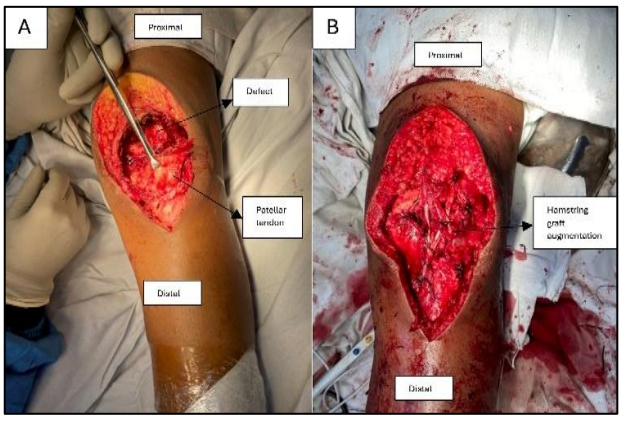

Figure 3: Intraop photographs: (A) post-curettage patellar defect with patellar tendon preserved; tendon is detached proximally from patella but remains attached distally to tibial tuberosity, and (B) hamstring autograft augmentation reinforcing continuity between quadriceps tendon and patellar tendon, with graft limbs (Semitendinosus and gracilis) re-routed.

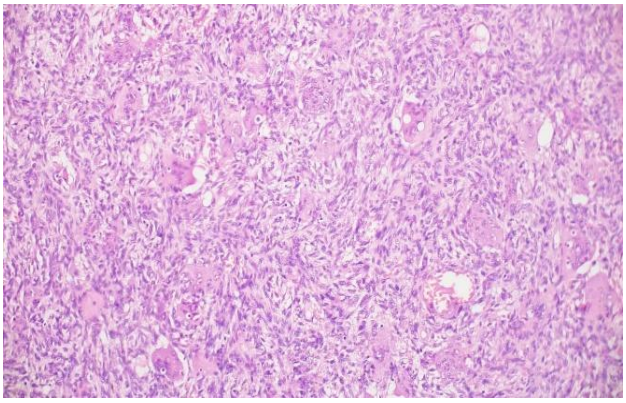

Figure 4: Histopathological section shows numerous uniformly distributed osteoclast-like multinucleated giant cells scattered within a background of mononuclear stromal cells. The stromal cells are oval to spindle-shaped with nuclei resembling those of the giant cells. No significant atypia or atypical mitoses are identified.

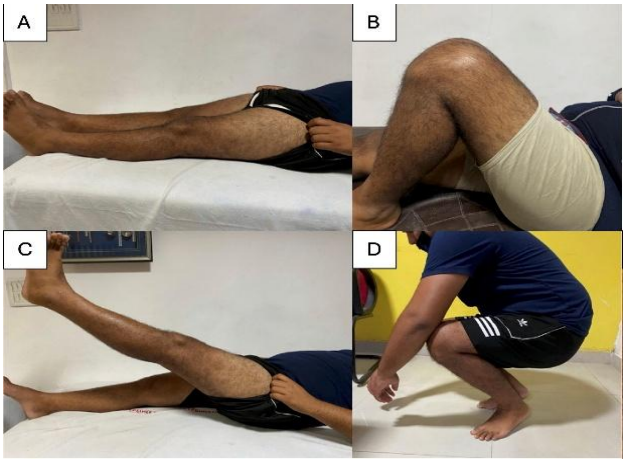

Figure 5: Clinical photographs at 5-year follow-up demonstrating functional recovery: (A) full knee extension, (B) 120° flexion, (C) active straight-leg raise without extensor lag, (D) squatting.

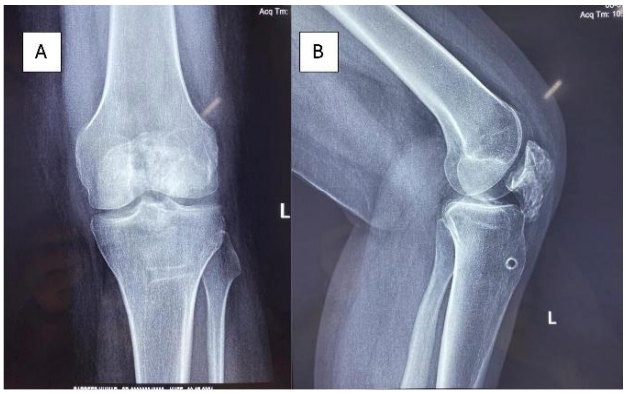

Figure 6: Five-year follow-up radiographs: (A) anteroposterior and (B) lateral views showing graft incorporation, without radiographic features suggestive of recurrence.

DISCUSSION

GCTB of the patella is uncommon yet clinically important because limited patellar bone stock and involvement of the tendon footprint can quickly translate into extensor mechanism dysfunction. In the classic radiologic series by Kransdorf et al patellar tumours were heterogeneous and imaging alone could not reliably distinguish benign from malignant lesions; notably, despite older impressions that GCTB is the commonest benign patellar tumour, their 42-case series found chondroblastoma to be most frequent among benign neoplasms, underscoring the need for a broad differential and histologic confirmation.[1] In contrast, Song et al emphasised that most patellar tumours are benign overall and that GCTB remains a recurring adult patellar diagnosis, supporting its relevance in young adults with persistent anterior knee pain.[3] Ferguson et al similarly highlighted the rarity and diagnostic heterogeneity of patellar tumors, reinforcing the importance of careful clinicoradiologic assessment and timely definitive management.[2]

Biologically, GCTB is benign but locally aggressive, and recurrence risk is closely linked to the adequacy of intralesional excision and local control measures. Campanacci et al provided the foundational clinicopathologic framework for GCTB behaviour and grading.[4] Contemporary reviews such as Sobti et al reaffirm that joint-preserving surgery is appropriate for many extremity lesions when aggressive intralesional technique is applied.[5] In line with this, Gundavda and Agarwal emphasise that extended curettage, adequate exposure, meticulous curettage, and high-speed burring remain a workhorse for local control.[6] Our management followed these principles with extended curettage and biological reconstruction, while also addressing extensor mechanism vulnerability, which is a distinctive challenge in patellar lesions.

Reconstruction after curettage is debated and depends on site-specific biomechanics. In the Scandinavian Sarcoma Group cohort, Kivioja et al recommended cementation in intralesional surgery for many GCTB lesions, citing immediate structural support and potential facilitation of recurrence detection, with a median five-year follow-up.[7] Nonetheless, recurrence remains possible even with modern techniques; Gouin et al reported recurrence after curettage in appendicular lesions, reinforcing the need for recurrence surveillance as a key outcome.[8] Adjuvant strategies also vary: van der Heijden et al compared liquid nitrogen and phenolization across two centres, highlighting how adjuvant choice is shaped by institutional practice and lesion characteristics.[9] In the patella, reconstruction decisions must additionally account for limited bone volume, patellofemoral stresses, and the tendon attachment; in the current patient, autologous iliac crest grafting was chosen to restore bone stock and complement planned extensor protection.

Positioning present case within prior reports is instructive (Table 1). Slavchev et al described an "active" patellar GCTB that was successfully treated with curettage and grafting, supporting patellar preservation when anatomy permits.[10] At other extreme, Malhotra et al reported an aggressive patellar GCTB with patellar tendon involvement, requiring wide resection and allograft reconstruction of patella, patellar tendon, and tibial tubercle, illustrating that extensive patella-tendon compromise may necessitate radical reconstruction.[11]

Current case lies between these extremes: despite interval clinical progression and increasing functional limitation, patellar preservation remained feasible, but we differentiated management by adding deliberate augmentation of extensor mechanism.

Table 1: Previous reported cases of patella GCT.

Authors	Year	Age (in years)/sex	Campanacci grade	Treatment	Reconstruction	Follow-up	Recurrence	Outcome
Malhotra et al[11]	2010	31/F	III	Wide resection	Patellar allograft	3 yr	No	ROM 0-95°, no extensor lag
Yoshida et al[12]	2012	38/M	NR	Curettage	Hydroxyapatite ceramic	5 mo	No	ISOLS 90%
Shibata et al[13]	2015	25/F	NR	Curettage + phenol/ethanol	Calcium phosphate cement	16 mo	No	Asymptomatic
Yu et al[14]	2016	46/F	NR	Curettage	Bone cement	3 mo	No	Full ROM
Song et al[3]	2016	27/M	NR	Curettage + burr	Autograft + allograft	1 yr	No	Full ROM
Slavchev et al[10]	2017	29/F	II (active)	Curettage + burr	TCP bone cement	8 mo	No	Pain-free
Morris et al[15]	2018	23/M	II	Curettage → excision inferior pole + curettage	Calcium sulfate–phosphate graft	5 yr	Yes (after 1st surgery)	Good function, mild PF arthritis
Jadhav et al[16]	2024	25/M	NR	Curettage + phenol/ethanol	Calcium phosphate cement	16 mo	No	Asymptomatic
Present case	2025	21/M	II→III	Extended curettage + burr	Iliac crest autograft + hamstring augmentation + suture tape	5 yr	No	Kujala 100, Lysholm 100

The rationale for augmentation is supported by patellar tendon repair biomechanics. Although not tumour-specific, the mechanical goal of protecting a tendon-bone interface and limiting gap formation during early healing is analogous. Gould et al demonstrated improved cyclic gap formation with high-strength suture tape augmentation in a transosseous patellar tendon repair model, supporting the "internal brace" concept.[17] Rothfeld et al similarly showed biomechanical benefits with internal brace augmentation.[18] We applied these load-sharing principles by augmenting the extensor mechanism with a hamstring graft and FiberTape through a transverse tibial tunnel, which aligned with the clinical outcome: excellent recovery within one year and durable 5-year function without recurrence.

The early-2020 service disruption provides relevant context. Fitzgerald et al documented morbidity associated with COVID-19-related delays in orthopaedic oncology, supporting the pragmatic need to reassess patients after postponement and revise surgical planning when functional structures may be at risk.[19] Overall, this case suggests that combining oncologic intralesional principles with proactive extensor mechanism reinforcement can be a reproducible option in selected patellar GCTB cases.[10,11,18,19]

CONCLUSION

Patellar giant cell tumor of bone is uncommon and functionally important because preservation of knee extension strength is central to outcome. This report demonstrates that patellar preservation using extended curettage and iliac crest bone grafting, combined with hamstring autograft and suture tape reinforcement through a transverse tibial tunnel, can result in excellent and durable function maintained at five years. This augmentation strategy may be considered when extensor mechanism integrity is threatened after joint-preserving patellar tumor surgery.

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