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Case Report

Patellar osteoblastoma: A case report and literature review ☆

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ABSTRACT

An osteoblastoma is a benign bone tumor characterized by osteoblast proliferation that is more commonly diagnosed in young men during adolescence and youth. The condition mainly occurs in the posterior regions of the spine and sacrum, but in rare cases, the patella as well. We present a case of patellar osteoblastoma successfully managed through intralesional curettage and grafting, highlighting the need for comprehensive imaging and pathological studies to ensure an accurate diagnosis. A 26-year-old male with a history of knee plica excision presented with persistent knee pain over 1 year. Radiographic and CT evaluations revealed an osteolytic lesion in the patella, further characterized by MRI. An incisional biopsy confirmed the diagnosis of osteoblastoma. Intralesional curettage and grafting were performed. Later, subsequent follow-up demonstrated complete pain relief, restoration of knee function, and optimal graft incorporation. As shown in this case, precise diagnosis and effective management are key to improving the quality of life of patients. Furthermore, it illustrates that intralesional curettage and grafting are effective treatments for patellar osteoblastomas. Given the rarity of this condition, further research and comprehensive case studies are imperative to establish standardized guidelines for improved healthcare and patient outcomes. In summary, while the clinical characteristics of patellar osteoblastoma resemble those of osteoblastomas in general, its unique presentation warrants specific attention. Individualized consideration of adjuvant measures, graft selection, and preventive fixation is vital to ensure optimal outcomes in patellar osteoblastoma management.

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Introduction

Osteoblastoma, formally giant osteoid osteoma, represents a benign bone tumor characterized by the proliferation of osteoblasts. This neoplasm exhibits higher incidence among males compared to females. It is worth noting that they can arise at any stage of life, but typically osteoblastomas manifest in individuals during adolescence and young adulthood, with an average age range of 10 to 35 years [1].

While osteoblastomas tend to be asymptomatic and are often discovered incidentally, they may occasionally induce localized dull pain [1]. Mostly observed in the posterior regions of the spine and the sacrum, accounting for approximately 40% to 55% of cases. They may also originate in other anatomical locations, such as the mandible and the metaphysis of long bones [1]. Patellar tumors, though relatively infrequent, encompass diverse entities including giant cell tumors, chondroblastoma, aneurysmal bone cyst, and enchondroma, among others [2]. Notably, patellar osteoblastoma is a rare occurrence, representing 2% of all patellar tumors [3]. Its infrequent presence in the patella introduces diagnostic and therapeutic challenges.

To the best of our knowledge, only a limited number of documented cases of patellar osteoblastoma have been documented. This paper presents a compelling case of patellar osteoblastoma that was effectively managed through intralesional curettage and grafting. Furthermore, this study conducts an in-depth review of literature and comparable cases, contributing to a comprehensive discussion on the most optimal approaches to the management of this uncommon condition.

Case presentation

A 26-year-old male patient, who had previously undergone an uncomplicated surgical intervention in October 2019 for the excision of a knee plica, presented in February 2023 with a recent history of persistent pain over the course of 1 year. Radiographic examination revealed the presence of an osteolytic lesion in the patella. A subsequent computed tomography (CT) scan demonstrated an osteolytic lesion with a cartilaginous matrix occupying the lower two-thirds of the patella.

Upon admission to our institution in February 2023, the patient exhibited clinical manifestations of progressive pain and localized swelling in his right knee, associated with restricted range of motion. Radiological assessment uncovered a well-defined lytic lesion with cortical thinning in the patella. Magnetic resonance imaging (MRI) identified a lesion in the middle and distal poles of the patella which characterized by a hypointense lesion on T1-weighted images, a hyper-intense T2 signal, with heterogeneous contrast enhancement post-gadolinium injection (Fig. 1). Following these diagnostic findings, an incisional biopsy was performed, which revealed a hemorrhagic aspect of the lesion and fragility of the anterior cortex of the patella. Histopathological analysis substantiated the diagnosis of osteoblastoma, showcasing a proliferation of osteoblasts and osteoid formation within a vascular stroma. Microscopic analysis displayed a tumor characterized by woven bone trabeculae associated with a richly vascularized stroma containing osteoblasts and osteoclasts-like giant cells (hematein eosin saffron stain, Gx5).

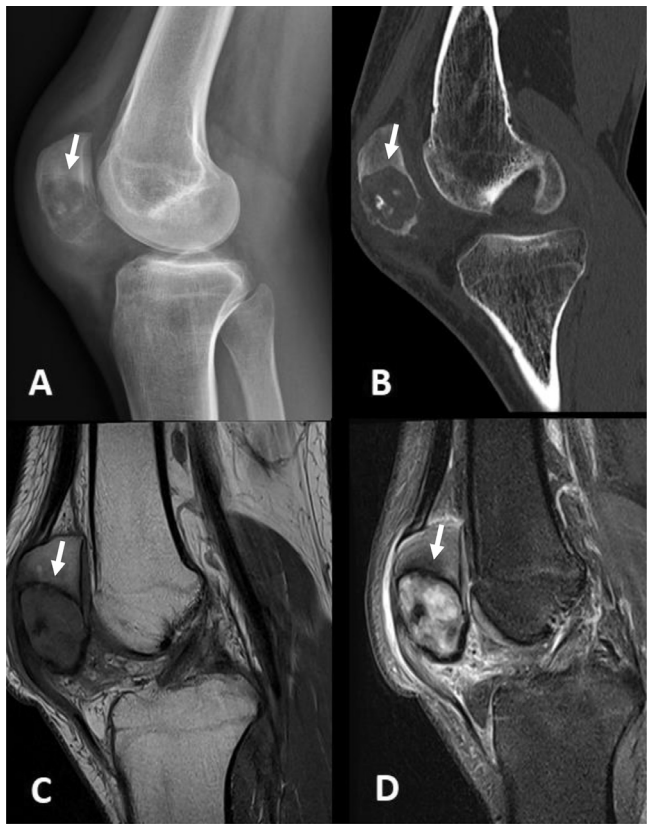

Fig. 1 – (A) Preoperative lateral x-ray of patella demonestrating an osteolytic lesion of distal two-third of the patella (white arrow). (B) Preoperative CT scan showing osteolytic lesion with calcification (white arrow). (C) Preoperative MRI T1 weighted image showing a hypointense lesion (white arrow). (D) Preoperative MRI T2 weighted image showing a hyperintense lesion (white arrow).

The patients' case was discussed in our institutional tumor board and surgical decision was made by curettage and bone filling. Informed consent was obtained from the patient. A bone window measuring approximately 3 × 2 cm was meticulously created in the middle and inferior poles of the patella. Subsequently, the tumor was accessed, and a thorough curettage procedure was executed, ensuring the complete removal of tumor tissue without compromising the integrity of the bone cortex. This was succeeded by an extended curettage using a high-speed burr, electrocauterization, and hydrogen peroxide to mitigate the risk of recurrences. The resultant cavity was filled with morselized allograft to facilitate bone tissue regeneration. To minimize the risk of patellar avulsion a cerclage wire was added, which was done through a horizontal bone tunnel through the patella and tibial tuberosity. An intraoperative specimen was submitted for histopathological examination, and the surgical incision was subsequently closed in layers (Fig. 2).

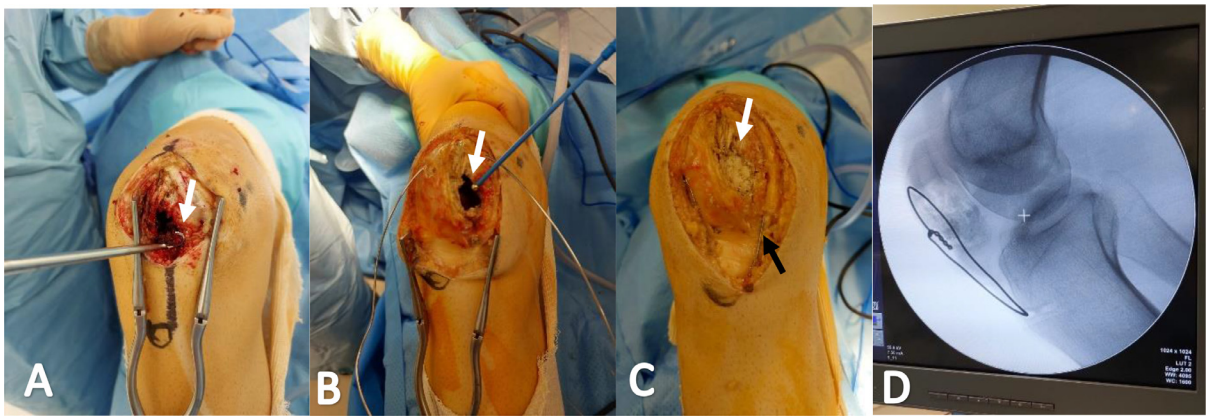

Fig. 2 – (A) A bone window was performed, and lesion curettage was done (white arrow). (B) Electrocauterization after complete curettage (white arrow). (C) Bone defect filled with a morselized allograft (white arrow) and preventive cerclage was added (black arrow). (D) Intraoperative fluoroscopic image after lesion filling.

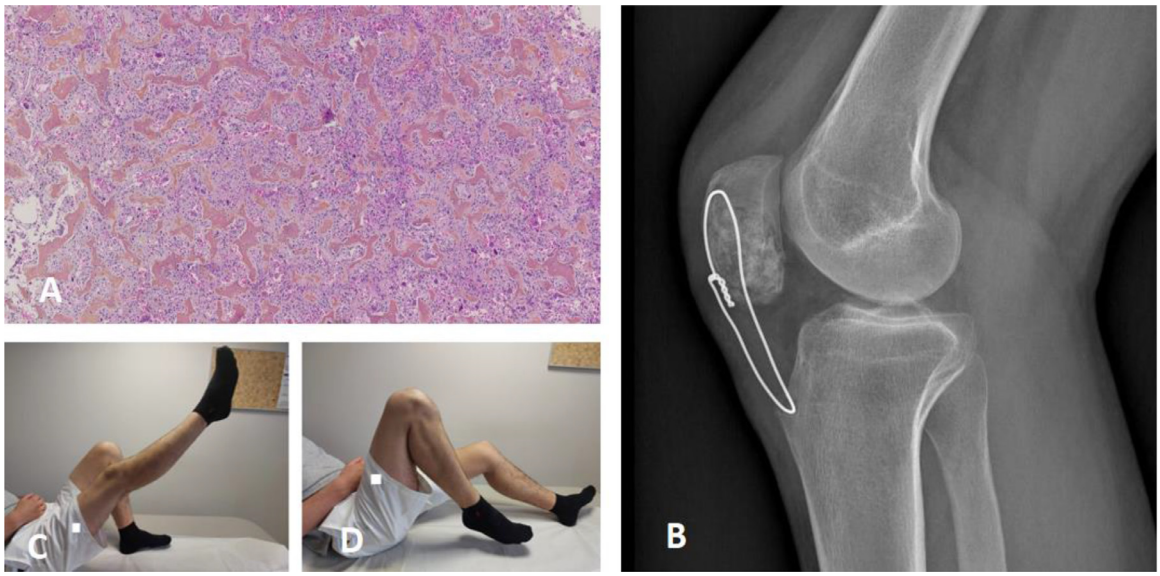

Fig. 3 – (A) Microscopic analysis of lesion. (B) Postoperative X-ray of lesion at 6 months duration. (C and D) Postoperative knee range of motion at 6 months duration.

The postoperative course commenced without complications, and postoperative rehabilitation was initiated. The patient was directed to bear full weight with a knee orthosis for a total of 6 weeks, accompanied by early active physiotherapy. At the 4-month follow-up, the patient reported the complete resolution of pain and swelling. Radiographic evaluation illustrated the successful incorporation of bone graft and progressive osseous remodeling of the patella. The patient regained full range of motion in the affected knee, exhibited no signs of infection, and demonstrated a quadriceps power rating of 5/5. At the 6-month follow-up, X-ray imaging further corroborated the improvement of bone allograft healing (Fig. 3).

Considering the absence of symptomatic hardware, it was decided to retain the cerclage wire for a minimum of 1 year. The patient successfully regained full range of motion in the affected knee and resumed normal activities without any discernible limitations. All in all, this patient has granted their informed written consent and agreement for the use of this information and publication of this case report.

Discussion

As with osteoblastoma generally, patellar osteoblastoma has a similar epidemiology, with numerous studies observing a notable male predilection [1,4–9]. Furthermore, these tumors tend to manifest during young adulthood, with documented cases primarily presenting in this age group [4–10] (Table 1).

The clinical presentation of osteoblastoma is highly contingent upon its anatomical location, leading to diverse symptoms. Cranial osteoblastomas, for instance, may present as an

Table 1 – Reported cases of patellar osteoblastoma.

Author (y)	Demographics	Manifestation (duration in mo)	Imaging		Treatment		Prognosis (Follow-up in mo)
			Xray	MRI[b]	Procedure (type of graft)	Adjuvant therapy	
Belgrano (1961) [4]	16, male	Pain and swelling (12)	Osteolytic lesion	N/A[a]	Surgical excision	N/A[a]	Full recovery
Sicard et al (1979) [5]	25, male	Gradually increasing pain and swelling in right patella (24)	Osteolytic lesion	N/A[a]	Patellectomy after failed wide curettage	N/A[a]	Full recovery
De Coster et al (1989) [6]	29, male	Sudden pain and swelling of right knee	Fracture (dorsolateral knee), osteolytic lesion	N/A[a]	Intralesional curettage (autologous iliac cancellous bone)	N/A[a]	Full recovery (18), no recurrence
Shen et al (2001) [7]	34, male	Pain and mild swelling, tenderness	Upper pole osteolytic lesion surrounded by sclerotic rim	N/A[a]	Intralesional curettage (allogenic bone grafting)	N/A[a]	Complete healing of the lesion without evidence of recurrence (24).
Bhagat et al (2008) [8]	38, male	Pain and swelling (6)	N/A[a]	N/A[a]	Excision of the lesion	N/A[a]	Full recovery (48)
Zhong et al (2010)[10]	20, female	Pain, swelling, and tenderness	N/A[a]	N/A[a]	Intralesional curettage (autologous Iliac cancellous bone)	N/A[a]	No evidence of recurrence and the cancellous graft healed well (3)
Li et al (2023) [9]	22, male	Right knee intermittent pain (6), tenderness	Osteolytic lesion in medial superior quadrant, surrounded by sclerotic margin	Hypointense lesion (T1 weighted), and hyper-intense (T2 weighted)	Intralesional curettage (autologous iliac cancellous bone)	High speed bur, and high frequency electro-cautery	Full recovery, and no clini-cal/radiological evidence of recurrence (24)
Present Report (2023)	26, male	Persistent pain over the course of one year, swelling and restricted range of motion	Osteolytic lesion of distal two-third of the patella	Hypointense lesion (T1 weighted), and hyper-intense lesion (T2 weighted)	Intralesional curettage and bone grafting	Electrocautery thermal coagulation, high speed burr, and hydrogen peroxide	No clinical or radiological evidence of recurrence (12)

[a] N/A, Not applicable.
[b] MRI, magnetic resonance imaging.

expanding mass, occasionally accompanied by pain and neurological symptoms. Conversely, osteoblastomas of the spine can cause localized nocturnal pain, muscle weakness, and radicular pain [1]. However, patellar osteoblastoma is a relatively rare entity, and the cases reported in the literature have indicated specific clinical presentations. Patients have typically complained of localized pain exacerbated by physical activity, along with the presence of a swollen mass in the knee region [4–10]. This rarity and the variation in clinical manifestations can occasionally result in a misdiagnosis, particularly with conditions such as osteoid osteoma, which shares some clinical features.

Osteoblastomas, in general, often remain asymptomatic and are primarily encountered in the axial skeleton [1]. However, in some instances, the progression may be sudden, leading to pathological fractures [6]. Hence, accurate diagnosis of patellar osteoblastoma necessitates a comprehensive assessment involving complete imaging studies and histological examination to differentiate it from other conditions with overlapping clinical presentations. On radiological imaging, osteoblastomas are commonly characterized by the presence of osteolytic lesions with a sclerotic rim [4–7,9]. Although there is limited data available on lesion sites, a few recorded instances have highlighted the presence of involvement in the upper pole [6–7,9]. Furthermore, distinguishing osteoblastoma from osteoid osteoma is a critical diagnostic challenge due to the absence of a fibrovascular rim, necessitating a preoperative or intraoperative biopsy to confirm the diagnosis [4–10].

The management of osteoblastoma is contingent upon its aggressiveness and anatomical location within the bone. Baghat et al. proposed a structured approach for the management of benign patellar tumors, which involves curettage with or without grafting for intraosseous lesions, curettage

with grafting for intra-compartmental lesions, and patellectomy for extra-compartmental lesions [8]. In the majority of cases, intralesional curettage and grafting have proven to be sufficient for complete recovery [4,6–10]. However, in some instances, such as the study conducted by Sicard et al., patellectomy after failed curettage was a successful intervention [5]. Despite the relatively low risk of osteoblastoma recurrence, adjuvant therapeutic measures, including electrocautery and high-speed burr, have been employed, showing efficacy in reducing recurrence in other tumor types such as giant cell tumors and chondroblastoma [3,9]. In our specific case, these adjuvant measures were employed.

The choice of bone graft for filling bone defects varies, with allogenic and autogenic grafts both being utilized. Several studies have demonstrated comparable outcomes with either graft type, although autografts are associated with morbidity for the patient [6,9–10]. In our case, an allograft was employed due to its proven efficacy and the absence of complications. Moreover, the issue of preventive fixation is essential in patellar osteoblastoma management. While most studies did not employ any form of preventive fixation, we decided to incorporate wire cerclage in our case. The rationale behind this decision was the extensive involvement of the inferior pole of the patella, which raised concerns about the risk of proximal pole avulsion. This precaution was considered crucial to enhance the stability and structural integrity of the patella during the healing process.

Conclusion

In summary, the epidemiological characteristics, clinical presentations, radiological features, diagnostic modalities, and management of patellar osteoblastoma closely align with those of osteoblastomas in general. However, the rarity of patellar osteoblastoma and its unique clinical presentation demand specific attention. As demonstrated in this case, the integration of adjuvant measures, graft selection, and preventive fixation should be considered on a case-by-case basis to ensure optimal outcomes in patellar osteoblastoma management. As prompt diagnosis and appropriate management can alleviate pain and restore knee function, eventually improving the patients' quality of life. Moreover, this article illustrates the management options and how successful is intralesional curettage and grafting as a treatment option for such cases. Furthermore, more research and comprehensive case studies are needed to establish standardized guidelines for managing this uncommon condition for better healthcare and enhanced patient outcomes.

Patient consent

I the author and corresponding author of the submitted article entitled "Patellar Osteoblastoma: A Case Report and Literature Review," hereby confirm that I have obtained written informed consent for the publication of the patient's clinical information, imaging data, and relevant medical details. The consent was obtained from the patient in accordance with ethical guidelines and regulations.

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