Case Report

Iraqi National Journal of Medicine. January 2024, Volume 6, Issue 1

Giant cell tumor of the patella: A case report

Hadi Raheem Derei Almalikei

Specialist Orthopedic Surgeon, Almawany Teaching Hospital, Basrah, Iraq

ABSTRACT

The patella has a low incidence of tumors. Primary neoplasms of the patella account for less than 1% of all primary bone tumors of the lower extremity, the most frequent of them being the giant cell tumor of bone, the chondroblastoma, and the aneurysmal bone cyst. This paper reports the case of a 32-year-old woman with an active giant cell tumor of the patella, examining its clinical and radiological features and providing a brief review of the literature.

Keywords: giant cell tumor of bone, patella, knee pain

Corresponding author: Hadi Raheem Derei Almalikei. E-mail: drhadi1968@gmail.com
Disclaimer: The author has no conflict of interest.

DOI: https://doi.org/10.37319/iqnjm.6.1.11
Received: 26 Sep 2023 Accepted: 13 Nov 2023 Published online: 15 Jan 2024

INTRODUCTION

Giant cell tumors (GCT) are the most common type of diagnosed patellar tumors (33% of all patellar tumors).[1] A GCT of the bone is considered to be histologically benign, but it tends to be locally invasive and to metastasize to the lungs. With a prevalence of 4%–5% among all primary bone lesions, these tumors develop in the metaphysis and epiphysis of the long bones and are staged as latent, active, or aggressive depending on the containment of the tumor within the bone, thinning of the cortex, or breaching of the bone by the tumor.[2] Although a GCT is usually located around the knee joint, patellar involvement is unusual. Its occurrence within this bone falls below 1% of all giant cell tumors.[3] The most common symptoms include pain and swelling.[2] Clinically, patients with patellar GCTs tend to complain about knee pains and/or swelling.[4,5] However, there may be no inducement to the initiation of relevant diseases and the enhancement of such symptoms. Physical examination may show redness, local heat, swelling, effusion, tenderness, lump, crepitus, and a decrease in range of motion.[6,7]

The laboratory findings on some severe patients showed an increase in serum alkaline phosphatase (AP)[8,9] and erythrocyte sediment rate (ESR).[5,8] Radiographs reveal an osteolytic lesion of the patella with destruction of the bone,[4,5,7,8] but soap bubble appearance,[8] sclerotic and radiolucent lesions,[9] fracture of the femur and the tibia,[9,10] and pathologic fracture[10] may also be found. Magnetic resonance imaging (MRI) shows abnormal extension and lesion of the patella, and there may be some evidence of adjacent tissues and sclerotin.[4,6,7,11] Additionally, chest radiography and bone scintigraphy are necessary for GCT patients to determine possible metastasis to the lungs and other bones.

CASE PRESENTATION

A 32-year-old woman presented to Almawany Hospital's orthopedic ward with a mass in the anterior aspect of

right knee (Fig. 1), pain, and limitation of movement of progressive severity over months. The patient's problem dates back to a previous history of trauma that was treated by application of Plaster of Paris (POP). The pain was irregular at first, aggravated by prolonged walking, but later became constant and non-responsive to non-steroidal anti-inflammatory drugs (NSAIDs).

Physical examination revealed mild edema and tenderness over the patella and wasting of the quadriceps. There was mild joint effusion, no skin changes, and limitation of the range of motion. Radiography revealed a circumscribed septate osteolytic area in the distal three-quarters of the patella extending to the subchondral bone with endosteal scalloping and thinning of the cortical layer, as well as remodeling of the subchondral bone with no periosteal reaction (Fig. 2). MRI showed a heterogeneous lesion contained within the bone with surrounding soft tissue edema and focal thinning of the patellar cartilage. An active GCT was suspected, with a chondroblastoma and an aneurysmal bone cyst as differential diagnoses. The patient was sent for Fine Needle Aspiration (FNA) on January 27, 2013, and the result revealed clusters of oval mononuclear cells and multinucleated giant cells (the picture was more in favor of a giant cell tumor) (Fig. 3). A biopsy was advised for further evaluation.

The patient was operated on January 29, 2013; the patella was approached ventrally, 1 cm lateral to its medial margin (Fig. 4). The lesion was thoroughly removed in bulk through a wide window, allowing for direct visualization of its whole internal surface (Fig. 5). Special attention was paid to the preservation of the subchondral bone, which was found to be deformed but not destroyed by the tumor. The main portion of the tumor tissue was a solid, yellowish-brown with multiple hemorrhages. The cavity was additionally curetted by extended curettage using concentrated hydrogen peroxide solution and the cavity left behind was filled with bone cement (Fig. 6). The wound was closed in the usual manner. The material that was removed from the lesion was sent for histopathological examination, which revealed evenly distributed giant cells with oval and spindle mononuclear cells, no mitoses or atypia, and incomplete excision; a diagnosis of giant cell tumor was made, and recurrence was expected (Fig. 7).

Rehabilitation was initiated on the second postoperative day with a return to full function as tolerated towards the end of the fourth week. Eight months after surgery, there was no radiographic evidence or signs of local recurrence, and the same findings were obtained 18 months after the surgery. After 60 months, the patient enjoys an active lifestyle with no pain or other troubles with her knee.

Figure 1: Swelling over the patella and hypotrophy of the quadriceps

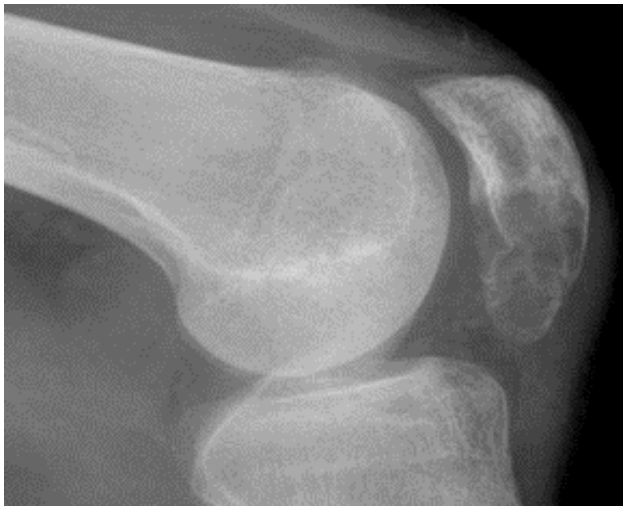


Figure 2: A circumscribed septate osteolytic area in the distal three-quarters of the patella reaching the subchondral bone

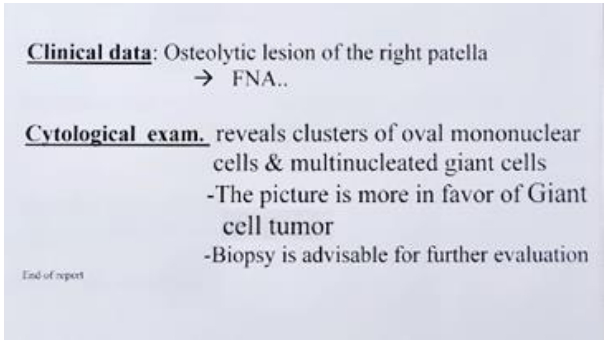
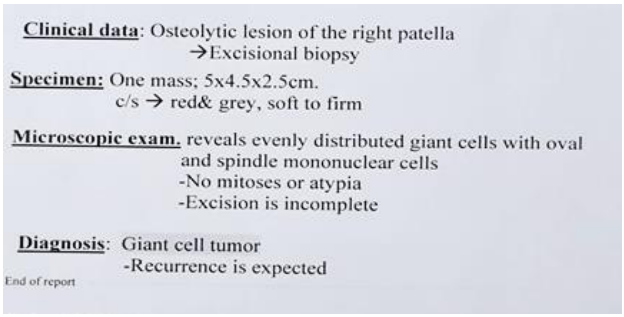


Figure 3: Result of FNA

Figure 4: The patella was approached ventrally, 1 cm lateral to its medial margin

Figure 5: Lesion was thoroughly removed in bulk through a wide window

Figure 6: Extended curettage by use of concentrated hydrogen peroxide solution



Clinical data: Osteolytic lesion of the right patella
→Excisional biopsy

Specimen: One mass; 5x4.5x2.5cm.
c/s → red& grey, soft to firm

Microscopic exam. reveals evenly distributed giant cells with oval and spindle mononuclear cells
-No mitoses or atypia
-Excision is incomplete

Diagnosis: Giant cell tumor
-Recurrence is expected

End of report

Figure 7: The microscopic examination revealed evenly distributed giant cells with oval and spindle mononuclear cells

DISCUSSION

The patella is an unusual location for any primary or secondary bone tumor, and a neoplasm would rarely be considered in the etiology of anterior knee pain. Therefore, the diagnosis of a tumor within this location is delayed in most patients.[12] Benign lesions are more common and represent 70% of the tumors affecting the patella. The most common is the GCT, followed by chondroblastoma and aneurysmal bone cyst.[13] Other lesions that might affect the patella include metastases, lymphoma, Paget's disease, osteosarcoma, chondrosarcoma, osteomyelitis, gout, brown tumor, osteoma, or solitary bone cyst.[14]

According to a study of 27,403 primary bone tumors by the Bone and Soft Tissue Tumor Committee of the Japanese Orthopedic Association carried out from 1972 to 2003, 13,860 of the tumors involved the bones of the lower extremity. Of those, 75 (0.5%) involved the patella, 71 (94%) of which were benign with GCTs accounting for 22 (31%) of those cases, i.e., the GCTs were 0.08% of all the tumors of the patella and 0.15% of the total bone tumors of the lower extremities.[15] Campanacci also reported that less than 1% of GCTs arise in the patella.[3] Balke et al.[16] reported on 214 cases of GCTs, of which only two cases (0.9%) involved the patella. Singh et al.[14] in 2009 presented 11 cases of GCTs out of 59 primary bone lesions of the patella.

The radiographic appearance of the GCTs of the patella is similar to that observed in other locations. It typically presents as a lucent lesion without matrix calcifications growing often—but not exclusively—eccentrically in the meta-epiphyseal region of the bone, generally in a skeletally mature patient. In sluggish and static tumors, the margins of the lesion are well-defined without a sclerotic rim. In aggressive cases, the margins are poorly demarcated and the cortex may be thinned, distended, or destroyed with soft tissue extension, but a periosteal reaction is generally lacking. Complete or incomplete pathological fracture after bone destruction might also be detected.[17]

As with other musculoskeletal neoplasms, computed tomography (CT) and MRI are essential in the evaluation and staging of GCTs. CT is useful in the evaluation of the cortical bone and could clearly present thinning of the cortex, pathologic fracture, periosteal reaction, and absence of matrix mineralization. In cases of cortical destruction, CT is exceeded by MRI's ability to delineate the soft-tissue extension of the tumor, appearing with a

heterogeneous signal that is low in T1-weighted images and high in T2-weighted images.[2]

The surgical treatment includes curettage with bone grafting with or without local adjuvants, wide resection with patellar allografting, or patellectomy. Patellectomy is the preferred treatment for aggressive lesions.[18] In our case, despite the involvement of a very large portion of the patella, removal of the patella was not expected as a primary procedure because of the unaffected overall function of the knee. As an alternative, aggressive curettage was performed, and concentrated hydrogen peroxide was used to extend the margin of curettage beyond 2–3 mm. Bone cement was chosen as the grafting material because of its mechanical strength in providing support for the subchondral bone , its thermal adjuvant effect to kill the tumor cell left behind, absence of donor-site morbidity, and general radiographic homogeneity allowing for early detection of a local recurrence.

CONCLUSIONS

Patellar tumors, despite being rare, should always be considered in cases of anterior knee pain of uncertain origin. GCTs, followed by chondroblastoma and aneurysmal bone cysts, are the most common patellar tumors. The tumor stage must be taken into account when discussing treatment options. Besides the curative effect, surgical treatment of non-malignant patellar tumors should attempt to provide mechanical support for the subchondral bone and confirm enough viable bone in the long term to withstand the high mechanical loads of the knee.

REFERENCES

1. Mercuri M, Casadei R. Patellar tumors. Clin Orthop Relat. 2001;163:35–46. doi: 10.1097/00003086-200108000-00007. - DOI - PubMed
2. Georgiev GP, Slavchev S, Dimitrova IN, Landzhov B. Giant cell tumor of bone: current review of morphological, clinical, radiological, and therapeutic characteristics. J Clin Exp Invest. 2014;5:475–485.
3. Campanacci M, Baldini N, Boriani S, Sudanese A. Giant-cell tumor of bone. J Bone Joint Surg Am. 1987; 69:106–114.
4. Yoshida Y, Kojima T, Taniguchi M, Osaka S, Tokuhashi Y. Giant-cell tumor of the patella. Acta Med Okayama. 2012;66:73–6.
5. Chakraverty G, Chakraverty U. Late presentation of G.C.T. of the patella. Internet J Orthopedic. Surgery. 2009;12:1.
6. Malhotra R, Sharma L, Kumar V, Nataraj AR. Giant cell tumor of the patella and its management using a patella, patellar tendon, and tibial tubercle allograft. Knee Surg Sports Traumatol Arthrosc. 2010;18:167–9. doi: 10.1007/s00167-009-0908-8.
7. Qureshi SS, Puri A, Agarwal M, Desai S, Jambhekar N. Recurrent giant cell tumor of bone with simultaneous regional lymph node and pulmonary metastases. Skeletal Radiol. 2005;34:225–8. doi: 10.1007/s00256-004-0824-4.
8. Achmad KF, Errol UH, Saukani G, Yogi P, Yanuarso Y. Primary malignant giant cell tumor of the patella: report of a rare case. Med J Indonesia. 2013;22:238–42. doi: 10.13181/mji.v22i4.607.
9. Okada K, Sato K, Abe E, Kataoka Y, Miyakoshi N, Ishikawa N, et al. Case report 858: postradiation osteosarcoma of the patella. Skeletal Radiol. 1994;23:471–4. doi: 10.1007/BF00204614.
10. Ofluoglu O, Donthineni R. Iatrogenic seeding of a giant cell tumor of the patella to the proximal tibia. Clin Orthop Relat Res. 2007;465:260–4.
11. Macdonald D, Fornasier V, Cameron J. Multicentric giant cell tumour involving the patella. Can J Surg. 2001;44:222–3.
12. Shibata T, Nishio J, Matsunaga T, et al. Giant cell tumor of the patella: an uncommon cause of anterior knee pain. Mol Clin Oncol. 2015;3:207–211.
13. Mercuri M, Casadei R, Ferraro A, et al. Tumours of the patella. Int Orthop. 1991;15:115–120.
14. Singh J, James SL, Kroon HM, et al. Tumour and tumour-like lesions of the patella – a multicentre experience. Eur Radiol. 2009;19:701–712.
15. Yoshida Y, Kojima T, Taniguchi M, et al. Giant-cell tumor of the patella. Acta Med Okayama. 2012;66:73–76.
16. Balke M, Schremper L, Gebert C, et al. Giant cell tumor of bone: treatment and outcome of 214 cases. J Cancer Res Clin Oncol. 2008;134:969–978.
17. Szendröi M. Giant-cell tumour of bone. J Bone Joint Surg Br. 2004;86-B:5–12.
18. Malhotra R, Sharma L, Kumar V, Nataraj AR. Giant cell tumor of the patella and its management using a patella, patellar tendon, and tibial tubercle allograft. Knee Surg Sports Traumatol Arthrosc. 2010;18:167–169.