MEDICAL SCIENCE

To Cite:
Mohanan A, Bisen Y, Ambade R, Sangamnerkar M, Singh A, Pandey G, Bhasin T. An unusual presentation of epiphyseal chondroblastoma with posterior cruciate ligament tear: A case report. *Medical Science* 2023; 27: e192ms2821.
doi: https://doi.org/10.54905/disssi/v27i134/e192ms2821

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Peer-Review History
Received: 10 January 2023
Reviewed & Revised: 14/January/2023 to 05/April/2023
Accepted: 09 April 2023
Published: 15 April 2023

Peer-review Method
External peer-review was done through double-blind method.

Medical Science
pISSN 2321–7359; eISSN 2321–7367

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An unusual presentation of epiphyseal chondroblastoma with posterior cruciate ligament tear: A case report

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ABSTRACT

Chondroblastoma is a sporadic, benign, locally aggressive, cartilaginous tumor that commonly affects the epi metaphyseal or epiphyses of the long bones. Chondroblastoma being extremely rare accounts for only one to two percent of all bone tumors. It usually occurs in skeletally immature patients, i.e., patients below 20 years old. Herein, we present a case of epiphyseal chondroblastoma of the right tibia with a posterior cruciate ligament tear in an 18-year-old female who presented with gradually progressive pain in the right knee for four years for which the patient underwent high-frequency radio-ablation.

Keywords: Chondroblastoma, Posterior cruciate ligament tear, Radiofrequency ablation.

1. INTRODUCTION

Chondroblastoma is a rare benign tumor most prevalent among skeletally juvenile patients. Chondroblastoma is an irregular chondroid bone growth which most frequently involves the epiphysis or epiphyseal comparable apophysis of long cylindrical bones (Binesh et al., 2013). Chondroblastoma is also rarely seen in the craniofacial region, usually in the age group of 30 to 40 years (Akhtar et al., 2014). Chondroblastoma has a 2:1 male-to-female patient ratio indicating predilection for males (Wing et al., 2022). The femur, humerus and tibia are the most affected bones (De-Mattos et al., 2022). The foot, talus, calcaneus and flat bones are less frequently afflicted locations. Although chondroblastomas are benign, they can progress to locally invasive and metastatic tumors. Here, we report a case of epiphyseal chondroblastoma of the right tibia with posterior cruciate ligament tear treated by high-frequency radio-ablation and cryotherapy.

2. CASE PRESENTATION

An 18-year-old female with no prior history of trauma presented with the chief complaints of pain over the right knee for four years, which was gradual in onset and progressive in nature. The pain was aggravated by movement and had no relieving factors. On general examination, her gait was antalgic. No appreciable lymphadenopathy was noted. On local examination of the right knee, it was observed that the overlying skin was normal. There was no deformity, scars, sinuses or swelling. On palpation, it was noted that there was no local rise in temperature and diffuse tenderness over the right proximal tibia. The range of movement (ROM) of the knee was terminally painful. The dorsalis pedis artery and posterior tibial artery were palpable and there were active movements of the ankle and toes. There were no proximal neurovascular impairments found. Following a systemic review, no obvious deviations were found.

Investigations

Various investigations for the diagnosis of chondroblastoma include radiographs, magnetic resonance imaging (MRI), diagnostic arthroscopy and histopathology examination. Figure 1 shows the X-ray of right knee in anteroposterior view and lateral view depicting increased bone mineralisation in the proximal tibia and soft tissue swelling.

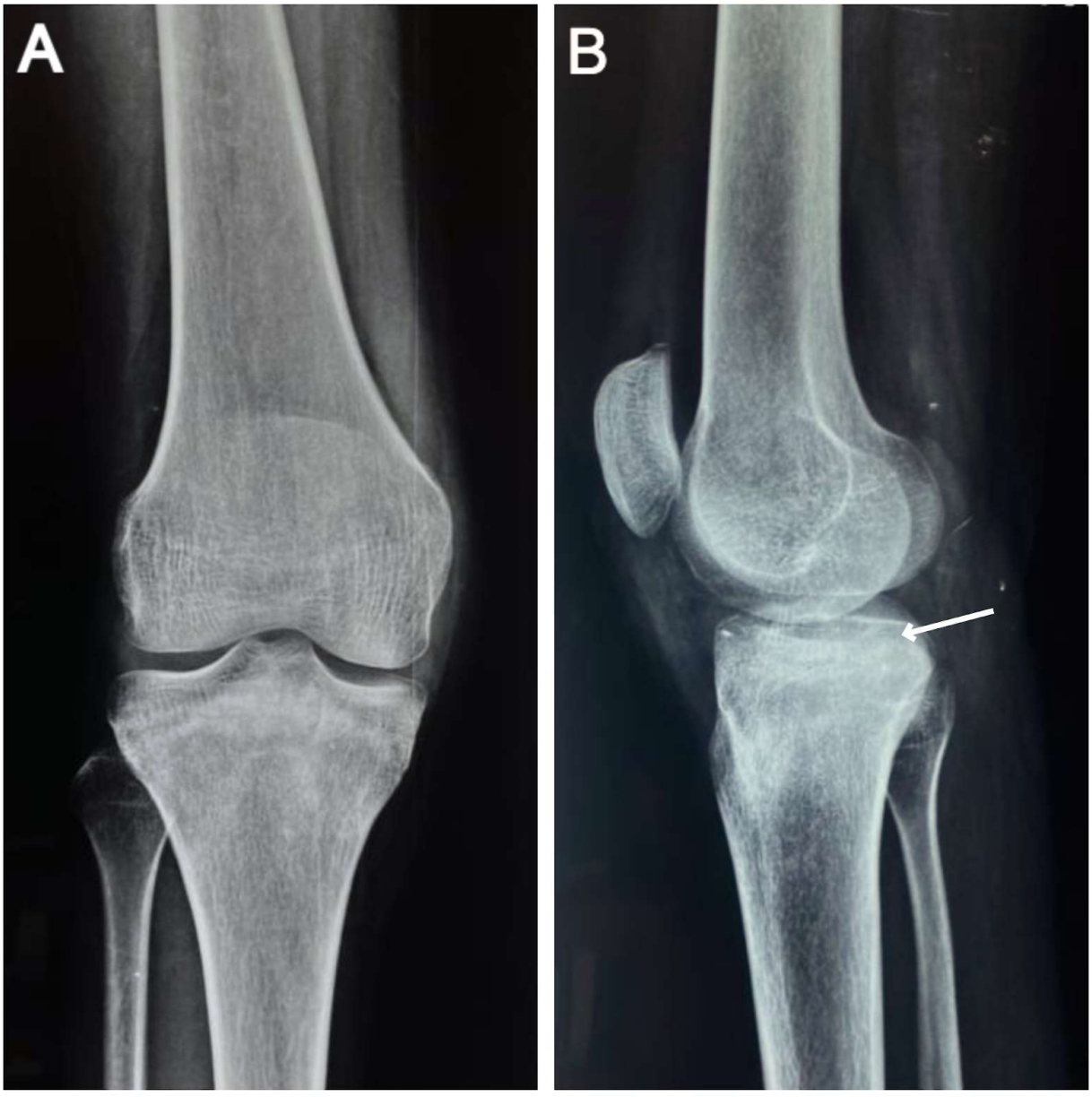

Figure 1 Radiograph showing chondroblastoma. A: Antero-posterior view; B: Lateral view

An MRI of the right knee shows moderate significant joint effusion in the patellofemoral and tibiofemoral joint space. There is evidence of focal, well-defined, signal intensity alterations in the upper part of tibia with surrounding marrow oedema. The lesion is in the posterior aspect and measures 14 x 12.1 cm. The lesion is predominantly located, spanning the epiphyseal location. T2 hyperintensities in the body of medial meniscus -grade 3 tear (Figure 2).

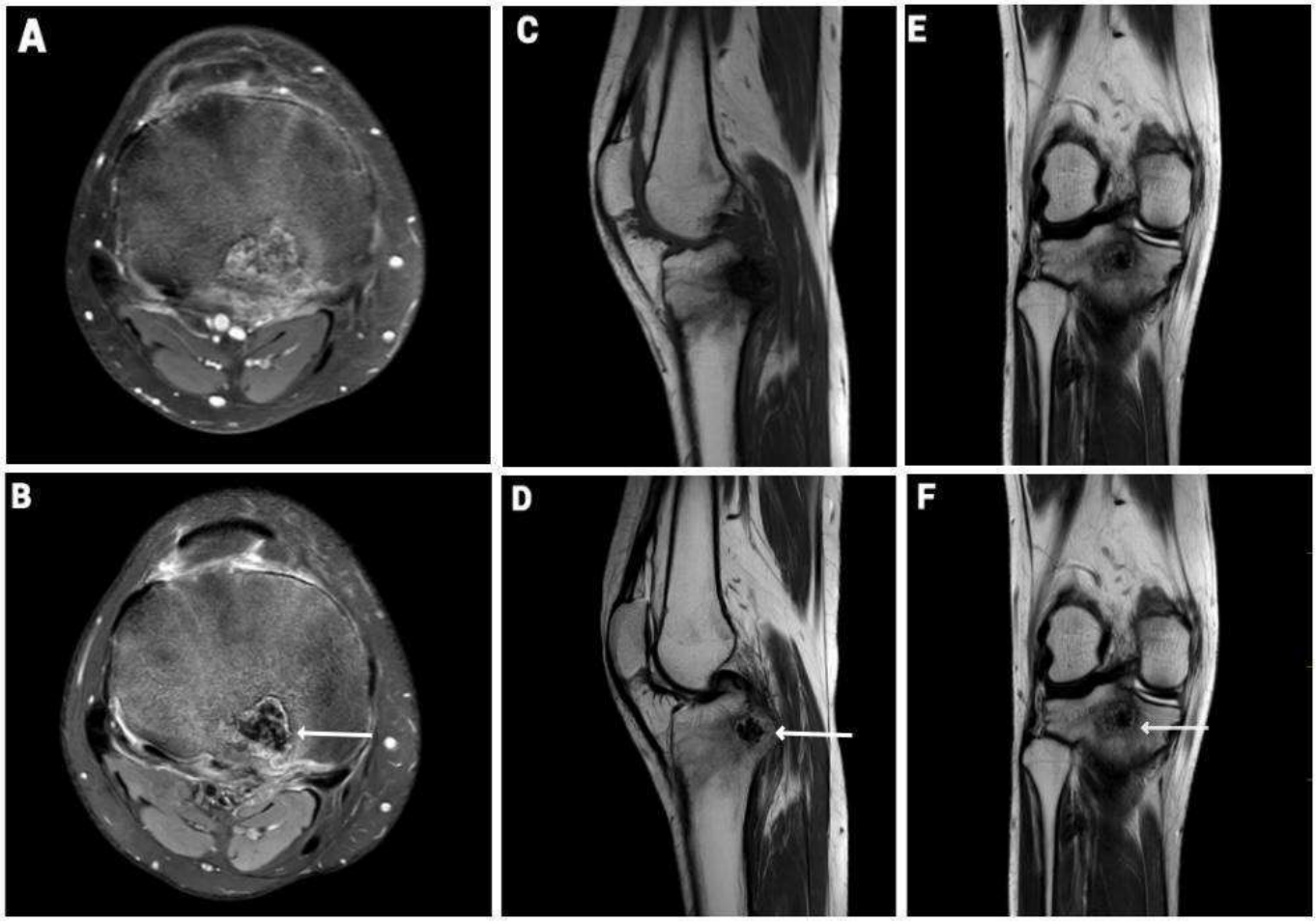

Figure 2 T1 and T2 weighted magnetic resonance images. A: Transverse magnetic resonance imaging (MRI) view (T1) of the right proximal tibia and fibula; B: Transverse magnetic resonance imaging view (T2) of the right proximal tibia and fibula; C: Sagittal MRI view of the right knee (T1); D: Sagittal MRI view of the right knee (T2); E: Coronal MRI view of the right knee (T1); F: Coronal MRI view of the right knee (T2)

Diagnostic right knee arthroscopy with a lesion biopsy was done under spinal anaesthesia. Anteromedial and anterolateral ports were made hypertrophied synovium was seen and was shaved off in the supra-patellar gutter in the knee joint. Both medial and lateral meniscus was intact. The anterior cruciate ligament was found to be intact but was lax. The posteromedial port was made to visualise the posterior aspect of the knee and the hypertrophied synovium was shaved off. Lesion over the tibia plateau was seen just below the tibial footprint of the posterior cruciate ligament (PCL) attachment. A partial PCL tear was noted-a biopsy from the lesion was taken with a Jamshidi needle. Three samples were collected and sent for culture and histology. Figure 3 shows images of diagnostic arthroscopy.

Histopathology slide showing degenerative chondroblasts have pericellular lace-like or chicken wire-type calcification. There is nearly invariably a chondroid matrix (Figure 4).

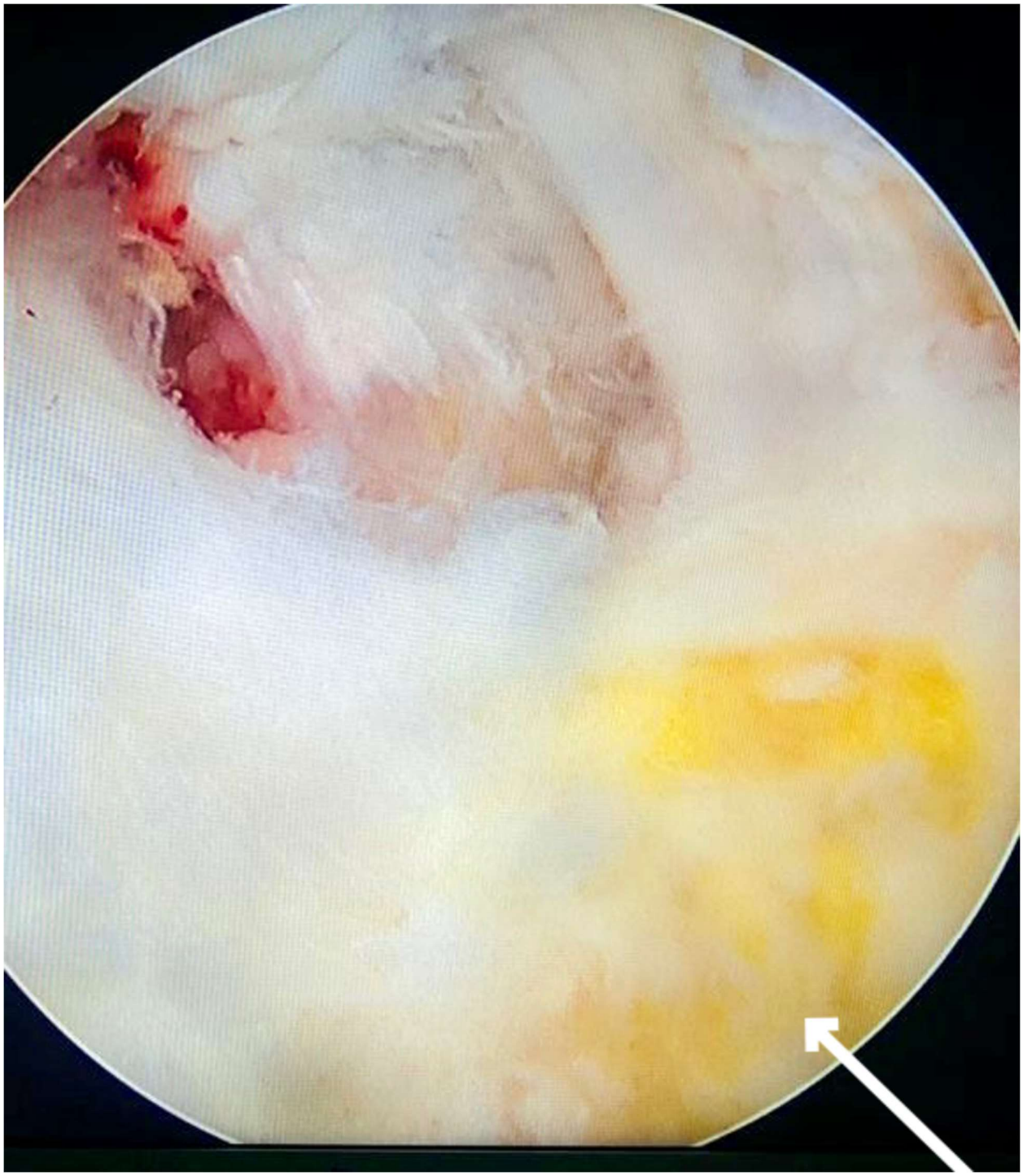

Figure 3 Diagnostic arthroscopy image showing chondroblastoma

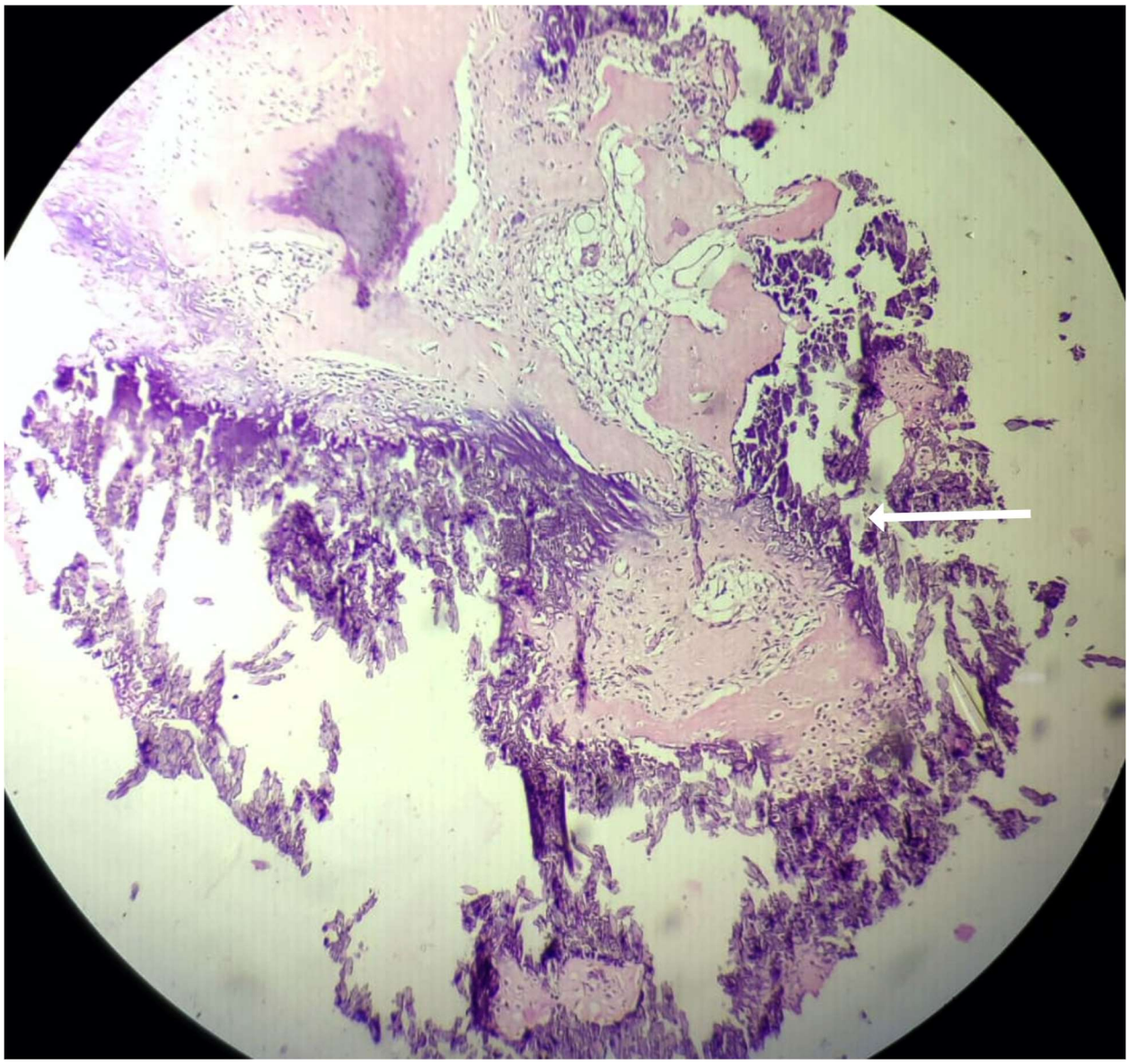

Figure 4 Histopathology slide showing chicken wire appearance diagnostic of chondroblastoma

Diagnosis and management

A finding of chondroblastoma is made with a biopsy showing chondroblastoma organized in a cobblestone or chicken wire design with a central region of the chondroid network. Treatment is nearly always required since chondroblastoma is likely to spread and destroy the bone if left untreated. Treatment aims to eliminate the tumour and stop other joint and bone damage. Chondroblastoma is often treated with surgery; however, there are specific circumstances when a tumour cannot be safely removed or efficiently because of its location or size non-surgical methods are used. Various non-surgical methods of management include radio-frequency ablation and cryotherapy. In our case, management was done by radio-frequency ablation. Under all aseptic precautions, the lesions entered through the medial aspect with a Jamshed biopsy needle after confirming the position within the lesion probe position taken, confirmed on computed tomography. Radio-frequency ablation energy was delivered at 100 Watts with a target temperature of 90 degrees Celsius for five minutes. The patient tolerated the procedure well. The procedure was uneventful. The patient's vitals were stable.

3. DISCUSSION

Chondroblastoma makes up one to two percent of all bone cancer and the majority of sufferers are men between the ages of 10 and 20 when they are diagnosed (Brandolini et al., 2017). The age of diagnosis in our report was 18. The pathophysiology and risk factors of chondroblastoma are both less known. Long bones are engaged with more than 75% of chondroblastoma sores. The most

often affected areas are the distal and proximal femur, proximal humeral and proximal tibial regions (Turcotte et al., 1993). Hip bone socket, ilium, bone, calcaneus, patella and transient bone are extra destinations. The most widely recognized side effect of chondroblastoma is discomfort and agony, regularly felt for under a year. In our report patient has had pain and discomfort for the last four years. In roughly 20 percent of instances, there is a soft tissue bulge, tumour or joint effusion. On the radiograph, chondroblastoma typically appears as a well-defined round or oval lesion. Matrix mineralisation, cortical erosion and soft tissue extension can all be seen on a computed tomography scan. The degree of lesion aggression differs across investigations. The metaphysis may be affected by larger chondroblastomas or can destroy the cortical tissue while forming a new periosteal bone.

Aggressive lesions frequently reoccur (Suneja et al., 2005). On histological examination chondroblast and chondromyxoid stroma surrounding the malignant cells is seen. The various cells are consistently formed from round to polygonal, contain transparent cytoplasm and have well-defined cytoplasmic boundaries. There may occasionally be a nuclear groove or tiny nucleoli. Giant cells of the osteoclast type are almost always dispersed randomly. The chondroblast is accompanied by a fluctuating region where chondroid material is deposited. A "chicken wire" calcification is a notable microscopic discovery. The S-100 protein, vimentin and cytokeratin-reactive neoplastic cells are most typically seen in the immunohistochemical pattern. Chondroblastoma should normally be distinguished from other tumours like eosinophilic granuloma, clear cell chondrosarcoma, giant cell tumour, chondromyxoid fibroma and chondroma-like chondroblastoma (Bousdras et al., 2007).

Chondroblastoma and giant cell tumours both develop in the epiphyses. Furthermore, unlike a large cell tumour, chondroblastoma exhibits a chondroid matrix and calcifications. The epiphysis is affected by chondromyxoid fibroma, which has a myxoid background and a lobulated growth pattern. An uncommon kind of osteosarcoma shares cytological characteristics with chondroblastoma. Yet, it also possesses cells arranged in a sheet-like configuration that penetrate bone trabecula. For chondroblastoma, there is no recognized standard treatment. In comparison, subsequent papers adopt a more aggressive tack, including extensive local excision. Earlier reports promoted curettage for eradicating these lesions or en bloc resection. Curettage alone or in conjunction with related cryosurgery is discussed (Ramappa et al., 2000). Like chemotherapy, radiotherapy had been utilized but is not currently employed. The most frequent consequence (14-18 percent), particularly with subtotal resection, is local recurrence. When it does, metastasis usually affects the lung and develops along the malignant bone lesion. It usually occurs when the underlying tumour recurs. Clinically, pulmonary metastases are non-progressive and frequently manageable with simple observation or limited surgical resection.

Treatments for recurrence include curettage and excising the adjacent soft tissue component. For chondroblastoma, there is no recognized standard treatment. At the same time, subsequent papers adopt a more aggressive tack, including extensive local excision; earlier reports promoted curettage for eradicating these lesions or en bloc resection. Curettage alone or in conjunction with related cryosurgery is discussed (Rodgers and Mankin, 1996). Like chemotherapy, radiotherapy has been utilized but is not currently employed. The most frequent consequence (14-18 percent), particularly with subtotal resection, is local recurrence. When it does, metastasis usually affects the lung and usually develops along the malignant bone lesion. It usually occurs when the underlying tumour recurs. Clinically, pulmonary metastases are non-progressive and frequently manageable with simple observation or limited surgical resection. But in our case, due to the involvement of the posterior cruciate ligament tear, high-frequency radio ablation was the treatment of choice.

4. CONCLUSIONS

Chondroblastoma is a benign bone tumor in nature. It has been reported less frequently to cause metastasis or be locally destructive, involving soft tissue. Surgery is most frequently used to treat chondroblastomas. Curettage or resections are two surgical procedures. Non-Surgical methods like Radiofrequency ablation and cryotherapy work best for small lesions. However, in our case, despite a larger tumor, high frequency radio ablation was used to manage our patient to prevent unacceptable complications and save the adjacent tissue.

Acknowledgement

We thank all the participants who have contributed to this study.

Informed Consent

Informed consent was obtained from the patient.

Author's contribution

All the authors contributed equally to the case report.

Funding

This study has not received any external funding.

Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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