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Case Report

Chondroblastoma of the femoral head-surgical management, outcomes and clinical perspectives: a case report

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ABSTRACT

Chondroblastoma is a rare benign tumor predominantly affecting the epiphyses of long bones, often presenting in the second decade of life. It is known for its potential to recur and cause joint complications despite its benign histology. This report details the case of a 12-year-old boy diagnosed with chondroblastoma of the femoral head, who underwent surgical treatment involving curettage and the use of synthetic hydroxyapatite (HA) bone substitutes. The patient presented with groin pain and limping, with imaging studies revealing an osteolytic lesion in the femoral head. A core needle biopsy confirmed the diagnosis. To manage the lesion, an anterolateral approach was used to perform extensive curettage, and the defect was filled with HA blocks. Postoperatively, the patient was managed with gradual weight-bearing and regular follow-ups. At five years, the patient exhibited normal hip function with no evidence of tumor recurrence, collapse of the femoral head, or osteoarthritis. This case demonstrates that the use of synthetic HA as a bone substitute in the treatment of chondroblastoma can effectively preserve joint integrity and function, providing a viable alternative to traditional grafting methods. The approach was successful in maintaining articular congruence and preventing complications, highlighting the potential benefits of synthetic materials in managing subchondral bone lesions.

Keywords: Chondroblastoma, Femoral head, HA

INTRODUCTION

Chondroblastoma is a rare benign tumor of the epiphysis, behaves slightly aggressive in the second decade of life, affected patients still have an open physis. Clinical course is vague and unpredictable, affected children have pain and limping. One of the striking features is the high incidence of recurrence irrespective of what surgical procedure done, can be as high as 25 percent within 3 years of treatment.[1] Few cases of metastases have been reported despite the histologically benign appearance of the tumour.[1] Usually it affects the ends of long bones and apophysis.[2] Appears more commonly in the epiphyses of the femur.[3] Sometimes after curettage and filling the defect with bone graft or bone substitutes secondary collapse can occur causing non spherical head causing a high incidence of progressive osteoarthritis.[4]

In this article we report a clinical case of a 12 year old boy who was diagnosed with chondroblastoma of femoral head and underwent surgical treatment for the same by curettage of the lesion and bone substitute filling of the cavity to maintain the integrity of the femoral head and to prevent tumor recurrence or development osteoarthritis during his 5 years of follow up. The patient was informed regarding this publication and permission was obtained from him for academic use.

CASE REPORT

A 12 year old boy came with vague symptoms of pain over his right groin and limping on the right leg with a history of difficulty in playing, jumping and sitting cross legged. He did not give any history of fever, chills, weight loss or night cries. On examination there was a classical antalgic

gait and tenderness over the anterior hip joint, there was no fullness and warmth over the scarpa's triangle. There were no fixed joint deformities. Range of movements of the hip were fairly normal with limitation of terminal flexion and internal rotation (90 and 15 degree respectively) and was associated with pain and muscle spasm.

Hence a plain radiograph of the pelvis with both hips AP view was done (Figure 1), to our surprise we found an osteolytic lesion in the proximal femoral epiphysis with a well defined margin with haziness of the lesion and sclerotic margin. To investigate further we did a CT scan (Figure 2) and a MRI of the pelvis with screening of femoral heads (Figure 3 and 4), to add to the confusion MRI revealed a T2 and STIR hyperintense lesion with cystic changes in the femoral head measuring 2.6×2.0 cm with joint effusion and edema of proximal femur and surrounding muscles indicating a differential diagnosis of osteonecrosis, giant cell tumour, enchondroma and chondromyxoid fibroma and tuberculosis had to be ruled out since it is endemic in India. CT of the femoral head showed significant loss of the weight bearing dome of the head and hence we wanted to intervene at the earliest. Blood investigations like ESR, CRP, Mantoux were negative, there was a slight increase in ALP. We had a working diagnosis of chondroblastoma, but we preferred to do a core needle biopsy under anaesthesia. The histology showed a chondro-osseous tumor showing relatively large amounts of chondro-osteoid matrix with partial ossification. The tumor cells had round to oval shaped nuclei and cytoplasm with distinct cell borders a, tumor cells revealed typical chondroblasts, and benign chondroblastoma was positively diagnosed. Immunohistochemically, most of the tumor cells were strongly positive for S-100 protein in their cytoplasm.

Although extensive curettage and packing of the defect with bone graft is the usual treatment for this kind of lesion, we tried to pack the lesion with bone substitute synthetic HA granules and blocks are made of multiphasic calcium HA in low crystalline form (G bone) to prevent additional morbidity of harvesting the graft or using allograft since there were many associated complications with them.

The surgery was performed using the anterolateral approach to the hip, respecting the internervous planes, the capsule of the hip was identified and a capsulotomy was performed, using fluoroscopic guidance a bone window was created in the anterolateral aspect of femoral neck without damaging articular surface of the head using a osteotome. The margins of the tumor were thoroughly debrided and an extensive curettage of the lesion was done and the cavity was filled with a bone substitute made of HA blocks (Figure 5).

Gross findings of the tumor: The tumor was a yellowish and grayish mass with cystic spaces.

Postoperatively, the patient was encouraged to walk with no weight bearing on the second day following surgery. He started partial weight bearing in the sixth week, and full weight bearing at 3 months following surgery.

He was on regular follow up and his symptoms and radiological assessment was done every 6 months (Figure 6-8). The clinical course after the treatment has been uneventful, there was no evidence of recurrence of the lesion and there was no evidence of collapse of the femoral articular surface and no development of osteoarthritis. At 5 years following surgery, the patient had normal hip function with no pain, and radiographs showed no collapse of the femoral head, no osteoarthritic change, and no tumor recurrence. He is active and healthy with no obvious symptoms. The range of motion of the affected hip increased postoperatively, to 120° of flexion, 30° of adduction, 40° abduction, 20° of internal rotation, and 40° of external rotation at the latest follow-up (Figure 9).

Our goal was to achieve stability and articular congruence to restore a functional hip joint. We found the procedure to be effective in preventing further collapse of the femoral head and controlling symptoms. The good clinical outcome seems to be related to the preservation of the joint space.

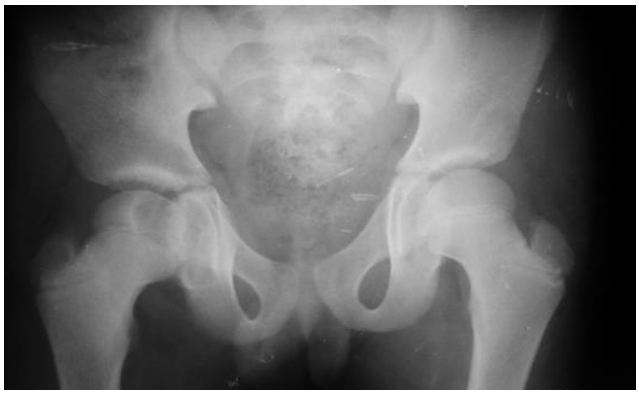

Figure 1: Lytic lesion in the right femoral epiphysis.

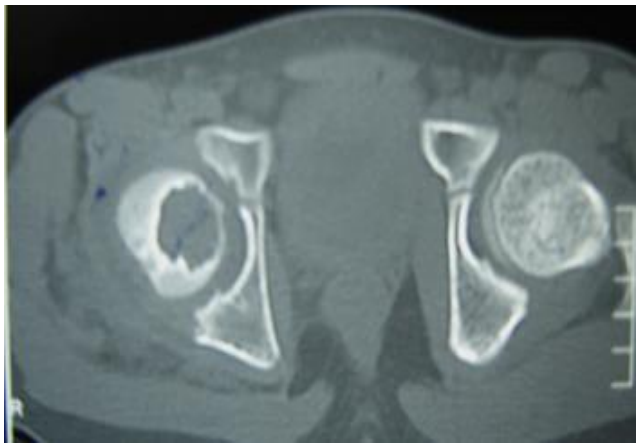

Figure 2: Axial CT of destruction of femoral head and slight involvement of articular area.

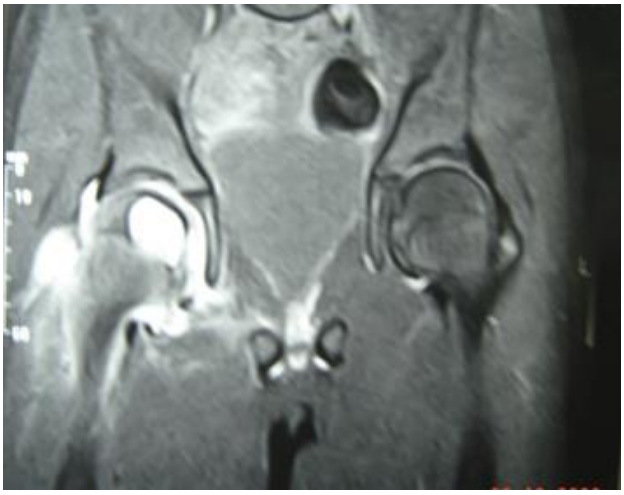

Figure 3: MRI of T2 hyperintensity with joint effusion.

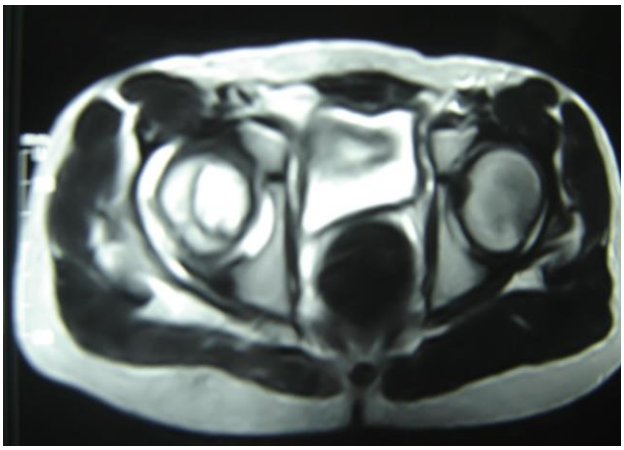

Figure 4: STIR sequence showing the lesion.

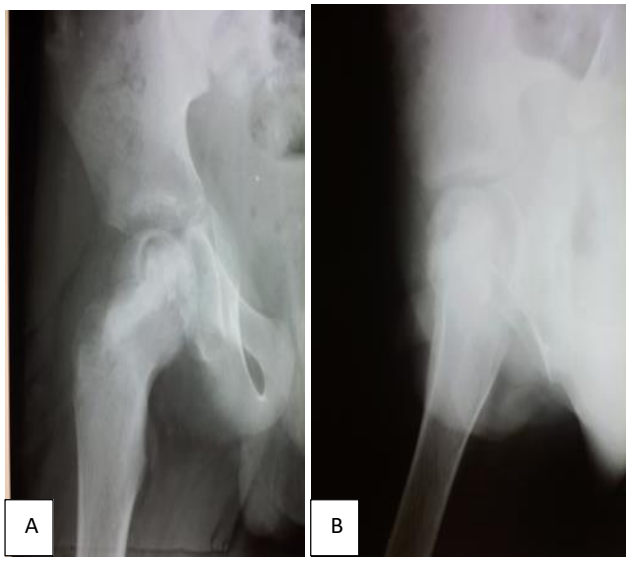

Figure 5 (A and B): X-rays of the right hip AP and lateral view showing the immediate post operative images-with HA bone substitute and curettage of the lesion.

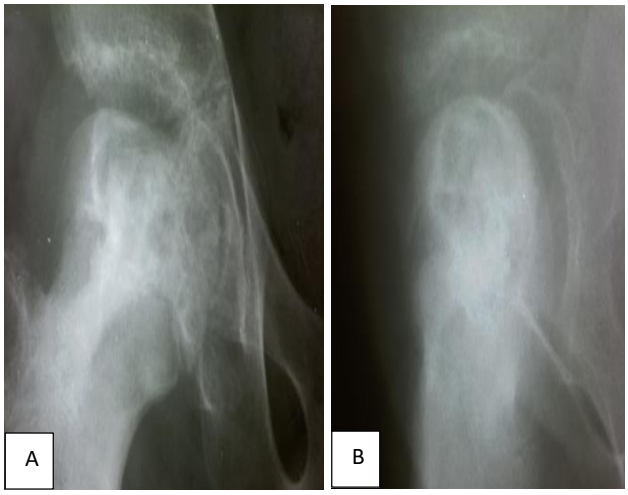

Figure 6 (A and B): At one and half year follow up showing good consolidation of lesion with well congruous hip joint.

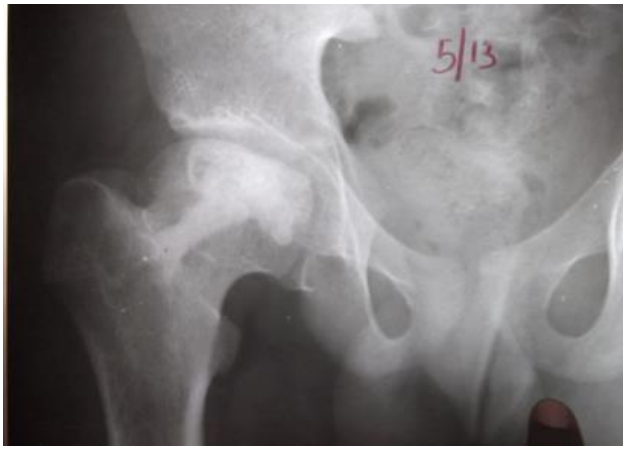

Figure 7: At 3 years follow up showing no recurrence of the lesion with HA graft holding the subchondral bone.

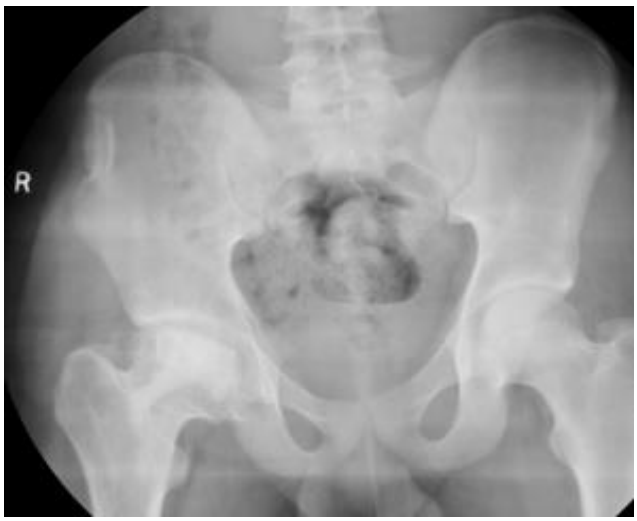

Figure 8: At 5 years follow up with a normal looking hip joint and no recurrence.

Figure 9 (A-C): Clinical photos of good functional outcome.

DISCUSSION

Chondroblastoma is a rare lesion, accounting for approximately 1% of all benign bone tumours.[10] Although the lesion may occur at any age the highest incidence is observed in the second decade of life and patients may still have an open physis. Although the usual treatment is curettage, local recurrence is not unusual (21% following curettage and bone-grafting). Recurrence usually occurs within the first three years after curettage. Curettage and filling with bone chips is usually preferred but when a large part of the head is involved this can be very challenging to obtain sufficient graft.[11]

The bone window procedure made for an easy and safe approach to the subchondral lesion of the femoral head, and it allowed sufficient access to complete curettage and bone substitute filling for the chondroblastoma.[6] With this procedure, we obtained successful results, while preserving the cartilage of the femoral head and avoiding secondary osteoarthritis of the hip joint or aseptic necrosis of the femoral head.[7]

A variety of synthetic bone grafts have been utilized to fill osseous defects following removal of bone tumors. Calcium phosphate ceramics are synthetic scaffolds that have been employed in orthopaedics since the 1980s. Postoperative radiographs revealed radiolucent zones between implanted HA and the surrounding bone immediately after surgery.[5] Over time, radiolucent zones disappeared and new bone developed and although HA was typically incorporated into host human bone, no obvious evidence of biodegradation was detected even after long periods following implantation thus acting as a mechanical strut for the subchondral bone.[5]

One of the surgical approaches for curettage of the lesion in the femoral head is the extra articular approach from the lateral femoral cortex.[8,9] Excellent results for extra articular endoscopic excision of femoral head chondroblastoma were reported. This method can provide access to subchondral lesions and allow bone grafting without disrupting the weight-bearing cartilage through a window in the lateral femur just distal to the greater trochanter.[9] However, that arthroscopic procedure is technically demanding to remove subchondral lesions completely, and it requires a bone tunnel that violates the proximal femoral physis and is not suitable for young children. Mont et al reported successful results for a trapdoor procedure with autologous cancellous and cortical bone grafting for late stage osteonecrosis of the femoral head.[6,7] We tried applying this surgical approach for chondroblastoma of the femoral head with some modifications by use of a larger neck window and bone substitute (HA).

CONCLUSION

However, collapse of the femoral head and progression to osteoarthritis of the hip joint have not yet occurred at the time of writing. We believe that the use of Bone Substitute grafts in the treatment of proximal femoral chondroblastoma in young people near the age of physeal closure may be a valid option in some instances by just playing a role like a spacer and offering mechanical support.

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Ethical approval: Not required

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