

Subcapital Neck of Femur Fracture in a Case of Osteonecrosis of Femoral Head – Rare Presentation

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Learning Point of the Article:

The presentation of osteonecrosis of femoral head with pathological sub-capital fractures is rare. Osteosynthesis of such fractures rarely has good results and Total Hip Arthroplasty can be a good treatment option.

Abstract

Introduction: Osteonecrosis of femoral head is a common debilitating condition affecting young males most commonly. It is endpoint of a series of events leading to disturbance in the blood supply of femoral head. Rarely, these cases present with acute pain following trivial trauma due to pathological fracture in the neck of femur. We present a rare case of pathological subcapital neck of femur fracture in a case of osteonecrosis of femoral head. These cases should not be confused with post-traumatic neck of femur fracture.

Case Report: A 28-year-old male student presented with history of acute pain in right hip and inability to walk after a squatting event. He was diagnosed to have osteonecrosis of bilateral femoral head 1 year back, for which he denied further treatment. On clinical examination, right hip examination was painful with flexion, adduction, and external rotation deformity. Radiological examination revealed fracture at subcapital region in neck of right femur with osteonecrosis of femoral head. After discussing treatment options with the patient, we performed total hip arthroplasty (THA). Harris hip scores improved from 17.1 to 83.5.

Conclusion: The presentation of osteonecrosis of femoral head with pathological fractures is rare. Furthermore, it is not included in the commonly used classifications. Osteosynthesis of pathological fracture of neck of femur with osteonecrosis of femoral head rarely has good results. THA can be a good option in these cases with good functional results.

Keywords: Osteonecrosis, avascular necrosis, pathological fracture.

Introduction

Osteonecrosis of the femoral head (ONFH) is the endpoint of series of events causing decreased blood flow to the femoral head leading to cellular death, subchondral fracture and cartilage collapse [1]. Mechanical vascular blockade, intravascular occlusion or intraosseous hypertension result in decreased microvascular circulation [2]. Young population is most commonly affected. The clinical presentation varies from painless hip, painful restriction of movements, shortening and deformity to total ankylosis [3,4]. Most common symptom is deep groin pain and pain referred to the ipsilateral buttock or knee. Physical examination may reveal painful and limited hip

motion, especially internal rotation. Collapse of the femoral head is associated with considerable loss of internal rotation. Rarely they are associated with pathological fracture of the neck of femur. There are very few reports of ONFH presenting with a pathological subcapital fracture. Commonly used classifications do not classify this atypical presentation. We report this rare and atypical presentation in a young male and its management.

Case Report

A 28 years old, moderately built male student, presented to the orthopedic outpatient department of a tertiary care center with

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Author's Photo Gallery



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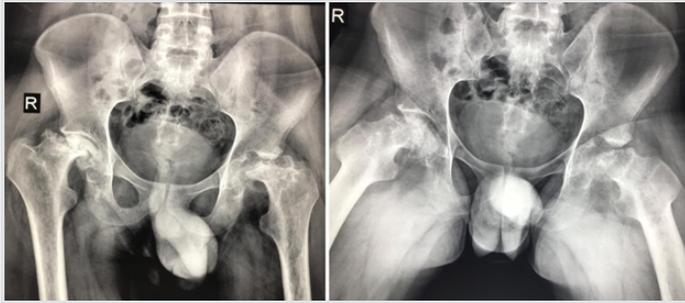


Figure 1: Pre-operative X-ray and magnetic resonance imaging (subcapital neck of femur fracture is seen in the right femur).

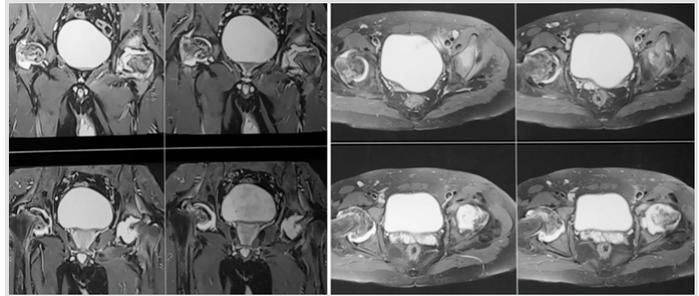


Figure 2: Pre-operative magnetic resonance imaging (subcapital neck of femur fracture is seen in the right femur).

a sudden increase in pain and inability to use the right hip for about 5 days. He complained of chronic pain in both hips and gluteal region associated with progressive limp for 1 1/2 years. He was previously investigated in our hospital and diagnosed to have ONFH of bilateral hip for which he had refused to take any further treatment and discontinued follow-up. After 1 year, he presented with above complaints. He had worsening of symptoms following a squatting event and required assistance to get up and walk thereafter. He was an alcoholic for the past 8 years. He denied any history of bleeding disorder, trauma, steroid intake, or family history. Limb was in the attitude of flexion, adduction, and external rotation. Clinical examination of the right hip revealed deep tenderness on anterior joint line, thump tenderness on greater trochanter, and wasting in thigh and gluteal muscles. Greater trochanter was at higher level as compared to the left side. There was true shortening of 2 cm, painful hip movements with 20° flexion deformity and 10°

adduction deformity in right hip. His left hip was also symptomatic. Harris hip score was 17.1. Previous X-rays showed increased sclerosis and lytic lesions in both hips, suggestive of ONFH. X-ray was done after patient had inability to walk, which revealed increased sclerosis with decreased joint space, loss of contour with subcapital femoral neck fracture (Fig. 1). Magnetic resonance imaging (MRI) pelvis with both hips revealed osteonecrosis involving both heads and pathological subcapital fracture on the right side. (Fig. 2) Presentation of ONFH with subcapital fracture has not been included in the commonly used classifications. It makes classifying or staging the avascular femoral head changes difficult. After discussing the treatment options with the patient, we planned for a right total hip arthroplasty (THA) since the patient wanted stable and mobile hip. Our intraoperative findings revealed that margins of the fracture were irregular with no capacity to bleed (Fig. 3). Cemented THA was done. Gross necrosis in the marrow and lipid infiltration was reported in histopathology of the femoral head which is consistent with osteonecrosis (Fig. 4). In the post-operative period, patient was mobilized full weight-bearing from 1st day and rehabilitation was continued as per protocol. The other hip was operated for cemented THA after 2 weeks (Fig. 5). At 6-month follow-up, Harris hip score was 83.5.

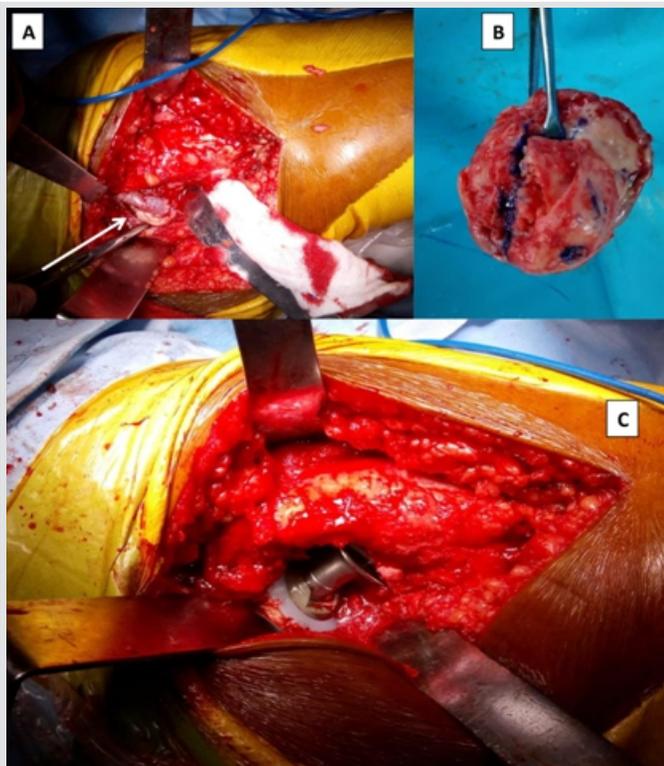


Figure 3: Intraoperative images. (a) White arrow showing fracture fragment before hip dislocation. (b) Fracture site with blue color line and Allis forceps inserted in fracture site. (c) Final image after total hip arthroplasty.

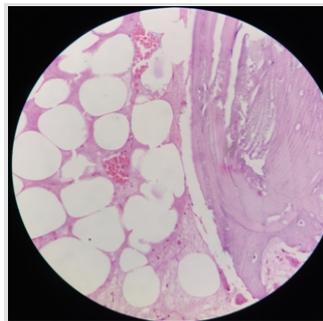


Figure 4: Description - histopathology showing viable trabecular bone with spicules of necrosed acellular bone.

Discussion

ONFH in adult is a common debilitating condition of hip. In 30% of cases, the etiology is idiopathic. Bilateral involvement is seen in 55% of cases. Subchondral region is common site for

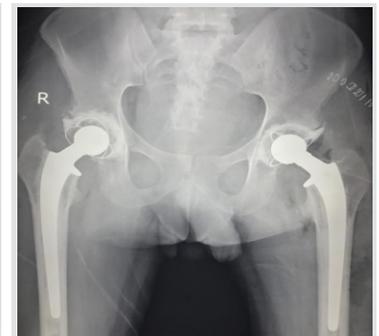


Figure 5: Post-operative X-ray showing bilateral cemented total hip arthroplasty done.



Table 1: Revised criteria (Sugano 2001) for diagnosis, classification, and staging of idiopathic osteonecrosis of the femoral head

S. No.	Criteria	Clinical findings of patient
1	Collapse of the femoral head without joint-space narrowing or acetabular abnormality on X-rays	No
2	Sclerosis in the femoral head without joint space narrowing or acetabular abnormality	No
3	“Cold in hot” on bone scans	Not done
4	Low-intensity band on T1-weighted images	Yes
5	Trabecular and marrow necrosis on histology	Yes

*Any two positive criteria of the five.- Definite diagnosis

fracture in ONFH. Kenzora and Glimcher proposed that, in osteonecrosis, femoral head can break in two different directions, either through subchondral fracture through the necrotic area or through a fracture through the junction between the necrotic bone and reparative bone [5]. When osteonecrosis involves the entire femoral head, the reparative process occurs at the subcapital area [5, 6, 7, 8, 9]. The differences between the elastic moduli and compliance of necrotic and regenerating areas of bone lead to fracture at this junction. Fractures occurring in this region can be misdiagnosed as post-traumatic [7, 8, 10].

Our patient had bilateral hip involvement and presented with pathological subcapital fracture in the right hip and modified Ficat and Arlet Stage IV avascular necrosis in the left hip. The criteria for ONFH given by Sugano et al. were also fulfilled [11]. (Table 1). There are few reports available on pathological subcapital fractures after ONFH [7, 8, 10].

In our patient with bilateral ONFH, pathological fracture occurred through the junction between the necrotic bone and reparative bone at the subcapital area of the right femoral head. Modified Ficat and Arlet is the most commonly preferred

classification for ONFH [12]. Many other classifications used for ONFH are based on X-ray, MRI, and bone scan such as the University of Pennsylvania, Marcus et al. and the Japanese Investigation Committee on osteonecrosis [13, 14]. None of the above classifications include ONFH with pathological fracture. Various treatment options have been described such as core decompression, vascularized bone graft, muscle pedicle bone graft, proximal femoral osteotomy, and arthroplasty. These surgical options are used at different stages of ONFH. Some nonoperative treatment options have also been described such as hyperbaric oxygen and extracorporeal shock wave therapy. No treatment options have been described for ONFH presenting with pathological fracture [15]. If osteosynthesis is performed in subcapital fractures in ONFH, results are rarely good. Therefore, these patients should be treated with THA. After discussing with the patient and taking his requirements into consideration, we found THA was the best option. Hence, we performed THA.

Conclusion

The presentation of ONFH with pathological fractures is rare. Furthermore, it is not included in the commonly used classifications. THA can be a good option in these cases with good functional results.

Clinical Message

The presentation of osteonecrosis of femoral head with pathological subcapital fractures is rare. Fractures occurring in this region can be misdiagnosed as post-traumatic. Osteosynthesis of such fractures rarely has good results. THA can be a good option in these cases with good functional results.

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