

Subchondral Insufficiency Fracture of Femoral head: Uncommon cause of Hip pain in Elderly

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Abstract

Introduction: Subchondral insufficiency fracture (SIF) of femoral head is not very common cause of hip pain. This usually occurs in elderly osteoporotic patients or fatigue fracture in young military recruits.

Case Report: We report a case of hip pain in an osteoporotic male which was diagnosed on MRI after the condition was missed by two physicians initially. Patient responded well to conservative treatment and was asymptomatic at one year follow up.

Conclusion: Purpose of this case is to highlight clinical and radiological features of this entity and to discuss the prognosis and treatment. This case should increase awareness of this rare condition amongst treating physicians. This may facilitate early diagnosis and successful outcome with conservative treatment in selected sub-group of patients having SIF of femoral head.

Keywords: Subchondral Insufficiency Fracture, Femoral Head, Elderly, Osteoporosis.

Introduction

Subchondral insufficiency fracture (SIF) is the fracture occurring in femoral head without any trauma and usually presents with hip pain [1,2]. The two categories of patients commonly affected are young military recruits and old patients with poor bone stock. It has also been reported in recipients of renal transplant, rheumatoid arthritis patients taking steroids and after liver transplant [3,4]. Osteonecrosis and transient osteoporosis are the main differential diagnosis. Few patients may respond to conservative treatment [5,6] But some may require surgical intervention due to rapid progression of disease [2,7,8,9]. Here we report this rare case in 54 year male who responded well to conservative treatment.

Case Report

Fifty four year old male came with pain in left hip since two months. Pain started insidiously and was gradually progressing, aggravated by prolonged walking, climbing

stairs and relieved with rest. Patient was already under treatment with analgesics for complaints of occasional back pain. There was no history of alcoholism, trauma, steroid intake or any systemic illness or childhood hip pathology like Perthes disease or any septic hip disease. Clinical examination of hip showed terminal restriction of flexion and internal rotation due to pain. Tenderness was present on anterior joint line. No other positive finding could be elicited in affected or opposite hip. Radiograph of the affected hip with pelvis did not reveal any abnormality (Fig. 1). Harris hip score was 48 with pain as most significant factor. MRI showed subchondral, discontinuous, serpiginous radiolucent line parallel to articular surface which was hypointense in both T1 and T2 images and with adjacent hyperintense shadow in T2 due to marrow edema. This picture was suggestive of subchondral insufficiency fracture (Fig. 2). DEXA scan revealed low T scores at all sites average of -1.4 indicating osteopenia. Vitamin D3 levels were below normal (8ng/ml).

Patient was kept non weight bearing and was given standard treatment for osteopenia including Vitamin D3 supplementation and alendronate. After six weeks, movements improved with minimal pain on exertion. Harris hip score improved to 80 and repeat MRI at three months showed decrease in bone edema and blurring of fracture line indicating healing. MRI at 6

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Figure 1: Radiograph of pelvis with both hips showing no obvious abnormality

months showed complete healing of the lesion (Fig. 3). At one year follow up patient was completely asymptomatic and was independently able to carry out his activities of daily living.

Discussion

The term subchondral insufficiency fracture of femoral head was coined by Bangil et al in 1996 [1]. SIF occurs when physiological stress is applied to weakened bone due to poor mineralization or decreased elastic resistance. So it is most commonly seen in postmenopausal osteoporotic females [1] but can be seen in young military recruits as stress fractures [11,12]. In a histopathological study done on surgically resected 7718 femoral heads by Yamamoto et al incidence was highest above the age of 60 but it is also seen in third and fourth decade [12].

SIF may be underdiagnosed due to difficulty in diagnosis. It needs to be differentiated from osteonecrosis and transient osteoporosis which may be difficult at times. Pain in hip in transient osteoporosis even though is similar to pain in osteonecrosis; pain in transient osteoporosis gradually progresses reaching highest intensity in 6-8 weeks and then gradually decreases over next 6-12 months. But pain in osteonecrosis is gradually progressive and worsening. Men above 40 who are alcoholic or taking steroids are the typical presentation for osteonecrosis. Transient osteoporosis of hip is self-limiting condition usually seen in middle aged males or in third trimester of pregnancy which is not the usual age group for SIF. Further studies needs to be done to find out correlation between these two. MRI shows bone marrow edema in all these three conditions. In osteonecrosis MRI shows

hypointense band with concavity to articular surface, in SIF this band is serpiginous, with convexity to articular surface and usually discontinuous [13,14]. But few reports mention shape of hypointense band concave to articular surface in SIF [1]. Contrast enhancement proximal to hypointense band in head may be additional MRI finding that can differentiate SIF from osteonecrosis and transient osteoporosis which is due to viable bone in SIF as opposed to dead bone in osteonecrosis [8].

This low intensity band in SIF corresponds to subchondral fracture and repair tissue [2,12]. This area contains irregularly arranged fracture callus, reactive cartilage and granulation tissue. Subchondral collapse, gradual deterioration of bone marrow edema in MRI, disorganization and collapse of femoral head are the MRI features which differentiates osteonecrosis from SIF and transient osteoporosis. Transient osteoporosis of hip shows bone marrow edema and low signal intensity linear patterns in T1 in subchondral region extending to intertrochanteric region which will be high intensity in T2 [1]. Bone trabeculae are thick in osteoarthritis but in SIF they are thin and sparse [12].

Treatment of transient osteoporosis of hip is supportive; as various treatment modalities has failed to conclusively show any benefit in this condition. Protected weight bearing, NSAIDs and physiotherapy as soon as patient is comfortable are the usual

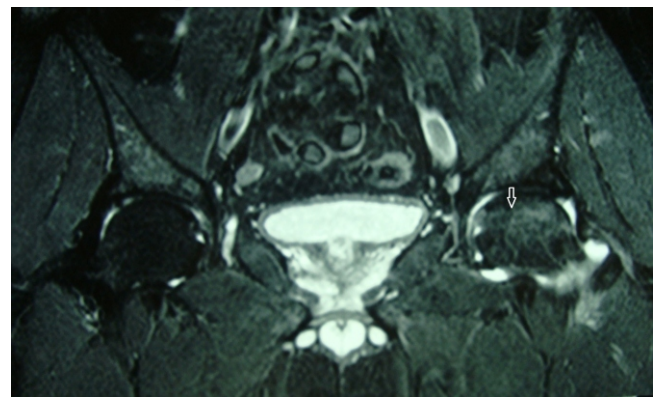


Figure 2: MRI T1 image showing subchondral, discontinuous, serpiginous dark line parallel to articular surface with surrounding oedema

components of treatment. Abductor strengthening exercises should be started at the earliest to prevent contractures. Aim of treatment is to prevent microfractures and pathological stress fractures. In those patients with no collapse on MRI heal with conservative treatment of osteoporosis, protected

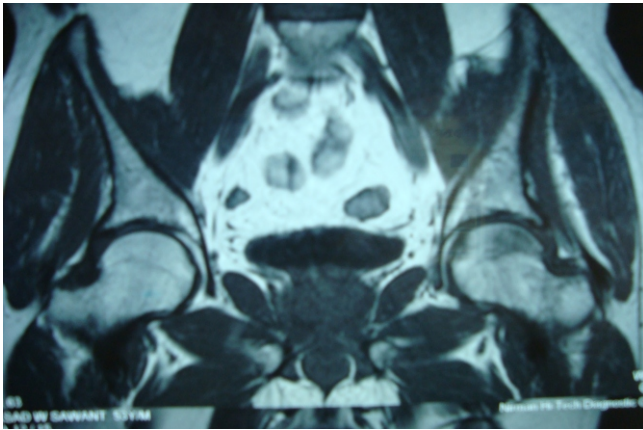


Figure 3: Six month follow up MRI showing healing of the lesion.

weight bearing and restriction of activities. Those having collapse require arthroplasty [10].

Prognosis of SIF is still unclear and may depend on extent of fracture, severity of osteoporosis (Singh's index), weight, activity level of the patient and age [9]. Miyanishi et al studied 27 patients having SIF of femoral head to identify the risk factors for THA. Patient age was the only statistically significant risk factor with elderly patients having more chances of undergoing THA [15]. As per Iwasaki et al who studied MRI of 25 patients having SIF of femoral head, band length and band length ratio may be predictive of collapse of head in cases of SIF. Band length being measured at the slice having maximum length of band in T1 wt coronal images of hip. Band length ratio represents length of fracture line relative to length of weight bearing portion at femoral head slice [16].

Conclusion

In short subchondral insufficiency fracture of femoral head is common in elderly osteoporotic patients, uncommon in healthy young adults. It needs to be diagnosed at the earliest by excluding osteonecrosis and transient osteoporosis. MRI will help in diagnosing it early and may help to determine prognosis. Patients without collapse has good prognosis as these are likely to respond to conservative treatment, but others may require arthroplasty so follow up is necessary once subchondral insufficiency fracture of femoral head is diagnosed.

Clinical Message

Elderly patients presenting with persistent hip pain without any abnormality on plain radiograph should be suspected for Subchondral insufficiency fractures. MRI is essential for diagnosis and early diagnosis can avoid progression of disease and need for surgical

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