

Recurrent Subchondral Insufficiency Fracture of the Femoral Head: A Case Report

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Learning Point of the Article:

If pain recurs after a first episode of subchondral insufficiency fracture (SIF) of the femoral head, it should be kept in mind not to overlook the possibility of a recurrent SIF.

Abstract

Introduction: Subchondral insufficiency fracture (SIF) of the femoral head has been reported to occur in older women with osteoporosis. No cases with recurrence of SIF at another site in the ipsilateral femoral head have been described.

Case Report: We report a case of a 75-year-old woman with recurrent SIF at another site in the ipsilateral femoral head. SIF was first observed at an anterolateral site on the femoral head and treated non-operatively. The hip pain disappeared after 3 months but recurred 5 months later when another SIF was newly observed at a posterolateral-to-medial site on the femoral head. This SIF was also treated non-operatively. Five months later, the pain was alleviated, but progression of osteoarthritis was seen on X-rays.

Conclusion: After an initial SIF, the possibility of recurrence should be considered if pain recurs, even on the ipsilateral side.

Keywords: Recurrence, subchondral insufficiency fracture, ipsilateral femoral head.

Introduction

Subchondral insufficiency fracture (SIF) of the femoral head has been reported to occur in older women with osteoporosis [1, 2]. In a few cases, SIF was reported to occur in young people and after renal transplantation [3-6]. Regarding treatment, non-operative treatments were reported to be effective in some cases [3, 5, 6].

Bilateral SIF has been reported in three cases [5, 6]. However, no cases with recurrence of SIF at another site in the ipsilateral femoral head have been described. Herein, we report a case of SIF recurrence at a different site in the same femoral head after an interval of 5 months.

Case Report

A 75-year-old woman presented to an orthopedic clinic with right hip pain caused by a misstep. Her height was 156 cm and her body weight was 63 kg, giving a body mass index of 25 kg/m². She had no history of steroid treatment or alcohol consumption.

On X-ray examination, an osteophyte on the acetabular fossa and subchondral sclerosis of the acetabulum were observed (Fig. 1a), but a crescent sign and collapse of the femoral head were not seen. A center-edge angle of 17°, a sharp angle of 43°, and an acetabular head index of 70% were noted. The patient was diagnosed with acetabular dysplasia for the first time. T1-weighted images on magnetic resonance imaging (MRI) revealed a low-intensity band parallel to the articular cartilage at an anterolateral site on the right femoral head (Fig. 1b and c). The

Author's Photo Gallery



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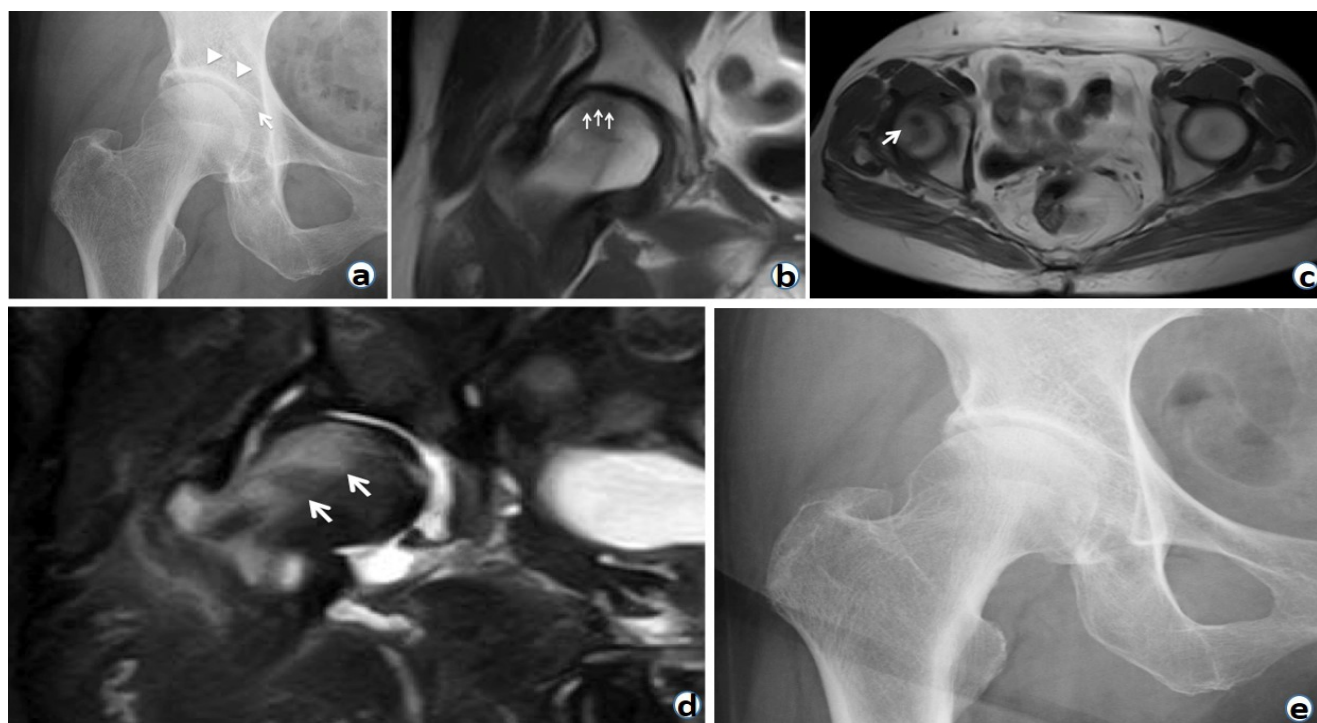


Figure 1: X-rays and magnetic resonance imaging (MRI) images of the first subchondral insufficiency fracture (SIF) (a) X-ray at first onset of SIF shows no crescent sign at the femoral head. An osteophyte on the acetabular fossa (white arrow) and subchondral sclerosis of the acetabulum (white arrowheads) are observed. Center-edge angle is 17°, sharp angle is 43°, and acetabular head index is 70%. (b) Coronal section of a T1-weighted image on MRI at the first SIF shows a low-intensity band parallel to the articular cartilage surface at a lateral site on the femoral head (white arrows). (c) Axial section of a T1-weighted image on MRI shows a low-intensity area at the anterior side of the femoral head (white arrow). (d) Coronal section of a T2-weighted image on MRI shows diffuse high signal intensity around the low-density band (white arrows). (e) X-ray shows no collapse of the femoral head at 3 months after onset of the first SIF.

length of the low-intensity band was 11 mm, and the band ratio (ratio of weight-bearing portion length to band length) [7] was 35%. A T2-weighted image on MRI showed diffuse high signal intensity around the low-intensity band (Fig. 1d). The bone mineral density (BMD) was not measured at this time. The patient was diagnosed with SIF involving bone marrow edema based on previously reported diagnostic criteria [8, 9]. The patient was treated non-operatively, including the administration of NSAIDs, and was allowed to walk according to the degree of pain. The pain disappeared 3 months after the onset (Fig. 1E).

Subsequently, the patient experienced ipsilateral hip pain while lifting her husband during nursing care, 5 months after disappearance of the first hip pain. X-ray examination revealed a 1-mm collapse at a lateral site on the femoral head and osteophyte formation at the lateral head-neck junction of the femoral head (Fig. 2a). The osteophyte on the acetabular fossa and subchondral sclerosis of the acetabulum were more clearly observed on the X-ray, and the minimum joint space was 1 mm narrower than that observed 5 months previously (Fig. 1e). The progression of osteoarthritis was observed. T1-weighted images on MRI showed a new low-intensity band at a

posterolateral-to-medial site on the femoral head (Fig. 2b and c). The length of the low-intensity band was 10 mm, and the band ratio [7] was 32%. A T2-weighted image on MRI showed diffuse high signal intensity around the low-intensity band (Fig. 2d). The high signal intensity area revealed in the first SIF had disappeared in the second SIF. The patient was diagnosed with a recurrence of SIF at a different sites on the ipsilateral femoral head from the first SIF. Osteoporosis was also diagnosed after dual X-ray absorptiometry demonstrated a BMD of 0.675 g/cm² (T-score: -1.0) in the right femoral head and a total BMD of 0.792 g/cm² (T-score: -1.8) in the lumbar spine (L1-L4). Administration of teriparatide was prescribed for the second SIF. The patient was treated non-operatively and was allowed to walk with a T-cane according to the degree of pain. At 5 months after the onset of the second SIF, the pain had gradually alleviated but was still present (Fig. 2e). In particular, walking pain remained, but the patient was able to walk with a T-cane. An X-ray showed progression of osteoarthritis of the hip at 3 years after the first SIF onset (Fig. 2f).

Discussion



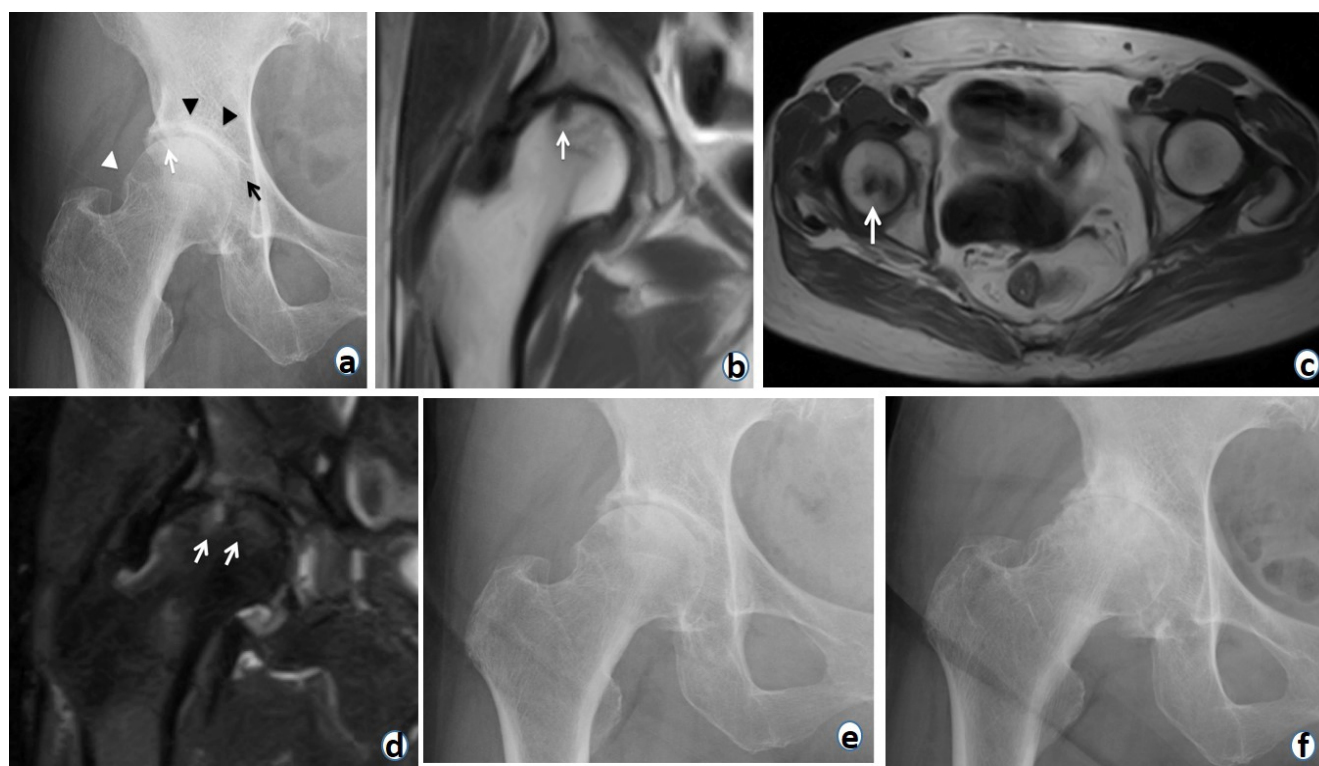


Figure 2: X-rays and magnetic resonance imaging (MRI) images of the second subchondral insufficiency fracture (SIF) (a) X-ray obtained 5 months after disappearance of the first hip pain shows a 1-mm collapse at a lateral site on the femoral head (white arrow) and an osteophyte at the lateral-head neck junction of the femoral head (white arrowhead). The osteophyte on the acetabular fossa (black arrow) and subchondral sclerosis of the acetabulum (black arrowheads) are more clearly observed and the minimum joint space is 1 mm narrower than the observations 5 months previously. Progression of osteoarthritis is observed. (b) Coronal section of a T1-weighted image on MRI at SIF recurrence shows a new low-intensity band at a lateral site on the femoral head (white arrow). (c) Axial section of a T1-weighted image on MRI shows a low-intensity area at a posterior site on the femoral head (white arrow). (d) Coronal section of a T2-weighted image on MRI shows diffuse high signal intensity around the low-intensity band (white arrows). (e) X-ray shows no progressive collapse of the femoral head at 5 months after onset of the second SIF. (f) At 3 years after onset of the first SIF, an X-ray shows progression of osteoarthritis of the hip.

SIF has been reported to occur in older women with osteoporosis and patients with organ transplantation [1, 2, 4, 10]. Bilateral SIF in patients who underwent renal transplantation was also reported [5, 6]. However, there are no reports of recurrence of SIF at another site in the ipsilateral femoral head.

The reason for recurrence at another site may be related to the position of the injured limb. Bachtar et al. [11] reported that load stress was concentrated at an anterior site on the femoral head during walking, based on a patient-specific finite element analysis. At the first SIF onset, the patient missed her step during walking, and the load stress may have been concentrated at an anterior site on the femoral head, leading to a fracture at the anterior site. Meanwhile, Anderson et al. [12] reported that load stress was concentrated at a posterior site on the femoral head during hip flexion and internal rotation. At the second onset, the patient had hip flexion and internal rotation when lifting her husband and the load stress may have been concentrated at a posterior site on the femoral head, causing a fracture at the posterior site.

Iwasaki et al. [7] reported that the length of the low-density band on a T1-weighted image on MRI, namely the length of the fracture line, and its ratio to the length of the weight-bearing portion (band ratio) were important factors for predicting collapse of the femoral head. If the band ratio was $\geq 57.9\%$ or less, conservative treatment was considered effective [13]. Owing to the short fracture line and small band ratio in the present patient, non-operative treatment may have resulted in bone union after the first episode of SIF. Although bone union was also observed after the second episode of SIF and there was no progressive collapse of the femoral head, osteoarthritis of the hip had progressed. Specifically, the X-ray examination at the onset of the second SIF revealed that osteoarthritis had progressed compared with the X-ray examination after the healing of the first SIF. As the first SIF had healed and a collapse of the femoral head was very slight, the joint space was not usually narrowed. Progressive osteoarthritis may have occurred through acetabular dysplasia. Yamamoto et al. [14] reported that the prevalence of SIF in cases with a pre-operative clinical diagnosis of osteoarthritis was 6.3% (460 of 7349 cases). SIF

may be involved in the progression of osteoarthritis, requiring surgical treatment. In our case, osteoarthritis may have progressed as a result of SIF overlapping with progressive osteoarthritis with acetabular dysplasia.

Iwasaki et al. [15] reported that the most common site of SIF was an anterior site on the femoral head. They classified SIF into lateral type and central type and found that lateral type was predominant in patients with acetabular dysplasia of the hip and represented a poor prognostic factor. The present patient had a lateral-type SIF and also had acetabular dysplasia of the hip, consistent with their report.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

Conclusion

We provide the first case report of recurrent SIF at another site in the ipsilateral femoral head. The reason for recurrence at another site may be related to the position of the injured limb. After a first episode of SIF, the possibility of recurrence should be kept in mind if pain recurs, even on the ipsilateral side.

Clinical Message

If pain recurs after the first episode of SIF, it may be diagnosed as resulting from the same site. It should be kept in mind not to overlook the possibility of a recurrent SIF.

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