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Imaging and histopathological evaluation of a cystlike formation in subchondral insufficiency fracture of the femoral head: A case report and literature review☆

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ABSTRACT

INTRODUCTION: In the majority of subchondral insufficiency fractures (SIFs) of the femoral head, T_1-weighted magnetic resonance imaging shows an irregular, serpiginous, low-intensity band that is convex to the articular surface. We report a case of a cystlike formation in SIF of the femoral head in an elderly woman.

PRESENTATION OF CASE: A 71-year-old woman reported right hip pain without any history of antecedent trauma. The initial radiograph showed a slight narrowing of the joint space in the right hip. The patient was treated with conservative therapy for 2 months. Radiographs obtained 3 months after the onset of pain showed non-progressive joint-space narrowing. T_1-weighted magnetic resonance images obtained 2 months after pain onset revealed a round, cystlike, low-intensity area just beneath the articular cartilage. The patient underwent total hip arthroplasty. Histopathological examination showed fracture callus and granulation tissue in the subchondral area, surrounded by vascular-rich granulation tissue and fibrous tissue, which corresponded to the round, low-intensity band observed on the T_1-weighted image.

DISCUSSION: This case was a rare SIF of the femoral head which had a cystlike formation with a low signal intensity on T_1-weighted images and a very high signal intensity on STIR sequences in the superolateral portion of the femoral head, surrounded by a pattern of edema in the bone marrow. To our knowledge, no similar cases were cited in the literature.

CONCLUSION: It is important for surgeons to keep in mind that sometimes SIFs of the femoral head can appear as a round cystlike formation.

1. Introduction

Subchondral insufficiency fractures (SIFs) of the femoral head occur mainly in elderly women with osteoporosis.[1,2] In the majority of patients, radiographs obtained at the onset of hip pain show no obvious findings, but T_1-weighted magnetic resonance imaging (MRI) reveals an irregular, serpiginous, low-intensity band that is convex to the articular surface.[1–4] This band histologically corresponds to a fracture line, and it is also one of the characteristic findings in SIF.[5] We report herein a case of SIF in which a cystlike formation was seen on magnetic resonance images in addition to a pattern of edema in the bone marrow.

2. Presentation of case

A 71-year-old-woman presented with a 1-month history of right hip pain without any history of antecedent trauma. She had no history of corticosteroid therapy or alcoholism. Her height was 150 cm, and at a weight of 51.0 kg and a body mass index of 22.7 kg/m^2, she was not overweight.[6] The range of motion in her right hip was 100° in flexion, 10° in extension, 30° in abduction, 20° in adduction, 20° in external rotation, and 0° in internal rotation. Her values on laboratory tests—C-reactive protein, lipid profile, liver and renal function, alkaline phosphatase, serum calcium and phosphorus, and clotting function—were all within normal ranges. Furthermore, findings were negative for rheumatoid factor and anticyclic citrullinated peptide antibodies. Her bone mineral density, measured by dual X-ray absorptiometry, was 0.739 g/cm^2 (T score, −2.5) for her lumbar spine and 0.576 g/cm^2 (T score, −2.1) for her right

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Fig. 1. A supine anteroposterior radiograph obtained 1 month after the onset of pain in the right hip shows acetabular dysplasia, the lytic area in the superolateral portion of the femoral head and slight joint-space narrowing.

femoral head. Initial radiographs obtained 1 month after pain onset revealed mild acetabular dysplasia [center-edge angle,[7] 15°; inclination angle of the weight-bearing portion of the acetabulum,[8] 13°] and joint-space narrowing in the weight-bearing area (Fig. 1). There was no history of any corticosteroid intake. Also, No evidence of malignancy, infection or inflammatory diseases was noted. The patient was treated with an intra-articular injection (1.65 mg of dexamethasone sodium phosphate and 3 ml of 0.5% lidocaine) and instructed to take an anti-inflammatory drug (loxoprofen, 60 mg, three times daily). However those treatments only relieved her temporarily. At 2 months after the onset of hip pain, radiographs showed no significant changes since the initial radiographs (Fig. 2A). Computed tomography (CT) showed a cystlike formation in the superolateral portion of the femoral head, facing the acetabular rim (Fig. 2B). MRI showed a low signal intensity on T_1-weight images and a very high signal intensity on the short τ inversion recovery (STIR) sequence of the superolateral portion of the femoral head, which was surrounded by a pattern of edema in the bone marrow. The edema pattern was found not only in the femoral head but also in the acetabulum facing the cystic lesion on the femoral head (Fig. 2C, D). Interestingly, although radiographs obtained just before surgery showed no remarkable changes (Fig. 3A), MRI

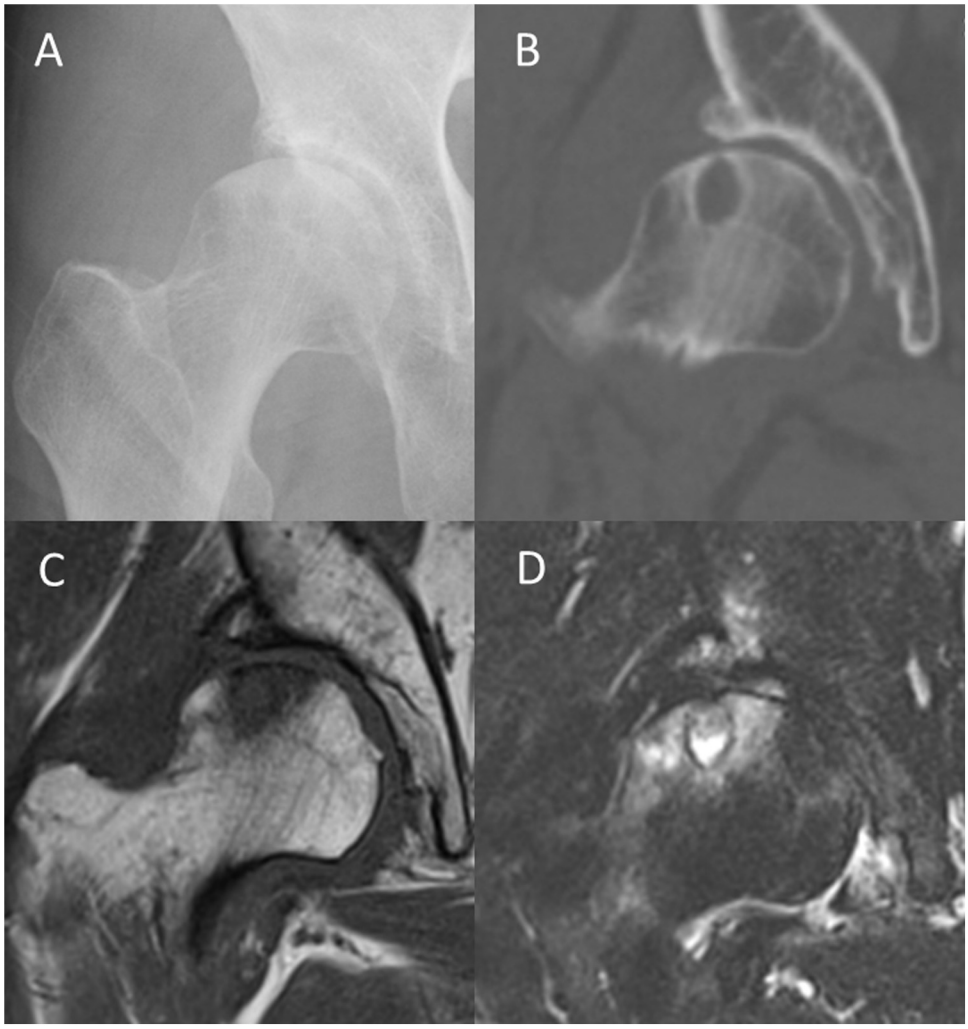

Fig. 2. Images obtained 2 months after the onset of hip pain: (A) radiograph showing no remarkable changes in the joint space. (B) Computed tomography multiplanar reconstruction showing a lytic lesion with a well-defined sclerotic margin in the superolateral portion of the femoral head. (C) Coronal T_1-weighted magnetic resonance image showing diffuse low signal intensity in the superolateral portion of the femoral head and acetabular rim. (D) Corresponding area of high signal intensity on the short τ inversion recovery (STIR) sequence. On the femoral side, there is a very high signal intensity area on the STIR sequence as well. A well-delineated round, low-intensity band is also visible on the T_1-weighted image and the STIR sequence.