—Report on Experiments and Clinical Cases—

A Case Report of Insufficiency Fracture of the Fossa Acetabuli in a Patient with Rheumatoid Arthritis

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Abstract

Aside from vertebral compression fractures, the most common site of insufficiency fractures is the pelvis and lower extremities. In the pelvis, the fractures usually occur in the ilium, the pubis and the ischium, but rarely in the fossa acetabuli. We report a severe insufficiency fracture of the fossa acetabuli in a 78-year-old woman with rheumatoid arthritis (RA). She had associated insufficiency fractures of the rib, the thoracic spine and the sacrum. In our case, senile osteoporosis was present before the onset of the fracture was recognized on radiographs, and RA and corticosteroid therapy might have further aggravated the porosis, resulting in the destruction of the fossa acetabuli. Regarding treatment for the fracture, a cemented total hip replacement without bone graft was attempted for several reasons such as the patient's activities, postoperative rehabilitaion and the bone mass of the acetabulum. The postoperative course was satisfactory during study period. However, further follow-up is needed to monitor carefully how the patient will be in the future. (J Nippon Med Sch 2000; 67: 267—270)

Key words: insufficiency fracture, rheumatoid arthritis, acetabulum

Case Report

A 78-year-old woman had been treated for osteoarthritis of the knee in our outpatient clinic from 1995. She began to have a pain and swelling in both finger joints in January 1997. She was diagnosed as having RA and treated with nonsteroidal anti-inflammatory drugs and bucillamine (100 mg). In December 1997, she began to have severe pain and swelling in both wrists, and was given predonisolone of 10 mg. The symptoms were subsequently alleviated. However in November 1998, she began to have a dull pain and mild swelling over the right hip joint extending to the groin area, but Pelvic X-ray showed no abnormal findings (**Fig. 1**). The pain gradually increased in intensity, and slightly subsided on intraarticular injection of steroids. On January 9, 1999, without any trauma, she suddenly felt severe hip joint pain.

Fig. 1 Radiography of the hip joints (November 1998). Pelvic X-ray showed no abnormal findings.

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Table 1 Blood examinations (January, 1999)

WBC	7,410 /μl	LDH	493 IU/l (180 ～ 460)
Hb	8.4 g/dl	TP	4.9 g/dl (6.7 ～ 8.3)
Plt	418,000 /μl	Alb	2.5 g/dl (3.8 ～ 5.3)
CRP	2.3 mg/dl (～ 0.1)	BUN	18.9 mg/dl (8.0 ～ 20)
RF	58 IU/ml (～ 20)	Cre	0.8 mg/dl (0.5 ～ 0.9)
ALP	362 IU/l (66 ～ 220)	Na	148 mEq/l
GOT	19 IU/l (10 ～ 35)	K	2.4 mEq/l
GPT	15 IU/l (5 ～ 40)	Fe	28 μg/dl (65 ～ 157)
		TIBC	197 μg/dl (270 ～ 406)

Fig. 2 Radiography of the hip joints (January 1999). Pelvic X-ray revealed upward collapse of the acetabular dome with central migration of the femoral head, and sclerotic change above the roof of the acetabulum.

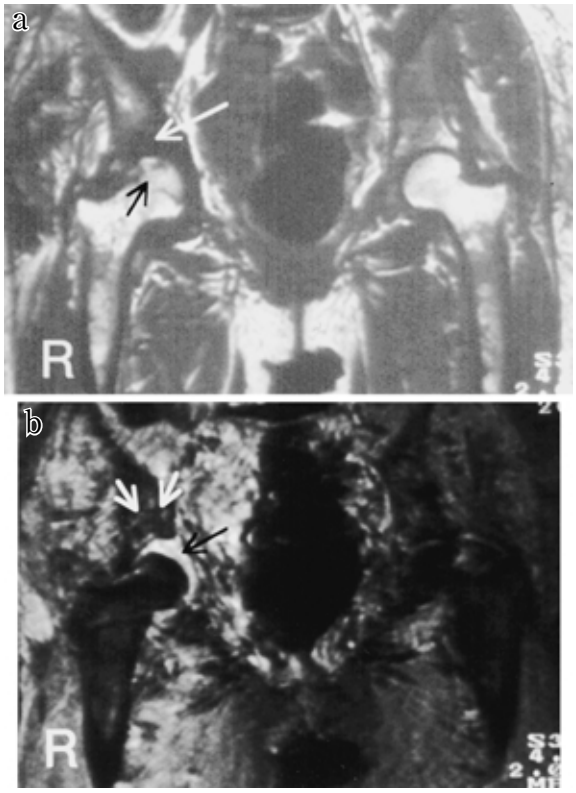

Fig. 3 a T 1-weighted MR image (January 1999). Coronal T 1-weighted image showed low signal region in the right femoral head suggestitive of osteonecrosis (black arrow), and low signal region in the supra-acetabulum (white arrow).

3 b T 2-weighted MR image (January 1999). Coronal T 2-weighted image demonstrated high signal region in the joint cavity suggesting joint fluid retention (black arrow), and high signal region paralleling the acetabular roof, which was seen as sclerotic change in X-ray (white arrow).

She was admitted to our hospital on January 11. Range of motion in the right hip joint was markedly restricted due to pain. There was moderate swelling over the hip joint extending to the lower extremities, but pulses of both dorsal pedis arteries were clearly palpable. Blood examinations showed mild inflammatory and malnourishment findings (**Table 1**). Pelvic X-ray revealed upward collapse of the acetabular dome with central migration of the femoral head, and sclerotic change above the roof of the acetabulum (**Fig. 2**). T1-weighted MR image showed low signal region in the right femoral head suggestitive of osteonecrosis, and low signal region in the supra-acetabulum. A T2-weighted MR image demonstrated high signal region in the joint cavity suggesting joint fluid retention, and high signal region paralleling the acetabular roof, which was seen as sclerotic change in an X-ray (**Fig. 3 a, b**). A bone scintigram demonstrated increased uptake in the right acetabulum, the left 8th rib, the 7th, 10th thoracic spine, and the sacrum (**Fig. 4**). These increased uptake areas in the scintigram were confirmed as insufficiency fractures by X-ray examination and CT scan. Bone mineral density in the radius was 0.405 mg/cm^2 with young adult means of 70%. MRI and CT scan in the chest and ab-

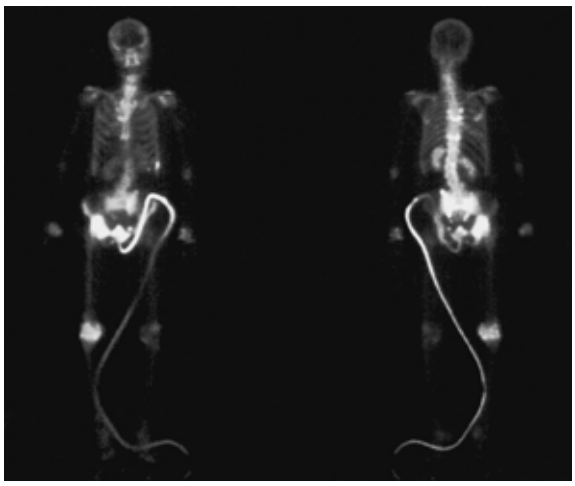

Fig. 4 Bone scintigram (January 1999). Bone scintigram demonstrated increased uptake in the right acetabulum, the left 8th rib and the 7 th, 10 th thoracic spine and the sacrum, suggesting insufficiency fractures.

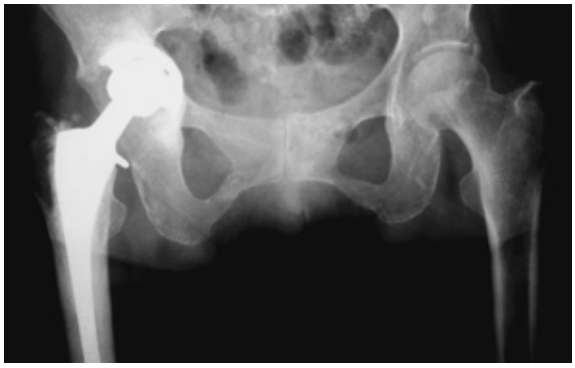

Fig. 5 Radiography of the hip joints 9 months after surgery. The acetabular cup was placed at the desired 45 ± 5 degree in relation to the log axis of the body, and no loosening sign was observed around the femoral and acetabular components.

domen showed no evidence of malignant diseases. Judging from the results of these examinations, the patient was diagnosed as having insufficiency fracture of the acetabulum.

In February 1999, a total hip replacement (THR) was performed. The femoral head was flattened slightly and the acetabulum became deeper than normal. There were moderate synovium proliferation and destruction of articular cartilage in the acetabulum with a bone defect of 15 by 15 millimeters in the fossa acetabuli. Because the bone mass in the weight-bearing area of the acetabulum was preserved enough to support an acetabular cup, a cemented THR with a large finned cup was inserted and bone grafting was not performed.

A culture of joint fluid for organisms was negative. Histology of the femoral head demonstrated osteonecrosis. Specimens from the acetabular surface showed necrotic bone and granulation with occasional newly-formed bone. Partial weight-bearing was allowed at 2 weeks postoperatively, and full weight-bearing at 4 weeks. At 9 months after surgery, she had complete relief of pain. Flexion of the hip joint was 100 degrees and abduction was 45 degres. In radiography, the acetabular cup was placed at the desired 45 ± 5 degree[1] in relation to the log axis of the body, and no loosening sign was observed around the femoral and acetabular components (**Fig. 5**).

Discussion

In 1964, Pentecost[2] classified stress fractures into fatigue fractures, insufficiency fractures and pathological fractures. Fatigue fractures are caused in normal bones by repetitive subthreshhold trauma, and are commonly seen in young athletes and military recruits. Insufficiency fractures occur when physical stress is placed on a bone with decreased mechanical strength. These fractures are usually seen in the elderly, especially in elder women with underlying diseases. Although insufficiency fractures occur in abnormal bones, they are distinct from pathological fractures, which occur in bone tumors and infectious bone diseases[3,4].

Cooper[5] listed conditions which create a predisposition to the development of insufficiency fractures as follows: osteoporosis, RA, radiation therapy, reconstructive surgery, Paget's disease and regional osteopenia becouse of disuse. For many reasons, RA patients are prime candidates for developing insufficiency fractures. These patients have generalized osteoporosis due to RA itself, and inactivity. Corticosteroid therapy further aggravated the porosis. Sindo et al.[6] stated that intraskeletal and extraskeletal factors may be linked to the mechanism of rapid destruction of the hip joint in RA: intraskeletal factors (osteoporosis, osteonecrosis, microtrauma) and extraskeletal factors (proteinase, pannus). In our case, insufficiency frac-

tures may be caused by RA, age-related change and corticosteroid therapy. Predonisolone of 3185 mg in total was given before the onset of insufficiency fractures.

Aside from vertebral compression fractures, the most common site of insufficiency fractures is the pelvis and lower extremities. In the pelvis, the fractures usually occur in the ilium, the pubis and the ischium, but rarely in the fossa acetabuli. Morinaga et al.[7] reported in a review of 148 pelvic insufficiency fractures (49 women and 1 man, aged 56 to 89 years) that 44.5 % of the fractures occurred in the pubic bone, 30.5% in the sacrum and the remaining 25% in the ilium, and that no fractures in the fossa acetabuli was observed. They also noted that 76% of patients had more than 2 fracture sites. In our case, a technetium bone scintigram suggested insufficiency fractures in the acetabulum as well as in the left 8th rib, the 7th, 10th thoracic spine and the sacrum.

MRI[8] and bone scintigram[9] have been reported to be sensitive methods for insufficiency fractures, and to give useful information to help differentially diagnose from pathological fractures due to bone tumors and infectious bone diseases. Otte et al.[10] stated that identification of a linear region of low signal intensity on both T1-and T2-weighted images was characteristic of supra-acetabular insufficiency fracture. However our MRI results were inconsistent with their study in that supra-acetabular insufficiency fracture was visualized as a low signal region paralleling the acetabular roof in a T1-weighted image, but this region showed high signal intensity in a T2-weighted image. Thus MRI findings of insufficiency fracture may be variable, depending on the interval from the fracture onset to MRI, causative factors and the degree of fracture.

Surgical treatments for insufficiency acetabular fractures in RA patients include resection of inflamed synovium and necrotic tissues as well as repair of the bone defects in the acetabular floor. In general, THR with bone graft has been performed in these patients. In our case, a cemented THR without bone graft was tried for several reasons: 1) The patient are was old with a low level of activity; 2) long-term bed rest and prolonged rehabilitaion may have further weakened her general condition and joint functions; 3) the bone mass in the weight-bearing area of the acetabulum was preserved enough to support an acetabular cup. The postoperative course was satisfactory during the study period. However, further follow-up is needed to monitor carefully how the patient will be in the future.

In summary, in our case, senile osteoporosis may has been present before the onset of the fracture was recognized on radiographs, and RA and corticosteroid therapy may have further aggravated the osteoporosis, resulting in the destruction of the fossa acetabuli. Insufficiency fractures should be added to the lists to be differentiated in patients who complain of pain and swelling in the pelvis or lower extremities without any trauma. MRI and bone scintigrams are critical in the early diagnosis of insufficiency fractures and differentiation from pathological fractures.

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