

—Report on Experiments and Clinical Cases—

Transient Osteoporosis of the Hip During Pregnancy

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Abstract

We report the clinical features of and MRI findings in transient osteoporosis of the hip during pregnancy. The study population consisted of 4 patients with a mean age of 33 years. The mean gestational age at onset was 31 weeks (range: 27 to 35 weeks). The main symptoms consisted of a weight-bearing pain in the hip and gait disturbance. The pain occurred suddenly and was of unknown cause and became severe within 2 to 3 weeks. X-ray examinations showed diffuse osteoporosis in the femoral head and neck. Moreover in 3 patients, similar lesions were also found in the lumbar spine or the knee. MRI obtained from 3 patients revealed a mottled low-signal lesion extending from the femoral head and neck on T1-weighted images and a high-signal lesion in the bone marrow suggesting edema on T2-weighted images. Mild elevation of C-reactive protein was shown in 2 patients. Conservative treatments with the limitation of weight bearing and bed rest were performed for all patients, and nonsteroidal anti-inflammatory drugs were given to 3 patients. The hip pain began to decline from 8 to 14 weeks after the onset, and completely disappeared from 14 to 24 weeks. X-ray examinations showed that osteoporotic lesions tended to improve at 10 to 14 weeks, on MRI, a high-signal lesion suggesting bone marrow edema resolved together with relief of the pain. No recurrence was found in any patients at mean follow-up of 70.8 months. (J Nippon Med Sch 2000; 67: 459–463)

Key words: transient osteoporosis, pregnancy, bone marrow edema, hip

Introduction

In 1959, Curtiss et al.¹ first described 3 cases of transient osteoporosis of the hip during pregnancy. Subsequently, several authors have reported similar cases with relation to pregnancy. This rare syndrome is characterized by a self-limited condition. However, the diagnosis and treatment present some problems such as acute, severe pain of unknown causes; difficulty in early diagnosis; the limitation of treatment regimens in pregnancy; and a risk of fracture. We repor

the clinical features of and MRI findings in 4 cases of transient osteoporosis of the hip during pregnancy.

(1) Patient population

The study population consisted of 4 patients (2 primigravidas, 2 multiparas) (**Table 1**). The mean age was 33 years, and the mean gestational age at onset was 31 weeks. The involved side was the right hip in 2 patients, and bilateral hips in 2 patients. None of the patients had past histories of serious illnesses or hospitalizations.

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Table 1 Background and the results of blood examination in 4 patients with transient osteoporosis of the hip.

Case	Age	Involved side	Parity (n)	Gestational age at onset (weeks)	Blood examination			
					WBC ($/\mu\text{l}$)	CRP (mg/dl)	ESR (mm/hr)	ALP (IU/l)
1	35	right	2	31	8,500	–	–	–
2	37	bilateral	0	R29, L27	8,800	0.8	47	287
3	33	bilateral	1	R30, L34	7,780	1.2	18	229
4	27	right	0	35	6,400	<0.3	14	219



Fig. 1 X-ray findings at first visit
a: Diffuse osteoporosis was shown in the right femoral head and neck (case 4). b: Focal osteoporotic lesion was demonstrated in the right knee (case 3).

(2) Clinical findings at first visit

The main symptoms consisted of a weight-bearing pain in the hip and gait disturbance. The pain occu-

red suddenly and was of unknown cause. It became severe within 2 to 3 weeks. Three patients with pain at rest required hospitalization. On physical examination, there was no swelling or warmth indicating an infection. Tenderness in the Scarpa triangle was found in 3 patients, and slightly limited range of motion in 2 patients. Mild elevation of C-reactive protein was shown in 2 patients. X-ray examination showed diffuse osteoporosis in the femoral head and neck (Fig. 1 a). Moreover in 3 patients, similar lesions associated with the pain were also found in the lumbar spine or the knee (Fig. 1 b). MRI obtained from 3 patients revealed a mottled low-signal lesion extending from the femoral head and neck on T1-weighted images and a high-signal lesion in the bone marrow suggesting edema with an effusion on T2-weighted images (Fig. 2).

(3) Clinical course

Conservative treatments with limitations on weight bearing and bed rest were performed on all patients, and nonsteroidal anti-inflammatory drugs (NSAIDs) were given to 3 patients who showed no pain relief with these treatments. The hip pain began to ease from 8 to 14 weeks after the onset, and completely disappeared from 14 to 24 weeks. The pain in the lumbar spine (case 1) and the knee (cases 2 and 3) spontaneously disappeared in the same course as that of the hip pain. X-ray examinations showed that osteoporotic lesions tended to improve from 10 to 14 weeks. On MRI, a high-signal lesion suggesting bone marrow edema disappeared together with the pain relief. At mean follow-up of 70.8 months (range: 15 to 144 months), no recurrence was found in any patients including one who was pregnant again.

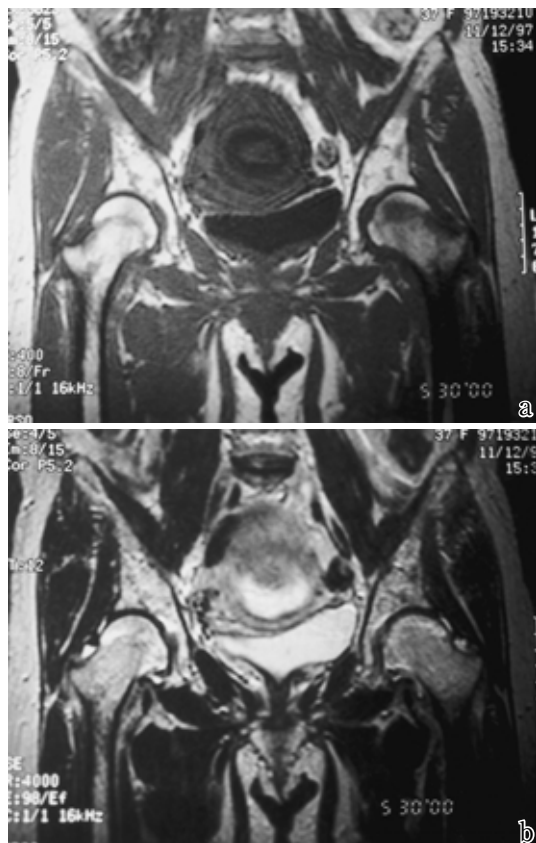


Fig. 2 MRI findings at first visit (case 2)
 a: T 1-weighted images revealed a mottled low-signal lesion extending from the left femoral head and neck.
 b: T 2-weighted images displayed a high-signal lesion in the bone marrow suggesting edema and an effusion.

(4) Case presentation

Case 1: a 35-year-old woman, gravida 2, para 2.

She complained of severe weight-bearing pain in the right hip with unknown cause in the 31 st week of gestation (January 3,1999), and consulted our outpatient clinic on January 6. On physical examination, there was no swelling or warmth in the hip, but tenderness was elicited over the Scarpa triangle. The pain was aggravated by motion; flexion and external rotation of the hip were 100° and 15°, respectively. The white blood cell count was normal.

X-ray examination obtained after delivery showed that the femoral head was poorly outlined due to diffuse osteoporosis extending from the acetabulum to the femoral head and neck (Fig. 3 a). similar osteoporotic lesion was found in the lumbar spine accompanied by an L 2 compression fracture (Fig. 3 b). T 1-weighted images revealed a mottled low-signal lesion

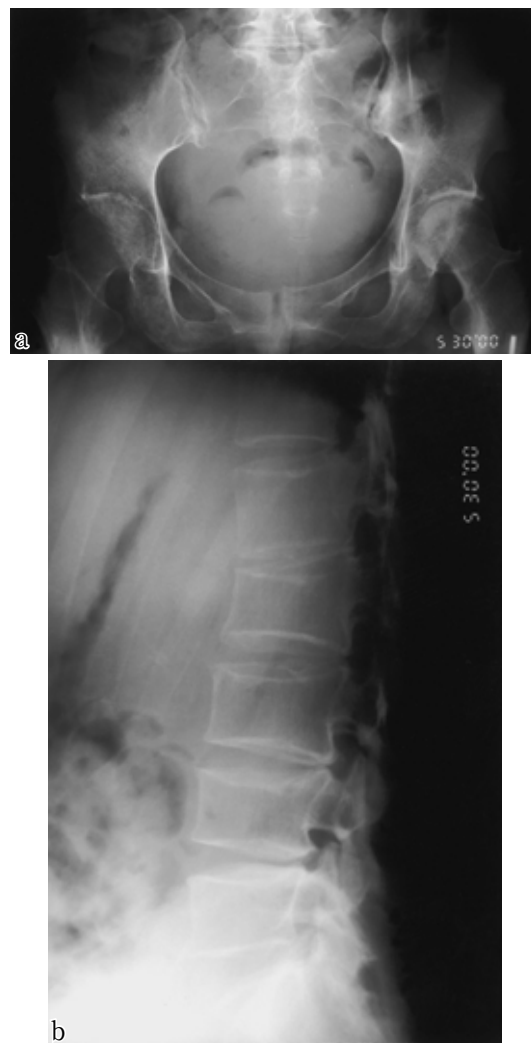


Fig. 3 X-ray examination after delivery in case 1 (8 weeks after onset)
 a: The right femoral head was poorly outlined due to diffuse osteoporosis extending from the acetabulum to the femoral head and neck. b: The osteoporotic lesion was found in the lumbar spine together with an L 2 compression fracture.

extending from the right femoral head and neck and T 2-weighted images displayed a high-signal lesion in the bone marrow suggesting edema and an effusion (Fig. 4). From these results, she was diagnosed as having transient osteoporosis of the hip, and underwent conservative treatment with a limitation on weight bearing and administration of NSAIDs. The pain was alleviated 12 weeks after the onset, and subsequently disappeared at 14 weeks. At 14 weeks X-ray examination showed improvement of osteoporotic lesions and MRI demonstrated the disappearance of bone marrow edema. The patient was permitted

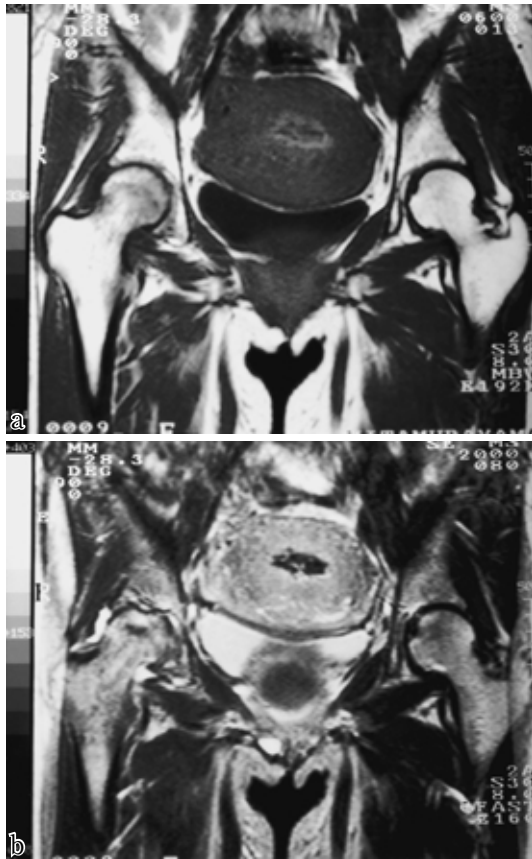


Fig. 4 MRI findings in case 1 (9 weeks after onset)
 a: T 1-weighted images revealed a mottled low-signal lesion extending from the right femoral head and neck, b: T 2-weighted images displayed a high-signal lesion in the bone marrow suggesting edema and an effusion.

weight bearing (**Fig. 5**). She had no recurrence at follow-up of 15 months.

Discussion

To date, 41 cases of transient osteoporosis of the hip during pregnancy have been published in Japan. The mean age in the 41 reported cases was 30.9 years (range: 21 to 39 years) and the mean gestational age at onset was 32.3 weeks (range: 6 to 40 weeks). This syndrome frequently occurs during the third trimester of pregnancy, and tends to be commonly seen in primigravidas. The incidence of bilateral hips was reported in almost 20% of the patients. This syndrome was characterized by a self-limited condition, but, insufficient fracture caused by osteoporosis is the most serious complication. Actually, fracture occurred in 15% of the 41 reported cases. Special attention should

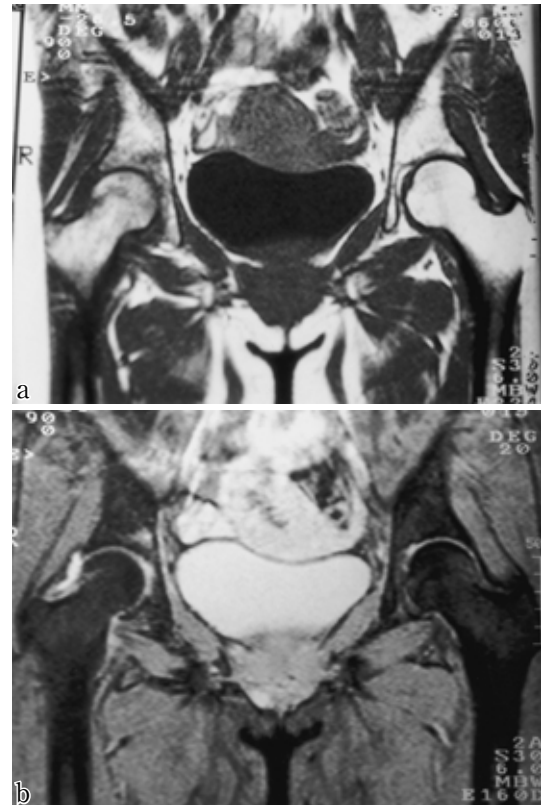


Fig. 5 MRI findings at 14 weeks after onset (case 1)
 a: T 1-weighted images showed improvement in the low-signal lesion, b: T 2-weighted images demonstrated the disappearance of bone marrow edema.

be given to the incidence of fracture. In our patients, to prevent a fracture, limitations on weight bearing and bed rest were continued until improvement of osteoporosis was confirmed by X-ray or MRI.

The etiology of transient osteoporosis remains unclear. Several hypotheses have been proposed such as mechanical compression of the obturator nerve (Curtiss et al.¹ 1959), reflex sympathetic dystrophy (Lequesne et al.² 1968), disturbance of venous return (Rosen et al.³ 1970), hormonal factors (Longstreth et al.⁴ 1973), transient synovitis (Bramlett et al.⁵ 1987) and an early phase of avascular necrosis (Hofmann et al.⁶ 1989).

In 1988, Wilson et al.⁷ reported in an MRI study of transient osteoporosis that all 10 patients showed similar abnormalities: low signal intensity in the bone marrow on T 1-weighted images with matching high signal intensity on T 2-weighted images. They stated that these MRI findings represent hyperemia, edema or increased bone mineral metabolism, and termed

this condition “transient bone marrow edema syndrome”. Similar MRI results were obtained in our study. Moreover, resolution of high signal intensity on T 2-weighted images tended to parallel the pain relief. As for the mechanism of bone marrow edema, possible explanations include increased mechanical loads on the hip joint by increased weight associated with pregnancy, high abdominal pressure resulting from increased uterus size and disturbance of venous return due to anatomical characteristics of the pelvic veins.

Several authors^{3,8} have reported that multifocal osteoporotic lesions were occasionally observed in some patients. Also in our study, aside from the hip, osteoporotic lesions were found in the lumbar spine and the knee joint. The reported results and our results suggest that the syndrome does not selectively occur in the hip, and is triggered by generalized disorders associated with pregnancy. These possible mechanisms of this syndrome were supported by studies of bone mineral density and bone absorption markers. Maeda et al.⁸ Stated that bone mineral density decreased in the asymptomatic lumbar spine, as measured by dual energy X-ray absorptiometry. Bone absorption markers such as serum level in interleukin 1 and 6 and urine level of pyrisinoline and deoxy-pyrisinoline are markedly elevated in the late stage of pregnancy^{9,10}. Further systemic investigations will be needed to clarify the pathology and etiology of this syndrome.

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