



## Stress fracture of the acetabulum in a ballet dancer. A case report

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**The authors report the case of a 26-year old professional ballet dancer with chronic dysmenorrhea and a Body Mass Index of 17, who presented with right hip pain related with a stress fracture of the acetabulum. Plain radiographs were unremarkable and the diagnosis was made with magnetic resonance imaging. Conservative treatment including partial weight bearing with crutches for six weeks resulted in immediate resolution of symptoms.**

**The authors discuss the specific risk factors for stress fractures encountered in professional ballet dancers, such as hypogonadism and eating disorders.**

**Key words :** ballet dancer ; fatigue fracture ; acetabulum.

Stress fractures occur frequently in ballet dancers. They predominantly involve the metatarsals, tibia and spine (1,2,3). On the other hand, pelvic stress fractures are rather rare and are usually located at the pubis, sacrum or femoral neck (11). These fractures are most often insufficiency fractures, seen more typically in patients with osteoporosis, rheumatoid arthritis, pelvic tumours, previous radiation therapy or on corticosteroid medication, than in athletes (2,5,6,11). In the former group of patients, a few cases of acetabular stress fractures have been reported (2,5,6,8,11). We report what appears to be the first case of an acetabular stress fracture in a ballet dancer.

### CASE REPORT

A 26-year old female professional ballet dancer presented in our clinic with right hip pain over the past three months. She was preparing a new show and this required dancing for eight hours per day.

The pain was present both during activity and at rest. In order to be able to perform, she used both antiinflammatory drugs and morphine. The pain started at the groin and radiated over the lateral aspect of the thigh. She had dysmenorrhea since a few years. On clinical examination, the Trendelenburg test was positive on the right side. There was a neutral alignment of the lower limbs. The mobility of the hip was completely normal with external rotation up to 90°. Forced external rotation with the hip flexed and the foot crossing the other leg was painful. Direct axial impaction of the hip joint elicited no pain. She had a Body Mass Index of 17.

A standing radiograph of the pelvis and a lateral radiograph of the hip showed no abnormalities. An MRI was prescribed to exclude intra-articular pathology of the hip ; it showed hyperintense signal on T2 images typical for a stress fracture of the acetabulum.

Conservative treatment was started with partial weight bearing with crutches for six weeks, which resulted in immediate pain relief. She was counseled to see a nutritional adviser and a gynaecologist to stabilise her dysmenorrhea.

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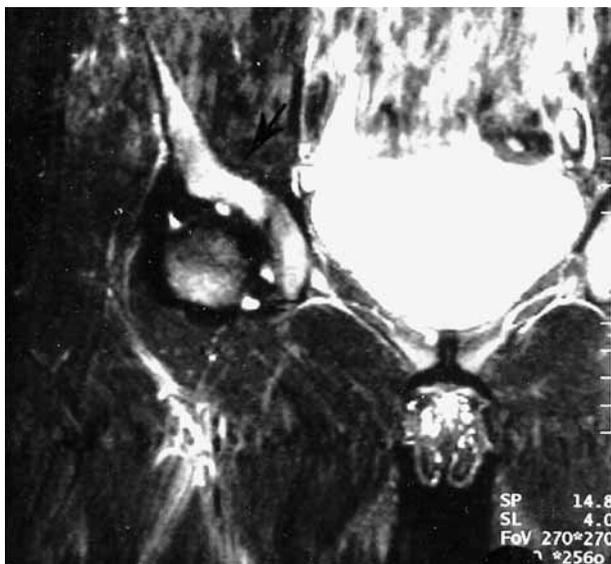
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**Fig. 1.** — MRI of the right hip : T2 image shows hyperintense signal at the acetabular roof, compatible with stress fracture.

## DISCUSSION

Ballet dancers are prone to insufficiency stress fractures due to a combination of risk factors. These factors are intensive dance training, reduced body weight, eating disorders and menstrual abnormalities (3,7,10,13).

Rehearsing and performing takes about five to six hours a day, five to six times a week. The hours danced per day are a significant risk factor for stress fractures, especially more than five hours per day (3). Furthermore this strenuous activity has an ambiguous effect, since it increases the bone density at the weight-bearing sites in the skeleton according to Wolff's law, especially in the cortical bone (12) but it also reduces the body weight and induces an athletic amenorrhea which are both risk factors for osteoporosis (1,3,10-13). Most ballet dancers are indeed underweight and some present with eating disorders (3). This condition also induces a state of hypogonadotropic hypogonadism and amenorrhea (10). We stress this amenorrhic state since hypogonadism reduces the trabecular bone density and since pelvic stress fractures are usually located in the trabecular bone (3,10,13). In fact the duration of the amenorrhea also increases the risk for insufficiency stress fractures (3,12).

Although stress fractures should be suspected in athletes, no typical history is present for acetabular stress fractures, except for hip and low back pain (2). On clinical examination, axial pressure is painful but the range of motion is not decreased. On the contrary in ballet dancers a higher range of motion at both hips induced by training is usually observed (4,9). Especially external rotation for a perfect turn out and forward flexion increase with time and rehearsal (4,9).

Plain radiographs of the pelvis and hip may show a subtle sclerotic band parallel to the acetabular roof, caused by trabecular compression and callus formation, or they may be completely normal (2,6). Stress fractures through cancellous bone are notoriously difficult to detect on standard radiographs (2). Further investigation with bone scintigraphy or MRI, which are both highly sensitive but less specific, is necessary (2,6). We prefer MRI since it is able to demonstrate other or related problems such as avascular necrosis of the hip, synovitis, trochanteric bursitis, labral tears, loose bodies or osteochondral fractures (6,9).

In the case of an insufficiency fracture of the acetabular roof, a hypointense zone on T1-weighted images and a hyperintense zone on T2-weighted images, corresponding to the area of oedema, is seen (2,5,6). In the early stage, cancellous bone impaction or a fracture line cannot be detected (2). If a fracture line can be seen, it is usually parallel to the roof of the acetabulum (6).

When the diagnosis is confirmed, a period of rest of at least six to eight weeks is usually enough for the complaints to disappear and the fracture to unite (3). Counseling the patient to treat the nutritional and hormonal status is necessary (1,7,12,13).

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