Bilateral Stress Fracture of Femur Neck, Fatigue Type of Non-Athlete Young Adult

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INTRODUCTION

Femoral neck stress fractures are uncommon injuries. Stress fractures can arise as a result of repetitive loading and, in general, there is dose-response relationship between the amount of training and frequency of training. These fractures can progress to non-union and osteonecrosis of the femoral head. Diagnosis of stress fracture of femoral neck is hard to detected. The clinical symptom is activity related hip pain and the pain is relived when a patient rests.

Plain radiographs obtained initially are often negative in femoral neck stress fractures. Magnetic resonance imaging (MRI) is considered to be the best choice to diagnosis an incomplete femoral neck stress fracture. The key features that appear in an MRI are the fracture line, osseous edema, and hip effusion.

The first report of a fatigue fracture of the femoral neck was documented in 1905. Since then, studies of femoral neck stress fractures were very rare between 1905 and 1977: only 133 cases were reported. Most of the patients were athletes, military personnel or elderly people. Bilateral femur neck stress fractures in the non-athlete, young adult population are extremely rare. Here, we report such a case and review the importance of considering a stress fracture for an accurate diagnosis of a patient with inguinal pain.

CASE REPORT

A 35-year-old man, who was previously healthy, visited the emergency department for right inguinal pain. He had no past medical history and medication use. He had not been exercising for more than 10 years. Recently, about three weeks ago he started personal training and worked out hard for two weeks. He did three sets of squats 15 times every two days. Initially without weight, he performed 15 kg for the third and fourth, and 30 kg for the fifth and sixth. He did three sets of burpee exercises and five runs in two weeks. He ran the treadmill without a slope and ran at least five kilometers every day. On the first week he ran at a speed of 7 km/h and on the following week at 11 km/h. He was 175 cm tall and weighed 75 kg.

A week ago, while he was running on a treadmill, he...
felt sudden pain on his right inguinal area. The pain lasted for 5 to 10 minutes and disappeared, so he took some rest and completed his daily exercise routine. The next day, the pain was on his right posterolateral hip. Pain was aggravated when he did weight bearing and relieved at rest. The pain was most severe while he was running. He used non-steroidal anti-inflammatory drugs for 5 days but there was no change in pain severity. Two days ago, he visited the orthopedic clinic, and was diagnosed with sub-gluteal bursitis. A triamcinolone injection was done on the right hip sub-gluteal bursa but there was no improvement. So he visited emergency department. On physical examination, there was no external wound, no tenderness on either inguinal area, and no limitation of motion in either lower extremity. The Patrick sign was positive on the right hip joint. There were no physical abnormalities on the left lower extremity. He ambulated with an antalgic gait on the right side. At that time, standard AP radiographs of the pelvis showed no gross abnormal findings (Fig. 1). However, the MRI showed linear fractures on both femoral necks with a marrow edema and a small amount of effusion on the right hip joint (Fig. 2, 3).

The results of the laboratory blood test, including a liver profile, thyroid profile, electrolytes and a renal profile was normal. Bone Alkaline Phosphatase was elevated at 26.1 ng/ml. C-telopeptide was also elevated at 0.63 ng/ml. The level of 25 (OH)-Vitamin D was low at 15.1 ng/ml, diagnosed as vitamin D insufficiency. A normal bone mineral density test was administered at the lumbar spine and both femur necks.

This patient was diagnosed as having a bilateral femoral fatigue fracture and was admitted to an orthopedic general ward. A closed reduction was performed on both femurs. A closed reduction and internal fixation with three cannulated screws and one washer were done for both femoral
fatigue fractures. After the surgery he was discharged. He ambulated with a wheelchair at discharge. Four weeks later, he visited the outpatient clinic for follow up. He was using crutches, and his gait was partial weight bearing. Eight weeks later, he can now ambulate by himself without using crutches and is full weight bearing. A post-operative and eight weeks follow up X-ray are shown in Fig. 4.

**DISCUSSION**

In this case, a young non-athlete adult was diagnosed with a bilateral femur neck stress fracture. The first symptom he complained of was right inguinal pain. Femoral fractures are rarely considered when young adults complain of right inguinal pain. Furthermore, the patient had no previous history of trauma. It is very difficult to diagnose a femur neck stress fracture with only clinical symptoms. As we can see in this case, femoral neck stress fractures often show normal X-ray findings initially, and this makes it more difficult to diagnose. The most common symptom that patients complain of is a dull ache in the hip region. It is not a characteristic symptom, so imaging tests are essential to diagnosis accurately. The plain radiographic appearance of spontaneous fractures depends on the time elapsed since the injury. Like in our case, in early examinations the degree of trabecular fractures may be insufficient on radiographic findings. MRI is usually considered as the best choice for the diagnosis of incomplete femoral neck stress fracture. The key features on the initial MRI were osseous edema, the presence of fracture line and hip effusion. Misdiagnosis or delayed diagnosis of femoral neck fatigue fracture can lead to displacement of an initially non-displaced fracture. Fatigue fractures of the femoral neck have potential to become disabling injuries if the diagnosis is missed or delayed.

There are several risk factors associated with femur neck stress fractures. Intrinsic risk factors are composed of nutritional factors and biochemical factors. Calcium levels and vitamin D levels are important in nutritional factor. In biochemical factors, muscle mass and bone mass density are important factor. Most of external factors are associated with overtraining such as sudden increases of exercise intensity or poor warming up before training. In our case, patient showed low level of vitamin D which indicated vitamin D insufficiency. Also, patient started high intensity exercise suddenly. These factors may have caused the bilateral femoral neck fractures in the case.

In our case, the exact diagnosis took two weeks, which included a misdiagnosis as sub-gluteal bursitis for 5 days. There were several reasons for the late diagnosis. The first reason is that the patient was a non-military, non-athlete, young adult, who had not exercised for the past 10 years. To the best of our knowledge, bilateral femoral neck stress fractures in young, non-athlete, adults have rarely reported before. For this reason, when an young adult who exercises recently suffers from inguinal pain, we must consider a femoral fatigue fracture as a differential diagnosis, even when the patient is not an athlete. The second reason is due to the normal findings on plain film. As we can see in the case above, when there is a fatigue fracture, an MRI is a valuable tool because plain film can show normal sign in early stage. However, there have not been many cases of femur neck fatigue fractures, and since the clinical findings are not specific, MRI should be considered as cost-effectiveness at an early stage.

In general, a stress fracture is not a surgical condition.
The vast majority of stress fractures heal within 8 weeks through conservative treatment. Non-weight bearing crutches and activity restriction are recommended. But in this case, considering the patient’s need for early mobilization and re-integration to society, surgery was done. Further studies should investigate whether early surgery for early mobilization is beneficial for young adults.

REFERENCES