

Paper #48

The Association of Femoral Neck Stress Fractures With Femoral Acetabular Impingement

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Summary:

Patients with Pincer type FAI, particularly, coxa profunda and acetabular retroversion, are at increased risk of developing femoral neck stress fractures

Abstract:

Purpose:

To determine if there is an increased incidence of femoral acetabular impingement (FAI) in patients presenting with stress fractures of the femoral neck.

Materials and methods:

After IRB approval, the imaging studies of 25 athletes (22 females, 3 males, mean age 26, range 19 – 39 years) with femoral neck stress injuries were assessed for the presence of features suggesting FAI, including acetabular retroversion, coxa profunda, abnormal femoral head-neck junction, fibrocystic change, os acetabulae, labral tear and chondral injury. All subjects had to have an adequate AP Pelvis radiograph, a lateral radiograph of the affected hip, and an MRI of the affected hip. The alpha angle, anterior offset ratio, and center to edge (CE) angle were measured on xrays. The grade of stress injury was determined on MR images. All images and measurements were made by an musculoskeletal fellowship trained radiologist, a fellowship trained orthopaedic surgeon and a physical medicine and rehabilitation resident.

Results:

Of the 25 hips (18 right, 7 left) with femoral neck stress reactions, 9 were grade 2 (bone marrow edema), 5 were grade 3 (high T2 and low T1 marrow signal), and 11 were grade 4 (stress fracture). 20 patients (80%) had coxa profunda (incidence in general population is 15.2% of males, and 19.4% of females). Acetabular retroversion could only be accurately assessed in 14 patients (distance between the sacrococcygeal junction and pubic symphysis 2 – 5cm on AP view), but 7 of 14 (50%) had a crossover sign of the acetabular margins indicating acetabular retroversion (normal incidence is 5% of population). An abnormal alpha angle > 50o was seen in 4, and an abnormal anterior offset ratio < 0.18 was seen in 7. No patients had CE angle > 48 o. Labral tears were seen in 14, an abnormal femoral head/neck junction in 5, fibrocystic change in 2, os acetabuli in 2 and cartilage damage in 3.

Conclusion:

Our results suggest that patients with femoral neck stress injuries have a higher incidence of bony abnormalities associated with pincer impingement, such as coxa profunda and acetabular retroversion. Over coverage of the femoral head may place additional stresses on the femoral neck, predisposing an athlete to stress injury as they take their hips through the extremes of motion while running. Some of our patients also had features of cam impingement, as evidenced by an increased alpha angle, decreased anterior offset ratio or fibrocystic change, although the incidence is similar to the values expected in the general population.

Clinical relevance/application:

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Our study suggests that patients with coxa profunda and acetabular retroversion are at increased risk of developing femoral neck stress fractures and therefore should focus on improving risk factors such as maximizing bone density, cross training, or focusing on core strengthening.