Stress reaction of the femoral neck complicating contralateral transient synovitis

Clinical History:
A 7-year-old boy presented with right knee pain and limping. Ultrasound (US) revealed an effusion in the right hip. Plain radiography was normal. After initial successful treatment with weight-bearing restriction and nonsteroidal anti-inflammatory drugs (NSAID) the patient presented with recurrent limping and fluid effusion in both hips on US.

Imaging Findings:
Initial US (Fig. 1) showed an effusion within the right hip with increased distance between the anterior joint capsule and the femoral neck.

Repeated US after recurrence of symptoms revealed a subtle fluid effusion within both hips. Persistent synovitis warranted MRI 9 weeks after initial presentation.

MRI of the pelvis confirmed a subtle bilateral effusion. There were no arguments for Perthes disease or slipped capital femoral epiphysis (SCFE). MRI (Fig. 2), however, revealed bone marrow oedema within the medial aspect of the left femoral neck in keeping with a grade 3 stress reaction according to Fredericson. [1] Repeated questioning revealed excessive antalgic hopping on the left leg while the right leg was submitted to weight-bearing restriction. Clinical examination at the time of MRI showed left hip pain on palpation and mobilisation.

Follow-up MRI after 6 weeks (Fig. 3) without any weight bearing showed near complete resolution of the bone marrow oedema.

Discussion:
Transient synovitis of the hip is a frequent, usually self-limiting joint inflammation. Aetiology is unclear, but viral, allergic and traumatic causes have been proposed. [2]

It typically occurs in children aged 3 to 8. [3] Symptoms include limited range of motion (ROM) and unwillingness to bear weight. [4] Septic arthritis may be differentiated from TS by analysis of additional parameters such as severity
of symptoms, presence of fever or toxic appearance and laboratory analysis. [2]

Although radiography is the first step in the diagnostic algorithm of hip pain, they are negative in TS. US is the preferred technique for identifying a joint effusion and for follow-up. MRI does not have an established place in the acute setting, but may become necessary when symptoms persist. [4, 5]

Therapy with NSAID may shorten the duration of symptoms. [6] In the event of protracted course or recurrence, subsequent MRI to exclude Perthes disease is warranted. [3] To the best of our knowledge a contralateral stress reaction of the femoral neck, complicating an antalgic gait has not yet been described.

Paediatric femoral neck stress fractures are rare. There are two types: the compression-sided at the medial aspect of the femoral neck and the tension-sided at the superolateral aspect, which has a worse prognosis. They commonly present with hip pain or limping. Increased or repetitive activity is not always evident in the clinical history. A fracture line on plain films might not be present at the onset of symptoms and signs of bone healing only become apparent after 3 to 4 weeks. MRI is much more sensitive for early detection. Stress reactions on MRI can be classified into 4 grades according to Fredericson. A grade 1 reaction shows mild to moderate periosteal oedema on fat suppressed (FS) T2-weighted images (WI). Grade 2 corresponds to marked periosteal oedema combined with bone marrow oedema on FS T2-WI. In grade 3 there is bone marrow oedema on both pulse sequences. When a fracture line is present, it is considered grade 4. Grading is prognostic for expected time to recovery. Bone scintigraphy has an equal sensitivity but is far less specific. [1, 7]

Treatment options include conservative therapy with restriction of weight bearing until ROM is pain-free for compression-sided fractures. For refractory compression-sided or tension-sided fractures, reduction and internal fixation is the therapy of choice. [7]

**Differential Diagnosis List:** Femoral neck stress reaction grade 3, Perthes disease, Fracture, Septic arthritis, SCFE

**Final Diagnosis:** Femoral neck stress reaction grade 3

**References:**


Figure 1

Description: Note a fluid collection in the right hip (A) and the slight thickening of the synovial lining (arrowheads) in the anterior recess of the right hip. Origin: Vanhoenacker FM, Department of Radiology, AZ Sint-Maarten, Mechelen-Duffel, Belgium 2014
**Figure 2**

**Description:** Coronal FS T2-WI.

Increased signal at the medial aspect of the left femoral neck (arrow) in keeping with bone marrow oedema. **Origin:** Vanhoenacker FM, Department of Radiology, AZ Sint-Maarten, Mechelen-Duffel, Belgium 2014
**Description:** Coronal T1-WI.

Note the presence of bone marrow oedema in the left femoral neck (arrow). There is absence of a clear fracture line. The imaging findings are indicative of a stress reaction grade 3. **Origin:**

Vanhoenacker FM, Department of Radiology, AZ Sint-Maarten, Mechelen-Duffel, Belgium 2014
Description: Coronal FS T2-WI.
Follow-up MRI 6 weeks later. Almost complete resolution of increased signal at the left femoral neck (arrow). The patient was completely pain-free. Origin: Vanhoenacker FM, Department of Radiology, AZ Sint-Maarten, Mechelen-Duffel, Belgium 2014
**Description:** Coronal T1-WI.

Follow-up MRI 6 weeks later. Note complete resolution of signal changes in the left femoral neck (arrow). **Origin:** Vanhoenacker FM, Department of Radiology, AZ Sint-Maarten, Mechelen-Duffel, Belgium 2014