Avulsion fractures of the pelvis in adolescents.

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Patient: 17 years, male

Clinical History:

Three male patients between 16 and 18 year(s) consulted because of acute onset of pain in the region of the groin and hip after suffering an injury during soccer.

Imaging Findings:

All three patients consulted because of an injury during soccer 1 to 4 days previously. They experienced a sudden onset of pain in the region of the hip during the game. Physical evaluation revealed tenderness above the hip region and difficulty to walk. Primary assessment with standard anteroposterior views of the pelvis and oblique views of the hip was performed in all patients and showed an avulsed bony fragment in the region of the anterior superior iliac spine in all 3 patients. In one patient multislice-CT was performed to assess the distance between the avulsed bony fragment and the iliac wing.

Discussion:

Avulsion injuries frequently occur in adolescent athletes (soccer, gymnastics and athletics). The lesions are the consequence of sudden and forceful muscle-tendon contractions. They are related to the time of appearance of the ossification nuclei and their fusion to the corresponding pelvic tuberosities. They are a consequence of the relative weakness of the epiphyseal plate that may give way for excessive functional demands provoked by forceful muscle contraction.

The five regions prone to avulsion injuries are, in order of frequency, the ischial tuberosity (hamstrings insertion), the anterior inferior iliac spine (m. rectus femoris), the anterior superior iliac spine (m. sartorius and tensor fascia lata), the superior corner of the pubic symphysis and the iliac crest (abdominal muscles).

The diagnosis of avulsion fracture of the anterior superior iliac spine is made on physical findings, patients age (adolescent or young adult), the sudden forcefull movement when the accident occurred with forcefull contraction of the sartorial and tensor fascia lata muscle and is confirmed by standard radiographs. The sartorial and tensor fascia lata muscles dislocate the fragment caudally and laterally. Because of this direction of dislocation, these lesions can be mistaken for a fracture of the anterior inferior iliac spine if the fragment is dislocated over an important distance. Evaluating the contralateral side can be helpfull in distinguishing pathology from the normal anatomic findings.

In some cases multislice-CT is necessary to evaluate the distance between the avulsed fragment and the pelvis in order to confirm whether the avulsed fragment originates from the superior or the inferior iliac spine and to decide whether surgical treatment is needed.

In the acute phase MRI imaging shows signs of muscle strain in the associated muscles and areas of oedema or...
haemorrhage surrounding the fractures but it may be difficult to distinguish the avulsed bony fragment from the adjacent soft tissues making the conventional radiographic view the best modality to evaluate acute lesions. The healing phase of the avulsion fracture with abundant reactive ossification in the soft tissues may clinically and radiographically be mistaken for neoplasia which can lead to the necessity for biopsy.

In the acute phase care should be taken in evaluating the conventional radiograph of the pelvis in a young adult or adolescent with special focus on the typical location with (or sometimes) without acute traumatic setting to come to an early diagnosis so that adequate treatment and rehabilitation can be initiated. Treatment consists of initial rest (immobilisation with crutches the first week) with subsequent mobilisation within pain limits and partial weight bearing with the use of crutches in the following two to three weeks. Rarely surgical intervention is necessary: meralgia paraesthetica resulting from traction or compression of the femoral lateral cutaneous nerve by the dislocated fragment has been reported and these lesions need surgical intervention with repositioning of the avulsed fragment.

**Differential Diagnosis List:** Avulsion fracture of the anterior superior iliac spine.

**Final Diagnosis:** Avulsion fracture of the anterior superior iliac spine.

**References:**

Description: Antero-posterior view of the pelvis shows right-sided avulsion fracture of the anterior superior iliac spine. Origin:
**Description:** Antero-posterior view of the pelvis shows right-sided avulsion fracture of the anterior superior iliac spine in a different patient with more obvious displacement caudally and laterally. **Origin:**
Description: Spot view of the avulsion fracture of the anterior superior iliac spine of the same patient as in Figure 1b. Origin:
Description: Conventional X-ray of the pelvis showing left-sided avulsion fracture of the anterior superior iliac spine (co-incidentally a right-sided healing avulsion fracture with abundant ossification of the ischial tuberosity is detected). Origin:
Description: Conventional X-ray of the left hip in the same patient showing avulsion fracture of the anterior superior iliac spine. Origin:
**Description:** Axial CT image confirms the avulsion fracture of the anterior superior iliac spine with diastasis of the fracture compared to the contralateral normal side. **Origin:**

**Description:** Sagittal CT image confirms the avulsion fracture of the anterior superior iliac spine with caudal displacement of the avulsed fragment. **Origin:**