Osteochondritis dissecans in adolescence

R de Villiers
MBChB (Stell), MMed (RadDiag) (Stell)

Radiology Practice: Van Wageningen and Partners
Medi-Clinic Vergelegen
Main Road, Somerset West, 7130
Tel: (021) 851-5595. Fax (021) 852-2697

Abstract

Osteochondritis dissecans (OD) involves the adolescent radio-capitellar joint and is due to chronic, compressive forces on the capitellum, ultimately causing injuries ranging from an articular cartilage injury to an osteochondral avulsion fracture. Plain films are often negative, while CT, MRI and MR arthrography are the examinations of choice. OD should not be confused with a pseudodefect of the capitellum or Panner's disease. Staging of the lesion is important for its management, which is conservative for stages 1 and 2, while surgery is indicated for stages 3 and 4. Osteoarthritis is a late complication in 50% of patients with advanced disease.

Case report

A 15-year-old elite downhill mountain-biker presented with a painful elbow after falling off his bike on a descent. On clinical examination he had a suspected fracture of the capitellum with associated soft tissue swelling. There was also limited range of movement, but no crepitus was present. On further questioning, there was a history of a few minor falls and intermittent pain.

Plain films show defect of the lateral aspect of the capitellum (Figure 1).

Figure 1: AP plain radiograph of the left elbow showing a defect in the capitellum (arrowheads)

Axial CT showed a deep defect of the capitellum and loose bodies in the coronoid and olecranon fossae (Figure 2). MRI T2 fat saturation (Figure 3a) and T1 coronal images (Figure 3b) showed the capitellar defect with fluid partially surrounding the fragment, as well as associated microtrabecular bone marrow oedema.

The clinician decided to treat the patient conservatively, as it was felt that the elbow is a non-weight-bear-

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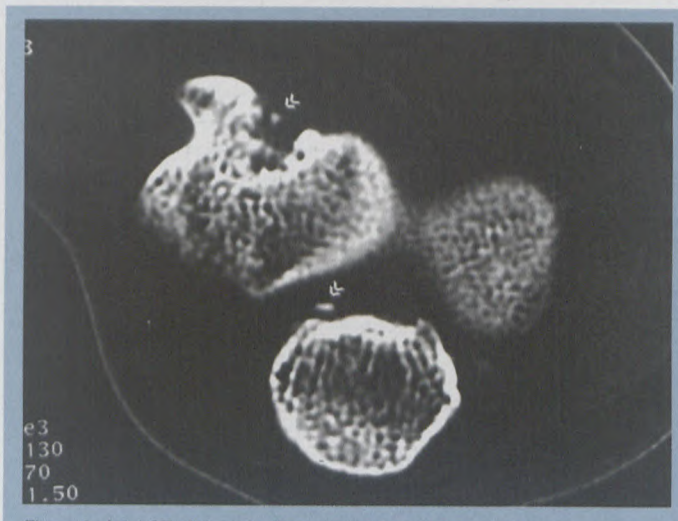

Figure 2: Axial CT of the left elbow viewed from the craniad aspect. Arrowheads indicate both the site of the capitellar defect and the loose bodies in the olecranon fossa.

Figure 3: (a) T2 fat sat coronal MRI of the left elbow and

(b) T1 coronal MRI of the left elbow. Both images show the capitellar defect (arrowheads), with joint fluid extending into the lesion.

ing joint. Rest was advised and further weight-bearing and compressive trauma to the elbow discouraged.

Discussion

Repeated valgus stress producing lateral compartment compression may lead to osteochondritis dissecans of the capitellum[1]. Osteochondritis dissecans represents a transchondral fracture secondary to a transmission of tangential shearing forces across the joint space. The stress compresses the bone and may result in a spectrum of injury ranging from articular cartilage injury to an osteochondral avulsion fracture. This injury is thought to be traumatic in origin, owing to either a single major event or repeated minor injuries.[2,4] Abnormal stress owing to malalignment or ligamentous laxity may be a predisposing factor. Other proposed causes include a hereditary ossification defect, familial localised abnormality in cartilage nutrition, or micro emboli with peripheral necrosis of bone. The age range is four to 15 years, but patients are predominantly within the second decade of life. Most children with this condition are active. Boys are three times more likely to have this entity than girls. The knee, elbow and talus are the most common sites involved. Gymnasts, pitchers and downhill mountain-bikers are predisposed to OD of the capitellum or radial head due to chronic lateral impaction.[2]

Plain films may show a fracture line, a fragment with a surrounding lucent zone or a concave defect. The fragment may be dense, suggesting necrosis, or may resorb.[1,2,3] An anteroposterior plain film of the elbow with 45% flexion is also suggested to show the pathological process.[5] The use of ultrasound is also suggested by certain authors. Localised subchondral bone flattening with overlying cartilaginous thickening is seen in early disease.[5] CT, MRI and MR arthrography are used to diagnose and stage osteochondritis, as the staging affects the management.[1,2,4]

It is important to stress that different classifications for OD exist for the elbow and the talus. This often leads to confusion.[4,5]

MRI Stage 1 OD of the elbow demonstrates signal changes consistent with cartilage injury, without disruption, and a normal subchondral bone. Stage 2 shows high signal breach of articular cartilage, but with a stable subchondral fragment. Stage 3 demonstrates a partial chondral attachment associated with a thin bright T2 signal behind the osteochondral fragment, probably representing synovial fluid around the fragment. Stage 4 represents a loose body within the centre of the osteochondral bed or free in the joint space.[2,5]

Care should be taken not to confuse an osteochondral defect of the elbow with the pseudodefect on MRI, owing to the abrupt transition between the posterolateral margin of the capitellum and the non-articular portion of the lateral humeral condyle.[4]

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Osteochondritis dissecans should also be distinguished from osteochondrosis of the capitellum, which is known as Panner's disease. Age is an important discriminator, because Panner's disease typically occurs in children five to 11 years of age, compared with the 13 to 16 years of age for OD. Panner's disease is thought to represent avascular necrosis of the capitellar ossification centre that occurs secondary to trauma. Plain films may show subtle fragmentation, while MRI shows abnormally decreased signal intensity within the ossifying capitellar epiphysis. Subsequent scans reveal normalisation of these changes with little or no residual deformity of the capitellar articular surface.[4]

Conservative treatment is indicated for stages 1 and 2, as the bone fragment may revascularise and heal. Surgery is indicated for stages 3 and 4, where the bone fragment is either fixed to the parent bone or removed and the osteochondral crater debrided or fixed. Osteoarthritis develops in 50% of patients with OD of the elbow.[1,2,4]

Conclusion

Osteochondritis dissecans of the elbow is a post-traumatic injury to the radio-capitellar joint caused by either a single major traumatic event or chronic lateral compressive forces. Plain film findings (in contrast to the index case) are usually negative, while CT and MRI show the different stages of the pathological process optimally. The diagnosis and staging are important, as the management and long-term prognosis are dependent on accurate imaging.

Aknowledgement

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Free intraperitoneal air on paediatric plain radiographs and differentiating this from a 'food mound'

in the gastric fundus accumulates in a mound instead of as the expected air-fluid level. When faced with a surgeon concerned about this finding, re-evaluation of the patient's clinical status is recommended together with re-assessment of the radiographs for free air in other recognised locations. We also keep examples of previous normal patients with the "food mound" sign, which we show to doubtful surgeons.

If the radiologist is familiar with this finding, such a radiograph will cause less distress to him/herself, the surgeon and the parents of the recently fed child. May the "food mound" be with you!

References

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