Avulsion fracture of the proximal fibula (arcuate sign) in a young woman

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DESCRIPTION

A 20-year-old woman presented to our primary care clinic for right knee pain 2 weeks after she was struck on her right side by a car travelling 10 mph (16 kph). She was seen in an emergency department after the accident and diagnosed with right superior and inferior pubic rami fractures but did not have any imaging of her right knee. The pain is constant, worsens with weight bearing, and has not been relieved by non-steroidal anti-inflammatory drugs (NSAIDs) or ice. It is aching in quality and worst on the lateral aspect. Her knee has also become gradually more swollen since the accident and feels unstable with weight bearing. She denies locking and clicking of the knee. She denies weakness, numbness and tingling of her leg. On physical examination, her gait is antalgic with mild right knee effusion. Range of motion is from 0° to 120° with pain at end range of motion. There is tenderness to palpation of the fibular head, but no tenderness of the medial or lateral joint lines, patella, patellar tendon, lateral collateral ligament (LCL) or medial collateral ligament (MCL). There is 1+ glide with Lachman, but negative anterior and posterior drawer tests. There is no laxity with varus and valgus stress and the leg is neurovascularly intact. Plain radiography revealed an avulsion fracture of the proximal fibula (figure 1).

Figure 1 Anteroposterior plain radiography 2 weeks after injury reveals an avulsion fracture of the proximal fibula (arrows) at the attachment of the arcuate ligament.

Figure 2 T2 weighted MRI images 4 weeks after the injury (A–D). Sagittal view (A) confirms the avulsion fracture of the proximal fibula (arrowheads). Sagittal (B) and transverse (C) views also show impaction oedema at the adjacent posterior lateral tibial plateau (circles). Coronal view (D) revealed severe bone marrow contusion of the medial femoral condyle (circle). Anterior cruciate ligament, posterior cruciate ligament, medial collateral ligament and lateral collateral ligament complex including the popliteus tendon were normal.

MRI (figure 2) showed impaction oedema and bone marrow contusion at the posterolateral tibial plateau and medial femoral condyle with intact anterior cruciate ligament (ACL), posterior cruciate ligament (PCL), MCL and LCL. She was treated conservatively with relative rest, ice and NSAIDs as needed. At 4-week follow-up, her pain and swelling had decreased significantly, and her feeling of instability resolved. She started formal physical therapy, including a home exercise programme for muscle strengthening. At 10-week follow-up, her pain and function had returned to her pre-injury baseline.

A fibular head avulsion fracture occurs at the insertion of the posterolateral ligamentous complex and is called the ‘arcuate’ sign when identified on plain radiograph.^{1–5} It is an important finding that frequently indicates other underlying structural injury to the knee.^{1–5} This fracture is highly

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Learning points

- Avulsion fracture of the proximal fibula, 'arcuate sign', is a rare finding on plain radiography.
- Due to high association of arcuate sign and internal derangement of the knee (eg, anterior cruciate ligament, posterior cruciate ligament and posterolateral corner injuries), an MRI should be obtained.
- Patients with arcuate sign and no major ligaments or soft tissue injuries can be treated non-operatively.

associated with a rupture of either the ACL or PCL, or an injury to the posterolateral corner of the knee.¹⁻⁵ If left untreated, these injuries can lead to posterolateral instability of the knee.³ The most common mechanism of injury is direct force to the anteromedial knee with tibia externally rotated or hyperextension force with tibia internally rotated.^{3,4} Anteroposterior is the best view to visualise the arcuate sign in plain radiography.³⁻⁵ MRI should be obtained to evaluate ACL, PCL and posterolateral corner injuries.^{3,5} In patients without any major ligamentous injuries, a nonoperative management is the treatment of choice which includes weight bearing as tolerated and rehabilitation.

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