

## X-ray quiz: a woman with knee pain

### X 光照片猜謎：一名女子的膝痛

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#### Case

A 38-year-old lady with good past health except occasional pain at both knees complained of right knee pain after turning around to pick up a file. She was unable to walk due to severe pain. On examination,

tenderness and swelling were noted at the anteromedial aspect of her right knee. The anterior drawer test, valgus and varus stress tests were all negative. However, pain might have affected the accuracy of these tests. Anteroposterior (AP) and lateral X-rays of the right knee were taken (Figures 1a & 1b).



Figure 1a. Anteroposterior view of right knee.

#### Questions

1. What is the abnormality?
2. What is the diagnosis?
3. What are the possible associated radiographic findings? (Not present in Figures 1a & 1b)



Figure 1b. Lateral view of right knee.

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## Answers

1. The abnormality is avulsion fracture of the tibial spine, with a bony fragment seen in both the AP and lateral views.
2. The diagnosis is anterior cruciate ligament injury.
3. Possible associated radiographic findings are: -
  - Anterior displacement >5 mm of the tibia relative to the femur on lateral view (tibial anterotranslation)
  - Segond fracture (Avulsion fracture of the lateral tibial condyle)
  - Fracture of the fibular head
  - Nondisplaced fracture of the posterior tibial plateau
  - Lipohaemarthrosis
  - Deepened lateral femoral condylar notch<sup>1</sup>

## Progress

The lady was admitted to the orthopaedic ward. Computed tomography of the right knee revealed a large haemarthrosis and an avulsion fracture of the anterior cruciate ligament attachment. The main fragment measured 21 mm (width) x 16 mm (length) x 9 mm (depth). There was also a bone fragment at the posteromedial portion of the lateral tibial condyle. Magnetic resonance imaging of the right knee showed complete anterior cruciate ligament avulsion fracture. The fracture extended to involve the entire root of the lateral meniscus. Arthroscopy of the right knee with screw fixation of the tibial spine fracture was performed one day after the injury.

## Discussion

The anterior cruciate ligament originates from the lateral femoral condyle at the most posterior point

of the intercondylar notch. It inserts into the intercondylar eminence or tibial spine of the tibia.<sup>1</sup> It prevents the posterior displacement of the femur on the tibia and hyperextension of the knee.

Anterior cruciate ligament injury is a common knee injury. This ligament is often ruptured in sporting activities by a sharp twisting movement or when the tibia is pushed forward forcefully relative to the femur. The patient may hear a 'pop' sound when the ligament ruptures. In young patients, the tibial spine may be avulsed instead as in this lady.<sup>2</sup> Haemarthrosis develops within a few hours. The patient complains of pain, swelling and instability. Joint laxity is difficult to assess in the acute setting due to pain, swelling and protective muscle spasm. Three special tests in physical examination can be used to test the integrity of the anterior cruciate ligament. The Lachman test is the most sensitive test while the anterior drawer test is not reliable due to spasm of the hamstring muscles.<sup>3</sup> The pivot shift test is difficult for the inexperienced. Examination under anaesthesia may be needed to facilitate the physical examination.

X-ray of the knee is indicated in patients with pain and swelling after twisting injury. Computed tomography and magnetic resonance imaging are useful to confirm and assess the severity of the anterior cruciate ligament injury. Arthroscopy is both diagnostic and therapeutic.

## References

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