Avulsion fracture of the anterior cruciate ligament in a 9-year-old child

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DESCRIPTION

A 9-year-old girl sustained an injury to her right knee during sliding on the playground. Immediately after the injury, she felt a sharp pain in her knee and she was unable to walk. On physical examination there was marked knee effusion without ecchymosis or deformity and the patient was keeping her knee in slight flexion. Both flexion and extension of the knee were painful. Knee ligamentous examination could not be performed due to intentional guarding. Plain radiographs demonstrated an intra-articular bone fragment in the intercondylar notch (figure 1A,B). An MRI examination

revealed completely displaced avulsion fracture of the anterior cruciate ligament (ACL; figure 1C,D). Open reduction and internal fixation with two compressive screws were performed with limited arthrotomy. At the final follow-up 9 months after the injury, the fracture healed without any sign of knee instability (figure 2).

Avulsion fractures of tibial spine also called as tibial eminence fracture or ACL avulsion fracture is an uncommon injury usually seen more in children than in adults. In children it is associated with forced flexion and in adults it occurs due to hyper-extension injuries.^{1 2}

Figure 1 (A) Anteroposterior and (B) lateral radiographs of right knee depicting an intra-articular fracture fragment in the intercondylar notch (arrow); (C and D) MRI showing a bone fragment avulsed from the tibia (arrow) with an adjacent marrow oedema.

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Figure 2 (A) Anteroposterior and (B) lateral views of the patient's knee at 9-month follow-up.

Standard imaging for ACL tibial spine avulsion fractures include anteroposterior and lateral radiographs. The fracture is best seen on the lateral radiograph. An MRI is useful to determine the site of origin of the bone fragment and to assess the associated soft tissue injuries.^{1 2} In the elderly, it can be confused chondrocalcinosis related with calcium pyrophosphate disease.³

The Meyers and McKeever classification describes three types of ACL avulsion fracture injuries. Type IV was later added by Zariczyj to include comminuted fractures of tibial spine. Type I—undisplaced fracture of tibial eminence, type II—anterior segment of fragment is elevated but hinged, type III—completely displaced fracture and type IV—completely displaced and comminuted fragment. Type I can be managed conservatively but anatomical reduction and internal fixation were required for types II–IV.²

Contributors All authors are included in writing and controlling the manuscript.

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Learning points

- ▶ Although most anterior cruciate ligament tears involve the midsubstance of the ligament, avulsion of its tibial attachment occurs in a minority of cases and is more common in children than adults.
- ▶ Anterior cruciate ligament avulsion fracture is best seen on lateral knee radiograph however MRI delineates the site of origin of the bone fragment and associated soft tissue injuries.
- ▶ Early diagnosis and treatment of this knee joint abnormality may help diminish long-term disability.

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