PICTORIAL MEDICINE

Occult posterior cruciate ligament avulsion fracture in a paediatric patient: easily missed diagnosis

Case report

Posterior cruciate ligament (PCL) avulsion fracture is uncommon in the paediatric population. Clinical examination in children can be difficult as they are often irritable and uncooperative. Moreover, subtle radiological signs on basic X-rays are also liable to be missed. Further imagings including computed tomography (CT) and magnetic resonance imaging (MRI) are crucial to rule out this rare condition. We present a patient with an occult PCL avulsion fracture.

After being tripped up while running, a 12-year-old boy suffered from direct right knee contusion. He complained of right knee pain and initially had a limping gait. A few hours later, he could not bear weight because of pain and swelling.

Physical examination revealed a gross right knee effusion and posterior sagging of the tibia with respect to the femur. He had limited active motion of the right knee at 5 to 30 degrees of flexion and passive motion at 5 to 45 degrees. Maximal tenderness was elicited at the posterior knee region. Ligament laxity tests could not be performed due to pain. The extension mechanism was intact.

X-ray of the knee showed no obvious fractures in anteroposterior view. On careful inspection, the presence of effusion was noted with joint space widening and a suprapatellar soft tissue shadow (Fig 1). On the lateral view, there was a suspicious tiny bone fleck at the posterior facet of tibial plateau (Fig 2), but was otherwise unremarkable. This was confirmed by CT (Fig 3). An MRI showed a heterogeneous signal at the posterior tibial facet with a small bone fragment minimally displaced and in continuity with the main substance of PCL and intact epiphysis (Fig 4). The anterior cruciate ligament, collateral ligaments, and the menisci were normal. Conservative management was adopted. The patient was initially treated with lower limb elevation and ice therapy. After the swelling subsided, he was fitted with a PCL extension knee brace and allowed full weight-bearing walking exercises with crutches. Four weeks later the fracture had healed.

FIG 1. An anteroposterior X-ray showing skeletally immature bones with physeal plates and widened joint space (grey arrow) as well as soft tissue swelling (white arrow)

Discussion

Awareness and ability to distinguish this subtle avulsion fracture is of paramount importance. A missed diagnosis can jeopardise patient care and

FIG 2. A lateral X-ray showing a tiny and slightly radio-opaque bone fragment (white arrow) that could be easily overlooked

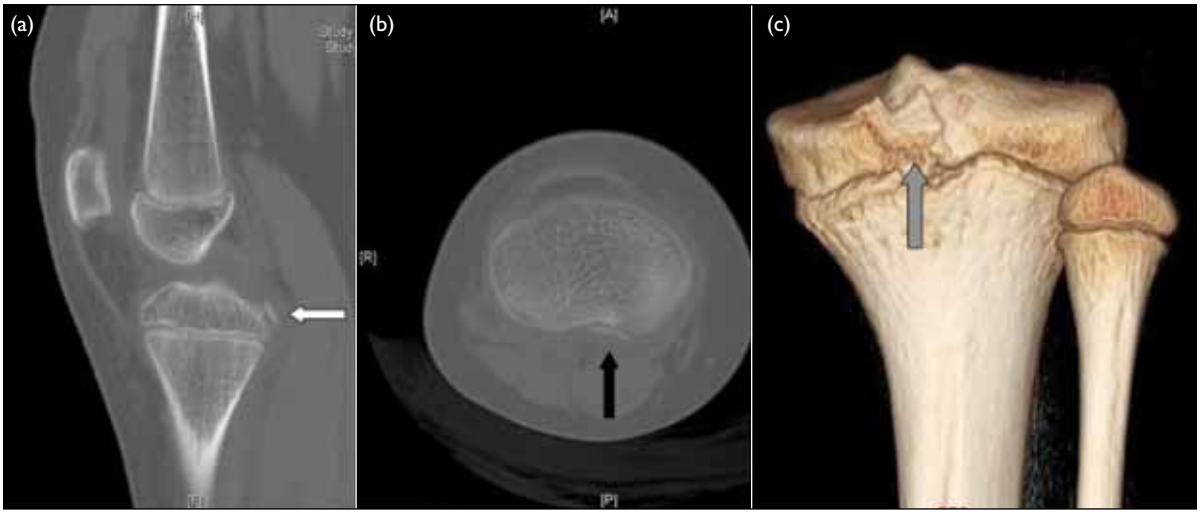

FIG 3. (a) Sagittal computed tomography (CT) showing the avulsion fragment (white arrow). (b) Axial CT with minimal displacement of the fracture (black arrow). (c) 3-Dimensional CT reconstruction image illustrating the fracture fragment (grey arrow)

FIG 4. Serial T1-weighted and T2-weighted magnetic resonance imaging showing gross knee effusion (grey arrow), heterogeneity of the avulsion fracture (white arrow) and intact posterior cruciate ligament (black arrow)

result in further injury, chronic insufficiency with medico-legal consequences. Whenever there is a discrepancy between clinical findings and simple radiological investigations, clinicians should not be complacent with relatively 'benign'-looking X-rays. Computed tomography can show up occult fractures while MRI can delineate ligamentous and soft tissue injuries.

As illustrated, diagnosis and prompt treatment of the minimally displaced avulsion fracture in our patient avoided further displacement and hence conservative management could be adopted. Had the fracture displacement been significant and ligamentous instability be noted, an operation would have been indicated to restore stability. Case reports describe operative methods such as

open reduction and internal fixation by cannulated screw and washer,[1] suture anchor[1] or direct suture repair[2] for moderately displaced types. In extreme cases, PCL reconstruction has been performed.[3] The main concern in relation to operating on paediatric patients is physeal plate injury, and subsequent growth plate arrest. However, as such cases are so few, this particular operative risk cannot be readily delineated.

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3. Solayar GN, Kapoor H. PCL tibial avulsion with an associated medial meniscal tear in a child: a case report on diagnosis and management. J Pediatr Orthop B. Epub 2011 Mar 30.

Answers to CME Programme
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I. Utility of a preoperative assessment clinic in a tertiary care hospital

A	1. True	2. True	3. False	4. False	5. False
B	1. True	2. True	3. False	4. True	5. False

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II. The last defence? Surgical aspects of gouty arthritis of hand and wrist

A	1. True	2. False	3. True	4. True	5. False
B	1. True	2. False	3. True	4. True	5. True