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Post Traumatic fracture of Shaft of femur with avulsion fracture of ipsilateral lateral epicondyle of femur and avulsion fracture of tibial spine and ipsilateral Posterior cruciate and Lateral collateral ligament injury without distal neurovascular deficit: A Case Report

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Abstract

We are presenting a case report of a patient having shaft of femur fracture with avulsion fracture of ipsilateral lateral epicondyle of femur and avulsion fracture of tibial spine and ipsilateral Posterior cruciate and lateral collateral ligament injury without distal neurovascular deficit accompanied by demonstrable posterolateral rotary instability (PLRI) of the knee. A 27-year-old man was involved in a road traffic accident. Radiographs revealed an avulsion fracture of the lateral epicondyle of the femur and a fracture of the femoral shaft. An MRI scan showed the lateral epicondyle was avulsed by the LCL. The PCL signal was absent. The femoral shaft fracture was fixed with an intra medullary nail. Sagging of the tibia, with loss of prominence of tibial tuberosity and a positive posterior drawer test, demonstrated a complete tear of the PCL. The avulsion fracture of the lateral epicondyle was treated by an open reduction and internal fixation with cancellous cannulated screw. A ligament can be avulsed at either end, and to our knowledge, this pattern of injury as a counterpart to arcuate sign has never been documented in the literature. It is important not to dismiss a small avulsion fracture around the knee joint as insignificant, as it could indicate the presence of a major ligamentous injury.

Introduction

The arcuate sign is an avulsion fracture of the fibular head by the pull of the arcuate complex consisting of the lateral collateral ligament (LCL), the biceps femoris tendon (BFT), the popliteofibular ligament (PFL), and arcuate ligament[1,4]. Most arcuate signs comprise the avulsion of the conjoined tendon of the LCL and BFT from the fibular head even though smaller avulsion by the PFL and arcuate ligament also occurs[3]. The arcuate sign is associated with insufficiency of the LCL and indicates that the latter has sustained an injury. Isolated damage to any ligament stabilising the knee joint is rare and injuries are frequently a combination of cruciate ligament tears and disruption of

other capsuloligamentous structures of the joint[5]. The arcuate sign is considered a pathognomonic sign for injuries of the posterolateral corner (PLC) of the knee and an associated posterior cruciate ligament (PCL) injury is frequently found.We present a case of femoral avulsion of the LCL with complete tear of the PCL and popliteus tendon, accompanied by demonstrable posterolateral rotary instability (PLRI) of the knee. Even though any ligament can be traumatised by avulsion at either end, as well by substance tear, this pattern of injury as a counterpart of arcuate sign has never been documented in the literature.

Case Report

A 27 year old male presented to our orthopaedic ER following road traffic accident (hit by heavy motor vehicle while sitting on passenger seat of a motor bike) with complaints of pain and swelling in right thigh within 6 hrs of accident (as shown in figure 1). Patient was referred to our tertiary care centre from a primary care centre for management of fracture shaft of femur right. We received the patient with crammer wire splintage in place.

Examination

On general examination, Patient was conscious, oriented, vitals stable, Chest compression and Pelvis compression test were negative.

On local examination of right lower limb, swelling, tenderness present over right thigh with overlying skin being normal. On knee examination of ipsilateral limb, no evident swelling was present with mild tenderness over lateral epicondyle of femur.

Treatment

Patient was initially managed with upper tibial traction and immobilisation on modified bohler-braun splint after getting all appropriate x-ray views(as shown in figure 2,3).On day two, we noticed a posterior sagging of right tibia, MRI right knee was done which showed PCL tear along with LCL injury.

Patient was planned to be operated in one sitting, Closed interlocking of femur following which open reduction and internal fixation of lateral epicondyle of femur done with one cannulated cancellous screw and then Arthroscopic PCL repair using fiber thread was done. During knee arthroscopy tourniquet was not used.

Arthroscopy findings: ACL and both menisci were intact but there was increased space between lateral meniscus and tibia, PCL tear present with avulsion fracture of tibia at PCL insertion with intact popliteus tendon.

Posterior Drawer test was negative in immediate post-op.Patient was kept strict non weight bearing on affected limb for 6 weeks and knee Rehabilitation exercises were started as per protocol.union of fracture shaft of femur was acheieved at 10 weeks and posterior drawer test and varus stress test were negative at 12 weeks.

Discussion

In presence of fracture femur shaft, ligamentous injuries of knee are frequently missed. The arcuate sign was first described by Shindell et al. as an avulsion fracture of the fibula head indicating posterolateral knee instability[4] .While the arcuate ligament and the PFL attaches to the posteromedial portion of the styloid process of the fibular head, the biceps femoris joins the LCL to insert more anterolaterally into the of fibular head. The name of the conjoined tendon explains that a small avulsion of the fibular head occurs by the pull of the PFL and arcuate ligament and that a large avulsion occurs by way of the conjoined tendon[5,6]. Strong association of the arcuate sign with other ligamentous injuries including PCL or the or arcuate complex, and associated PLRI has been well documented[1-3]. Any ligament can be avulsed at either end. The avulsion fracture of the ACL can occur from the femoral as well as the tibial side[7] and the same applies to

the PCL[8]. In the shoulder, capsulolabral avulsion from the glenoid rim, or Bankart lesion has its counterpart as a humeral avulsion of the glenohumeral ligament, or HAGL. In the ankle, the tibial avulsion of the distal anterior tibiofibular ligament is known as a Tillaux fracture, and fibular avulsion as a Wagstaffe fracture. With regard to the injury of the LCL of the knee, complete or partial tear of ligament substance and fibular avulsion fracture, fracture have been described[9]. However, a femoral avulsion as described in this case study, has never been reported, to our knowledge. Small avulsion fractures around the knee joint are sometimes suggestive of major ligamentous injury[10]; a Segond fracture is to an ACL injury, with anterolateral rotary instability, what the arcuate sign is to a posterolateral knee injury. It is equally the case that a small avulsion fracture might be an indication of injury to the LCL and other major ligamentous structures. Even though radiographs may show only a small avulsion, the real injury is to ligamentous structures at the posterolateral corner of the knee, and treatment must address this accordingly.

So in conclusion we advise that it is more imperative to have all x-rays that is one joint above and below the fracture (in our case, fracture femur shaft) and to have atleast two views perpendicular to each other as in this case AP view of knee did not show avulsion fracture of lateral epicondyle and could have been missed and to have suspicion of single/multiple ligamentous injuries in presence of even avulsion fractures around the knee and a small avulsion fracture around the knee joint should not be dismissed but instead be addressed carefully, as it may indicate the presence of a major ligamentous injury.

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Figure: 1 showing Swelling and deformity over Right thigh

Figure: 2 Xray AP and Lateral view of Right Hip with Thigh showing fracture of shaft of femur with avulsion fracture of lateral condyle of right femur.

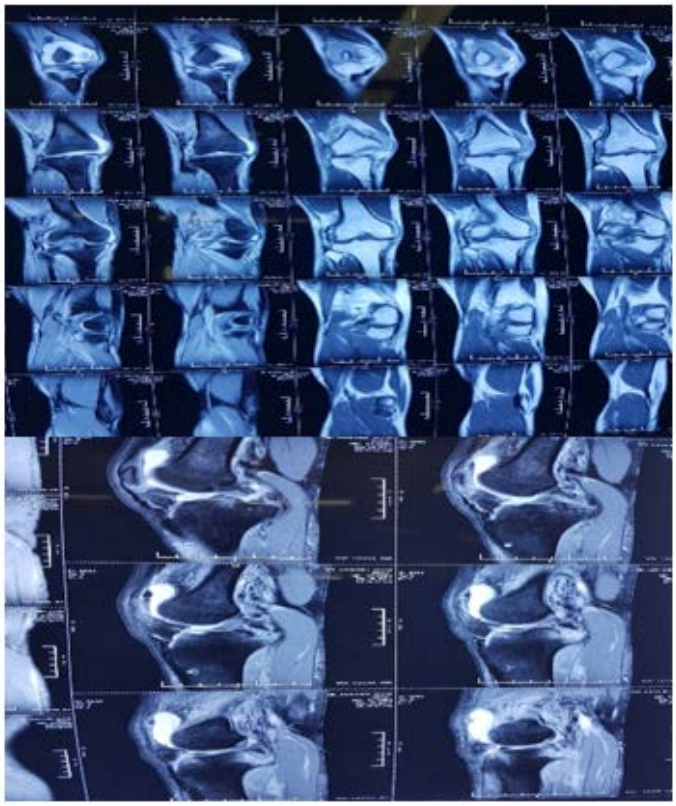

Figure 3: MRI of right knee showing PCL tear and Avulsion of right tibial spine

Figure: 4 post operative xray after fixation of fracture shaft of femur with intramedullary nailing

Figure: 5 post operative xray after fixation of fracture lateral condyle with cannulated cancellous screw.