

Tillaux Fracture In Adult: A Case Report

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Study performed at Rotherham District General Hospital, Rotherham, South Yorkshire, United Kingdom

Abstract

Case report

We report a rare case of Tillaux fracture of the ankle in a 36-year-old man. He sustained the injury in a football tackle and presented to us with pain and swelling of the left ankle. After preliminary X-rays, a CT scan was done which showed a Tillaux type fracture which is a rare injury after epiphyseal fusion. The ankle was treated with open reduction and internal fixation with screws and plaster for 6 weeks. At 3 months the patient had no pain in the ankle and able to mobilize full weight bearing on that side.

Keywords: Ankle fracture, Tillaux fracture, Anterolateral tibial avulsion

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Introduction

Tillaux fracture is an uncommon, rare ankle injury, described as an avulsion fracture of anterolateral part of distal tibia due to the stronger pull of the anterior tibiofibular ligament, by an external rotation force to the foot causing a Salter Harris type III injury [1-3]. It is typically seen in adolescents who have open epiphysis because the anterior tibiofibular ligament is stronger than the epiphyseal bone, and so the strong pull of this anterior tibiofibular ligament, predisposes to an epiphyseal bony injury rather than a ligament rupture leading to an avulsion physeal injury to anterolateral distal tibia [2,3]. Occurrence of this rare tillaux fracture in adults is further rare, because in adults i.e. after physeal fusion, ligament strength is less than bony strength and therefore a rupture of the ligament is more likely than a bony avulsion [4]. Only very few cases of this Tillaux fracture in adults has been reported [4-9]. In the present report, we describe such rare case of a Tillaux fracture in an adult, with

aim to educate the clinicians about this rare injury in adults, which is worthy of discussion.

Case report

A 36-year-old gentleman presented to the emergency department immediately after trauma sustained in a football tackle. His body rotated internally when the foot was on ground, when he was hit by an opponent, giving external rotational force injury to the ankle. He complained of excruciating pain and severe swelling on the anterolateral aspect of distal tibia and ankle. He had superficial abrasions over the shin. No other injuries were identified. Distal neurovascular structures were normal. He had no significant previous medical history.

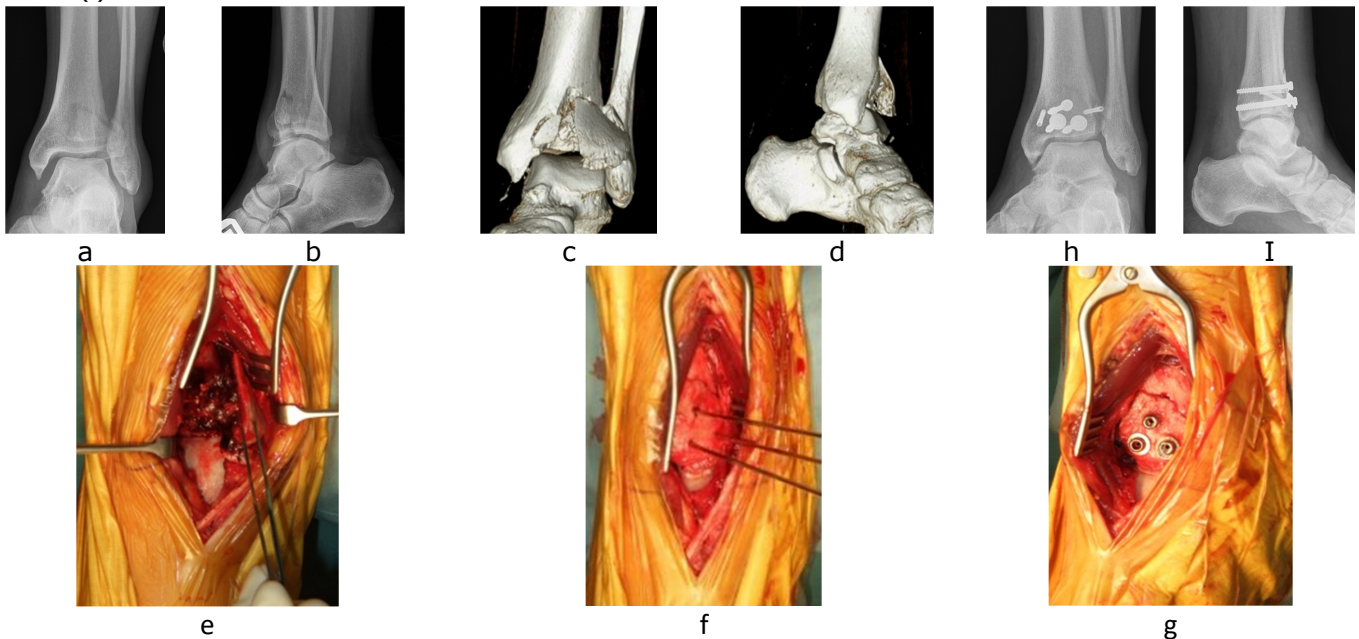
Plain radiographs of ankle showed a distal tibial avulsion fracture of the anterolateral aspect indicating a Tillaux-type injury. He was given analgesics and placed in a below knee plaster of paris back slab. He was admitted to the ward and limb was elevated. A CT scan of the ankle was performed to determine the extent of the fracture, to access the injury

three dimensionally and to plan the surgery. It confirmed an avulsion fracture of the distal anterolateral tibial cortex with an intact tibiofibular syndesmosis. This was deemed consistent with an adult-type Tillaux injury.

Since this was potentially unstable injury requiring anatomical reduction and internal fixation, we planned to treat the patient surgically. Patient was operated in supine position, under tourniquet under spinal anesthesia via anterior approach to ankle. Intra operative findings confirmed an avulsion fracture of the distal tibia with an intact tibiofibular ligament. The fragment was reduced and initially temporary fixed with k wires, after confirming reduction under C arm. Following this, 3 cannulated 4.5mm lag screws and 2 headless compression screws were

passed to ensure stable hold and anatomical reduction of the articular surface (fig 1). Postoperatively, a back slab was applied and the patient's limb was elevated whilst swelling subsided. Check dressing was done on second postoperative day and oral antibiotics continued till five days. After suture removal at 2 weeks a complete below knee cast was applied. The post-operative regimen included non-weight bearing mobilization for a period of 6 weeks in a below knee cast. Partial weight bearing was instituted for a further 2 weeks and physiotherapy to mobilize the ankle was begun. Full weight bearing began at eight weeks along with proprioceptive rehabilitation. Radiographs at 6 weeks showed union of the fragment. Normal foot and ankle function was regained by three months.

Fig 1. Pre-operative AP (a) and lateral (b) x rays and 3-D reconstruction CT scan views (c and d) of the patient with tillaux type fracture fixed with CCS as shown in intra photograph (e to g) and post-operative AP (h) and lateral (i) views.



Discussion

Ankle syndesmosis is formed by distal tibia and fibula and is stabilised with four ligaments - the anterior and posterior tibiofibular ligaments, transverse tibiofibular ligament and interosseous membrane [1].

Sir Astley Cooper, was first to recognize the Tillaux fracture in 1822, as an avulsion injury to antero-lateral distal tibial epiphysis [10]. Tillaux fracture is an eponym given by Paul

Jules Tillaux in 1892 who described this avulsion injury and its mechanism of injury following his experiments on cadavers. He described it as an external rotation of ankle that leads to an avulsion fracture of the anterolateral aspect of the tibial plafond owing to the pull of a taut antero-inferior tibiofibular ligament [11]. Chaput later described similar counterpart injury to the posterolateral tibia (avulsion of posterior tibio-fibular ligament), later called Tillaux-Chaput injury.

Distal tibial epiphysis appears at age 6-10 months and it unites with the diaphysis at about age 18 years [1]. Kleiger and Mankin showed that fusion in the distal tibial epiphysis occurs first in the middle third of the epiphysis, followed by, the medial side, and finally in the lateral portion [12]. Tillaux fracture occurs after the medial part of the physis has fused but before the lateral part closes, hence this injury is commoner in adolescents.

In adolescents, the lateral physis is open and anterior tibiofibular ligament is stronger than the epiphyseal bone (growth plate). When a strong external rotational force acts on ankle, it causes a pull force on this strong taut anterior tibiofibular ligament which rather than causing pure ligament rupture, predisposes to an avulsion epiphyseal bony injury leading to an avulsion physeal injury to anterolateral distal tibia. Further since the lateral physis growth plate is avulsed away with fracture line involving the joint, this Tillaux fracture is typically a Salter Harris type III physeal injury [2-4]. In adults this type of injury is very rare because physeal fusion has already been obtained and the ligament strength is less than the bony strength and ligament will usually give way and rupture before avulsion of its attachment to the anterolateral tibial plafond, leading to relative rarity of this avulsion fracture injury pattern in adults.

In adult type of Tillaux fracture, the avulsed fracture fragment is triangular as compared to the juvenile one, where the fragment is quadrangular. Adult pattern of Tillaux fractures are classified into Type A and Type B. Type A is avulsion fracture of the anterolateral aspect of the distal tibial plafond and Type B is a fracture pattern extending into the medial aspect resulting in antero medial pattern [6,7]. A few case reports are published, with this type of fracture in adults, but are not conclusive [4-9].

Like our case, Tillaux fracture is more common with sports related trauma that involves external rotation of the foot in relation to the leg. Children usually present with inability to bear weight along with painful and tender

ankle especially in the anterior part of the ankle, after a low energy trauma, whereas in adults it is usually a high energy trauma and may be associated with other fractures [4-9].

Antero-posterior, lateral and oblique plain radiographs of the ankle are helpful in diagnosing this fracture. But un-displaced fracture or cursory examination of the radiographs can miss the injury, necessitating computed tomography as a useful adjunct to confirm the diagnosis, clearly define the extent of the fracture, rule out any associated injuries involving the tibial pilon and to plan management [13,14].

Acute management includes elevation, ice fomentation and rest. Un-displaced fractures can be managed non-operatively by below knee non-weight bearing cast immobilisation for six weeks. Since these are intra-articular fractures and usually displaced due to avulsion pull by the ligament, these injuries need closed or open reduction with internal fixation to restore ankle joint congruity aiming congruous reduction, rigid fixation, and early mobilization for better functional outcome and to prevent complications like nonunion, malunion, arthritis, deformity and avascular necrosis of the fracture fragment [6,7].

This open reduction can be done by anterior or the anterolateral approach [6]. As per Kumar et al anterolateral approach provides the best access to the fracture [9], but we used anterior approach for fixation and reduction, because we suppose the approach should depend on the extend of the fracture line. Since we have done CT scan, which showed the exact extend of the fracture line, we used the anterior approach for fixation. Careful use of wires as "joysticks" to achieve accurate reduction and fixation, with 1 or 2 inter-fragmental compression screws will usually be enough to stabilize the fractured fragment. Arthroscopy-assisted reduction and percutaneous fixation techniques have also been described to treat this injury, predominantly among adolescents [15].

Conclusion

Tillaux fractures are usually seen in the adolescent population but can, rarely occur in adults. Anatomical reduction and internal

fixation leads to a full functional recovery and is recommended in the adult. Fixation is easier in the adult as one does not need to be concerned with iatrogenic physeal injury.

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