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Case Report

About a rare ankle injury in adults: Case report of a Tillaux fracture in adult

Yassine Ben Bouzid^{*}, Mohamed Saleh Berrada

Department of Orthopaedic and Trauma Surgery, Ibn Sina University Hospital, Rabat, Morocco

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ABSTRACT

Introduction and importance: Tillaux fracture occurs as a result of a forced external rotation mechanism involving the anterolateral tibial plafond. The occurrence of this fracture in adults is rare because the ligament usually disrupts before causing bone avulsion.

Case presentation: We report the case of a 31-year-old man who, following a trauma in a foot-ball game, was admitted for management of an isolated anterolateral tibial plafond fracture. The diagnosis was made by X-ray, supported by CT scan, which investigated the fracture and excluded other associated injuries. Management was based on open reduction and direct screw fixation. After a 12-month follow-up, we obtained an excellent result.

Clinical discussion: Tillaux fracture occurs most often in adolescents, more rarely in adults. The balance between ligament strength and bone strength explains the occurrence of this fracture in children, and the decrease in its incidence with the closure of the conjugation cartilage. Diagnosis is based on a complete radiological workup with standard radiographs and possibly a CT scan. Treatment is most often surgical using either direct screw fixation or plate osteosynthesis.

Conclusion: Avulsion of the anterolateral distal tibia, called Tillaux fracture, is a rare entity requiring careful examination and a complete assessment in order to make the diagnosis and to eliminate other associated injuries. Although the literature reports single cases, management is often surgical.

Introduction

First described in 1822 by Sir Ashley Cooper [1], the Tillaux fracture occurs after a forced external rotation mechanism in which the anterior tibiofibular ligament (AITFL) tears the anterolateral aspect of the tibial plafond [2]. This fracture is usually seen in adolescents in whom the AITFL is stronger than the epiphyseal bone and therefore the mechanism described results in avulsion of the anterolateral distal tibia rather than ligament rupture [3]. In adults, this fracture is very rare [4] due to the fact that the AITFL often ruptures rather than causing avulsion of the anterolateral tibial plafond. Only rare cases of Tillaux fracture in adults have been reported in the literature [4–7].

We report a case of Tillaux fracture in an adult. This fracture may go unnoticed on radiographic examinations which requires CT to describe the fracture anatomy and plan the approach [9]. In addition, it is an articular fracture of a weight-bearing joint, which requires anatomical reduction and stable fixation to allow early mobilization.

^{*} Corresponding author.

E-mail address: yassine.benbouzid2@gmail.com (Y.B. Bouzid).

Presentation of case

A 31-year-old man with a left ankle injury during a football game was admitted to the emergency room. The patient reported a forced external rotation mechanism during a ball shot. Physical examination found a swollen ankle on its anterior aspect with impossible and painful mobilization. Palpation of the medial malleolus and fibula did not reveal any pain. No skin lesions were observed and the vasculonervous examination was normal. On standard radiography, there was an anterolateral fracture of the tibial plafond (Fig. 1). The syndesmosis was intact, as were the medial malleolus and fibula (Fig. 3). Immobilization with a plaster splint was performed with analgesic treatment, then a CT scan was requested confirming the diagnosis of Tillaux fracture (Fig. 2).

The patient underwent surgical treatment. Using an anterolateral approach to the ankle, the fragment was reduced by pressure with a square tip and then provisional fixation was maintained with two Kirschner wires. Three 4.0 mm cancellous screws were placed anteroposteriorly (Fig. 4). On visual inspection, we found a medial extension (Fig. 4 (arrow)) that was fixed with two 4.0 mm cancellous screws inserted percutaneously through the medial malleolus, in order to have rigid fixation of the joint.

Postoperatively, the ankle was protected by a plaster cast for 15 days, with medical treatment of pain, antioedematous treatment, antibiotic prophylaxis for 48 h, and thromboprophylaxis for 14 days. At the 2nd week check-up, ankle mobilization was prescribed according to a defined scheme, without weight-bearing. Partial weight-bearing was allowed 8 weeks after surgery, and full weight-bearing after an additional 4 weeks. With a 12-month follow-up, we achieved fracture healing with normal ankle mobility without pain or limping on walking. No infectious or cutaneous complications were observed.

Discussion

The syndesmosis unites the distal part of the tibia and fibula and is formed by four ligaments: the anterior and posterior tibiofibular ligaments, the transverse tibiofibular ligament and the interosseous membrane [9]. Stable syndesmosis is one of the main conditions for a good functional outcome [9]. Because of its position, the AITFL is vulnerable to external rotation forces that could cause either its rupture or bone avulsion on the tibial or fibular side [10]. The anterolateral tibial plafond fracture was developed by 3 authors: Cooper [1] was the first to describe it in 1822, Tillaux [2,11] proved the avulsive nature of this fracture in 1892 after an experiment on cadavers, and Chaput [5,11] who described the avulsion of the posterolateral part of the distal tibia later called the Tillaux-Chaput fracture.

The Tillaux fracture is rare in adults and its incidence in transmalleolar fractures is 12 %, but the incidence of isolated bone avulsion remains unknown [12,13,17,18]. This fracture occurs most often in adolescents. Indeed, closure of the distal tibial epiphysis occurs between 12 and 14 years of age in girls and between 15 and 18 years of age in boys, and involves first the middle, then the medial, and finally the lateral part of the epiphysis. As a result, the lateral portion remains the last to fuse, which exposes it to the risk of fracture [10]. In adults, this injury is less common because of the physical fusion and the ligament strength, which is lower than the bone strength, and therefore, during forced external rotation, the ligament breaks before detaching the anterolateral part of the distal tibia [15]. It should also be mentioned that the avulsed fragment is triangular in adults and quadrangular in children [6].

The diagnosis of this fracture is difficult because it may go missed on standard radiographs, especially if the fracture is not displaced. This examination should always include a mortise or internal oblique view to expose fractures obscured by the fibula [9]. It may rarely be associated with a medial or posterior malleolus injury and therefore, syndesmosis should be evaluated [5]. A CT scan is often necessary to support the diagnosis and exclude any associated fracture [8,19]. Conservative treatment with a 6-week cast has been used by some authors [6] with satisfactory results, but is no longer appropriate [15] and the ideal surgical treatment is controversial. Oak et al. [6] treated their case with 2 quadricortical transsyndesmotic screws in which the external rotation stress test revealed syndesmosis instability. Lee et al. [17] opted for a T-plate fixation supplemented by two tricortical screws to fix the syndesmosis. Feng et al. [18] report arthroscopic management and Herbert screw fixation with excellent results.



Fig. 1. Anteroposterior and lateral radiographs showing an anterolateral tibial plafond fracture (arrow).

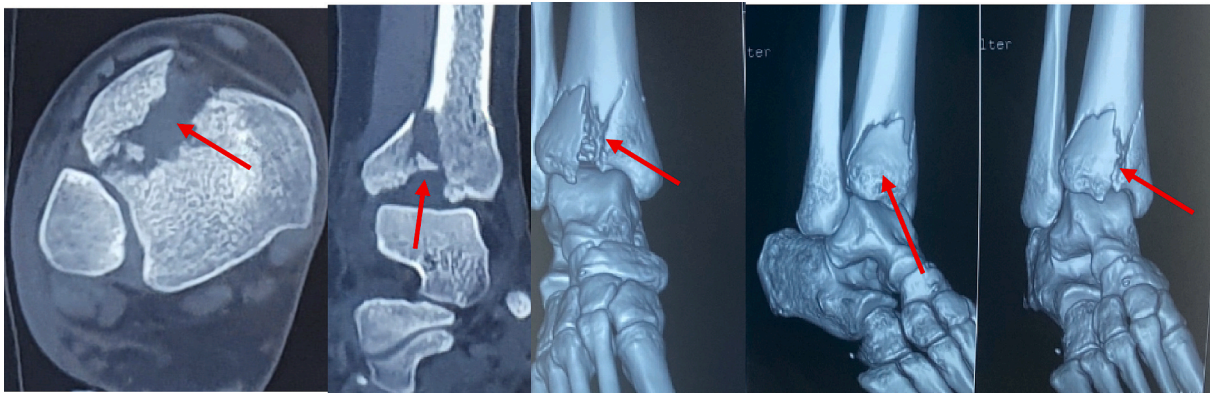


Fig. 2. CT scans showing the isolated nature of the Tillaux fracture (red arrow).



Fig. 3. Transverse CT section through the medial malleolus (white arrow) and lateral malleolus (red arrow) on which no fracture is noted.

Conclusion

Tillaux fracture in adults is a very rare lesion and may go unnoticed, requiring a complete radiological workup. Its management is still controversial. Most studies are based on case reports with no consensus on the management of this injury.

Ethics approval

The study is exempt from ethical approval in our institution.

Patient consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

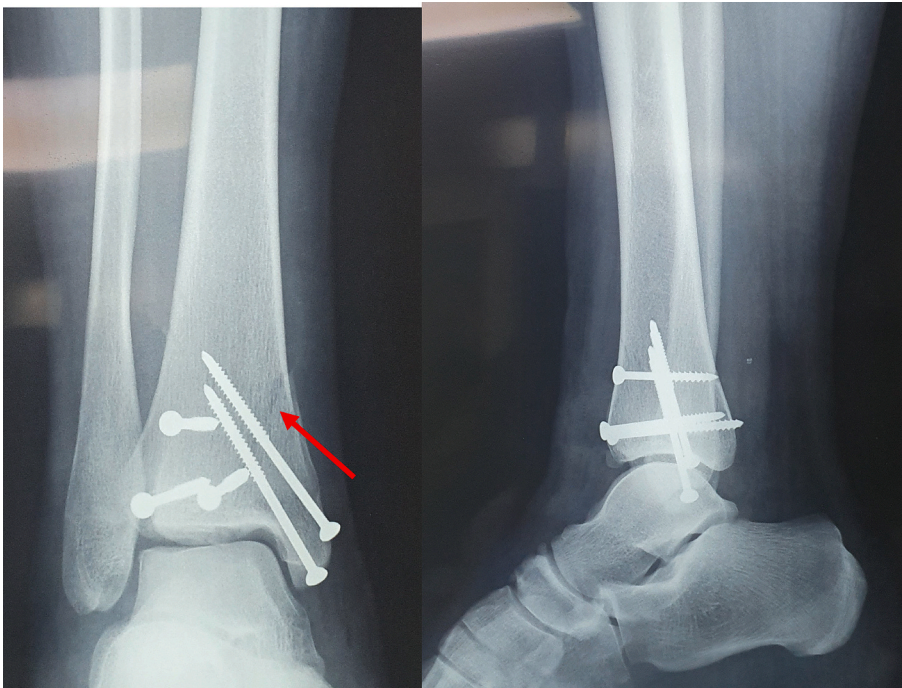


Fig. 4. Postoperative radiographs. Three anteroposterior screws were used to fix the anterolateral fragment and two medial screws to fix the medial extension (arrow).

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Authors' contributions

All authors have read and approved the final manuscript.

Declaration of competing interest

The authors declare that there is no conflict of interest.

Data availability

The datasets used and analysed during the study are available from the corresponding author.

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