

Case report of a very rare trauma combination: Concomitant complex ipsilateral ankle fracture associated with tibia shaft fracture

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Received – 25 June 2019

Initial Review – 25 June 2019

Accepted – 9 August 2019

ABSTRACT

There is a relationship between tibial shaft fractures and ankle injuries. Complex ankle injuries including fractures and syndesmosis injuries associated with ipsilateral tibial fractures are uncommon. In this case report, a four-combination injury including oblique-spiral tibial shaft fracture [TSF], posterior malleolar fracture [PMF], lateral malleolar fracture [LMF], and anteroinferior tibiofibular ligament [AITFL] avulsion in ankle are presented. A 45-year-old female patient was reported to the Department of Orthopedics with the diagnosis of tibia fracture by the emergency department. Ankle injury was noted during clinical examination and evaluation of xray. CT study used to determine the components of ankle injury and to plan surgery showed distal third oblique-spiral TSF, LMF, PMF, and AITFL avulsion. The next day, the patient underwent open reduction and internal fixation with the fluoroscopic guidance, for all fractures. Only the screw to the posterior malleolus was sent percutaneously under fluoroscopy. No complication and untoward event developed during and after the operation. The fractures reached both radiological and clinical bony union at 4 months. Ankle injuries such as LM fractures, PM fractures and AITFL avulsion fractures, which may be associated with oblique spiral type TSFs, are rarely seen or neglected. It is clinically important to recognize the four-combination injury preoperatively as unsuccessful reduction or fixing of the four-combination injury in the anatomic position may increase the risk of posttraumatic arthritis. Therefore, ankle fracture and syndesmosis injuries which is associated with tibia shaft fracture should not be missed and should be treated appropriately.

Key words: Ankle, Avulsion, Fracture, Osteosynthesis, Tibia.

Distal fractures of the leg, including the ankle, are the most common physical injury after distal radius fractures [1]. Posterior malleolar fracture (PMF) is the most common ankle injury associated with tibial shaft fractures (TSF) [2, 3]. Complicated ankle injuries with TSFs can be overlooked if patients do not complain of specific ankle pain during injury. In order to prevent degenerative changes in the ankle joint and persistent articular incongruence in the future, a complete and accurate evaluation and correct reduction and fixation should be performed in time. Therefore, orthopedic surgeons who manage TSFs should be more alert to detecting concomitant ankle injuries [1, 4]. If fractures are not treated well and movement limitation of ankle is not

recognized they may cause deformations such as varus, valgus, procurvatum, recurvatum, rotation, shortening or excessive growth due to complications [1]. In this case report, a very rare four-combination injury (oblique-spiral tibial shaft fractures, Posterior malleolar fracture, lateral malleolar fracture (LMF), and anteroinferior tibiofibular ligament (AITFL) avulsion) in the leg and ankle are presented.

CASE REPORT

A 45-year-old female patient was brought to the emergency department of our hospital due to an accidental falling at home. The patient declared that she was alone at

home and did not remember how she had fallen. She just said that "I slipped and fell". The patient had, deformation, swelling and pain in her right leg. Plain radiographs were taken (Figure 1).



Figure 1. Initial radiographs: Oblique spiral fracture is observed in the diaphysis of tibia.

The patient was diagnosed with tibia fracture in the emergency room and orthopedic consultation was requested. Subsequent formal ankle radiographs confirmed and Computed tomography (CT; Toshiba Alexion Advance 16) was performed to assess the injury before surgery. (Figure 2) Based on the clinical and radiographic evaluation, patient was diagnosed as "distal third oblique-spiral TSF, LMF, PMF, and AITFL avulsion"

The next day (*one day after injury*), the patient underwent open reduction and internal fixation with the fluoroscopic guidance, for all fractures. Only the screw to the posterior malleolus was sent percutaneously under fluoroscopy. Firstly, TSF was repaired by open reduction method and was provided osteosynthesis with plate and screws. Then, the AITFL avulsion fracture in the lateral malleolus was repaired by open reduction and fixed with one screw. The LMF was then repaired by open reduction. Osteosynthesis was provided by one lag screw and plate and screws. Finally, a percutaneous screw was sent to PMF. Scope control was performed at all stages of surgery.

No complication and untoward event developed during and after the operation. Patient was discharged with long leg splint and instructed to remain non-weight bearing for 4 weeks followed by a further 2 weeks partial weight

bearing with a Sarmiento cast. Subsequent follow up of the fracture was carried out to the adequate surveillance of the injury, until the satisfactory bony union. The fractures was deemed to have reached both radiological and clinical bony union at 4 months (Figure 3). She has full range of motion in her knee and ankle.



Figure 3. Postoperative radiographs. This patient underwent open reduction and internal fixation with the fluoroscopic guidance, for all fractures.

DISCUSSION

The rate of TSF with co-injuries of the ankle joint has increased over the years [2, 3, 5]. While this ratio was in between 0.9% and 14.5% before 2000, the rate has increased a lot thereafter. The rates of ankle joint injury with TSF have been reported by Stuermer [5] as 20% who prospectively examined fractures in 43 of 214 patients, Schottel et al [3] as 49.3% (88.6% of them occurred in spiral TSF), and Jung et al [2] as 66.2% as observed in 47 of 71 consecutive patients. Particularly, due to the developments in CT and magnetic resonance imaging (MRI), facilitating diagnosis of the ankle joint and soft tissue injuries with TSF has thus increased the incidence of TSF with co-injuries. Though there are many reported cases on ankle injuries associated with tibia shaft fractures, most of the publications are related to posterior malleolar fracture associated with tibial fracture [2, 5-8]. There are limited reports of complex ankle fractures including syndesmosis ligament components accompanying tibia shaft fractures [2, 5].

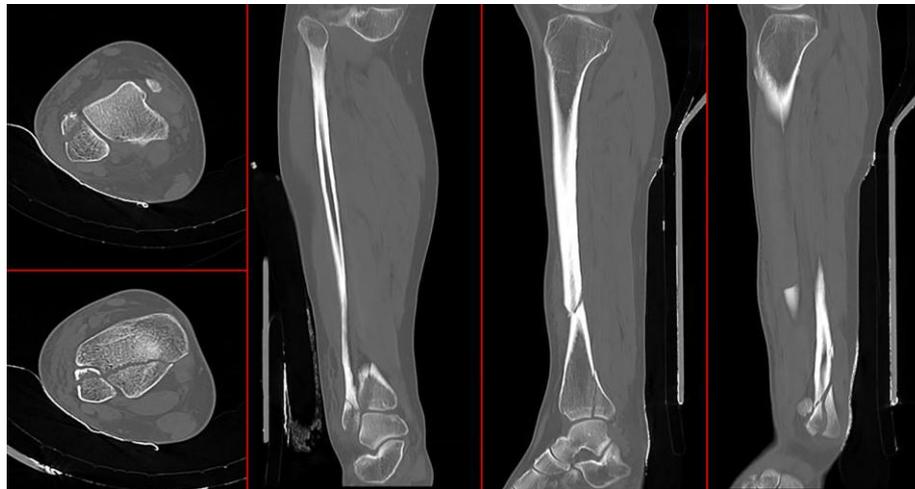


Figure 2. Axial and lateral CT showing the oblique spiral fracture in the tibial shaft, lateral malleolar fracture, posterior malleolar fracture and anteroinferior tibiofibular (AITF) ligament avulsion of patients.

The spiral type distal TSF is commonly associated with the PMF. Hou et al [8] retrospectively studied 1685 TFs. Among these 288 were spiral type TSF, of which 28 (9.7%) were accompanied by PMF. A four-combination injury (oblique-spiral TSF, LMF, PMF, and AITFL avulsion) in the leg and ankle is an uncommon fracture combination.

Jung et al [2] examined CT images of 71 patients (37 male and 34 female; the mean±SD age was 48.3±16.7 years) with TS fractures. In their study, they observed that spiral type (n=46) TSFs were associated with 89% and oblique type (n=18) TSFs, 33%, with concurrent ankle joint injuries. They found that 47 of these patients (64.7%) had ankle injuries concomitant TSFs. They also found that 8 of these patients had LMF, PMF, and AITFL avulsion accompanied with TSF. This number is 11.3% of all TSF cases and 17% of the patients with TSF concomitant ankle injuries.

It is believed that oblique and spiral type of TSFs are caused by the torsional force of the lower leg, and the distance between the tibial and fibular fractures is thought to represent the degree of tissue damage. This broad torsional force can increase the probability of concomitant ankle injuries by exerting tensile force on the AITFL attachment and compression or shear force on the posterior malleolus via the talus at the ankle joint [2,5].

In addition to simple radiographs, CT examinations

facilitated the diagnosis of ankle injuries associated with TS fractures, thus increasing the incidence [2, 3]. If the non-displaced incognita ankle fractures are neglected, the fracture may create more risk in intraoperative replacement during intramedullary nail fixation surgery, and postoperative rehabilitation strategies may change depending on the presence of concomitant ankle injuries. If ankle fractures and syndesmosis injuries accompanying the tibial fracture are missed and not treated appropriately, postoperative arthritis of the ankle may be encountered [5]. Therefore, ankle fracture and syndesmosis injuries should not be missed and should be treated appropriately. In addition, intraoperative syndesmotic stability should be checked if there is AITFL avulsion fracture in the preoperative CT examination [2, 9].

CONCLUSION

Ankle injuries such as LM fractures, PM fractures and AITFL avulsion fractures, which may be associated with oblique spiral type TSFs, are rarely seen or neglected. Orthopedic surgeons should keep this situation in mind. Even the attentive x-ray examination of the ankle joint, that is compulsory before surgery, may not define this injury. CT scan should be routinely applied in clinical practice, and MRI may be a compensative method to detect these injuries, especially for the soft tissue damage. It is clinically important to recognize the complex ankle fracture syndesmosis injury preoperatively, because it may be hard to decrease and improve it after the osteosynthesis

of tibia fracture. Unsuccessful reduction or fixing of the ankle injury in the anatomic position may increase the risk of posttraumatic arthritis.

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Funding: None; Conflict of Interest: None Stated.

How to cite this article: Başdelioğlu K. Case report of a very rare trauma combination: concomitant complex ipsilateral ankle fracture associated with tibia shaft fracture. *Eastern J Med Sci*. 2019;4(3):138-141.

DOI: [10.32677/EJMS.2019.v04.i03.007](https://doi.org/10.32677/EJMS.2019.v04.i03.007)