



Early total care for open lateral ankle dislocation without tearing of tibiofibular syndesmosis: case report

Giuseppe Rocco Talesa^{1^}, Michele Mercurio², Davide Castioni², Paolo Ceccarini¹, Pier Luigi Antinolfi¹, Lorenzo Maria Di Giacomo¹, Giuseppe Rinonapoli¹, Auro Caraffa¹

¹Department of Surgical and Biomedical Sciences, University of Perugia, Perugia, Italy; ²Department of Orthopedic and Trauma Surgery, “Magna Graecia” University and “Mater Domini” University Hospital of Catanzaro, Catanzaro, Italy

Contributions: (I) Conception and design: GR Talesa; (II) Administrative support: GR Talesa; (III) Provision of study material or patients: GR Talesa; (IV) Collection and assembly of data: GR Talesa; (V) Data analysis and interpretation: GR Talesa; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Dr. Giuseppe Rocco Talesa. Department of Surgical and Biomedical Sciences, University of Perugia, Perugia, Italy. Email: talesa.giuseppe@libero.it.

Background: Open dislocation of the ankle not accompanied by rupture of the tibiofibular syndesmosis ligaments is an extremely rare injury. They represent a challenge for surgeon, either in acute or in the late outcomes. Since this is an uncommon injury, there is no standard treatment protocol reported in the literature, which indeed showed that many different treatments have been applied. We report an unusual case of an open lateral dislocation of the ankle joint without tearing of the tibiofibular syndesmosis ligaments accompanied by a complex fracture of the mid-foot.

Case Description: A 16-year-old man was admitted to our institution following a motor vehicle accident. The physical examination showed ten centimeters of exposed dislocation of the ankle joint, classified as a Gustilo-Anderson 2A. The radiographic examination reported a fibula fracture, classified as a Weber B one, a displaced distal diaphyseal fracture with dislocation of the base of the fifth metatarsal bone, and fracture of the base of the fourth metatarsal bone. The patient was taken to surgery 150 minutes after injury and a manual reduction of the ankle dislocation under arthroscopic control was performed. The fibula fracture was treated with a cannulated screw and the ankle joint was stabilized with the Hoffman II external bridge fixator. The reduction of the dislocation of the fifth metatarsal was treated with two 1.8 mm K wires, which were fixed on the cuboid bone, and a definitive percutaneous synthesis with intramedullary K wire of the fracture of the fifth metatarsal bone was gained. A follow-up clinical and radiological examination six months after trauma showed a fully resumed daily living and sports activities.

Conclusions: An early total care treatment should be considered a good option that allows for mechanical stability and good mobility of the ankle joint.

Keywords: Open ankle dislocation; distal fibula fracture; tibio-fibular syndesmosis; early total care; case report

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[^] ORCID: 0000-0002-8530-4200.

Introduction

Ankle joint dislocation is a relatively frequent injury at a young age and occurs following high-energy trauma or sports trauma (1). The treatment depends on the extent of the trauma, and consists on an immediate reduction, preferably in sedation, and a subsequent immobilization of the joint using a brace or an external fixator in case of concomitant fractures (2). Pure open dislocation of the ankle or dislocation not accompanied by rupture of the tibiofibular syndesmosis ligaments is an extremely rare injury. We report a clinical case deals with an open lateral dislocation of the ankle joint without tearing of the tibiofibular syndesmosis ligaments accompanied by a complex fracture of the mid-foot, following a motorcycle accident. This trauma was urgently treated through joint reduction and stabilization with an external fixator, a cannulated screw at fibula level and K-wires for the stabilization of the fracture of the fifth and fourth metatarsal bones. We present the following case in accordance with the CARE reporting checklist (available at <https://jxym.amegroups.com/article/view/10.21037/jxym-22-16/rc>).

Case presentation

A 16 years-old patient, which presented at the orthopedic emergency room of the Santa Misericordia Hospital in Perugia, Italy, following a motorcycle accident, in which he encountered a high-energy trauma in the left lower limb. The physical examination revealed about ten centimeters of



Figure 1 Exposed lateral dislocation of the tibiotalar joint.

exposed dislocation of the ankle joint, classified as a Gustilo-Anderson 2A (*Figure 1*), pain with functional limitation, and no neurological and major vascular deficits, confirmed by a triphasic ultrasonographic Doppler. The radiographic examination reported an exposed dislocation of the tibiotalar joint, with fibula fracture, classified as a Weber B one, a displaced distal diaphyseal fracture with dislocation of the base of the fifth metatarsal bone, and fracture of the base of the fourth metatarsal bone (*Figure 2*). A computed tomography (CT) examination with three dimensions (3D) reconstruction was performed (*Figure 3*). Due to the open nature, an antibiotic prophylaxis with piperacillin/tazobactam 3 g, amikacin 1 g, metronidazole 400 mg, was performed, in order to let the patient undergoing to emergency surgical treatment. A loco-regional anesthesia was adopted; ten liters of physiological solution was used for the washing of the wound, and a subsequent manual reduction of the dislocation under arthroscopic control was performed; thus, the fibula was definitively synthesized by a 60 mm cannulated screw and the joint was stabilized with a Hoffman II external bridge fixator (External Fixation System, Stryker), a device which consisted in two fiches on 4 mm to the level of the tibial shaft and a trans-calcaneal fiche. Subsequently, under arthroscopic control, reduction of the dislocation of the V metatarsus was achieved by two

Highlight box

Key findings

- Open ankle dislocation; distal fibula fracture; tibio-fibular syndesmosis; early total care; case report.

What is known and what is new?

- Ankle joint dislocation is a relatively frequent injury at a young age and occurs following high-energy trauma or sports trauma.
- Pure open dislocation of the ankle or dislocation not accompanied by rupture of the tibiofibular syndesmosis ligaments is an extremely rare injury.

What is the implication, and what should change now?

- A detailed assessment, including the patient history, imaging examinations and classifications is necessary for a timely diagnosis and treatment. The choice of the early total care demonstrated to be a good option with mechanical ankle stability and good mobility.



Figure 2 Preoperative X-rays: open dislocation of the ankle joint with displaced fibula fracture, displaced diaphyseal fracture at V metatarsus with proximal migration of the proximal stump and fracture of the fourth metatarsal on the left.



Figure 3 CT with 3D reconstruction. CT, computed tomography.

1.8 mm K wires, which was fixed on the cuboid bone, and a definitive percutaneous synthesis with intramedullary K wire of the fracture of the fifth metatarsal bone was gained. At the last intraoperative arthroscopic control, a stable synthesis was satisfactorily obtained (*Figure 4*).

The patient remained in the trauma department for one week, in order to control the clinical condition and the soft tissues state continuing the antibiotic therapy with piperacillin/tazobactam 500 mg and ampicillin/sulbactam 3 g.

At the discharge, non-weight-bearing and the use of two crutch for 30 days, weekly dressings of the fixator device

and wounds, left lower limb in anti-decline position with strengthening of quadriceps muscles, deep vein thrombosis prophylaxis and pain relief therapy with opioid drugs were recommended. The wound dressings were performed with physiological solution at the level of the K-wires and the fides of the external fixator, and wound margins underwent cruentation with a subsequent application of Iruxol[®] ointment and Ligasano[®] polyurethane-soft-foam dressing medication.

One month after surgery, the patient underwent to radiographic follow-up: early development of bone callus

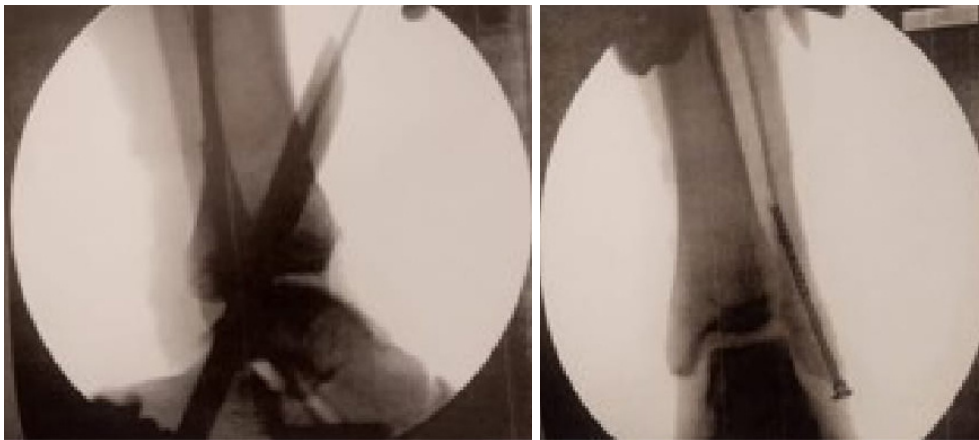


Figure 4 Amplioscopic control at the end of surgical procedure.



Figure 5 Post-operative X-rays AP and LV projections showing the reduction and stabilization of the dislocation with midfoot fractures using a Hoffmann II external fixator and three 1.8 mm K-wires. AP, anterior-posterior; LV, lateral view.

was noted (*Figure 5*); moreover, pain symptoms relief, absence of vascular and neurological deficits, and wound healing by secondary intention were reported. At this follow-up, the patient was allowed to walk with partial weight-bearing using two crutches. Two months after the trauma, another clinical-radiographic control was performed: further development of callus compared to the previous control was noted (*Figure 6*) and it was decided to remove the fixation devices. At the time of this follow-up neither local pain nor tenderness, and no functional limitations were reported. After removal of the synthesis devices, the ankle appeared stable after stress tests. Thus, the patient was allowed to walk with progressive weight bearing using two crutches, and to wear a walker brace for 20 days. Three months after the trauma, the patient walked autonomously without the use of a brace, with no analgesic

functional limitations; the clinical follow-up showed a loss of 10 degrees in ankle extension and pain and tenderness at the acupressure of the fifth metatarsal bone, American Orthopaedic Foot and Ankle Society (AOFAS)'s equal to 75 (3). Radiographic examination showed complete bone healing of the fibula, but a malunion at the level of the distal shaft of the left fifth metatarsal bone. Consequently, one cycle of magnetic fields (BIOSTIM, Igea, Carpi, Italy) at those bone level, specific physiotherapy for the complete recovery of the joint range of motion, and new clinical and radiographic follow-up after another month were recommended. At the three-month follow-up, a reduced tone of the periarticular muscles of the ankle was noted, probably due to prolonged immobilization of the joint. Radiographs showed poor healing of the left fifth metatarsal fracture, with an unresolved malunion of the



Figure 6 X-rays control at two months after the trauma.



Figure 7 X-rays control at three months after the trauma.

bone stumps (*Figure 7*). However, despite these radiological findings, the patient detected good clinical conditions, and the mind-foot pain symptoms resolved and at the ankle joint was stable in the stress and stability tests. Therefore, the patient was suggested to progressively resume sporting activity, to perform strengthening of the ankle muscles and to undergo a further clinical and radiographic control three months thereafter. At the last follow-up, the patient reported fully resumed daily living and sports activities, on physical examination the joint appeared stable in the stress tests which excluded any unrecognized lesions of the deltoid ligament, reaching an AOFAS score of 95, despite at the radiographic control non-union at the diaphysis of the fifth metatarsus was reported (*Figure 8*).

Ethical statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient's parent for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

Discussion

Open dislocation of the ankle not accompanied by rupture



Figure 8 X-rays control at six months after the trauma.

of the tibiofibular syndesmosis ligaments is an extremely rare injury. To our knowledge, there have been few reports in the English-language literature (4). Furthermore, open ankle dislocation with fracture are less common than closed ones, that are the most common intra-articular injuries of weight-bearing joints: they represent a challenge for surgeon, either in acute or in the late outcomes (5). In the current clinical case, since an open dislocation associated with a distal fibula fractures occurred, it had been important to fully assess the integrity of the soft tissues and the vascular and nervous conditions (6). Once dealing with the clinical evaluation of the patients, it was possible to rely on various classification systems, ranging from the type of mechanism (i.e., Lauge-Hansen classification), the integrity of the soft tissues both in closed traumas (i.e., Oestern and Tschernke classification) and in those exposed (i.e., Gustilo and Anderson classification), or the fracture pattern and the possible involvement of the syndesmosis (i.e., AO and Denis-Weber classifications) (6-9). It has been so important to quickly choose the type of treatment that must restore capsule-ligament stability, ensure healing of fractures, and prevent complications, either in acute, referable to early vascular-nerve injuries, such as the development of infections or late infections associated with osteonecrosis, residual capsule-ligamentous instability, mal- or non-unions, heterotopic ossifications of the joint capsule, and osteoarthritis (10). Delayed repositioning is a negative prognostic factor: the urgent recommendation for repositioning prior to admission remains; this is to avoid

consequential injuries and a deterioration of the functional result. However, risks must be carefully assessed (11).

Since this was an uncommon injury, there was no standard treatment protocol in the literature, which showed that many different treatments have been applied for open ankle fractures in the last decades (4,5).

This case report presented a peculiarity which could appear to run against to the principles of emergency treatment. In fact, the choice was to use an external fixator, associated with a cannulated screw to stabilize the distal fibula fracture, in consideration of the state of the soft tissues and the risks of a definitive synthesis with plaque, which would have increased both the infection probability rate at the bone level and the healing of the tissues themselves. Furthermore, the compromised skin did not allow us to predict the timing of a second stabilization, as another risk which could compromise definitive outcomes. Therefore, the association of a damage control treatment, with early total care approach, ensured an ideal compromise between the quality of syntheses and the reduction of complications (12,13).

Our surgical choice gave excellent clinical results and patient reported satisfaction, despite the non-healing of the fracture of the distal shaft of the V metatarsus.

As reported in the literature, other authors supported this kind of treatment; Al-Obaidi *et al.* evaluated the results of fibular synthesis in closed and open ankle fractures, and concluded that minimal synthesis could give good results both in open and closed fractures (14). This surgical option

was also shared in the work of Xiao *et al.*, in which authors stated that external fixation combined with minimal invasive fixation (i.e., screws or K-wires) in open ankle fractures was less traumatic, thus facilitating bone healing (15).

Open lateral ankle dislocation without tearing of the tibio-fibular syndesmosis ligaments is an extremely rare injury. A detailed assessment, including the patient history, imaging examinations and classifications is necessary for a timely diagnosis and treatment. The choice of the early total care demonstrated to be a good option with mechanical ankle stability and good mobility.

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Footnote

Reporting Checklist: The authors have completed the CARE reporting checklist. Available at <https://jxym.amegroups.com/article/view/10.21037/jxym-22-16/rc>

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <https://jxym.amegroups.com/article/view/10.21037/jxym-22-16/coif>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient's parent for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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