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Case-report

High Energy Injury Ankle Fracture-Dislocation without Neurovascular Involvement

Pamudji Utomo[1,2], Zarkasyi Arimuqti[1)], Asep Santoso[1,2], Tangkas SMHS Sibarani[1,2], Iwan Budiwan Anwar[1,2]

[1)]Department of Orthopaedic and Traumatology, Faculty of Medicine, Universitas Sebelas Maret
[2)]Consultant Orthopaedic Surgeon, Prof. Dr. R. Soeharso Orthopaedic Hospital, Surakarta

ABSTRACT

Background: Open tibiotalar joint dislocation associated with medial malleolus and distal fibular fracture without neurovascular damage are rarely reported.
Case presentation: This study present a case of 55-year-old female with open tibiotalar joint dislocation associated with medial malleolus and distal fibular fracture without neurovascular injury treated with emergent debridement, open reduction, and internal fixation.
Results: Six months follow-up showed complete bone and soft tissue healing with excellent functional outcome.
Conclusion: Emergent debridement, open reduction, and internal fixation is needed to treat tibiotalar joint dislocation associated with medial malleolus and distal fibular fracture.

Keywords: high energy injury, ankle joint, fracture dislocation

Correspondence:
Asep Santoso. Department of Orthopaedic and Traumatology, Faculty of Medicine, Universitas Sebelas Maret. Jl. Ir. Sutami 36A, Surakarta 57126, Central Java, Indonesia. Email: asepsantoso@gmail.com.

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BACKGROUND

Open injury to ankle joints are frequently encountered. Ankle fracture is most common among weight-bearing joint intra-articular fractures, accounting for 9 percent of all fractures it included mostly unimalleolar, bimalleolar, and trimalleolar fractures (Leininger et al., 2007; Mandi, 2012; Sporer et al. 2006). Distal syndesmotic-tibiofibular disruption is a common associated injury with dislocated ankle fracture. Usually it results from lower-energy rotational injury mechanisms (Bible et al., 2014).

However, a high energy injury which resulted a frank open dislocation without neurovascular involvement are rare situation. Ankle fracture dislocations occur most frequently in young males, and are caused by accidents in motor vehicles, sports trauma, or fall (Southerland, 2013). These injuries are typically caused by a trauma with high energy (Agawal et al., 2008). Low-energy dislocations in the rotational ankle fracture were reported less frequently (Wilson and Toriella, 1991).

The direction of the joint dislocation is determined by the foot position and the direction in which the force is applied (Wroble, 1988). Eversion injuries can disrupt the joint capsule of the deltoid ligament and the medial ankle, progressing towards lateral dislocation of the ankle

(Davenport, 2012). Excessive ankle joint laxity, medial malleolar hypoplasia, peroneal weakness and a history of chronic ankle sprains are risk factors for these injuries (Thangarajah, 2008; Davenport, 2012).

This study aimed to report a 55-year-old female with open tibiotalar joint dislocation associated with medial malleolus and distal fibular fracture without neurovascular damage treated with an emergent surgical debridement, open reduction, and internal fixation of the fracture with excellent outcome.

CASE PRESENTATION

A 55-year-old female presented to the Emegency Department of Prof. Dr. R. Soeharso Orthopaedic Hospital, Surakarta, Central Java, with ankle pain open wound after being crushed by a huge broken walls. The left ankle was acutely painful and severely deformed, with an open wound on the medial side of the ankle joint. Moreover, the distal tibial bone was also frankly exposed (Figure 1). Physical examination revealed good pulsation of dorsalis pedis artery and posterior tibialis artery. Toes oxygen saturation examination also showed 98-99% results. There was no neurology deficiency.

Figure 1. Initial clinical presentation at emergency department. Exposed distal tibial bone with tibiotalar dislocation and malleolus medial fracture

Figure 2. Radiograph of the left lower leg and ankle joint demonstrated tibiotalar dislocation, medial malleolus and comminuted distal fibular fracture. Separation of ankle syndesmosis also noticed

The traumatized limb was examined using plain radiograph study. Radiograph of lower leg and ankle joints showed a complete tibia-fibular dislocation with medial malleolar fracture and comminutive distal fibular fracture on syndesmotic site (Fig 1B).

The patient was administered and prepared for emergency surgical treatment. Under spinal anesthesia, surgical debridement was performed to the open wound by using normal saline solution combined with povidoneiodin 10% and hydrogen peroxide 3%. Subsequently, immediate reduction of the dislocation was performed by longitudinal traction of the foot and application of some direct force from the medial side of the fracture site. Fibular fracture fixed with a one-third tubular plate and screws. Malleolar screw and K-wire were used for malleolus medial fracture fixation. The last

procedure was inserting a single cortical syndesmosis screw.

RESULTS

After the surgery, posterior splint was applied for 6 weeks, followed by partial weight bearing ambulation. Full weight bearing walking was allowed at 12 weeks after the surgery. Final 6 months follow-up showed excellent clinical outcome with bone and soft tissue, and no sign of infection and full ankle range of movement.

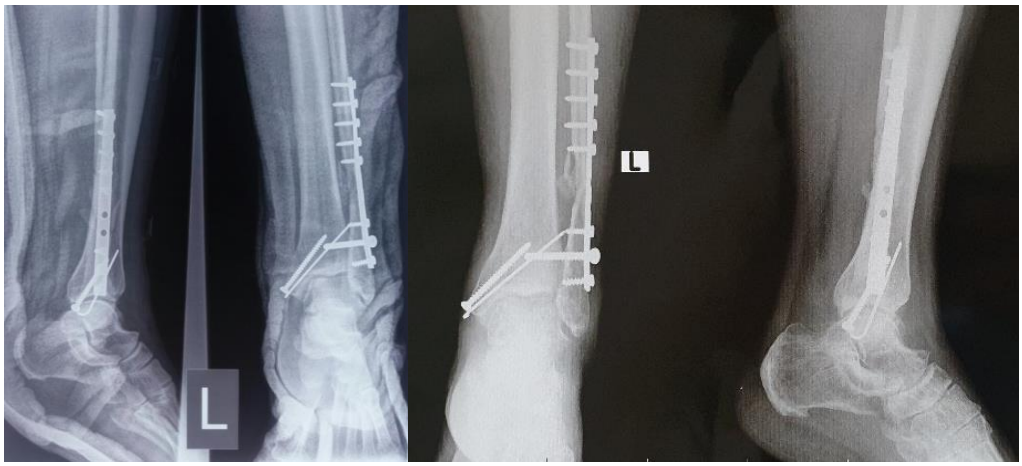

Figure 3.A. Immediate radiograph after emergency debridment and open reduction internal fixation, B. Radiograph at 6 months follow-up, good bone healing was obtained

Figure 4. Range of motion of the ankle joint at final 6 months follow-up

DISCUSSION

The severe fracture pattern in recent case shows the high impact force involved to the joint. It also confirm the literature statement that says ankle ligaments were stronger than malleolar bone structure. Ankle stability provide by osseous configuration and ligamentous structurs, which is anterior talofibular ligament, calcaneofibular ligament, posterior talofibular and talotibial ligament (Harper, 1988; Elsayed et al., 2017).

In 1965, Fahey and Murphy divided five types of injury: anterior, posterior, lateral, medial and superior (Fathey and Murphy, 1965). According to fracture and

wound presentation, classified as Gustilo-Anderson (Kim and Leopold, 2012) type IIIb with moderate contamination and medial dislocation direction. Neurovascular on the distal region of the fracture site is well preserved. According to open fracture management known worldwide, within 6 hours from the time of injury, early debridement should be done to prevent further infection and create biofilm along the bone surface. It will also reduce the risk of joint complication in the future (Clauss et al., 2013; Mauffrey et al., 2012; Cross and Swiontkowski, 2008).

The main challenge in management of this case was during reduction of the dislocation, which prone to high risk of vascular injury. Tibiotalar dislocation was reduced by pulling the tibia laterally in combination with longitudinal traction performed to reduce the joint. Durante operation confirmation using C-arm should be performed to make certain reduction (Kumar et al., 2017; Richter, 2018) Tibiotalar reconstruction have a high risk to harm the vascular around dislocated area. Therefore neurovascular examination before and after surgery is mandatory in this case. After reposition of tibiotalar, the stability of ankle joint was checked, and reparation of tendon or ligament on ankle joint should be done if instability is encountered.

Six weeks immobilization with a Non-weight-bearing posterior splint help to achieve complete soft tissue healing (Elsayed et al., 2017). In the literature, good to excellent results have been reported on closed and open injuries that were treated conservatively with prompt reduction and subsequent cast immobilization. However, complications including loss of ankle range of motion, residual instability or early arthritis were commonly reported (Dlimi et al., 2011; Fournier et al., 2012). The fact that clinical results for closed injuries are better than open ones is probably due to more serious soft tissue trauma. Early anatomic reduction and fracture fixation would improve outcome in an operated ankle fracture dislocation (D'Almeida et al., 2015).

High energy open ankle dislocation could be resulted an excellent clinical outcome if emergent and proper management was performed. Further evaluation is needed to confirm long term outcome of this case.

PATIENT CONSENT

This study had obtained patient approval and informed consent for study and publication.

AUTHOR CONTRIBUTIONS

All authors discussed the result and contributed to the final manuscript. From the patient management and wrote the manuscript.

CONFLICT OF INTEREST

There was no conflict of interest in this study.

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