

ATYPICAL MAISONNEUVE'S FRACTURE: A CASE REPORT

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Abstract: *A Maisonneuve's Fracture is a fracture of proximal third fibula associated with a disruption of the distal tibiofibular syndesmosis, the interosseous membrane and associated injuries (eg, fracture of the medial malleolus, fracture of the posterior malleolus, and rupture of the deltoid ligament). The mechanism for the fracture is an external rotation force to the ankle with transmission of the force through the interosseous membrane which causes a proximal fibular fracture. In a very rare form, we can find an unusual pattern of the level of the involved fibula, such as middle third of fibula. A 19 year old male presented to us with pain and swelling of his left ankle after felt while playing futsal. Physical examination showed deformity, swelling and tenderness on his left ankle. Range of motion was decreased. On imaging, plain radiographs of left ankle showed dislocation of the ankle, with disruption of syndesmotic and fracture comminutive middle third of fibula. We performed operation which consists of three procedures; closed reduction, percutaneous fixation of syndesmotic by using a single transfixing screw, and plate-screw for the fibula. Normal range of motion is achieved well after 8 weeks, without pain on full weightbearing. The pattern of the fracture-dislocation of the ankle discussed is very rare. The mechanism of the injury is a twisting motion of the upperbody inward, while the foot is planted, resulting a more higher energy impacted to the ankle and fibula. We performed closed reduction easily by reverse the mechanism of injury.*

Keywords: *Maisonneuve's Fracture, distal tibiofibular syndesmosis, interosseous membrane, rupture of the deltoid ligament*

INTRODUCTION

The Maisonneuve fracture was initially described in 1840 by Dr. Jacques Maisonneuve.¹ A Maisonneuve's Fracture is a fracture of proximal third fibula associated with a disruption of the distal tibiofibular syndesmosis, the interosseous membrane and associated injuries (eg, fracture of the medial malleolus, fracture of the posterior malleolus, and rupture of the deltoid ligament).¹ The mechanism for the fracture is an pronation and external rotation force to the ankle with transmission of the force through the interosseous membrane which causes a proximal fibular fracture.² This pronation-external rotation mechanism involves either an avulsion fracture of the medial malleolus or disruption of the deltoid ligaments.² This is followed by an external rotation force that causes disruption of the syndesmotic ligaments and the interosseous membrane, the energy pattern continues along the path of the interosseous membrane and exits in the proximal fibular region.² Proximal tibiofibular dislocation initially was described by Dubreuil³ in 1844 and then by Malgaigne in 1855.⁴

Lauge-Hansen classified this fracture as a pronation-external rotation variant, with disruption of the syndesmosis.² Danis and Weber classified these injuries as type-C fractures, and the AO/ASIF Group described them as type-C3 injuries.⁵

In a very rare form, we can found atypical pattern of the Maisonneuve fracture that is unusual level of the involved fibula, such as middle third of fibula⁶, posterior malleolar fracture and disruption of the anterior-inferior tibiofibular ligament without disruption of the deltoid ligament or fracture of the medial malleolus⁷, presence of intact deltoid and tibiofibular syndesmotic ligaments⁸. Lock et al. reported the case of patient with a missed Maisonneuve fracture who presented with a chief complaint of medial ankle pain and

normal radiographs of the ankle.⁹ Healy *et al.*¹⁰ reported on a triplane fracture that was associated with a proximal-third fibular fracture in an adolescent wrestler and recommended awareness of the Maisonneuve fracture pattern in association with triplane injuries in the adolescent. Hensel and Harpstrite¹¹ reported on a Maisonneuve fracture that was associated with a bimalleolar ankle fracture-dislocation. The patient in that study had a distal fibular fracture, a lateral ankle dislocation, a Maisonneuve fracture of the proximal part of the fibula, and a medial malleolar fracture.

Del Castillo and Geiderman described the importance of making proximal tibiofibular radiographs when patients present with ankle pain.¹² Recommendations included the assertion that one should be suspicious of a Maisonneuve fracture pattern when there is an isolated fracture of the posterior tibial tubercle, if there is evidence of deltoid ligament disruption or fracture of the medial malleolus in the absence of a lateral malleolar fracture, if there is tenderness over the anteromedial capsule of the syndesmosis, or if there is tenderness over the syndesmosis.

The literature related to syndesmotic fixation is controversial with regard to the number of screws, the size of the screws, and the position of the screws relative to the tibiotalar joint. Numerous treatment strategies have been proposed. Weening and Bhandari¹³ reviewed the technical aspects of syndesmotic screw fixation and found that, despite variations in treatment, most patients achieved good quality of life and functional outcomes. McBryde *et al.*¹⁴ recommended placing the syndesmotic screw 2 cm proximal to the joint line. Sproule et al.¹⁵ recommended placing the screw 4 cm proximal to the tibiotalar joint. Thompson and Gesink¹⁶ found that a 4.5-mm screw had no biomechanical advantage compared with

a 3.5-mm screw. Xenos *et al.*¹⁷ found that two screws were biomechanically stronger than a single screw. Duchesneau and Fallat¹⁸ recommended either one or two screws for partial diastasis and two bicortical screws for complete diastasis.

The case that we describe here is an atypical pattern of fracture–dislocation produced by a high-energy mechanism in external rotation and pronation of the ankle. It corresponds to an equivalent Maisonneuve's fracture that presents dislocation of the tibiofibular joint with disruption of interosseous membrane, injury associated rupture of the deltoid ligament

and fracture of the middle third of the fibular diaphysis

CASE

A 19 year old male came to ER with a painful, twisted and swelling of his left ankle after fell while playing futsal. He was unable to weightbear. From physical examination we found deformity, swelling and tenderness on his left ankle. Range of motion was decreased. On initial plain x ray we found dislocation of ankle joint with disruption of syndesmotic and fracture comminutive middle third of fibula.



Figure 1. Physical Examination Found Deformity, Swelling, and Tenderness



Figure 2. Plain X-Ray Found Dislocation of an Ankle Joint with Disruption of Syndesmatic and Fracture Comminutive Middle Third of Fibula

We performed operation which consists of three procedures, closed reduction of the dislocation, percutaneous

fixation of syndesmotic by using a single transfixing screw, and plate and screw of the fibula fracture.



Figure 3. Patient Mobility Return Normally after 8 Weeks, without Pain on Full Weightbearing.

DISCUSSION

The pattern of the fracture-dislocation of the ankle discussed is very rare. The mechanism of the injury is a twisting motion of the upperbody inward, while the foot is planted, resulting a more higher energy impacted to the ankle and fibula. The literature related to syndesmotic fixation is controversial, and numerous treatment strategies have been proposed.

Although generally our preference is to performed closed reduction by reverse the mechanism of injury, percutaneous fixation of syndesmotic by using a single transfixing screw, and plate and screw of the fibula fracture. The use of a plate-screw helps to distribute forces across the syndesmosis as compared with the use of screw alone. In the case presented in the current report, at the time of the surgery, a eight-hole plate-screw construct was utilized in an effort to distribute forces on an extremely thin fibula in order to avoid breaking it.

Normal range of motion is achieved well after 8 weeks, without pain on weightbear. Those authors recommended surgical intervention to maintain reduction

of the fibula into the notch of the tibia in order to avoid shortening of the fibula, lateral talar displacement, and subsequent painful ankle arthrosis.

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