

A Maisonneuve Like Bimalleolar Fracture: A Case Report

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Abstract

Bimalleolar ankle fractures with an additional proximal fibular fracture are unusual and rarely described in the literature. We present two cases with a similar injury pattern in two elderly women and assess the injuries by their fracture pattern.

Keywords: *Maisonneuve; Bimalleolar Fracture; Syndesmotic Injuries*

Introduction

Bimalleolar fractures are relatively uncommon and account for only 5 - 10% of all ankle fractures. Maisonneuve fractures, in contrast, are even less common with an incidence of 0.5% to 1.5% of all ankle fractures. The latter injuries occur more in young and physically active individuals, as well as in those with high-impact jobs, such as construction workers or athletes but can also be influenced by age and gender. They are most commonly described as a result of high-impact trauma, such as a fall from a height, a motor vehicle accident, or a sporting injury. Maisonneuve fractures with an additional distal fracture to the fibula, however, are rare and related to as Maisonneuve-like lesions. Differentiation must be given in comparison to bimalleolar fractures with an additional fracture to the proximal fibula. We present two cases of elderly women who sustained a similar fracture pattern as a result of a low-impact injury.

Case Reports

Case 1

An 86-year-old woman was presented in casualty after a fall on stairs in her nursing home. She explained that she missed a step and fell backwards on the stairs. Her leg was "twisted" as she fell and could not be moved afterwards. Prior to the fall, the woman was mobile with a rollator and able to manage her activities of daily living. Past medical history consisted of a queried dementia, psoriasis and hypertension.

An ambulance attended the scene and placed the leg in a vacuum splint. The paramedics reported a noticeable dislocation of the ankle, which was tried to be reduced at the scene under gas and air.

On arrival, the leg showed significant displacement in a supinated position and marked instability of the ankle joint. The soft tissue mantle was closed and appeared vital. There were trophic skin changes due to an underlying psoriasis but the neurovascular status was



Figure 1: AP and lateral views with fractured medial malleolus and a compound fracture to the fibula above syndesmosis level.

intact. During the examination, the woman also complained of pain in her knee. A crepitus could be provoked on palpation of the proximal fibula. Overall, the ankle joint was reduced and put in a fiberglass cast before X-ray.

Admission radiographs revealed a bimalleolar fracture. The distal fibula fracture was above the level of the syndesmotic ligaments and showed a multifragmented fracture zone. The medial malleolus showed a vertical fracture line and the proximal fibula a transverse fracture line.

The intended treatment would have been a closed reduction with internal plate fixation for the fibula and two cortical screws for the medial malleolus. Stability of the syndesmotic ligaments would have been tested under image intensifier and if found to be unstable stabilised with a syndesmosis screw. Unfortunately, the carer of the patient did not consent to surgery.

Case 2

A 70-year-old woman was presented in casualty by the ambulance. She was about to climb down stairs when her knee gave way, which made her lose her balance and fall down 3 steps. She was unable to get up and bear weight afterwards.

The patient is usually fit and mobile without walking aids. She lives in her own house and is looked after by her children. There is no relevant past medical history.

On examination, the patient presented with a massively swollen ankle joint with a lateral displacement. The swelling involved the entire ankle and the midfoot. The soft tissue mantle was closed. She was able to move her toes and did not complain of a loss of sensation. However, mobility in her ankle was limited due to pain and instability on examination. There was tenderness over both malleoli as well as a positive Squeeze Test with tenderness over the proximal fibula.

The ankle was reduced and placed in a fibreglass cast before X-ray. X-rays confirmed a fracture pattern that involved the proximal as well as the distal fibula and the medial malleolus leading to a talar tilt.



Figure 2: AP and lateral views with fractured medial malleolus and a compound fracture to the fibula at syndesmosis level, displacement and talar tilt. Proximal fibula with short oblique fracture.

The patient underwent open reduction with internal fixation. The syndesmosis was found to be unstable and required fixation too. Recovery and wound healing was uneventful. The patient could be discharged from the hospital after 5 days. During her stay, she learned to mobilise herself with a frame non-weight-bearing.

Discussion

A Maisonneuve fracture is defined as a spiral fracture of the proximal fibula with associated disruption of the syndesmotic ligament and an injury to the medial ankle structures [1]. There are a few cases in the literature that describe a Maisonneuve in association with a distal fibula fracture [2,3]. Those are also referred to as a "bimalleolar fracture associated with a proximal fibula fracture" [4]. Reviewing the morphology of the fracture helps to understand their possible associated pathologies.

The accepted mechanism of injury is most commonly the external rotation with the ankle in either in a supinated or pronated position. Although the mechanism is often referred to the Lauge-Hansen classification [5], it should be understood that it applies to the patients' given history in less than 50% [6,7]. However, the injury follows four patho-anatomical stages [8]. Stage I tears the deltoid ligament or fractures the medial malleolus. In stage II, the transmitted force causes disruption of the interosseous membrane. This is followed by stage III when a fracture to the proximal fibula occurs and stage IV with either a rupture of the posterior syndesmosis or fracture of the posterior tibia at the level of the ankle joint.

Although it is described as a high-energy trauma, complex injuries can occur as low-energy trauma too [9]. Yoshimura [10] could demonstrate that the injury mechanism causes additional damage to the cartilage of the medial section of the talar dome. On arthroscopic assessment, changes occurred to the medial but not the lateral compartment. Chondral debris and hemarthrosis were found in all cases together with a tear on the anterior inferior tibiofibular ligament and interosseous tibiofibular ligament but no tear of the posterior inferior tibiofibular ligament.

A bimalleolar fracture follows an identical injury pattern. The only difference is the level of the fibula fracture. To help understand the fracture of our patients, considerations are helpful in analysing the proximal fibula fracture. Torsional forces usually create a spiral or oblique fracture line. In our first case, the fracture to the proximal fibula was short and transverse and oblique in the second case. It can be

concluded that the proximal fibula fracture in the first patient is more than likely the result from a direct impact. This could have occurred as the patient fell onto the steps of the stairs.

The proximal fibula fracture in the second patient follows more the Maisonneuve pattern. Its presentation is oblique to torsional. Both injuries in common is the same mechanism of injury. It is more than likely that they result in a disruption of the syndesmosis. In the second case, it could be confirmed during the operation. In the first case, it remains highly suspicious as no further treatment was warranted.

With these highly unstable injuries, treatment usually consists of a surgical procedure in order to restore alignment and stability of the ankle. Anatomical reduction of the ankle mortise is crucial for a good functional result. Ramsey [11] could demonstrate that already 1 mm lateral shift of the talus will cause a decrease of the tibiotalar contact area by 42%. If untreated, persisting instability can lead to external rotation of the talus. In combination with a valgus position of the talus, this instability leads to a decrease in the contact area, which results in early posttraumatic arthritic changes.

Conclusion

These cases represent an unusual variant of the so-called Maisonneuve fracture. There are not too many cases in the literature that describe this injury pattern. The pitfall is the potential risk of missing the proximal fibula fracture [12-14] as the most obvious finding is to the ankle joint. A Maisonneuve fracture should be taken into account whenever there is a history or evidence of an injury to the medial malleolus or widening of the ankle mortise. The cases show that despite a bimalleolar fracture, injuries to the proximal fibula can occur. Therefore, the need for a complete evaluation of the entire leg in torsional injuries of the ankle must be emphasised.

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