

# Diagnostic Imaging Review

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## A common ankle injury with a not-so-common twist

### CASE

A 17-year-old male came down from a jump shot and landed on another player's foot while playing basketball. When the patient presented to our office 1 day later, he reported hearing a pop as he rolled his right ankle. Since the incident, he had been unable to bear weight on his right leg.

Examination demonstrated swelling over the medial malleolus and the proximal fibula. No tenderness was detected with palpation over the lateral malleolus or the base of the fifth metatarsal. A proximal squeeze test was positive for pain. The patient was unable to actively dorsiflex and invert his ankle. Gross laxity was detected with

evercion stress and talar tilt. An anterior drawer test was negative. He was neurovascularly intact. We obtained radiographs of the ankle as well as the tibia and fibula (see Figure 1). **What do the radiographs reveal?**

### DISCUSSION

Figure 1 shows a displaced fracture through the proximal fibula. This type of fracture is commonly called a Maisonneuve fracture. The patient also had a grade 2 deltoid ligament injury and an injury to the syndesmosis without complete rupture. The findings from the radiographs of his ankle were normal.

A Maisonneuve fracture is defined as a proximal fibula fracture associated

with either an ankle fracture or a deltoid ligament tear. An accompanying syndesmotic injury often extends as far as the fibula fracture. The syndesmotic injury can vary from a partial tear to a complete tear.

**Thorough assessment needed** In a patient with an ankle injury, three radiographic views of the ankle are standard: anteroposterior, mortise (15°-20° internally rotated), and lateral views. These images will allow for visualization of the ankle joint and evaluation of associated fractures. However, if the patient also has pain into the calf and tenderness to palpation over the proximal fibula, additional radiographs should be ordered to include the proximal tibia and fibula.

Always examine the calf and the entire tibia and fibula when evaluating an ankle injury. A health care provider who focuses the evaluation and treatment on the ankle and does not properly examine the lower leg can miss a Maisonneuve fracture. Because of the swelling and tenderness to palpation of the proximal fibula, we obtained tibia and fibula radiographs on this patient. This fracture would have been missed if only the standard radiographic images of his ankle were obtained.

**Ankle injuries** The most common ankle injury is an inversion sprain with injury to the anterior talofibular ligament (ATFL). There are two anatomic reasons for this: First, the medial malleolus is shorter than the lateral malleolus. Second, the deltoid ligaments on the medial side of the ankle are much stronger than the lateral ankle ligaments. As a result, the ankle is more resistant to eversion stresses than to inversion stresses.

Three main ligaments are located on the lateral aspect of the ankle: the ATFL, the posterior talofibular ligament (PTFL), and the calcaneofibular ligament (CFL). The ATFL attaches to the anterior fibula and the anterior talus

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**TABLE 1. Grading system for ankle injuries**

Grade	Ligament injury	Symptoms	Sign
I	Stretch	<ul style="list-style-type: none"><li>• Pain</li><li>• Swelling</li></ul>	Able to walk but unable to run or jump
II	Partial tear	<ul style="list-style-type: none"><li>• Pain</li><li>• Swelling</li><li>• Bruising</li></ul>	Pain with walking
III	Tear	<ul style="list-style-type: none"><li>• Pain</li><li>• Swelling</li><li>• Bruising</li></ul>	<ul style="list-style-type: none"><li>• Unable to walk</li><li>• Ankle will feel unstable</li></ul>

and prevents anterior translation of the talus relative to the fibula. The PTFL attaches to the posterior fibula and the posterior aspect of the talus and prevents posterior translation of the talus relative to the fibula. The CFL attaches the distal fibula to the calcaneus and prevents inversion of the ankle joint.

The medial ligaments of the ankle consist of one strong, broad, fan-shaped ligament called the deltoid. The deltoid attaches to the tibia proximally and the talus, calcaneus, and navicular bone distally. The deltoid ligament prevents eversion of the ankle joint.

The ankle syndesmosis consists of three main ligaments. They are the anterior inferior tibiofibular ligament (AITF), the posterior tibiofibular ligament (PITF), and the interosseous ligament. The AITF and the PITF connect the distal tibia and fibula. The interosseous ligament is a thickening of the distal interosseous membrane and believed to function as a “spring” permitting slight separation of the medial and lateral malleolus during ankle dorsiflexion.

Ankle injuries are very commonly seen in emergency departments (EDs) and orthopedic offices. Of all ankle injuries evaluated in the ED, only 15% are ankle fractures; the Maisonneuve fracture occurs in only 5% to 10% of all ankle fractures.

**Grading scale** Ankle sprains are described by a I to III grading scale that is based on the amount of ligamentous injury (see Table 1). Note that the signs and symptoms described may vary depending on each patient’s pain tolerances.

Because an ankle fracture often manifests with symptoms similar to those of ankle sprain, a complete and thorough examination of the extremity is important to avoid missed diagnoses.

Signs and symptoms of a potential ankle fracture include

- Gross deformity
- Swelling
- Tenderness to palpation of bony prominences
- Ecchymosis
- Inability to bear weight

Many of the signs and symptoms associated with a fracture may be present with a severe ligamentous injury as well, so quality radiographs are essential.

**Complications** The peroneal nerve is in very close proximity to the proximal fibula, and injury to the peroneal nerve should always be assessed in a patient who presents with a Maisonneuve fracture. Common symptoms of injury to the peroneal nerve include tingling and numbness in the top of the foot and a drop foot. Electromyography and a nerve conduction study may be indicated if damage to the peroneal nerve is suspected.

**Treatment** Most Maisonneuve fractures can be treated symptomatically. Rarely does the fracture require surgical intervention. However, surgical fixation of the syndesmosis may be indicated if the tibiofibular joint is unstable and the mortise is widened. Patient outcomes are excellent with either surgical fixation of unstable syndesmotic injuries or immobilization of stable injuries. [JAAPA](#)

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