Late Treatment of Syndesmotic Injuries

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KEYWORDS

• Syndesmosis • Late fixation • Ankle • Malunion • Fibula

KEY POINTS

- Syndesmotic injuries may be subtle and difficult to diagnose.
- Malalignment at the syndesmosis may result in decreased function, pain, and arthritis.
- Late reconstruction of the syndesmosis should be considered in cases of malreduction.

Ankle fractures are one of the more common fractures treated by orthopedic surgeons. Normal function of the ankle requires appropriate alignment and stability for function. Ankle fractures include a broad spectrum of injury, including stable patterns as well as severe fracture dislocations; 23% of ankle fractures are reported to have a syndesmotic injury.[1] Operatively treated fractures are, by definition, less stable and are associated with a higher rate of injury to the syndesmosis, with reports as high as 39% to 45%.[2,3] Despite the frequency of these injuries, accurate diagnosis, reliable treatment methods, and restoration of normal anatomic relationships continue to prove challenging. High rates of malreduction continue to be seen in operative treatment of syndesmotic injuries. Strategies and surgical techniques for late treatment of syndesmotic injuries are reviewed.

The osseous anatomy of the distal tibia and fibula and associated ligaments is referred to collectively as the syndesmosis. The anterolateral (Chaput) tubercle of the tibia, the anterior (Wagstaffe) tubercle of the distal fibula, and the incisura fibularis are all important osseous contributions to the syndesmosis. The shape of the incisura is not consistent and may be concave or shallow concave.[4] The relationship between the distal tibia and fibula at the syndesmotic region is also variable.[5,6] The anterior

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inferior tibiofibular ligament (AITFL) spans from the anterolateral tubercle of the tibia and attaches to the anterior tubercle of the fibula. The posterior inferior tibiofibular ligament (PITFL) travels from the posterior malleolus to attach along the posterior tubercle of the fibula. The interosseous membrane is located between the tibia and fibula spanning nearly the entirety of the lower leg. The interosseous tibiofibular ligament (IOL) is found in the distal 1 cm of the lower leg and is contiguous with the interosseous membrane. As the number of ligaments that are sectioned increases, the ankle has more instability.[7] In a study performed by section-specific ligaments, Ogilvie-Harris and colleagues[8] found that the AITFL provided 35%; the transverse tibiofibular ligament, or deep portion of the PITFL, 33%; the IOL 22%; and the PITFL 9% of the overall stability. A second sectioning study resulted in significant syndesmotic widening occurring only after the IOL was sectioned.[9]

Injury to the syndesmosis may occur from fracture, ligament injury, or both.

Late presentation and need for delayed reconstruction may occur in a variety of clinical scenarios. Unrecognized syndesmotic injury and resulting instability may result in long-term pain and disability. All injuries about the ankle should be treated in a diligent manner to try to prevent missing a syndesmotic injury. In a successive series of patients reporting to a tertiary center for ankle arthrodesis, 20.3% had significant widening of the ankle mortise.[10] Biomechanical studies have shown that small amounts of deformity can result in alteration of ankle function; 1 mm to 2 mm of lateral translation, shortening of more than 2 mm, and malunion resulting in more than 5° of external rotation of the distal fibula are all associated with generating abnormal pressure distribution at the ankle.[11–13] As a result of these findings, reconstruction is recommended for cases with malreduction. Malreduction may occur at the time of ankle fracture fixation. This malreduction may occur in fixation of the lateral malleolus (**Fig. 1**), reducing the fibula in the incisura fibularis, or both (**Fig. 2**). Finally, late fixation may be necessary in cases where either the hardware has broken resulting in instability or, in some cases, when the surgeon removes the hardware prior to adequate healing of the syndesmosis so late widening occurs.

Isolated malleolar fractures with syndesmotic injury have been reported to have worse functional outcome (Short Musculoskeletal Function Assessment Questionnaire [SMFA]) at 1 year than patients who had a malleolar fracture without syndesmotic injury.[14] In a recent study, Sagi and colleagues[15] reported worse outcomes at 2 years on both the SMFA and Olerud-Molander ankle score in patients with syndesmotic malreduction, as confirmed by CT, than patients with an anatomic reduction. Weening and Bhondari[16] have shown that improved SMFA and Olerud- Molander scores were predicted by anatomic reduction of the syndesmosis on radiographic assessment.

Patients with syndesmotic malreduction complain of ankle pain. They often report that since the time of injury the ankle has never felt right. Syndesmosis malreduction must be evaluated in individuals with persistent disability or pain after an ankle injury (**Fig. 3**). Surgical treatment of syndesmotic malreduction is performed ideally before significant ankle arthritis is present. In the presence of advance arthritis, ankle arthrodesis or ankle arthroplasty should be considered as reconstruction options. The goal is to restore normal anatomic alignment, resulting in improved function, ideally prior to development of arthritis.

SURGICAL TECHNIQUE

All patients require a thorough clinical examination of both the affected and nonaffected ankle. Complete imaging requires CT examination as well as weight-bearing ankle radiographs (**Fig. 4**A–C).