Overcompression of the Syndesmosis During Ankle Fracture Fixation: A Case Report

Robert E. Rupp, MD

Ankle syndesmotic injuries are often associated with ankle fractures but can also occur without bone injury. Syndesmotic disruption alters normal tibiotalar joint mechanics and, if not appropriately treated, can lead to ankle arthrosis or instability. Although a variety of techniques have been described to stabilize an injured ankle syndesmosis, the basic principle of anatomic reduction of the syndesmosis is well accepted.

Cadaveric studies have demonstrated that syndesmotic fixation alters normal ankle motion and mechanics, and this has led investigators to recommend syndesmotic fixation with the ankle in maximum dorsiflexion.[1] This recommendation is based on the concept that ankle dorsiflexion brings the wider dimension of the talus into the ankle mortise and minimizes the risk of fibular overreduction during syndesmotic fixation.

More recently, however, the concept that the syndesmosis can be overtightened has been challenged. In a cadaveric study, Tornetta and colleagues[2] compressed the syndesmosis in plantar flexion and found no significant change in ankle dorsiflexion or plantar flexion. This article presents a case in which the syndesmotic fixation overcompressed the normal distal tibiofibular relationship, significantly limiting ankle dorsiflexion and causing pain. Treatment consisted of screw removal after adequate healing of the syndesmotic ligaments, and this allowed resumption of normal ankle motion and radiographic parameters.

Case Report

A man in his late 30s injured his ankle when he fell from a height. He was treated at another medical facility initially but sought follow-up treatment from Dr. Rupp 4 months after his injury. He had sustained a distal fibular fracture with lateral translation of the talus and was treated acutely with open reduction and internal fixation (Figures 1 and 2). The fixation consisted of a lateral one-third tubular plate and a 3.5-mm cortical syndesmotic screw. The operative report describes a large reduction clamp positioned across the syndesmosis to maintain reduction while the syndesmotic screw was placed with the ankle in neutral dorsiflexion. Postoperatively, the patient was placed in a short leg cast with protected weight bearing for 6 weeks. He presented to the author's clinic 4 months after his surgery with concerns of a limp and ankle pain. He reported ankle stiffness that had not improved with ambulation the previous 2 months.

The ankle examination was significant for dorsiflexion limited to 0° and external rotation of 5°. His other ankle dorsiflexed to 10° and externally rotated to 20°. Radiographs demonstrated healing of the lateral malleolus fracture but overreduction of the syndesmosis with loss of the normal distal tibiofibular clear space (Figure 3). The syndesmotic screw was removed, and the patient developed a normal gait over the next 6 weeks with resolution of ankle pain. At 6-month follow-up the patient had regained full ankle range of motion, and the radiographic appearance of the distal tibiofibular joint was normal (Figure 4).

Figure 1. Anteroposterior radiograph of ankle demonstrating a distal fibular fracture and lateral shift of the talus.

Dr. Rupp is a faculty member of the Lake Tahoe Sports Medicine Fellowship program and is with the Lake Tahoe Orthopaedic Institute, Zephyr Cove, Nevada.

Address correspondence to: Robert E. Rupp, MD, Lake Tahoe Orthopaedic Institute, 212 Elks Point Rd, Suite 200, PO Box 11889, Zephyr Cove, NV 89448.

Am J Orthop. 2008;37(5):259-261.

Figure 2. Lateral radiograph of ankle fracture.

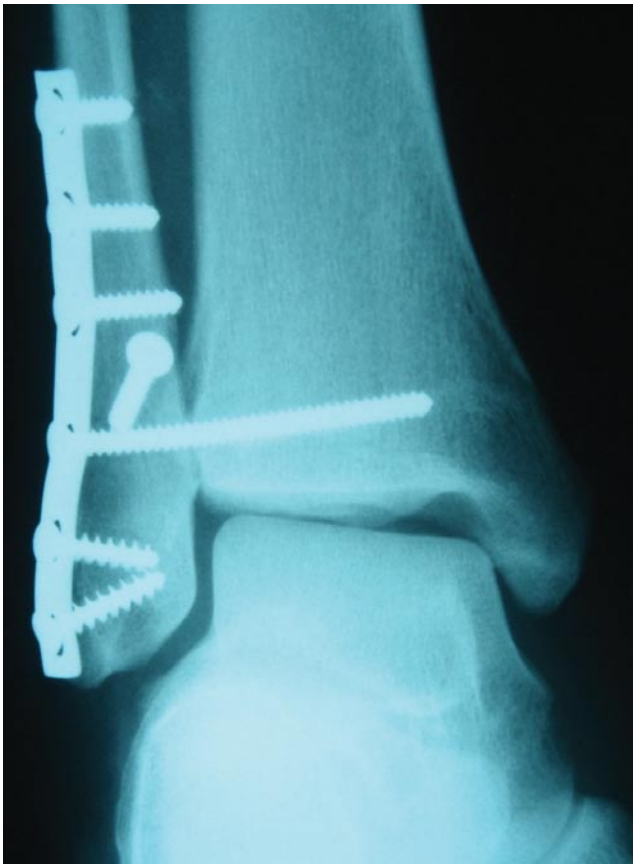

Figure 3. Mortise view radiograph of ankle fracture after operative treatment and syndesmotic screw compression. There is complete loss of the normal distal tibiofibular clear space and talar tilt.

Figure 4. Mortise view radiograph of ankle after removal of syndesmotic screw. The distal tibiofibular clear space is restored, and the tibiotalar relationship is normal.

Discussion

The indication for syndesmotic fixation during ankle fracture treatment is based on the fracture pattern and syndesmotic stability. Ankle fracture malleolar fixation will stabilize some syndesmotic disruptions, but often intraoperative stressing of the syndesmosis (Cotton test) is required for a final determination of syndesmotic stability.

Several authors[3,4] have recommended syndesmotic fixation without lag screw fixation to avoid compression of the distal tibiofibular joint, whereas other authors[2] have questioned the concept of overtightening of the syndesmosis. Tornetta and colleagues[2] tested cadaveric ankles and compressed the syndesmosis with a 4.5-mm cortical screw and washer with lag screw technique. Maximal manual tightening of the syndesmotic screw was performed with the ankle in plantar flexion, and this did not lead to a loss of ankle motion. The authors stressed the importance of an anatomic reduction of a disrupted syndesmosis and not the position of the ankle during syndesmotic screw placement.

Despite some cadaveric studies showing residual loss of ankle motion with syndesmotic screw stabilization, this is not usually encountered in clinical practice.[1,5] The bone around the syndesmotic screw may remodel, allowing the resumption of normal motion of the distal tibiofibular joint as the patient progresses in ambulation.[6] Sometimes the syndesmotic screw will break from the motion at the syndesmosis.[3]

Conclusions

This case report is informative because it describes the clinical outcome when the distal tibiofibular joint is overcompressed with screw fixation. Although the patient had attempted normal ambulation after fracture healing, the syndesmotic screw continued to overcompress the distal tibiofibular joint, and there was no radiographic evidence of bone remodeling about the screw. The treatment of syndesmotic screw removal was effective in restoring normal ankle function and radiographic parameters. One aspect concerning the patient's initial treatment is that syndesmotic fixation may not have been indicated. The fracture pattern was appropriately stabilized with a plate, and this may have been sufficient to reduce the talus and restore joint stability. This case report supports the concept of anatomic reduction of the disrupted syndesmosis and neutralization screw fixation without compression of the distal tibiofibular space.

Authors' Disclosure Statement

Dr. Rupp reports no actual or potential conflict of interest in relation to this article.

References

1. Olerud C. The effect of the syndesmotic screw on the extension capacity of the ankle joint. *Arch Orthop Trauma Surg*. 1985;104:299-302.
2. Tornetta P, Spoo J, Reynolds F, Lee C. Overtightening of the ankle syndesmosis: is it really possible? *J Bone Joint Surg Am.* 2001;83:489-492.
3. Michelson JD. Fractures about the ankle. *J Bone Joint Surg Am.* 1995;77:142-152.
4. Wuest TK. Injuries to the distal lower extremity syndesmosis. *J Am Acad Orthop Surg.* 1997;5:172-181.
5. Needleman RL, Skrade DA, Stiehl JB. Effect of the syndesmotic screw on ankle motion. *Foot Ankle.* 1989;10:17-24.
6. Kaye RA. Stabilization of ankle syndesmosis injuries with a syndesmosis screw. *Foot Ankle.* 1989;9:290-293.