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Osteomyelitis After TightRope® Fixation of the Ankle Syndesmosis: A Case Report and Review of the Literature

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ABSTRACT

Fixation of ankle syndesmosis injuries using the Ankle TightRope® has been gaining popularity. It has been shown to produce good results, facilitate early weightbearing, reduce the need for implant removal, and allow an earlier return to work and, possibly, a more anatomic syndesmotic reduction compared with screw fixation. However, its usage has been associated with complications such as soft tissue irritation, infection and wound breakdown, suture-button subsidence, and pathologic fracture from the screw tract. We describe a case of chronic osteomyelitis and suture-button migration associated with TightRope® fixation and a limited contact-dynamic compression plate for ankle syndesmosis disruption and lateral malleolus fracture.

Fixation using the Ankle TightRope® (Arthrex, Inc., Naples, FL) is a relatively new technique compared with screw fixation for stabilization of ankle syndesmosis injuries. It is a suture-button device composed of a loop of no. 5 FiberWire™ (Arthrex, Inc.) suture held between 2 terminal metallic buttons. These two metallic buttons are secured against the tibia and fibula to provide stabilization of the ankle mortise. The TightRope® system (Arthrex, Inc.) permits physiologic motion at the syndesmosis, maintaining construct rigidity to allow healing (1). Several studies have also shown that TightRope® fixation in ankle syndesmosis injuries produces good results, facilitates early weightbearing, reduces the need for implant removal, and allows an earlier return to work (2–6). Naqvi et al (3) compared TightRope® fixation to syndesmotic screw fixation and showed that fixation of ankle syndesmosis injuries with a TightRope® provided more accurate syndesmotic reduction compared with screw fixation.

However, this system is not without its own problems. Willmott et al (7) reported in their series of 6 patients that 2 TightRope® devices needed to be removed because of soft tissue irritation and granuloma formation. Soft tissue complications and subsidence of the button due to osteolysis in adjacent bone have also been reported in several case series (2–8). We describe a unique complication of TightRope® fixation consisting of a chronic discharging sinus from the lateral wound due to a prominent lateral knot and failed fixation from lateral button slippage through the oblong screw hole of the limited contact-dynamic compression plate (LC-DCP™, Synthes® USA, West Chester, PA) into the bone tunnel, resulting in chronic ankle osteomyelitis.

Case Report

Our patient was a 25-year-old male with no significant medical history, who presented with a right lower extremity injury after a motor vehicle accident. He had been knocked on the left side by a vehicle while riding his motorcycle to work. The patient and his motorcycle fell onto his right, and he twisted his right ankle. He was sent to the emergency room, and the clinical examination by the emergency room physician revealed a swollen right ankle with multiple superficial abrasions over the right knee, thigh, and forearm. The right ankle was grossly swollen, but no open wounds were seen. The foot pulses were strong, and sensation was intact. The radiographic assessments revealed a trimalleolar ankle fracture (Fig. 1). The patient was placed on bed rest, analgesia, and strict lower limb elevation with a compression bandage to allow the soft tissue swelling to subside. When the swelling improved, he was prepared for surgery. On day 6 after injury, he underwent right ankle open reduction and internal fixation of the trimalleolar fracture. Two medial malleolar screws and a 9-hole LC-DCP™ were used for the lateral malleolus fracture. A TightRope® was used for stabilization of the syndesmosis disruption (Fig. 2). The posterior malleolus was reduced by ligamentotaxis and was not fixated. His postoperative stay was unremarkable. He was discharged 2 days after ankle fixation.

The patient presented to our clinic 27 months after the index surgery with a chronic discharging sinus on the lateral wound. On

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Fig. 1. Right trimalleolar ankle fracture.

further questioning, he revealed that the lateral wound had never healed after the operation. The patient had been told by his treating surgeon that the lateral knot from TightRope® fixation was too prominent and had caused the lateral wound breakdown. He had undergone trimming of the lateral knot on several occasions in the office; however, the wound had never healed, despite oral antibiotics and daily dressing changes. It subsequently developed into a chronic discharging sinus. He was able to ambulate despite mild pain on the lateral wound site with weightbearing and chronic ankle swelling.

Clinically, the patient had a 5-cm longitudinal scar on the distal fibula, with a small discharging sinus directly over the TightRope® lateral knot area. The ankle was chronically swollen (Fig. 3). Plain radiographs and computed tomography scans showed that the lateral TightRope® button had slipped through the oblong screw holes into the bone tunnel. The distal fibula tunnel was enlarged on the plain radiographs (Fig. 4). A localized isotope bone scan using technetium-99m performed 27 months after the index surgery showed a 3-phase positive osteoblastic lesion in the right distal tibia that was suspicious for osteomyelitis. His white blood cell count was 9.92×10^9/L, his C-reactive protein level was <5 mg/L, and his erythrocyte sedimentation rate was 13 mm/h.

The patient underwent right ankle medial and lateral wound exploration, removal of the implants, including the failed TightRope®,

Fig. 2. Postoperative radiograph.

and curettage and washout of the tibia and fibula bone tunnel. The bone tunnel was curetted and washed with a Nelaton catheter through and through. Tissue and bone biopsy samples were sent for culture and sensitivity testing. Intraoperatively, the syndesmosis was tested using Cotton's test with a bone hook and found to be stable. The postoperative radiographs showed a stable syndesmosis joint with no widening of the ankle mortise (Fig. 5). The infectious diseases physician was consulted, and a peripherally inserted central catheter was placed for intravenous antibiotic treatment. The tissue and bone biopsy samples returned positive for methicillin-sensitive *Staphylococcus aureus*. Intravenous cefazolin was started with the aid of the infectious diseases physician, who also arranged for outpatient parenteral antibiotic therapy for the patient. Our patient completed 6 weeks of intravenous cefazolin with weekly monitoring of the inflammatory markers. At the end of the antibiotic treatment, the wound had completely healed, and he was able to ambulate well without any pain or swelling. At his latest follow-up visit, 18 months after removal of the implants and debridement, he was well and did not have any additional wound complications or pain.

Discussion

The incidence of ankle fractures has been reported to be approximately 107 to 184/100,000 persons annually (9,10). Up to 10% of all ankle fractures and 20% of operatively treated ankle fractures will be accompanied by syndesmotic injury (10). Trans-syndesmotic screw fixation has been the most popular and reliable method of syndesmosis stabilization, although much controversy exists regarding the number and size of the screws used, timing of removal, cortices engaged, and the level of screw insertion (6,11,12). Suture-button devices, in particular, the TightRope®, have been gaining popularity for several years. Overall, it is a relatively new technique for fixation of ankle syndesmosis injuries. It comprises a loop of no. 5 FiberWire™ (Arthrex) suture held between 2 terminal metallic buttons. These 2 metallic buttons are secured against the tibia and fibula to provide stabilization of the ankle mortise. Several studies have also shown that TightRope® fixation in ankle syndesmosis injuries produces good results, facilitates early weightbearing, obviates the need for implant removal, and allows an earlier return to work (2–6). Naqvi et al (3) reported in 2012 that TightRope® fixation resulted in more accurate syndesmotic reduction compared with trans-syndesmotic screw fixation in their comparative cohort study.

TightRope® fixation can be used to reduce and fix ankle syndesmosis disruption with or without associated ankle fractures. In ankle syndesmosis diastasis without fractures, the TightRope® system can be used alone, with the suture loop tensioned and both metallic buttons secured against the tibia and fibula. In addition, the TightRope® system can be used with plate and screw fixation of lateral malleolus fractures. Once the lateral malleolus fracture has been reduced and anatomically fixed to achieve good length and rotation, the TightRope® system can be used by way of one of the screw holes of the plate and tensioned using the standard technique. The lateral distal fibula plate then serves as a buttress plate for the lateral rounded button.

Lateral soft tissue complications such as a prominent knot, skin irritation, wound breakdown, and infection with the use of TightRope® fixation have been reported in several studies. Willmott et al (7) first reported in 2009 on soft tissue complications from the lateral knot resulting in formation of a granuloma. Subsequently, Naqvi et al (4) reported in the largest series of ankle syndesmosis fixation cases using TightRope® devices to date that 3 of 49 patients developed soft tissue complications on the lateral side. Two patients required removal of the TightRope® because of an infected sinus and a prominent lateral knot causing skin irritation, respectively. The third