incisions on either side of the tendon are made 4–6 cm distal to the palpable defect. Forceps are then used to mobilise the tendon from beneath the subcutaneous tissues. A 9 cm Mayo needle (BL059N, #B00 round point spring eye, B Braun, Aesculap, Tuttingen, Germany) is threaded with 2 double loops of Number 1 Maxon (Tyco Healthcare, Norwalk, CT, USA), and this is passed transversely between the proximal stab incisions through the bulk of the tendon. The bulk of the tendon is surprisingly superficial. The loose ends are held with a clip. In turn, each of the ends is then passed distally from just proximal to the transverse Maxon passage through the bulk of the tendon to pass out of the diagonally opposing stab incision. A subsequent diagonal pass is then made to the transverse incision over the ruptured tendon. To prevent entanglement, both ends of the Maxon are held in separate clips. This suture is then tested for security by pulling with both ends of the Maxon distally. Another double loop of Maxon is then passed between the distal stab incisions through the tendon, and in turn through the tendon and out of the transverse incision starting distal to the transverse passage. The ankle is held in full plantar flexion, and in turn opposing ends of the Maxon thread are tied together with a double throw knot, and then three further throws before being buried using the forceps. A clip is used to hold the first throw of the lateral side to maintain the tension of the suture.

A subcuticular Biosyn suture 3.0 (Tyco Healthcare) is used to close the transverse incision, and Steri-strips (3M Health Care, St Paul, MN, USA) are applied to the stab incisions. Finally, a Mepore dressing (Molnlycke Health Care, Gothenburg, Sweden) is applied, and a bivalved removable scotch cast in full plantar flexion is applied being held in place with Velcro straps.

The patient is allowed home on the day of surgery, and fully weight bears as able in the cast in full plantar flexion. At 2 weeks, the wounds are inspected, and the back shell is removed allowing proprioception, plantar flexion, inversion and eversion exercises. The front shell remains in place for 6 weeks to prevent forced dorsiflexion of the ankle.

In conclusion, the nascent literature on minimally invasive AT surgery is far from universally supportive. Most series that have been published in support of these surgical approaches are first reports by originators of particular techniques. Randomized controlled trials are required to address the issue of the comparison between open versus minimally invasive AT surgery. In our hands, minimally invasive surgery has provided similar results to those obtained with open surgery, providing decreased perioperative morbidity, decreased duration of hospital stay, and reduced costs.

10:10-10:20 am - Minimally Invasive Technique for Harvesting Long Flexor Tendons of the Foot
Vinod K. Panchbhavi, MD
Galveston, Texas

Flexor digitorum longus and flexor hallucis longus tendons are used in a variety of foot reconstructive procedures. They are commonly harvested in the midfoot and transferred to a different location in the foot to augment or replace a degenerate tendon.

The surgical technique to harvest FDL was described by Mann and Thompson. In this ‘open’ technique, the FDL sheath is identified at the medial malleolus and followed distally. The abductor hallucis muscle is retracted plantarward to expose the interval between the flexor hallucis brevis and the first metatarsal. The origin of the flexor hallucis brevis muscle is released to further enhance the exposure on the plantar aspect of the foot. The FDL tendon sheath is opened and the tendon kept on tension, the dissection of the sheath carried distally into the plantar aspect of the foot. As this is achieved there are quite a few vessels that need cauterization. The FDL tendon is sharply divided at the distal most extent possible. This ‘open’ technique however requires extensive, deep and difficult, dissection in the midfoot in vicinity of blood vessels and nerves. A minimally invasive technique developed by the author is presented here to overcome these difficulties.

Surgical Technique: The tendon sheath of the FDL or FHL is identified in the region of the hindfoot through the exposure that is used for the concomitant procedure such as the exploration of the posterior tibial tendon or the Achilles tendon. A malleable metallic probe that has a smooth bulb at its tip is introduced within the tendon sheath and passed gently distally into the midfoot where it is easily palpated. A vertical incision then is made in the skin in the midfoot over the prominence that is made by the probe. Once the skin is incised the central part of the plantar aponeurosis is exposed. The vertically
oriented fibers of the aponeurosis are separated to expose muscle fibers of the flexor digitorum brevis muscle. These muscle fibers are then separated and retracted to expose the flexor digitorum longus tendon.

The identity of the tendon is verified by applying a pulling tension on the tendon through the proximal wound in the hindfoot and asssessing transmission of the tension distally to the tendon identified in the midfoot and at the same time observing maximal flexion either in lesser toes or the great toe. The tendon is then cut sharply in the midfoot and the cut end pulled proximally through the wound in the hindfoot region.


2. Panchbhavi VK: Chronic Achilles Tendon repair with Flexor Hallucis Longus Tendon harvested using a Minimally Invasive Technique. Techniques in Foot and Ankle Surgery 6(2) 123-129; 2007


10:20-10:30 am - Minimally Invasive Calcaneus Fracture Fixation: European Experience

Stefan Rammelt, MD, PhD
Dresden, Germany

Percutaneous reduction and screw fixation of calcaneal fractures aims at reducing the risk of wound complications and postoperative scarring as compared with open reduction via extended approaches. It is a suitable treatment for extra-articular and selected intra-articular calcaneus fractures provided anatomical reduction of the posterior calcaneal facet can be achieved.

The method of closed reduction with percutaneous pin leverage ("Essex-Lopresti reduction" in the English-speaking literature) was introduced by the German surgeon Westhues in 19341. This method has found reappraisal for less severe fracture patterns, like Sanders type IIC fractures, with the posterior facet being displaced as a whole2. When applying this method to Sanders type IIA and IIB fractures, anatomic reduction of the posterior facet should be controlled with intra-operative subtalar arthroscopy3 or 3D fluoroscopy because subtalar joint congruity is highly predictive of the functional outcome4.

Percutaneous reduction and screw fixation may also be a treatment alternative even in more severe fracture patterns (Sanders types III and IV) in patients with contraindications to open reduction and plate fixation (i. e. critical soft tissues, immunodeficiency, high perioperative risk)4.

Ideally, surgery should be performed within 3 to 5 days after the injury before the formation of excessive clots and fibrous adhesions makes percutaneous reduction difficult. Patients should be compliant with the postoperative protocol of partial weight-bearing and early active range of motion exercises for the ankle and subtalar joints in order to benefit from this type of treatment. Hardware removal is required for prominent screw heads only.