

A MODIFIED APPROACH FOR A MEDIAL ARCH TENOSUSPENSION

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INTRODUCTION

In 1939, Young described an “operative treatment of pes planus.” This procedure was originally performed on 7 patients for correction of flexible pes planovalgus and was coupled with a tendo-Achilles lengthening. This soft-tissue procedure was described as the inferior transpositioning of the tibialis anterior tendon (TAT) through a slit or a hole in the navicular tuberosity (1-4). Young’s early results showed “symptomatic relief, correction of the depressed arch, and eversion and abduction of the forefoot” (1-2).

Often performed in conjunction with other soft tissue and osseous procedures, the Young tenosuspension can play an important role in stabilizing the medial column of the foot. In 1997, Dragonetti et al retrospectively compared results of subtalar arthroereisis and tendo-Achilles lengthening with or without Young tenosuspensions. The significant difference between groups was a reduction in forefoot supination in the group that underwent a tenosuspension (5). Typically, this procedure is utilized following an Evans calcaneal osteotomy when the foot shows recalcitrant medial column instability. With the senior author’s years of experience, when correcting flexible pes planovalgus deformities, Young tenosuspensions have proven a useful technique on a case-by-case basis and are seldom preformed as an isolated procedure.

SURGICAL TECHNIQUE FOR A MODIFIED MEDIAL ARCH TENOSUSPENSION

The incision placement for this procedure is critical to obtain adequate visualization and exposure for dissection of the medial arch. The proximal extent of the incision is at the distal tip of the medial malleolus and the distal aspect of the incision is marked at the inferior edge of the medial first metatarsal base. This distal point of the incision is approximately 1 centimeter distal to the first metatarsocuneiform joint (MCJ) at the level where the first metatarsal base flares. Next, TAT is traced out and a bisecting point

between the TAT and the plantar aspect of the navicular tuberosity is found. An “artistic incision line” is then drawn connecting these 3 marks (Figure 1).

A controlled depth incision is made through the skin down to the level of the subcutaneous tissue. Sharp or blunt dissection is utilized to expose the deep fascia with care taken to maintain adequate surgical hemostasis. The medial marginal vein is regularly encountered at this level and is usually amenable to superior or inferior retraction without the need for sacrifice (Figure 2). Once down to the level of the deep fascia, the subcutaneous tissue should be separated just enough so that the TAT is visualized superiorly and the posterior tibial tendon (PTT), navicular tuberosity, and abductor hallucis muscle belly can be visualized inferiorly.

Next, a deep fascial incision is made distally at the level of the base of the first metatarsal and on the superior edge of the abductor hallucis muscle belly (Figure 3). Using Mayo scissors, the fascial incision is carried proximally to the level of the plantar navicular tuberosity and continued into the PTT sheath to the level of the medial malleolus. The abductor hallucis muscle belly is then retracted inferiorly, which gives access to the plantar first MCJ and naviculocuneiform joint (NCJ) (Figure 4). Next, the medial slip of PTT needs to be released from its insertion into the navicular tuberosity so that visualization is gained to the plantar talonavicular joint (TNJ). This can be done through an inverted “L” periosteal incision at the most distal aspect of the navicular tuberosity with care taken not to violate the NCJ or release the lateral slip of the PTT (Figure 5). The medial slip of the PTT is then retracted inferiorly so the spring ligament and lateral slip of the PTT can be visualized. If the spring ligament is severely attenuated it can be repaired, however the senior author rarely finds it necessary to do this (Figure 6). Attention is now directed to the TAT.

The TAT sheath can be easily accessed by teasing up the deep fascia distally. The sheath is incised near its insertion and carried as far proximal as is needed for transposition (Figure 7). In order to properly relocate the TAT, its



Figure 1. Incision placement.



Figure 2. Medial marginal vein.

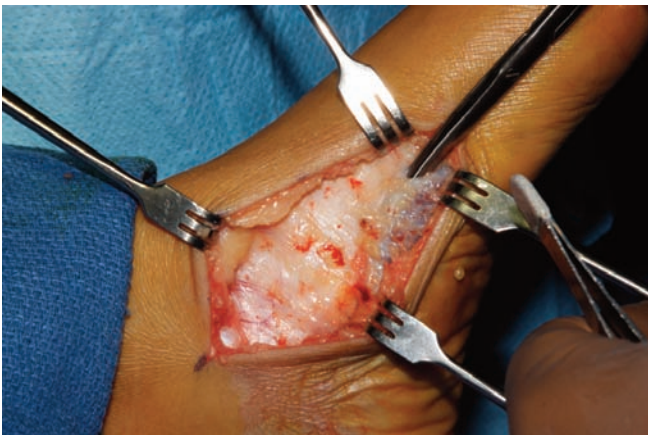


Figure 3. Deep fascial incision.

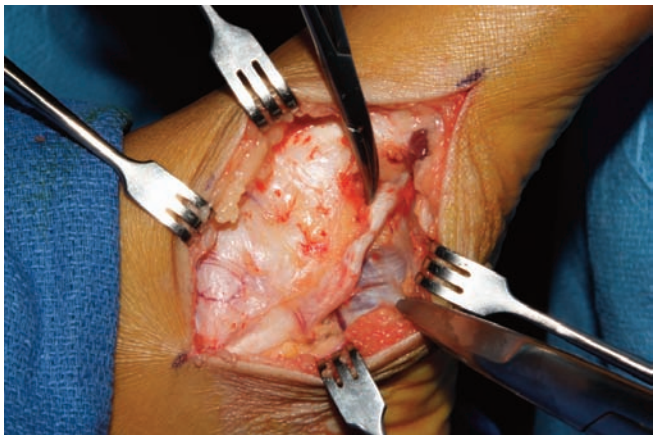


Figure 4. Inferior retraction of the abductor hallucis muscle.



Figure 5. Releasing the medial slip of the posterior tibial tendon.

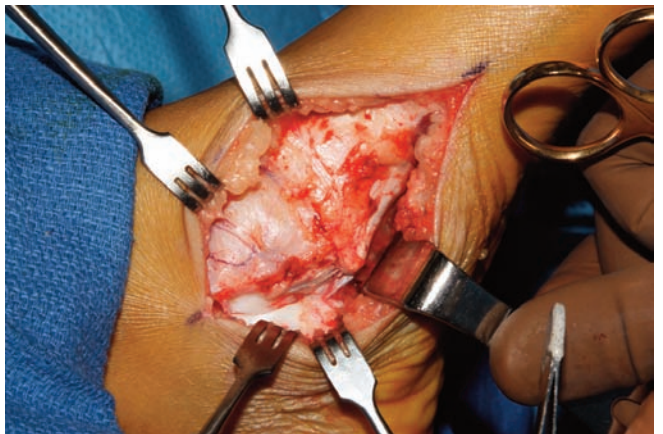


Figure 6. Access to the spring ligament and lateral slip of the posterior tibial tendon.

insertional fibers into the medial first metatarsal and medial cuneiform need to be sectioned so that only the plantar fibers remain (Figure 8). This maneuver allows the full thickness of TAT to span the plantar aspect of the first MCJ and NCJ once relocated around the navicular tuberosity. The tendon is then rerouted around the navicular tuberosity and its position inspected.

Next, a vertical periosteal incision is made on the navicular where the TAT will course. The periosteum is gently reflected and preserved for later closure (Figures 9, 10). Traditionally, extensive osseous work has been used to prepare the navicular to receive the TAT and secure its transposition. However, this modified technique deviates from traditional methods, and uses minimal bony resection



Figure 7. Incising the tibialis anterior tendon sheath.

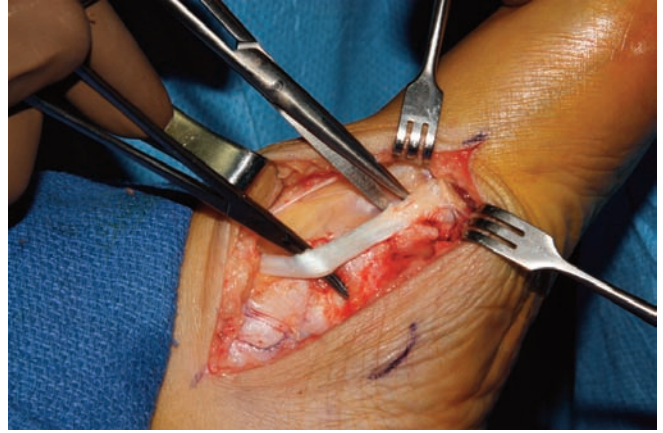


Figure 8. Releasing the medial insertional fibers of the tibialis anterior tendon.

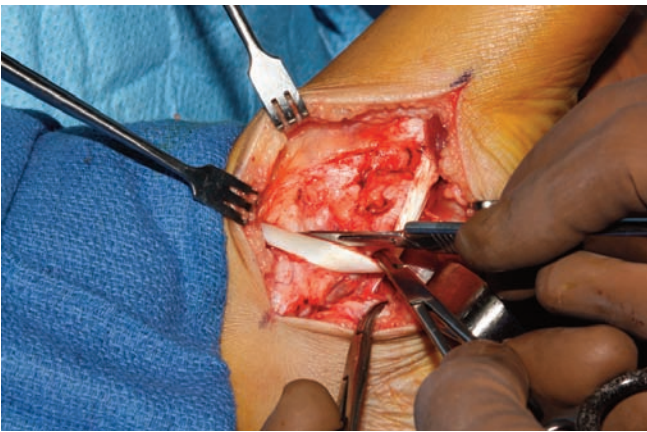


Figure 9. Relocating the tibialis anterior tendon.

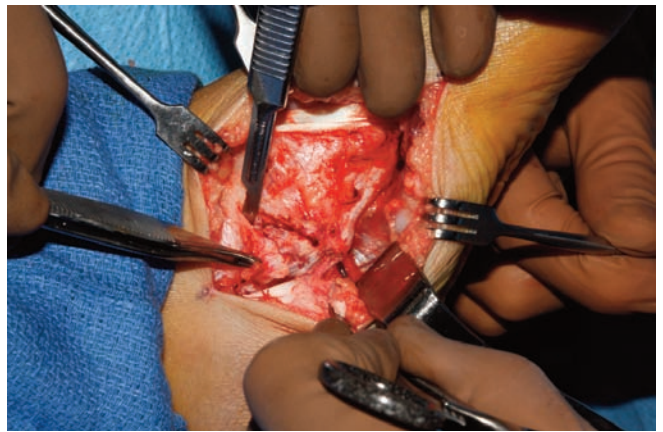


Figure 10. Periosteal incision in the navicular.

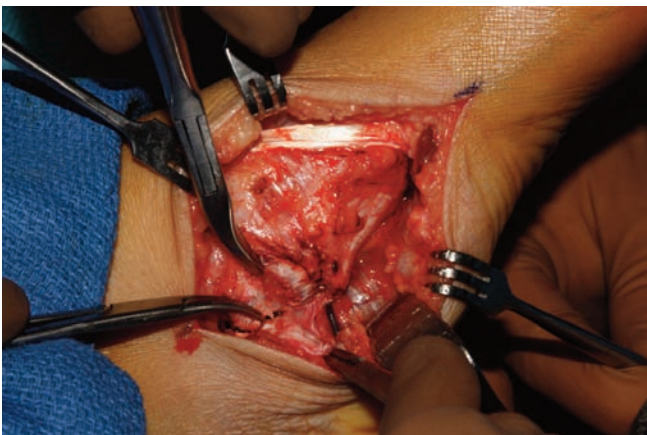


Figure 11. Notching the navicular.

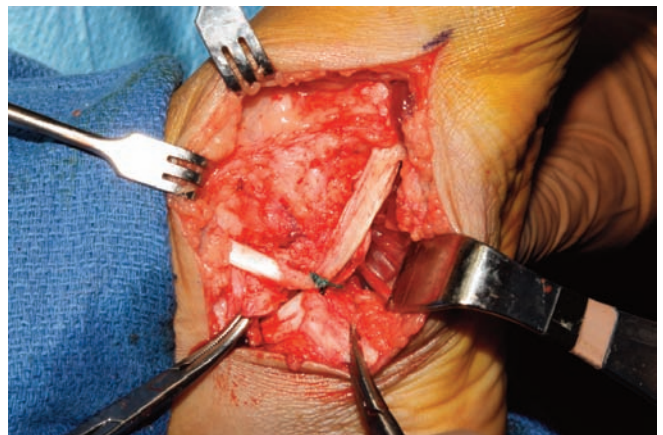


Figure 12. Securing the tibialis anterior tendon to lateral slip of the posterior tibial tendon.

to notch the navicular. A rongeur is used to notch approximately 2 millimeters of the posterior plantar navicular tuberosity (Figure 11). The critical step of this procedure is tensioning and positioning of the TAT as it courses the plantar NCJ and first MCJ. Tensioning the TAT allows the surgeon to correct for medial arch instability by reinforcing the plantar ligaments and plantarflexing the first

metatarsal. When the desired correction is achieved, the TAT is secured to the lateral slip of the PTT with #0 Ethibond suture (Figure 12). The medial slip of the PTT is then sutured over the TAT and back into the navicular tuberosity with #0 Ethibond suture (Figure 13). Typically this procedure is performed without violating any medial column joints.

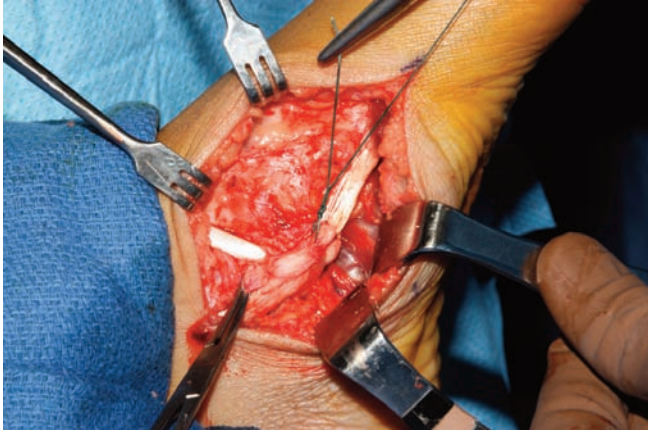


Figure 13. Reattaching the medial slip of the posterior tibial tendon.



Figure 14. Deep fascial closure.



Figure 15. Running subcuticular skin closure.

Once the tenosuspension is secured, the deep fascial layer is closed with 3-0 Vicryl (Figure 14). The subcutaneous tissue is reapproximated with 4-0 Vicryl in a running fashion and the skin is closed with 5-0 Vicryl in a subcuticular running stitch (Figure 15). The patient is placed in a hard Jones compression cast.

POSTOPERATIVE CARE

For a healthy patient who underwent this procedure, it is recommended the patient remain nonweight bearing on the surgical limb for 6 weeks. As stated above, this procedure is not recommended as an isolated procedure for collapsing pes plano valgus repair. The duration of nonweight bearing is rarely dictated by the tenosuspension, but is dependent on the osseous correction done in conjunction. Return to normal shoe gear should be based on the patient's postoperative radiographs, clinical evaluation, and symptoms.

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