

Technique Tip

Interference Screw Fixation of Tendon Transfers in the Foot and Ankle

Thomas Clanton, M.D.; Mark Perlman, M.D.
Houston, TX, and La Mesa, CA

INTRODUCTION

Tendon transfers play an important role in reconstructive foot and ankle surgery. Multiple methods for fixation of tendon to bone are used including suture of tendon to periosteum, suture into bone troughs, suture anchors, and passage through bone tunnels.

With the increasing popularity of hamstring tendon anterior cruciate ligament reconstructions has come new fixation technology. Soft-tissue interference screws have been introduced that allow fixation of tendons into bone tunnels without the need for bone blocks.^{1,6} Bioabsorbable versions of these screws have been shown to have equivalent or greater initial fixation than their titanium counterparts.^{2,6}

We have recently begun using soft-tissue interference screw fixation for tendon transfer in the foot. Our initial biomechanical studies in a foot and ankle model suggest its efficacy. Our original indication for use of an interference screw was graft length limitation. As part of our reconstruction for posterior tibial tendon insufficiency, we commonly transfer the flexor digitorum longus through a bone tunnel in the navicular, and suture the tendon back to itself. In a case where sufficient length was not available, rather than rely on the tendon sewn to periosteum, we achieved fixation with a biodegradable interference screw. Since that time, we have confirmed the strength of this fixation method with a biomechanical study.⁴ Several additional tendon transfers have been fixed with this technique without complication.

Transfer of the posterior tibial tendon through the interosseus membrane for drop foot and split anterior tibial tendon transfer are also potential indications for interference screw fixation of the tendon transfer in the bony tunnel. Commonly, fixation for these transfers involves the use of felt and a button on the plantar aspect of the foot.⁵ The tension required can result in

ulceration of the plantar skin (Fig. 1). This is avoided with the use of an interference fit screw.

TECHNIQUE

The tendon to be transferred is harvested in the standard fashion, obtaining as much length as possible, and extraneous soft tissue is removed. A large absorbable grasping suture is passed through the distal portion of the tendon. This may be augmented by an absorbable suture in a Chinese finger-trap method as described by Krackow and Cohn.³



Fig. 1: Tendon fixed into bone tunnel with sutures tied over button and felt on plantar aspect of foot.

Corresponding Author:
Thomas Clanton, M.D., Professor and Chairman of Orthopaedics
University of Texas–Houston Medical School
6431 Fannin, 6.156 MSB
Houston, TX 77030
Phone: (713) 500-7017
Fax: (713) 500-0688
E-mail: Thomas.O.Clanton@uth.tmc.edu

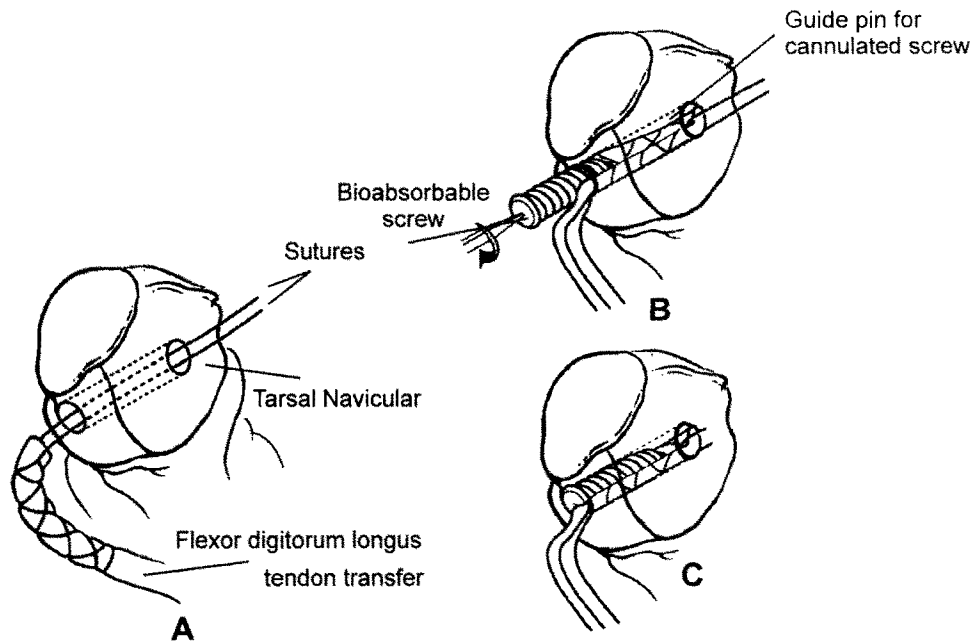


Fig. 2: Line-drawing depiction of tendon transfer into bone tunnel with interference screw fixation of the tendon within the tunnel. (a) tendon of flexor digitorum longus pulled into bone tunnel in tarsal navicular using grasping sutures. (b) with tendon pulled slightly into the tunnel, the cannulated bioabsorbable screw is passed over a guide pin next to the tendon graft. (c) The bioabsorbable screw is secured within the tunnel giving solid fixation of the tendon transfer.

A bone tunnel is prepared using a drill bit (typically $\frac{1}{4}$ " or 6 mm). Using the grasping suture, the tendon is passed into the tunnel (Figs. 2a, 2b, 2c). With transfer of the posterior tibial tendon into the cuneiforms, this is accomplished by passing the grasping sutures with Keith needles into the tunnel and through the plantar aspect of the foot. With tension held on the tendon, the guide pin for the interference screw is inserted into the bone tunnel adjacent to the tendon. A properly sized screw (7mm x 20-25 mm) is selected and inserted (Fig. 3). The passing sutures can either be cut and removed or used as additional fixation.

CONCLUSION

Tendon transfers in foot and ankle reconstruction usually involve fixation of tendon to bone. When the tendon is placed through a bone tunnel and sutured back to itself, more length is needed. By using a bioabsorbable screw in an interference fashion, shorter tendon length can be accommodated and excellent fixation can still be obtained. The technique is quick and easy to apply. The primary disadvantages are the slightly larger drill hole and the expense of the bioabsorbable screw. We have found the technique to be useful.

REFERENCES

1. **Aune, AK; Ekland, A; Cawley, PW:** Interference screw fixation of hamstring vs. patellar tendon grafts for anterior cruciate liga-

ment reconstruction. *Knee Surg Sports Traumatol Arthrosc* **6(2)**:99-102, 1998.

2. **Caborn, DN; Coen, M; Neef, R; et al.:** Quadrupled semitendinous-gracilis autograft fixation in the femoral tunnel: a comparison between metal and bioabsorbable interference screws. *Arthroscopy* **14(3)**:241-245, 1998.
3. **Krackow, KA; Cohn, BT:** A new technique for passing tendon through bone. *J. Bone Joint Surg* **69A**:922-924, 1987.
4. **Louden, KA; Beatty, SG; Clanton, TO; et al.:** Tendon transfer fixation in the foot and ankle. A biomechanical study valuating two sizes of bioabsorbable screws. Accepted for publication in *Foot & Ankle Intl*, 2001.
5. **Sabonghy, EP; Wood, RW; Ambrose, CA et al.:** Tendon transfer fixation in the foot and ankle: a biomechanical study comparing a traditional technique versus bioabsorbable interference-fit screw fixation. Submitted for publication in *Foot & Ankle Intl*, 2001.
6. **Warner, WC:** Paralytic Disorders. In Canale, S.T. (ed.), *Campbell's Operative Orthopaedics*, Vol. 4. St. Louis, Mosby, 1998, p. 3987.
7. **Weiler, A; Hoffmann, RF; Stahelin, AC; et al:** Hamstring tendon fixation using interference screws: a biomechanical study in calf tibial bone. *J. Arthrosc & Related Surg* **14(1)**:29-37, 1998.



Fig. 3: Bioabsorbable screw being placed next to the posterior tibial tendon to secure fixation in the bone tunnel in the middle cuneiform.