

## NEGLECTED ACHILLES TENDON RUPTURES: Surgical Considerations

*Robert P. Taylor, DPM*

To have a legitimate discussion about a clinical entity, it is necessary to have a clear definition or idea as to what constitutes that particular malady. When the term “neglected Achilles tendon rupture” is used, a review of the literature and opinions of those who diagnose and treat this condition, offers various descriptions such as “delayed or missed diagnosis of an Achilles tendon rupture,” “a rupture of the tendon where the ends cannot be apposed with simple plantar flexion of the foot,” or a “space between proximal and distal tendon slips that requires some form of tissue reconstruction.” A four week interval between rupture and repair was offered by Gabel et al. Essentially there is no consensus.

The author defines a neglected Achilles tendon rupture as a rupture with delayed or improper treatment secondary to delayed patient presentation, non-adherence of the patient to appropriate conservative treatment protocol, missed diagnosis, or insufficient treatment. As a result of the time between the injury and surgical intervention, surgical treatment involves working with advanced degenerative frayed tendon tissue, which is retracted and cannot be apposed by simple plantar flexion of the foot. Repair requires reconstruction including possible fascial advancement, tendon transfer, graft augmentation, or any combination thereof.

It is the author’s experience that delayed diagnosis and insufficient treatment are the primary etiologies of the neglected tendon rupture. Reasons for delayed treatment include delayed diagnosis, delayed treatment secondary to the need for medical stabilization or clearance, and delayed presentation of the patient to a medical practitioner. A patient delaying their presentation to a doctor is often a result of them having no significant pain and their ability to function, although decreased. There is another unique situation that can cause an acute tendon rupture to essentially present surgically similar to a neglected tendon. This situation occurs when surgical intervention is decided upon, and the patient is either permitted by the surgeon to walk on the limb unprotected or under protected until the time of surgery, or the patient, unbeknownst to the surgeon, continues with activity on the unprotected limb until the time of surgery. The patient assumes that since they are having surgery anyway, increased or unprotected

ambulation on the limb will not matter. It is not acceptable to allow a patient to have full unprotected weight bearing on the affected limb until surgery. The surgeon should also counsel the patient that doing so prior to surgery could complicate the repair and present the surgeon with a situation they are not prepared to correct.

Symptoms of a neglected Achilles tendon rupture include an unsteady gait, difficulty climbing steps or slopes, a limp with ambulation, or difficulty or inability with heel rise. Pain is an uncommon complaint. The physical examination will often show a palpable gap causing the normal tendon contour to be absent (Figure 1). Other findings include increased dorsiflexion compared with the contralateral ankle, diminished plantarflexion strength, and a possible positive Thompson’s test.

There is no shortage of literature or debate regarding nonoperative versus surgical intervention for the acute Achilles tendon rupture. To the author’s knowledge, there is no such study stratifying nonoperative versus operative treatment for the neglected Achilles tendon rupture. Nonoperative treatment would include bracing, ankle foot orthosis (AFO), and extended casting in gravity plantarflexion with or without nonweight-bearing status.

A successful surgical outcome is to reestablish the normal function of the muscle tendon unit. Indications for surgical intervention include weakness and dysfunction. Potential contraindications for surgical intervention include



Figure 1. Patient with significant tissue contracture secondary to neglected Achilles tendon rupture.

systemic diseases (poorly controlled), smoking (relative), and concern about noncompliance or adherence to the necessary postoperative course.

Once it is determined that surgical intervention is indicated, and the patient is an appropriate patient for reconstruction, preoperative considerations should be an evaluation of the extent of skin contracture, and the length of tendon deficit, and if necessary, fine tuning or stabilizing the patient medically.

Surgical planning should include an evaluation of the tendon and amount of contracture with the use on magnetic resonance imaging (MRI.) It is the author's opinion that this is absolutely necessary. Most radiologist and MRI facilities have the ability to obtain true measurements from the MRI to determine the size of the deficit or gap between the proximal and distal tendon slips (Figure 2). This will allow the surgeon to develop a surgical plan. The surgeon should also prepare for multiple different surgical plans that should be discussed with the patient preoperatively. For example, the preoperative MRI might show mild to moderate gapping of the tendon ends, which the surgeon intends to reapproximate with a fascial advancement procedure alone, but once in the surgical field, it might be determined that more than a fascial advancement is needed to perform an adequate repair, and a tendon transfer or graft might be necessary (Figure 3). The author recommends informing the surgical candidate on the anticipated procedures necessary for repair, but also obtaining informed consent for any other ancillary procedures that might become necessary should the initial surgical plan need augmentation or need to be aborted.

Surgical options for reconstruction include fascial

advancement, tendon transfers (peroneus brevis, FDL transfer, FHL transfer), fascial advancement with tendon transfer, graft augmentation, and ankle fusion. Fascial advancements alone can be utilized for mild to moderate gapping. With mild gaps (2-3 cm) a gastrocnemius recession, or V-Y advancement can provide the necessary length for end to end repair. Moderate gaps (4-5 cm) often require fascial advancement with a central turndown flap. It is the author's experience that several minutes of distal tension applied to the proximal tendon prior to the procedure can lengthen the muscle group and provide length from the contracted muscles.

Large gaps (5 cm or greater) usually require a combination of reconstruction techniques such as fascial advancement, tendon transfer, graft augmentation, or tendon allograft.

Multiple different tendon transfers techniques have been described in the literature. Mann et al described the use of the FDL tendon, harvested from the midfoot. Their study included 7 patients with neglected Achilles ruptures. There was a 39 months average follow up. Six of the 7 patients in the study obtained good or excellent results, with no pain and no limitations postoperatively. Elias et al described FHL transfers and V-Y lengthening in 15 patients with neglected Achilles ruptures. Patients on average had 5-8 cm gaps. An analysis of these patients showed 22% loss of plantarflexion strength, and a 5-degree loss of ankle range of motion. They scored an average of 94/100 on the AOFAS hindfoot score. Shalaby et al utilized the peroneus brevis tendon transfer in 11 cases with fresh and neglected Achilles tendon ruptures. Retrospective analysis showed no rerupture. Three

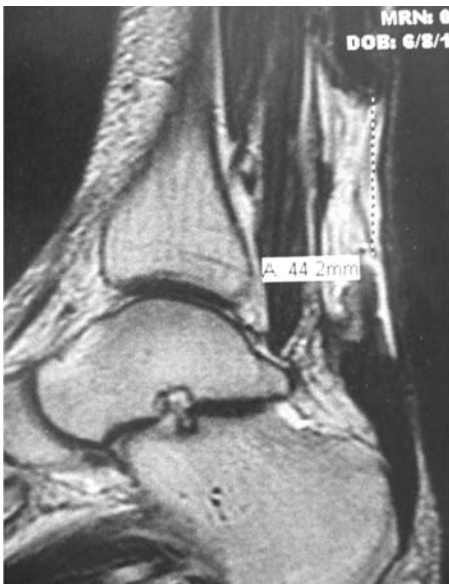


Figure 2. Neglected Achilles tendon rupture with a preoperative gap or 44.2 mm.



Figure 3. Patient with neglected Achilles tendon rupture with gapping between tendon ends larger than preoperative MRI measurements.

patients had greater than 3 cm calf atrophy, 2 had less than 10 degrees of restriction of ankle dorsiflexion, and all regained preinjury daily activities levels. Eight were rated as excellent and 3 with good results.

The author utilizes the FHL tendon transfer when augmentation of the repair requires a tendon transfer. Many have stated advantages of the FHL transfer over other tendon transfer. Those advantages include: strength compared with other tendon transfers, same phase transfer (the FHL fires in phase with the Achilles), and there is ease of access to the tendon utilizing the proximal harvest technique (Figure 4). There is little or no functional morbidity associated with harvest, while maintaining normal muscle function.

Several allograft and xenograft materials are available and have been utilized for augmentation of tendon repair

(Figure 5). Porcine intestinal xenograft, equine pericardium xenograft, and dermal matrix allograft have all been utilized to augment tendon repair. A recent study by Barber showed the use of human dermal allograft (Graft Jacket) augmentation of an Achilles repair significantly increased repair strength and stiffness in Achilles tendon rupture repair (Figure 6). Their findings suggested that use of this allograft would allow a more aggressive rehabilitation program allowing early return to activities. The author's preferred technique is to tubularize the reconstructed tendon with a graft prior to layered closure. In cases with severe gapping between tendon slips, Achilles tendon allograft can be utilized. This graft can either be sewn into the proximal and distal slips essentially bridging the gap (Figure 7). A tenodesis type procedure can also be performed inserting the graft into

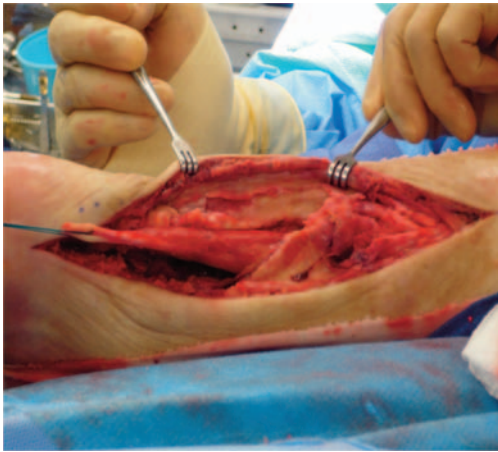


Figure 4. FHL transfer to augment repair of a neglected Achilles tendon rupture.

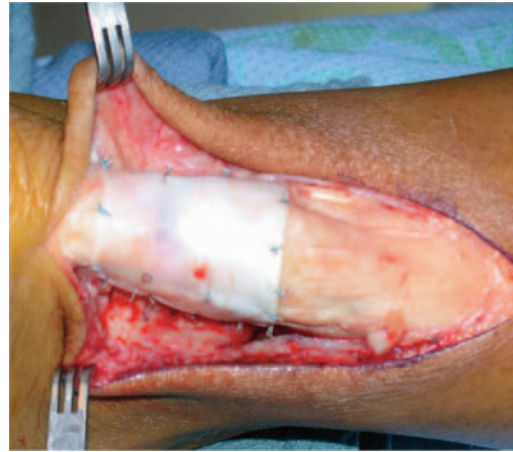


Figure 5. Achilles tendon repair augmented with graft.

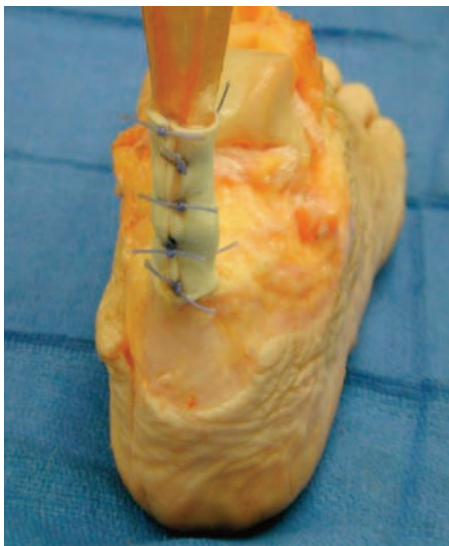


Figure 6. Cadaveric model utilized in Barber study for human dermal allograft (Graft Jacket) augmentation of an Achilles tendon repair.

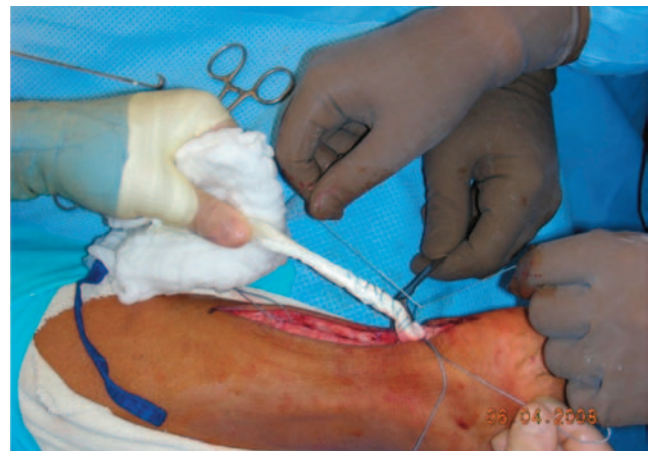


Figure 7. Neglected Achilles tendon repair utilizing fresh cadaveric Achilles tendon allograft.



Figure 8. Patient with complete wound dehiscence following Achilles tendon rupture repair.

the calcaneus while the proximal and distal tendon slips are secured to the graft under physiologic tension. These grafts can be obtained with or without their attachment to the posterior tuber of the calcaneus.

Complications of repairing neglected Achilles tendon ruptures include wound dehiscence, weakness, decreased ankle range of motion, calf atrophy, and re-rupture. These complications are similar to those seen in the acute tendon rupture repair. The surgeon must pay particular attention to the extent of the contracture of the soft tissues that is present in the area of the deficit created by the rupture. This area provides many challenges when a wound occurs (Figure 8). It is not difficult to understand that the recreated bulk of the reconstructed tendon can cause excessive tension on the tissues when attempting closure. It is the author's opinion that tissue expanders might be worth considering preoperatively if the contracture is severe. Also, because of the morbidity of this wound dehiscence complication, these patients can be poor candidates for initial protracted cast immobilization as inspection of the surgical site during the first few weeks can be valuable and potential minimize a wound complication. Once the surgical site is healed, then cast immobilization can be utilized at the discretion of the surgeon.

Postoperative management includes a Jones compressive dressing with splint maintained until 2 weeks

postoperatively. This is followed by a nonweight-bearing cast or Achilles boot for 4-6 weeks then transitioning over the next 6-8 weeks with weight bearing allowed in an Achilles Boot or CAM Walker with a heel lift. Physical therapy for range of motion and mild strengthening can be instituted from 6 to 10 weeks postoperatively.

Clinical studies and anecdotal experience show that patients who undergo surgical intervention for delayed or neglected Achilles tendon ruptures can expect a good outcome. Boyden et al compared patients who underwent immediate repair of an Achilles tendon rupture versus those that had late reconstruction, and their data indicate that patients with late reconstruction have successful clinical results and were comparable to those with early repair.

In conclusion, a patient with a delayed or neglected Achilles tendon rupture can anticipate an excellent result with reasonably good function after surgical repair as long as the surgeon goes through an arduous process of appropriate patient selection, detailed preoperative workup including an MRI, and is prepared for multiple surgical options intraoperatively.

## BIBLIOGRAPHY

- Barber A, et al. A biomechanical study of Achilles tendon repair augmentation using graft-Jacket matrix.
- Boyden EM, et al. Late versus early repair of Achilles tendon rupture. *Clin Orthop Rel Res* 1995;317:150-8.
- Den Hartog BD. Surgical strategies: delayed diagnosis or neglected achilles' tendon ruptures. *Foot Ankle Int* 2008;24:456-63.
- Elias I, et al. Reconstruction for missed or neglected achilles tendon rupture with v-y lengthening and flexor hallucis longus transfer through one incision. *Foot Ankle Int* 2007;29:1238-48.
- Gabel S, Manoli A. Neglected rupture of the Achilles tendon. *Foot Ankle Int* 1994;15:512-7.
- Hansen ST.: Transfer of the flexor hallucis longus to the heel cord. In: ST Hansen, ed, *Functional Reconstruction of the Foot and Ankle*, Philadelphia: Lippincott; 2000. p. 425-9.
- Hanson, ST. Trauma to the heel cord. In: Jahss MH, ed. *Disorders of the Foot and Ankle*, Second Edition. Philadelphia: W.B. Saunders; 1991. p. 2357.
- Kissel CG, Blacklidge DK, Crowley DL. Repair of neglected Achilles tendon ruptures—procedure and functional results. *J Foot Ankle Surg.* 1994;33:46-52.
- Mann RA, et al. Chronic rupture of the Achilles: a new technique of repair. *J Bone Joint Surg Am* 1991;73:214-9.
- Shalaby MS, Abdel-Kader MH, Dawoud OA. Surgical repair of neglected Achilles tendon ruptures. *Pan Arab J Orth Traum* 2008;2:135-42.
- Takao M. et al. Repair of neglected Achilles tendon rupture using gastrocnemius fascial flaps. *Arch Orthop Trauma Surg* 2003;123:471-4.
- Tashjian RZ, et al. Flexor hallucis longus transfer for repair of chronic Achilles tendinopathy. *Foot Ankle Int* 2003;24:673-6.
- Us AK, Bilgin SS, Aydin T, Mergen E. Repair of neglected Achilles tendon ruptures: procedures and functional results. *Arch Orthop Trauma Surg* 1997;116:408-11.