Acute Achilles Rupture Percutaneous Repair

Approach, Materials, Techniques

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KEYWORDS

• PARS • Achillon • Minimally invasive • Trauma • Sports medicine
• Midsubstance speed bridge

KEY POINTS

- Percutaneous repair can offer similar results in regards to rerupture rate as open repair, while minimizing complications.
- Accelerated rehabilitation can and should be instituted safely after percutaneous repair.
- A major concern for percutaneous repair is damage to the sural nerves, and careful planning and instrumentation is paramount to avoid damage to this area.
- Modern techniques for percutaneous Achilles repair and accelerated rehabilitation can offer excellent results in regards to return to activity, better than seen in the past.
- Developing techniques may offer ability for more secure immediate fixation into the calcaneus and allow faster rehabilitation, but more research is needed.

INTRODUCTION

Achilles tendon rupture is a significant injury, and often results from sporting activity in patients younger than 55 years old.[1] Treatment of acute, closed, traumatic ruptures of the Achilles tendon continues to be a controversial topic. Historical nonoperative treatment with extended non–weight bearing in a plantarflexed cast has essentially been abandoned in favor of active rehabilitation.[2,3] A meta-analysis in 2005 found that surgical repair of an acute Achilles tendon rupture leads to a lower rerupture rate compared with nonoperative treatment, and all groups benefitted from accelerated rehabilitation. Open repair was associated with higher complication rates, and this

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was improved with percutaneous methods.[4] Although there has been a recent push toward nonoperative treatment with functional bracing and an accelerated rehabilitation program,[5] there is still recent evidence that operative treatment may lead to a lower rerupture rate.[6,7]

Surgical repair of the ruptured Achilles tendon falls broadly into open or minimally invasive techniques. These two types of repair have been compared in the past. Percutaneous repair of the Achilles tendon has come to represent everything from truly a percutaneous approach, to those with K-wire or endoscopic assistance, to minimally invasive techniques that use specialized instrumentations. These techniques have gone through an evolution over the years. The percutaneous technique was originally described by Ma and Griffith[8] in 1977 as a truly percutaneous repair using a Bunnell-type suture technique through two stab incisions proximally, and then passing the needle through the same holes it exited the skin with distally. Modifications to this technique include various suture patterns, and assistance with K-wires or endoscopy.[9–11] In 2002 the Achillon device (Integra Life Sciences Corporation, Plainsboro, NJ) was reported as a minimally invasive approach through a transverse incision using specialized instrumentation to guide the sutures.[12] This too has gone through an evolution with the addition of channels to guide the suture or techniques to allow for the introduction of locking sutures (percutaneous Achilles repair system [PARS], Arthrex, Inc, Naples, FL).[13,14] Most recently methods have been described and biomechanically studied that tension the proximal portion of the Achilles tendon and secure it in a bridge technique with anchors to the calcaneal tuberosity, spanning the distal stump.[15,16]

The authors present their current recommendations for minimally invasive repair of the acute closed Achilles tendon rupture.

MINIMALLY INVASIVE TECHNIQUES

Preoperative Planning

Approach to the patient begins with a careful clinical examination. Importance is placed on the date of injury. A percutaneous repair should be approached only for acute ruptures. Achilles tendon adhesions with retraction or chronic neglected Achilles tendon ruptures become significantly difficult after 4 weeks. This limits adequate repair with a percutaneous approach.

Clinical examination starts with a supine patient on the examination table to adequately assess neurovascular status and swelling. A standard injury examination should evaluate for concomitant injuries. The patient can then roll to a prone position. Evaluation of both extremities should be performed (**Fig. 1**). Thompson test is used to evaluate Achilles continuity of the involved side. Passive dorsiflexion and plantarflexion should also be used to palpate the level of dell of the Achilles. Careful determination of insertional, mid-substance, or proximal rupture is made. Palpation of the proximal stump is crucial in determining surgical approach. It is more difficult to approach insertional and proximal ruptures of the Achilles with the minimally invasive approach. The authors prefer open surgical approach for these. Mid-substance Achilles surgical approach is discussed in this article.

Adequate soft tissue envelope is crucial to minimize skin complications postoperatively. The procedure is most ideal 7 to 14 days postinjury. To assist in swelling a bulky Jones compression posterior splint is used with the patient non–weight bearing until the operative date.

Operatively, the patient is placed in a well-padded prone position. Both limbs should be draped. Opposite limb draping is used for assessing appropriate Achilles tension during correction.