Achilles Tendon Rupture in the Athlete:
Fix It, Re-Rupture, and Return to Play

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Acute Achilles Tendon Rupture

* Introduction

- Epidemiology: 18 per 100,000 per year—may be missed in up to 25% of patients
- In men aged 30-40 years old, acute Achilles tendon ruptures are more common in episodic athletes (weekend warriors) than they are in professional athletes
- Incidence in professional athletes is much lower than is the incidence in the general population:
  - NBA: 18 ruptures in 23 seasons (.078 ruptures per season)\(^1\)
  - NFL: 31 ruptures in 5 seasons (6.2 ruptures per season)\(^2\)
  - UEFA Champions League: 9 ruptures in 11 seasons (0.82 ruptures per season)\(^3\)

*Mechanism

- Usually traumatic during sports that involve explosive acceleration or maximal effort such as basketball, tennis, football and soccer
- Rupture is often caused by violent forced dorsiflexion
- Rupture occurs 4-6 cm above the insertion in a relatively hypovascular area

*Diagnosis

- Patient often feels a “pop” or reports “someone kicked me” followed by difficulty walking with pain
Physical examination reveals a palpable gap, increased range of motion in dorsiflexion, and a positive Thompson test

*Imaging*

For equivocal cases (partial rupture), use ultrasound as well as possible preoperative planning if the patient has a longstanding history of Achilles problems (MRI)

*Treatment*

Optimal treatment for acute Achilles tendon ruptures is still a subject of debate. Studies examining surgical intervention report complications such as re-ruptures and wound complications without focusing on functional outcomes

Nonoperative treatment involves functional bracing and casting in equinus


- There was no significant difference in re-rupture rate between patients in weight-bearing and non-weight-bearing casts
- Patients in weight-bearing casts reported less subjective stiffness one-year postoperatively than did patients in non-weight-bearing casts, though both groups reported the same amount of pain and patient satisfaction
- There were no significant functional differences between those who wore weight-bearing casts and those who wore non-weight-bearing casts

Willits, Amendola, Bryant et al. – Operative Versus Nonoperative Treatment of Acute Achilles Tendon Ruptures: A Multicenter Randomized Trial Using Accelerated Functional Rehabilitation (*JBJS 2010*)

- Accelerated functional rehab and nonoperative treatment was used for acute ruptures. All measured outcomes of nonoperative treatment were acceptable and advocated accelerated rehabilitation (walking boot with 2cm lift)
- A closer look at the graph below reveals that there is a small but significant difference in plantarflexion strength ratio at 240 degrees per second (plyometrics, high speed contractility, fast twitch)
Olsson, Grävare Silbernagel, Eriksson – Stable Surgical Repair with Accelerated Rehabilitation Versus Nonsurgical Treatment for Acute Achilles Tendon Ruptures: A Randomized Controlled Study (AJSM 2013)

From the article: “The results of the present study demonstrate that stable surgical repair with accelerated tendon loading could be performed in all patients without re-ruptures and major soft tissue–related complications. However, this treatment was not significantly superior to nonsurgical treatment in terms of functional results, physical activity, or quality of life.”

- A closer look shows a trend toward superior functionality in the surgical group; the results were significantly superior when assessed by the drop counterjump movement and during hopping
- There were no re-ruptures in the surgical group and five re-ruptures in the nonsurgical group

*CONCLUSION: For most patients, nonoperative treatment outcomes are comparable to operative treatment outcomes. These patients are at a slightly higher risk of re-rupture, but they are likely to have fewer complications compared to those who are treated surgically. However, operative treatment offers significant functional improvements during high-speed activities and hopping. Therefore, operative treatment is recommended in athletes.

*Operative Treatment

- Open, percutaneous, mini-incision (Achillion, PARS). The goal is to set muscle tendon unit tension equal to opposite side and start rehabilitation early
  - Personal choice: No. 2 fiber wire, modified Bunnell with running epitendinous cross stitch of 2.0 vicryl, keep knots inside tendon, close paratenon

- Operative treatment is associated with higher complication rates in most studies (except Olsson, Grävare Silbernagel, Eriksson (AJSM 2013))

- Ideal for athletes because plantar flexion strength at high velocity, hopping, and counter jump movements are all significantly better than is strength in patients who received nonoperative treatment
*Re-Rupture

- More common following nonoperative treatment

  - Risk of re-rupture is higher in younger patients with accelerated postoperative protocol (<30 yrs old = 16.6% rate, >30 yrs old = 0% rate). Re-rupture at average of seven weeks postoperatively. All patients were treated with revision of primary repair, and all returned to sports

*Options for Re-Rupture

- Re-Repair Primarily
  - If this procedure is chosen, then slower rehabilitation will likely follow. Slower rehabilitation has been shown to have inferior results compared to accelerated rehabilitation
  - Unless the re-rupture occurs as a result of trauma, we have to assume that re-rupture occurs due to degenerative tendon, and I would recommend some type of augmentation

- Repair Plus Turn-Down or V-Y Plasty
    - Free the gastrocnemius aponeurosis flap to cover the gap after end to end suture
    - These ruptures healed, but there were significant decreases in strength and toe-raise test for endurance in patients who underwent this procedure

- Local Tendon Transfer (FHL, FDL, Peroneal Tendon)
  - Multiple reports show adequate results but most studies focused on chronic Achilles tendonosis instead of tendon rupture
  - The patients undergoing this procedure are older than are patients receiving other procedures, but many studies have shown significant FHL weakness, decreased IP pressure, and notable Achilles tendon weakness (75% compared to opposite side)
    - Therefore, the above procedure would be cautioned against with athletic patients
  - FDL may be a better choice because of less donor site morbidity, but the transfer is technically more difficult because the tendon must be transferred around a neurovascular bundle bundle.

- Distant Autograft (Hamstring)
  - Chronic tear patients were able to walk on their toes, but at follow-up, their treated legs were substantially weaker and maximal calf circumferences were substantially decreased
  - This procedure is a good option for acute re-rupture as it adds enough strength for resumption of early mobilization
• Allograft
  o Achilles allograft is used extensively for extensor mechanism of the knee
  o There are no large case series regarding Achilles repair, only case reports
  o Wound complications might be cause for concern

*SUMMARY*

• There is strong level 1 evidence for nonoperative treatment of Achilles ruptures as long as accelerated rehabilitation and early weightbearing are performed in most patients
  o However, nonoperative treatment leads to statistically significant deficits in high speed plantar flexion strength and hopping ability, which is crucial for professional athletes

• Re-rupture rate is higher in nonoperative treatment, but nonoperative treatment leads to fewer complications

• Re-ruptures repaired primarily seem to do well as long as they do not get infected, but the number of patients who have received this procedure is still low

• Mini-incision surgery may minimize wound complications, but these repairs tend to be weaker than are open repairs

• Whether operative or nonoperative treatment is chosen, early weight bearing and rehabilitation are paramount to good functional outcomes

**Bibliography**