

# Average Rate of Return to Baseline Activities Following a Mini-Open Achilles Tendon Rupture Repair Technique

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## Statement of Purpose

The purpose of this study is to determine the average time in weeks to return to baseline activity following a mini-open Achilles tendon repair and determine if there is correlation between strength of repair construct and return to activity.

## Methodology and Hypothesis

A retrospective review was conducted on 12 patients who had a complete Achilles tendon rupture confirmed via MRI or ultrasound over the past year and a half. Inclusion criteria included 1) acute Achilles tendon ruptures (<3 weeks from injury) and 2) patient underwent a mini-open/percutaneous Achilles tendon repair. Exclusion criteria included patients who had adjunct procedures such as a primary FHL tendon transfer to augment the Achilles repair. Of the 12 patients identified, 11 patients with a mean follow up of 10.4 months met the inclusion criteria.

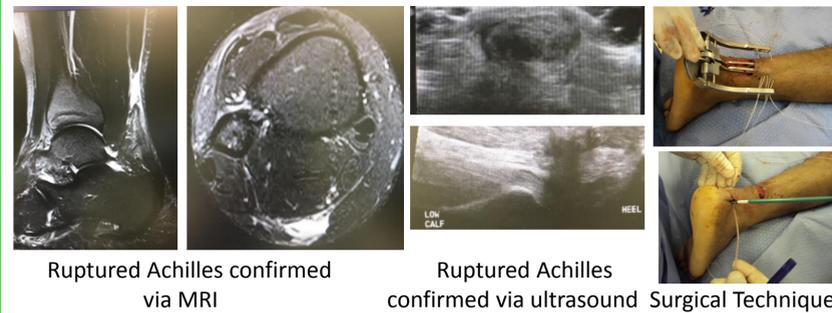
The proposed hypothesis is a mini-open Achilles Tendon repair anchored into the calcaneus allows a quicker return to baseline activity than repairs that tie the locked suture at the rupture site.

## Procedure

Surgical technique consisted of the patient in a prone position with approximately a 2 cm transverse or longitudinal incision over the Achilles rupture sight. Dissection was carried down to the paratenon and any hematoma within the rupture sight was evacuated. The paratenon was then slightly freed from the distal and proximal ends of the ruptured Achilles with a freer elevator. Next, the jig for the percutaneous sutures was passed proximally along the Achilles tendon and five percutaneous sutures were thrown through the jig. The sutures were pulled out the incision using the jig and two of the sutures were locked on itself leaving three suture tails on each side of the Achilles tendon.

The procedure then proceeded in one of two ways. 1) Two stab incision were made over the medial and lateral posterior calcaneus down to the level of bone and a drill hole was made on each side of the calcaneus. A suture passer was used to pass the suture tails corresponding suture tails were then tied using a surgeon's knot on each side of the tendon at the rupture site.

out each incision on the corresponding side. The foot was maximally plantarflexed bringing the two ends of the rupture site together and the tails were then Anchored into the previous drill holes using a 4.75 mm BioComposite anchor. 2) The jig was passed distally along the Achilles tendon and sutures were passed and locked in a similar manner as proximally. The foot was maximally plantarflexed and the



Ruptured Achilles confirmed via MRI

Ruptured Achilles confirmed via ultrasound Surgical Technique<sup>4</sup>

## Literature Review

There is extensive past literature comparing complications rates between open and percutaneous/mini-open repairs for acute Achilles tendon ruptures. More recent literature highlights the strength constructs between the repair techniques.

Several studies including Buono et al in 2014, Cretnik et al in 2005, Henriquez et al in 2012, Karabinas et al in 2014, Lim et al in 2001, Schinner et al in 2016, and Yang et al in 2017 have compared open Achilles repairs such as the Bunnell, Kessler, and Krackow repair to percutaneous/mini-open repairs including the Ma and Griffith, Dresden, Tenolig, and Achillon. The overall consensus from these studies was that the percutaneous repair provided better to similar functional outcomes with lower complication rates, quicker procedure times, and better cosmetic appearance.

Demetracopoulos et al in 2012 compared the resistance to gap formation and maximum load to failure between two mini-open Achilles repair techniques on cadaveric specimens including one technique using only simple sutures and the other using a locking suture. They found a significant difference between the two groups in the number of cycles required for gapping of 2 mm, 5 mm, and 9.5 mm. There was also a significant difference in the median load to failure between the two groups.

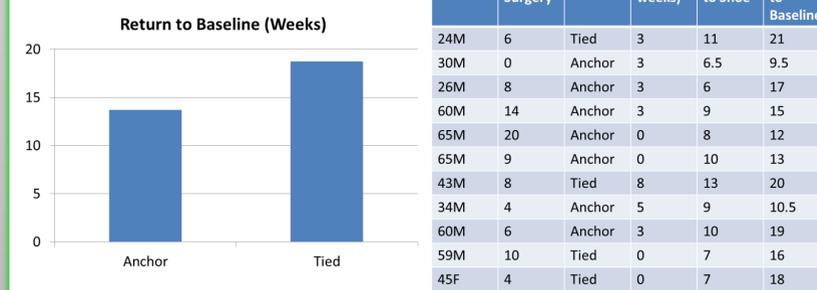
Cottom et al in 2017 further compared the mini-open locking suture technique in cadaveric specimens with a traditional Krackow and a technique which anchored the locking suture into the calcaneus. Their results showed a stronger repair with the use of suture anchors after 10, 500, and 1000 cycles and a greater load to failure in the suture anchor group. They concluded that these results may translate to a faster return to activity and be more resistant to an early and aggressive rehabilitation protocol.

Hsu et al in 2015 compared 101 mini-open locking suture Achilles repairs with 169 open Krackow repairs. They found a 98% return to baseline activity by 5 months after surgery in the locking suture repair group compared to 82% in the Krackow group.

The only clinical outcome to date of a locking suture with a suture anchor repair was highlighted in a case study by Bryne et al in 2017. They highlight a 36 year old male Olympic bobsled athlete who returned to training at 13 weeks, won a World Cup Silver Medal at 18 weeks, and raced at the 2014 Winter Olympic games at 29 weeks.

## Results

Of the 11 patients, there were 10 males and 1 female with an average age of 40.5 years old. 7 patients had the proximal locking sutures anchored into the calcaneus and 4 patients had the sutures tied at the rupture site. The average time of return to a regular shoe for the tied locking suture technique was 9.5 weeks and the average time of return to baseline activity as reported by the patient was 18.75 weeks. The average time to a regular shoe for the anchored group was 8.4 weeks and the average to baseline was 13.7 weeks. The average rate of return to baseline for all 11 patients was 15.5 weeks.



## Analysis and Discussion

In this study there was a 5 week earlier return to baseline activity when the locking suture repair was anchored into the calcaneus compared to the repair tied at the rupture site. This is likely the result of a stronger repair construct as illustrated by Cottom et al in their cadaveric study. This also allows for a more aggressive post-operative course as several of the anchored repairs were immediate weight bearing in a walking boot with heel lifts post-operatively. As Cottom et al highlighted this is likely due to ultimate failure being an anchor pulling out of bone vs knot slippage at the rupture site. An overall average rate of return of 15.5 weeks is also quicker than 21 weeks previously reported by Saxena et al.

Limitations of this study include a small sample size and subjectivity of patient's assessment of return to baseline. Further randomized controlled trials comparing traditional open techniques, mini-open locking suture techniques, and a mini-open locking suture anchored into the calcaneus technique with an objective grading system to further evaluate the strength of repair and whether it correlates to a faster return to baseline activity. This could potentially change standard of care if a positive correlation is obtained.

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