

SUBSPECIALTY PROCEDURES

ACHILLES TENDON RUPTURE REPAIR USING THE MINI-OPEN APPROACH IN A SUPINE POSITION

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Investigation performed at the University of Alabama at Birmingham, Birmingham, Alabama

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Abstract

Background: The mini-open approach with supine patient positioning is a useful technique to consider for acute Achilles rupture repair, ideally performed within 2 weeks from the time of injury. The traditional surgical approach is completed with the patient in the prone position with an extensile midline incision. Here we describe a mini-open approach with supine positioning that utilizes a single incision measuring approximately 3 to 4 cm in length and avoids the pitfalls of prone positioning, which include greater operative time and potential difficult airway management, vision loss, and brachial plexus palsies¹.

Description: When positioning the patient supine, lower-extremity bolsters are placed beneath the contralateral hip and the operative ankle in order to allow for exaggerated external rotation of the ankle and improved medial visualization. A thigh tourniquet is then applied on the operative side in a standard sterile fashion.

After appropriate draping, begin by palpating the tendon rupture site and mark a 3 to 4-cm incision line just medial to the tendon. Sharp dissection through the skin to the level of the paratenon is then performed. Incise the paratenon with a knife, separate the paratenon from the underlying Achilles tendon with a Freer elevator or scissors, subsequently remove any hematoma formation, and cut the paratenon proximally and distally with scissors or a knife. Debride any damaged tendon thoroughly.

The steps of the procedure are performed under direct visualization. If the sural nerve is encountered, it is noted and retracted, and extra care is taken to avoid damaging it with instruments or suture.

Now that the proximal and distal ends of the Achilles tendon are free, utilize a 4-stranded double Krackow locking stitch with two #2 FiberWires (Arthrex) on both the proximal and the distal stump. The stumps of the ruptured tendon are approximated by tying the free suture ends together with use of a simple surgeon's knot. A running epitendinous repair is performed with use of number-0 Vicryl (Ethicon) suture in a cross-stitch weave technique to provide additional strength to the repair. Finally, test the integrity of the repair

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via an intraoperative Thompson test. The postoperative protocol includes non-weight-bearing with the operative limb in a posterior splint for 2 weeks. At the 2-week follow-up, stitches are removed and the limb is placed in a tall CAM (controlled ankle motion) walker boot with 2 heel wedges measuring 6.35 mm (0.25 inches) apiece. The patient can begin partial weight-bearing with crutches at 2 weeks postoperatively. At 4 weeks postoperatively, 1 heel wedge is removed, and at 6 weeks postoperatively, the second heel wedge is removed. Patients are instructed to begin gentle range-of-motion exercises at 2 weeks, with formal physical therapy scheduled to begin at 6 weeks. Most patients are out of the boot at 8 to 10 weeks postoperatively.

Alternatives: Nonoperative treatment of Achilles rupture includes functional bracing or casting with the foot resting in the equinus position and early weight-bearing and rehabilitation. As mentioned earlier, the traditional operative approach with prone positioning is a viable option but is associated with a higher incidence of procedural and anesthesia-related complications, as well as potentially increased cost¹.

Rationale: Recent studies have shown that a mini-open approach will produce a repair that is comparable with the traditional open approach, while also minimizing the anesthesia and postural complications associated with prone positioning¹. Previous studies focusing on supine positioning have generally utilized a larger incision more comparable with that of the traditional prone approach⁶. Other studies have utilized a minimally invasive approach but require >1 incision and often utilize specialized instrumentation, which may limit the technique to certain facilities⁷. The technique described in the present article utilizes a single 3 to 4-cm incision that requires no specialized instrumentation, has a minimal learning curve, and can be performed at any facility.

Expected Outcomes: McKissack et al. demonstrated that the overall complication rate of the mini-open supine approach (7.7%) was lower than that of the traditional prone approach (9.3%), while the average cost of the prone approach exceeded that of the supine approach by \$1,823¹. This increased cost, although not significant, may be attributable to longer operating room and post-anesthesia care unit times. Additionally, no patient in either cohort experienced tendon rerupture within the first year after repair, further proving the effectiveness of this technique. We have utilized this mini-open supine technique for acute Achilles ruptures for over 9 years now, with good patient outcomes and satisfaction. Throughout this duration we have not had a single patient experience rerupture of the repaired tendon. In our experience, we find this technique to be effective, with fewer complications than prone positioning. Additionally, this approach may be associated with decreased financial and anesthesia burdens.

Important Tips:

- Always palpate the tendon rupture site to determine the best incision placement.
- With ruptures close to the tendon insertion site, it can be notoriously difficult to mobilize the distal tendon stump, so extended incisions may be required.
- Test the integrity of the repair with use of the intraoperative Thompson test.
- This technique does not utilize any special equipment and thus can be performed at any facility.
- This supine approach decreases operating room turnover time, anesthesia burden, and complications associated with prone positioning.

Acronyms & Abbreviations:

- AP = anteroposterior
- MRI = magnetic resonance imaging
- US = ultrasound
- DVT = deep vein thrombosis
- VAS = visual analog scale
- NWB = non-weight-bearing
- CAM = controlled ankle motion

- PWB = partial weightbearing
- ROM = range of motion
- PT = physical therapy
- OR = operating room

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