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# Achilles Tendinosis

Dominic King, DO, FAOASM, FAMIA, CAQSM  
Cleveland Clinic, Cleveland, Ohio

## Case Example

A 46-year-old female patient presents with 2 years of post-exercise right ankle pain, which has become more progressive in the past 6 months.

Patient has attempted ankle sleeves, tall cam walking boot for 2 weeks, change in exercise format, change of shoes, Achilles tendon stretch protocols, and intermittent use of oral OTC NSAIDs; all with temporary improvement in symptoms but continued discomfort.

## Physical Examination

Physical examination reveals normal range of motion, tightness to passive dorsiflexion of the right ankle, fusiform swelling of the mid-substance of the Achilles tendon with pain to direct palpation, no pain to the retrocalcaneal bursa or insertional Achilles tendon, normal Thompson's test, and intact neurovascularly.

## MSK-Ultrasound Examination

The patient's MSK-US demonstrates moderate mid-substance tendinosis without hyperemia. A Kager fat pad squeeze test revealed tethering of the tendon to the fat pad.

## Differential Diagnosis Considerations

The patient was also evaluated to rule out other potential causes of posterior leg or ankle heel pain such as chronic calf strains, gastrocnemius scars, radiculopathy, deep vein thrombosis, osteoarthritis, and os trigonum, plantar fasciitis or bone stress injury.

## Diagnosis

Based on the clinical history of atraumatic insidious onset of pain, chronic tendon swelling, 3+ months progression that is unresponsive to conservative treatment, physical exam, findings of diagnostic ultrasound, and differential diagnostic evaluations, the patient is diagnosed with mid-substance Achilles tendinosis.

## Treatment Options and Expectations

Physical therapy and traditional surgery have the potential to help patients with overall discomfort and function. However, minimally invasive tenotomy (MIT) could be considered to resect and remove the degenerative tendon tissue confirmed during physical examination and diagnostic imaging.

It is important that patients have a complete understanding of the post-procedure protocol and the timeline of recovery. Presence of hyperemia, split tears, and intra-tendinous calcifications, usually lengthen recovery by 4-8 weeks. Insertional Achilles' tendinopathy and calcaneal bursitis also have longer recovery.

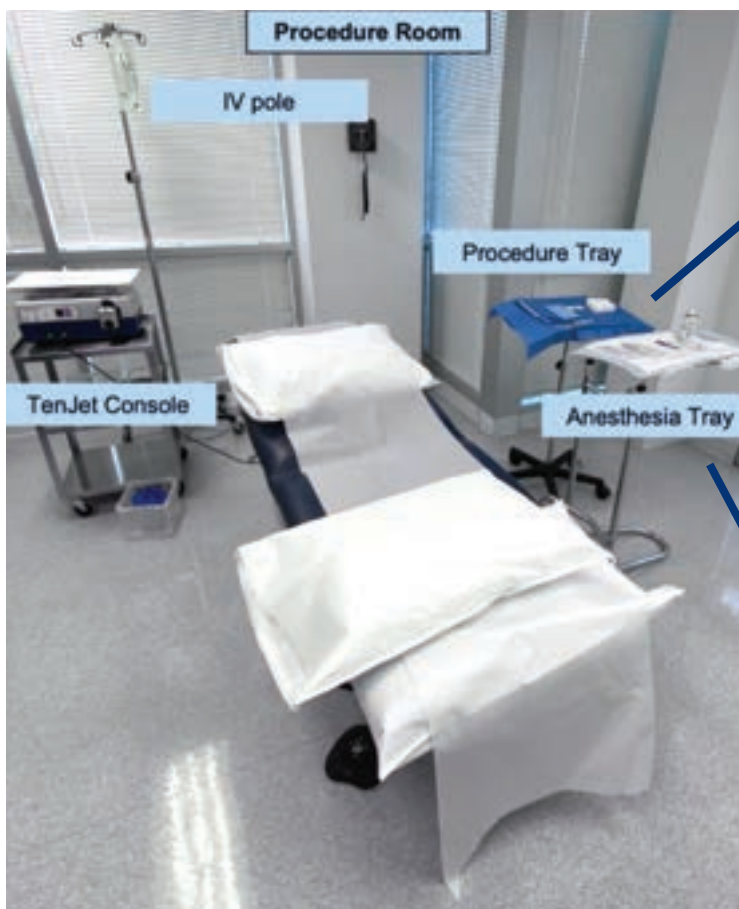
It is also important that orthopedic surgical colleagues and physical therapists understand that MIT inherently spares healthy tissue, allowing a quicker return to tendon loading during post-procedure rehabilitation compared to traditional surgical rehabilitation protocols.

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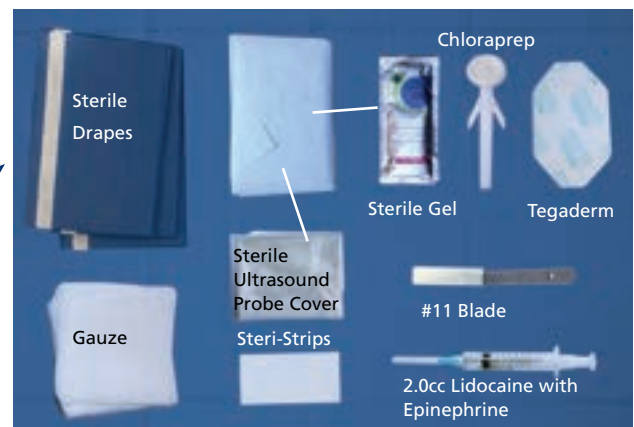
# Procedure Day

Set aside a separate day or a block of time for minimally invasive tenotomy procedures, and schedule patients at 45-minute intervals. Prior to your first cases, ensure the staff is trained on the equipment setup. Also rehearse room setup, tray setup, supply needs (needles, local anesthetic, glove sizes, patient drapes, etc.), and patient positioning so that the staff can plan for the procedures and adequately support you. Always have the room prepped before bringing the patient into the room.

## Room Set-Up



### Procedure Tray



### Anesthesia Tray



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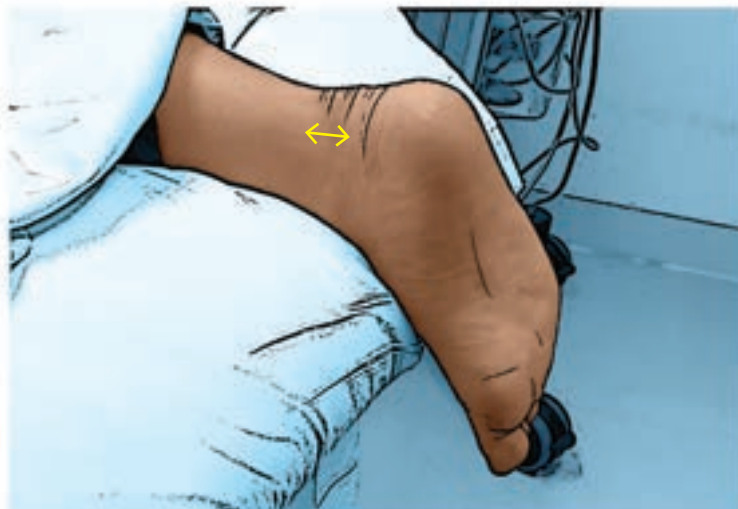
# Patient Positioning

Patient can be positioned in between prone and lateral decubitus, with a comfortable 90-degree angle of the foot at the end of the bed for best visualization.

## Patient Positioning for Insertional Achilles Tendinosis



## Patient Positioning for Mid-substance Achilles Tendinosis





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# Procedure Steps

1. Time-Out	Verify patient name, DOB, procedure, and any allergies.
2. MSK-US localization	Using MSK-US imaging, identify point of greatest cross-sectional area of the mid-substance tendinosis.
3. Skin marker	Use a skin marker to identify area and determine incision site.
4. Hydro-dissection and tendon anesthesia	Using sterile technique and a 21G 2" needle with 10cc of Ropivacaine, perform a longitudinal out-of-plane injection to hydrodissect the Kager fat pad from Achilles tendon. Use the same 21G 2" needle to anesthetize the Achilles tendon by injecting 1.5cc – 2.0cc of Ropivacaine into the tendon through 5-6 medial, lateral, posterior, anterior passes of the needle.
5. Skin wheal	Use a 25G 1" needle with 1cc of 1.0% Lidocaine and epinephrine to inject as a skin wheal at the site of the incision.
6. Sterile field	Prepare area with Chlorhexadine™ or alcohol-based sterilization. Place sterile blue drapes to create a sterile field and place the sterile ultrasound probe cover on the ultrasound probe.
7. Incision	Use a #11 blade to make an incision parallel to the Achilles tendon on the lateral or medial side of the largest cross-sectional area of tendinosis.
8. Introduce the TenJet device	Using ultrasound guidance, approach the tendon in transverse view, and advance the TenJet needle directly into the cross-sectional area of tendinosis. This area will have the least resistance and a soft tactile feel by comparison.
9. Resect and Remove	With the TenJet console set to a speed of 7 and using a longitudinal out-of-plane approach, move the needle in and out superiorly, and inferiorly along the Achilles fibers to perform a "sweep" and to reach all areas of tendinosis. The procedure time depends on the amount of area needing treatment, and whether there are calcifications. A single, localized area should take about 3 minutes of console run time.
10. Confirm treatment completion	Probe the most superior and inferior aspects of the cross-sectional area of tendinosis with the needle to confirm increased resistance of the tendon. The tactile feel of healthy tendon is similar to passing needle through an eraser. The procedure is complete once there are boundaries of healthy tendon tissue.
11. Close the incision	Place 3 Steri-Strips™ perpendicular to the incision, 2 Steri-Strips as an "X" across the incision, and 1 Steri-Strip parallel to the incision. Top with a 1x1 gauze and Tegaderm™.

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# Post-Procedure Rehabilitation

New tissue formation and maturation takes approximately 3 months. Work closely with physical therapists to ensure that the patient is not overloading through the different phases of recovery and rehabilitation. Consider MSK-US scanning if overloading results in suspected acute tendinitis; manage acute tendinitis with ice, rest, anti-inflammatory medication, and activity modification with active continued motion.

## Phase 1

**Days 1-14 - aims to protect tendon overloading.**

This phase is to allow healing to begin. It is important to prevent overloading of healthy tendon fibers that were not allowed to compress and load due to the tendinosis.

Patients are discharged with a tall boot. At week 1, patients should be NWB on crutches. At week 2, with crutches as pain allows and gentle ROM to gravity (calf pumps). Within first 2 weeks, any discomfort can be treated with heat, OTC acetaminophen or Tylenol. More significant pain can be treated with OTC NSAIDs; if pain medication is needed daily, patient should be seen and managed by treating physician.

## Phase 2

**Days 14-28 - is restorative for tendon loading and motion.**

Patients begin physical therapy with a 2:1 ratio of eccentric to concentric, partial weight tandem exercises to start. It should be of high volume to stimulate metabolic activity. Patients with significant hyperemia or longitudinal tears may tend to be more flared up at this stage. If consistently painful, MSK- US can be performed to evaluate potential recalcitrant tendinitis due to overloading. Avoid IASTM early since the degenerative tissue was removed and there wouldn't be much tissue to work on. Pain should remain below 3-4/10 and return to baseline after 24 hours. Progressive reloading can continue as long as therapy is not causing pain of 5/6.

## Phase 3

**Days 28-60-90-120 - focuses on patient specific progressive tendon loading.**

Manage progress to repetitive activities and re-educate on load management. Make sure patient is listening to his/her body and not overloading.

At week 6, patients can expect to begin return to repeat activities. The patient should have a post-procedure office visit by week 8 and expect initiation to return to sport-specific activities.

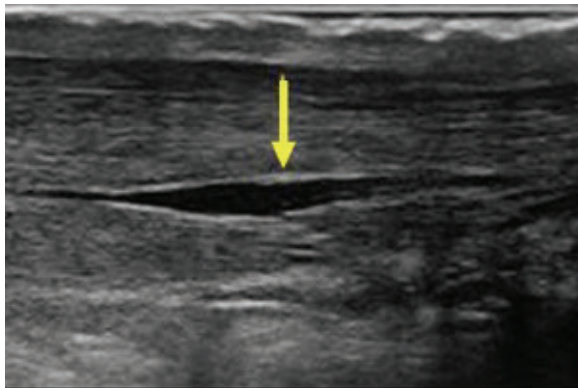
At 3-4 months, many patients should be experiencing progressively positive results, such that they do not think about the tendon pain. However, patient-specific and condition-specific factors such as hyperemia or partial tears may protract this timeframe to 6 months.

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# Additional Pearls

It is important to classify tears. In contrast to longitudinal split tears, which have a good amount of intact longitudinal tendon fibers, transverse or partial thickness tears represent a loss of overall cross-sectional area of the healthy intact tendon tissue, reducing linear loading capacity and theoretically increasing the potential risk of post-procedure tearing. It is advisable to consult with the surgical team prior to treatment, as the probability of rupture after loading a transverse or partial thickness tear is conceptually higher than with longitudinal tears.

## Longitudinal Split Tears



## Transverse Partial Thickness Tears



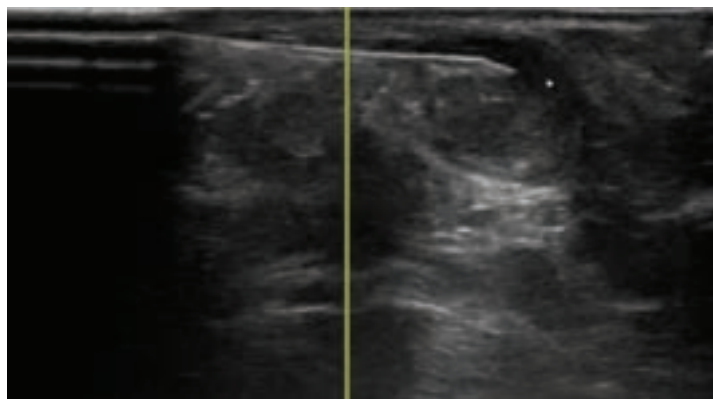
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# TenJet “MIT Sweep”

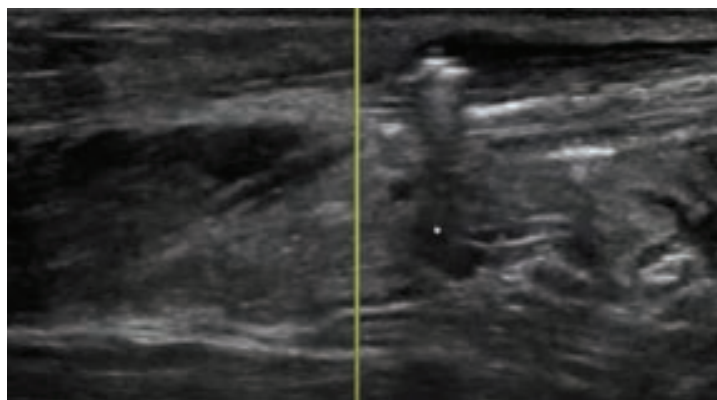
## TenJet “MIT Sweep” resection technique

Making an incision and approaching from the lateral or medial side of the Achilles tendon allows for resection of the tendinopathic degenerative tissue along the linear orientation of the fibers by positioning TenJet’s cutting window in an advantageous transverse orientation. The technique allows the physician to move the needle in and out, superiorly and inferiorly, along the tendon fibers to “sweep” or reach all areas of tendinosis with a single incision.

### Longitudinal View



### Transverse View





HydroCision Inc.

267 Boston Road, Suite 28  
North Billerica, MA 01862

[www.hydrocision.com](http://www.hydrocision.com)

Telephone: 1- (978) 474 9300

Customer Care: 1- (888) 747 4470

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