



Surgical Pearls

By Richard T. Braver, DPM

HOW TO REPAIR CALCANEAL STEP DEFORMITIES

Distal posterior heel pain is a deformity we see quite often. It masquerades as chronic Achilles tendinitis, when in fact a calcaneal step (aka retrocalcaneal exostoses) is present at the Achilles insertion. You must also clinically differentiate it from adjacent problems, such as Haglund's deformity, retrocalcaneal bursitis and intra-Achilles tendon tear. Often, these problems may be concurrent, however, you must treat the calcaneal exostoses for complete cessation of pain. Keep in mind that retrocalcaneal exostoses are most symptomatic in active individuals over 30.

On inspection, you will usually note a red and irritated area across the entire posterior heel, not just the posterior superior lateral aspect, which is most commonly associated with Haglund's deformity. Lateral X-rays in the weight bearing position reveal the calcaneal step deformity at the area of the Achilles insertion, located at the distal two-thirds of the posterior heel. You may also see thickening of the Achilles near its insertion, pain during range of motion, and crepitation due to synovitis. Since you may also see some of these findings with Achilles microtears and chronic Achilles tendinitis, it is necessary to palpate in addition to getting an X-ray.

Listening to your patient's complaints often helps to differentiate the distal posterior heel spur from a Haglund's deformity, which is usually bothersome when it rubs against the hard counter of a shoe. Complaints of morning pain, also known as post static dyskinesia, are more indicative of chronic Achilles tendinitis, which can be precipitated by a calcaneal step deformity.

Know The Causes Of Calcaneal Step Deformities

These deformities may be due to a longer

horizontal calcaneus, excessive frontal plane motions of the heel and tight calves. Tension from tight calves and excessive frontal plane motions of the heel are exaggerated on softer surfaces and with increased activities. This causes abnormal tension at the Achilles insertion with subsequent reactive bone formation and hyperostosis.

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Subsequently, the calcifications can cause irritation, which leads to inflammation and possible microtears with resultant

healing and fibrosis. Furthermore, the excessive motions may create cumulative stresses or microtrauma, which result in degenerative changes within the Achilles. It typically takes years for the hyperostosis to develop, which you most commonly see in active individuals during middle or older ages. After reading about the pathomechanics leading to the progression of the calcaneal step deformity, you can appreciate how similar it can be to the development of plantar calcaneal heel spurs and patellar tendinitis with insertional calcification.

Assessing The Radiographic Findings

The calcaneal step deformity is present at the insertion of the Achilles tendon. Sometimes, the posterior calcaneal spurring or exostoses may be a separate ossicle or it may fracture off and appear fragmented. Since the remaining portion of the calcaneus often obscures these, it is helpful to take several lateral X-rays of the heel with the foot angled approximately 10, 15 and 20 degrees away from the plate. I find these views more helpful than the axial calcaneal views. Keep in mind that calcaneal step deformities are often incidental findings on X-rays of patients who have other foot disorders.

Recent literature suggests the calcaneal step deformity may not be within the Achilles tendon, but does irritate the overlying Achilles tendon. Getting an MRI or diagnostic ultrasound may be useful for making this determination.¹ Checking the X-rays for other joint pathology or insertional calcifications should prompt you to test for any other arthritides, such as rheumatoid, psoriatic, gouty or ankylosing spondylitis-type arthritic disorders.

When it comes to conservative treatment for retrocalcaneal exostoses, focus on resolving the cause of the problem. You can use the Silfverskiold test to clinically diagnose a tight calf. If indicated, put the patient on a stretching regimen, including the wall push, slant board or Pro Stretch device.

What You Should Know About Using Bone Anchors

The use of bone anchors has revolutionized and simplified the adherence of tendon to bone. Prior to this, you had to drill holes within the bone and pass sutures through to reattach tendons. Other treatments involve removing a bone plug and inserting the tendon into the bone and then fixating with the bone plug. In addition, surgeons have used staples to tack tendons to the bone.

The newer bone anchors, like the Mitek, require a special drill with automatic stop. Others, like the Anchorlok, are inserted by hand. Always check the strength of the anchor fixation by pulling on the suture to see if the anchor is fixated well. If the anchor pulls out, you can insert a larger anchor or choose a different location.

You can replace the anchor, using a polyethylene spiked washer to screw through the tendon and into the bone. The washer and screw head firmly grasps the tendon against the bone to promote tenodesis.

Using a posterior splint or night brace along with heel lifts has also proven helpful. To help control excessive frontal plane motions of the heel, emphasize deep heel cups (14 to 16 mm) within the orthotic devices. Using prefabricated soft heel cups may also reduce irritation and limit motion of the heel bone within the shoe. NSAIDS, regular use of heat in the morning and ice in the evening, along with physical therapy modalities, have also proven helpful in many cases. I do not advocate the use of corticosteroid injections for calcaneal step deformities as there have been repeated cases of Achilles atrophy, which may lead to spontaneous rupture.

Step-By-Step Surgical Tips

Despite conservative care, results are often discouraging in athletes. I am now performing the extracorporeal shock wave therapy for Achilles insertional pain, but long-term results are pending. In a previous *Podiatry Today* article (see "Surgical Solutions For Treating Posterior Heel Deformities," January 2001, pg. 23-26), I described the surgical procedure for the Keck & Kelly osteotomy.² I reiterate that for patients who have a long horizontal calcaneus and/or those who have a high calcaneal inclination, you must consider performing the calcaneal osteotomy. This reduces the posterior tilt of the calcaneus, preventing Achilles irritation and subsequent pain recurrence.

After treating numerous retrocal-

canal exostoses through various surgical approaches, I favor a straight linear longitudinal midline incision. Begin approximately 1 cm above the posterior superior prominence of the calcaneus and extend the incision to the distal aspect of the calcaneus. Deepen the incision down to the level of the paratenon overlying the Achilles. Sometimes the paratenon is frayed due to the bony prominence of the calcaneal step or chronic synovitis. Meticulously dissect the paratenon and save it for closure.

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The deep incision is straight to bone, parallel with the initial incision. At this time, sharply dissect the tendon from the bone medially and laterally with a scalpel or key elevator. Using an osteotome and

mallet, chisel redundant bone off laterally, including the calcaneal step deformity. Perform the same step medially.

It is important to smooth out the posterior surface of the calcaneus to allow for a new insertional surface for tenodesis. It is also important to maintain the Achilles attachments, distal medial and distal lateral, below the calcaneal step deformity area.

Proceed to palpate the posterior superior prominence of the calcaneus. Most of the time I resect any prominent portion of

the Haglund's deformity. Use an osteotome and mallet from lateral to medial and rasp the remaining bone smooth to prevent irritation of the Achilles tendons. Intraoperatively, I have been aggressive in removing a large portion of the posterior superior prominence of the calcaneus without any detrimental effects. You should certainly be aware to stay well posterior to the posterior process of the talus so as not invade the posterior subtalar joint. Also look for a retrocalcaneal bursal sac, which is located just superior to the bone you just removed. If present and abnormal, remove the bursa.

Lastly, examine the Achilles tendon. Palpate for any nodules and look for any frayed or damaged portions of the tendon. Remove any abnormalities. If necessary, you may thin the tendon when it is fibrotic in appearance.

At this point, irrigate the surgical site well with sterile saline solution and examine the tendon again for intra-Achilles calcification and check the bone for rough areas that may irritate the Achilles tendon.

Two or three bone anchors are placed within the distal insertional area at the posterior calcaneus. I prefer to use the Mitek super anchors or Wright Medical Anchorlok 3.5 mm tendon anchoring devices. While two are adequate, I use three anchors for heavier set individuals. The anchors have size 0 non-absorbable suture to firmly hold the Achilles onto the calcaneus.

Your suturing technique is important

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HOW SUPPLIED: 30g tube. Store at controlled room temperature (59°-86°F, 15°-30°C).

Rx Only

REFERENCES:

- Miller, J.M.: The Interaction of Papain, Urea and Water-Soluble Chlorophyll Proteolytic Ointment for Infected Wounds, *Surgery* 43:939, 1958.
- Smith, L.W.: The Present Status of Topical Chlorophyll Therapy, *New York J. Med.* 55:2041, 1955.
- Barnard, R.D.: Elucidation of Chemically Defined Haptens for Competitive Inhibition of Aggressin Activity, *Immunol.* 8:78, 1954.

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since you want good tendon to bone apposition. Perform the suturing intra-Achilles so the suture is not stuck between the Achilles and the bone, and so the Achilles is not overly apparent between the Achilles and its covering. Additionally, you should reoppose the medial and lateral halves of the Achilles with a running suture from proximal to distal, using 3-0 vicryl or similar absorbable suture.

If you remove large defects of the Achilles, then it is acceptable to repair them by using 3-0 non-absorbable suture in simple interrupted technique. Lay the paratenon and/or subcutaneous tissues over the Achilles and again suture with a similar non-absorbable 4-0 running suturing technique. Perform skin closure with a running 5-0 prolene or skin stapling technique at your discretion.

What About The Post-Operative Course?

Dress the patient's wound appropriately and place it in a below knee fiberglass cast with the foot positioned at 90 degrees to the leg for three weeks. Then remove the cast and put the patient in a below knee boot cast. These patients should remain non-weightbearing for one week while attending physical therapy. At this time, they progress to partial weightbearing in the boot cast. At approximately six weeks, place the patient back in sneakers. A course of physical therapy is absolutely necessary for up to three months. Please advise your patients the healing process does require three to six months of rest from sports. However, patients are usually walking well after eight to 12 weeks.

Final Notes

In summary, the beauty of this incisional approach is that while you retract the medial and lateral halves of the Achilles tendon with Army/Navy retractors, you get a clear view of the retrocalcaneal exostoses and can easily remove them. In addition, you can maintain the distal medial and distal lateral insertional areas of the Achilles.

This procedure is technically easy to perform. However, you should perform meticulous dissection and evaluate the anatomical sites intra-operatively. Following the above guidelines should offer exceptionally good results as patients should be able to make a full return to sports. ■

References

- Carter, Steven. A New Technique for Resection of the Posterior Calcaneal Spur. *Podiatry Institute News*, Page 2. October 2000.
- Braver, Richard. Surgical Solutions for Treating Posterior Heel Deformities. *Podiatry Today*. Pages 23 - 26, January 2001.
- Fiamengo, Steven and Warren, Russell. Posterior heel pain associated with a calcaneal spur and achilles tendon calcification. *Clinical Orthopaedics and Related Research*, No. 167, Pages 203-211. July 1982.



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