

# POSTERIOR CALCANEAL OSTEOTOMY: A Surgical Alternative for Chronic Retrocalcaneal Pain

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The patient who complains of pain and deformity in the posterior aspect of the calcaneus presents a challenge to the treating physician. Although extensively discussed in the medical literature, there is little agreement concerning the methods of treatment for this condition. Furthermore, significant overlap exists between several similar clinical conditions in this location. Achilles tendonitis, paratenonitis, tenocalcinosis, Haglund's deformity, retrocalcaneal bursitis, and retrocalcaneal spur pain all have comparable clinical features. Successful treatment for these conditions will vary depending on the exact etiologic factors involved. This paper will address chronic pain associated with retrocalcaneal spurring and Achilles tendonitis, which will be referred to as retrocalcaneal spur syndrome.

### ETIOLOGY

Both static and dynamic factors may contribute to the development of retrocalcaneal spur syndrome. Static intrinsic factors, such as a cavus or cavovarus foot type, can predispose the heel to abnormal pressures when combined with improper shoes. As the Achilles tendon and retrocalcaneal bursa become pinched between the hard posterior superolateral aspect of the calcaneus and the firm heel counter of the shoe, inflammation and degeneration may occur. Although this process is commonly associated with the classic Haglund's deformity, it can also be seen as a complicating factor in the retrocalcaneal spur syndrome.

Another static factor that can contribute to this syndrome is the posterior bursal projection of the calcaneus or spur formation. An enlarged bursal projection and/or posterior spur can project directly into the retrocalcaneal bursa and Achilles tendon, causing pain with dorsiflexion (Fig. 1). As the condition becomes more severe, the tendon will go through a degenerative process resulting in tendon thickening around the insertion site. When this process occurs, any type of closed shoe can serve as a source of pressure irritation (Fig. 2).

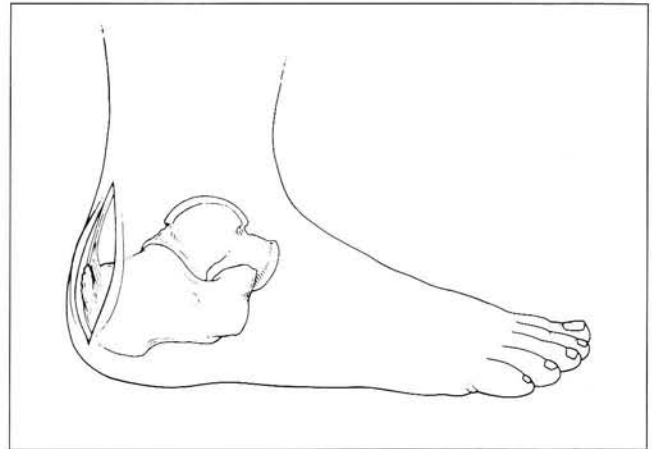


Figure 1. The posterior bursal projection of the calcaneus with or without spur formation can become a source of mechanical irritation with ankle joint dorsiflexion.

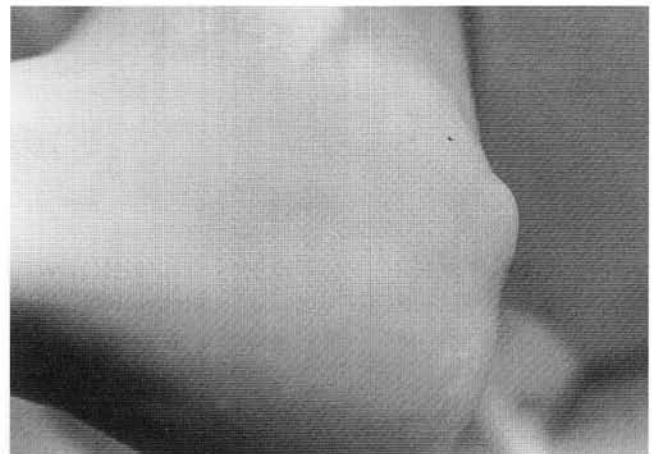


Figure 2. Clinical appearance following chronic tendonitis and degeneration.

Dynamic factors also contribute to retrocalcaneal spur syndrome. An overwhelming majority of the patients with this condition present with a significant equinus deformity of the triceps surae complex. In fact, many authorities believe that an equinus deformity is the single most important factor underlying this syndrome. Other dynamic contributing factors include the daily stresses placed on the foot. For example, during periods of intense activity such as fast running, forces up to 900 kg can be exerted on the tendon.

The cumulative effect of these static and dynamic forces results in the pathologic changes about the insertion site of the Achilles tendon. Microscopically, the tendon progresses through a myxomatous form of degeneration with eventual fibrosis and calcification within the tendon. As the tissue weakens, varying degrees of tendon rupture can be seen.

### CLINICAL PRESENTATION

Pain, edema, and erythema at the insertion site of the Achilles tendon are the most common complaints of the patient exhibiting retrocalcaneal spur syndrome. Localized tenderness is usually present when the medial and lateral insertion fibers of the tendon are palpated. An obvious enlargement or thickening of tissue in the area of the Achilles tendon will also be seen. Increased activity and certain types of shoes are aggravating factors, and patients will often experience a reduction in symptoms when high-top tennis shoes or boots are worn.

Retrocalcaneal spur syndrome is common in middle-aged or slightly older individuals, although it can be seen in individuals of any age. Both males and females are affected, however, females are seen more frequently for this condition. This tendency can be attributed to the types of shoes that females wear. Many of these patients also have varying degrees of obesity which contribute to the symptoms. When the condition is seen in younger, non-obese patients, there is usually some form of aggravating physical activity producing the symptoms.

The majority of patients will also demonstrate some degree of equinus deformity when the gastrocnemius-soleus muscle complex is tested (Fig. 3).



Figure 3. Preoperative assessment reveals a gastro-soleal equinus deformity.

Gait examination may reveal excessive pronation, an early heel lift, and occasionally, an antalgic limp on the involved side.

A weight-bearing lateral x-ray will give the best view of any pathologic changes (Fig. 4). Oblique views can also provide better definition of the medial and lateral extensions of the spurring (Fig. 5A, 5B).



Figure 4. Lateral radiograph confirms the presence of posterior calcaneal spurring.



Figure 5A. A medial oblique view reveals significant calcaneal spurring.



Figure 5B. The spurring noted in Figure 5A is not evident on this lateral view.

## TREATMENT

Conservative therapy should be exhausted prior to considering any surgical treatment. Physical therapy can occasionally offer gratifying results due to the strong dynamic component underlying the etiology. Physical therapy, combined with nonsteroidal anti-inflammatories (NSAIDs) can frequently keep the patient comfortable enough to avoid surgery.

Surgical reconstruction should be considered if conservative therapy fails. A variety of surgical approaches have been described for this condition, but no real consensus exists regarding the most effective treatment. Although a few limited case histories have been reported, no large study has been conducted.

Traditional surgical approaches vary according to the primary site of pathology, and the presence of any medial and lateral extensions of the spurring process. The most common incision approaches include a medial or lateral paratendinous, a single longitudinal mid-linear, or an oblique mid-linear incision (Fig. 6).

When the deep fascia and paratenon tissues are encountered, a decision needs to be made to determine the best way to reach the intra-tendinous spur with the least amount of tendon disruption. In the past, the spur has been reached through gentle medial or lateral reflection, or by placing a midline incision directly through the tendon (Fig. 7). Another more recent approach involves completely detaching the Achilles tendon from the calcaneus and reflecting it proximally. This method provides excellent exposure to the underlying osseous pathology. However, this necessitates satisfactory

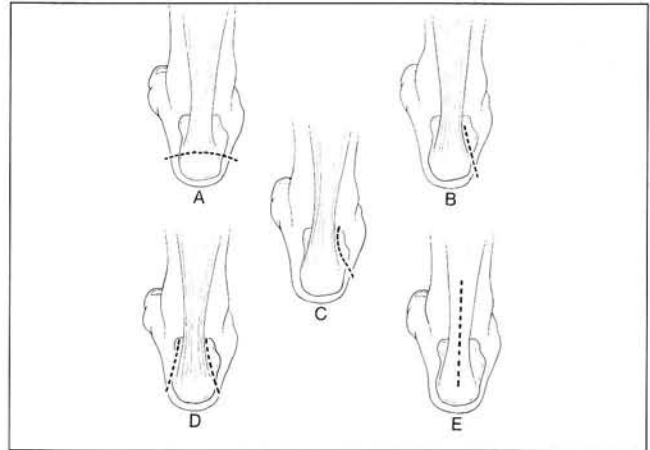


Figure 6. Common incision approaches A. Fowler and Phillip. B. Lateral linear. C. Lazy-L. D. Medial and lateral linear. E. Linear midline.

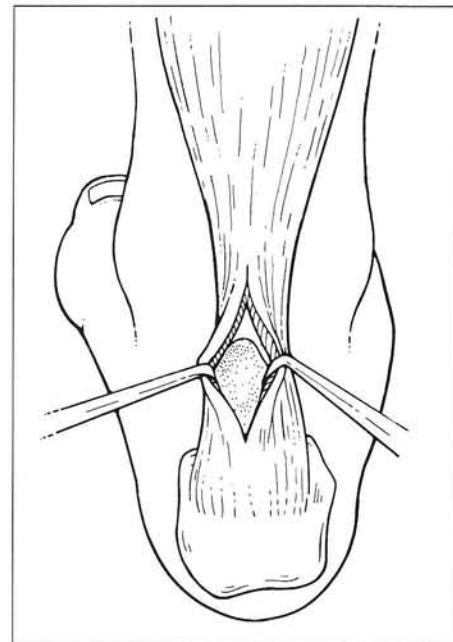


Figure 7. Midline tendon splitting incision.

re-attachment of the Achilles tendon, under the proper amount of tension. (Fig. 8). Although these methods adequately deal with the posterior calcaneal spurring, none address the underlying equinus deformity that is often present. Another negative factor associated with these traditional approaches includes the relatively long and unpredictable postoperative rehabilitation process.

Downey (1994) described a modified V-Y flap incision through the tendon that offers advantages over the previous approaches<sup>1</sup> (Fig. 9). Downey's approach allows for easy removal of both retrocalcaneal and intra-tendinous calcification.

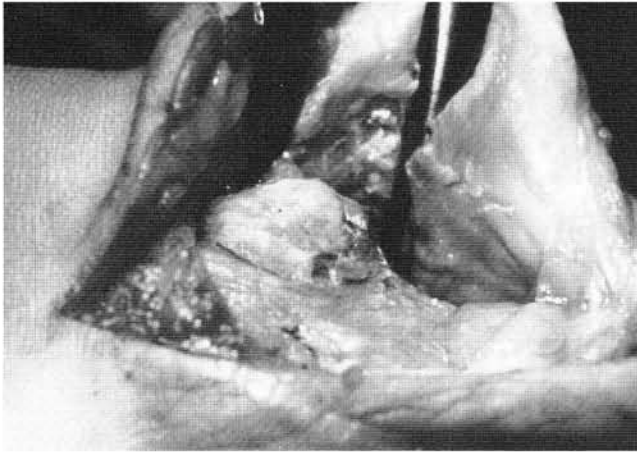


Figure 8. Complete detachment of the Achilles tendon provides excellent exposure to the posterior osseous pathology.

Although not specifically mentioned by the author, the V-Y tendon flap also permits lengthening of the Achilles tendon during closure. This allows the equinus component of the deformity to be partially addressed.

### AUTHOR'S TECHNIQUE

A technique has been designed by the author to address both the static and dynamic components of the retrocalcaneal spur syndrome. This procedure requires minimal if any disruption to the Achilles tendon, and also has less morbidity and a more predictable postoperative rehabilitation.

The primary component of the procedure involves a shortening osteotomy of the posterior aspect of the calcaneus (Fig. 10). A wedge of bone is removed from the calcaneal body, and the most posterior aspect of the calcaneus, including the insertion of the Achilles tendon, is advanced anteriorly.

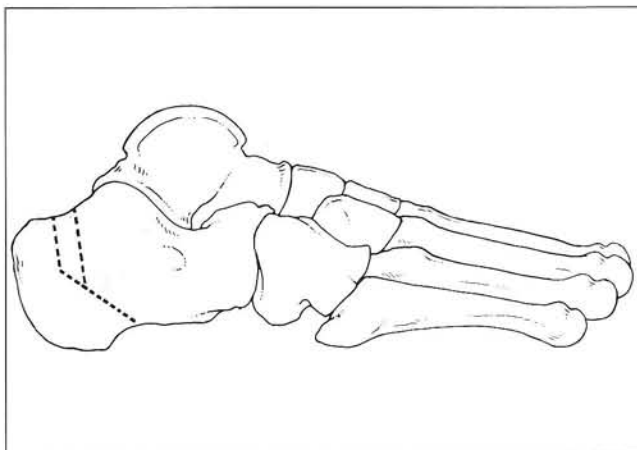


Figure 10. Posterior calcaneal shortening osteotomy.

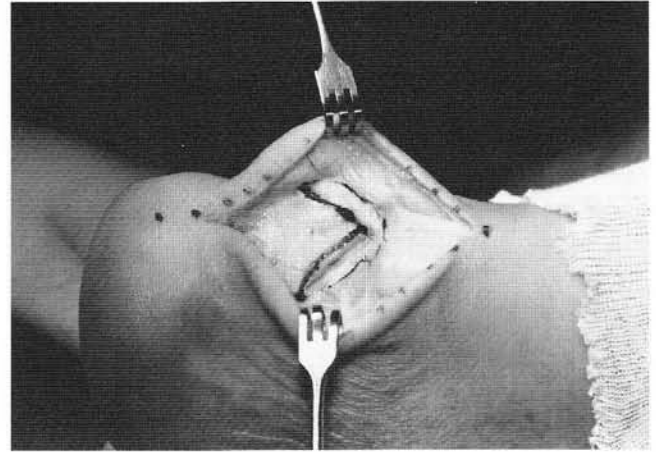


Figure 9. The modified V-Y tendon incision as described by Downey.

This causes a significant shortening of the lever arm of the tendon at the level of the ankle joint (Fig. 11). The resultant weakening of the gastrosoleal muscle complex effectively addresses the equinus

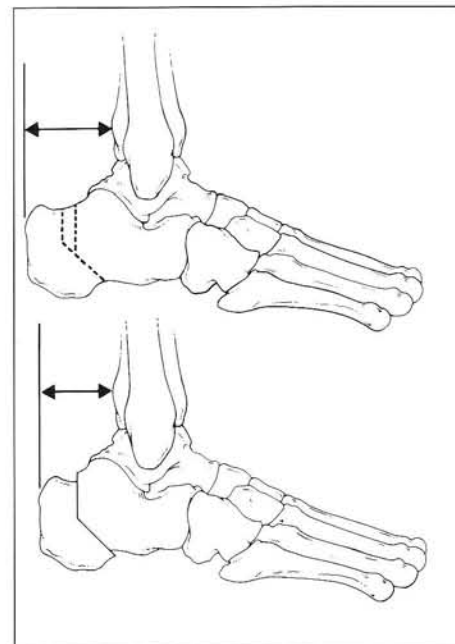


Figure 11. Note the effective shortening of the lever arm of the Achilles tendon at the ankle joint following the described osteotomy.

component of the deformity. This will clinically perform very similar to the Murphy Achilles tendon advancement procedure used for spastic equinus deformities. The second intent of this osteotomy is to decrease the amount of structural irritation resulting from the spur formation and inflammation. Hence, the static component of the deformity is addressed.



With the patient in a lateral position, the procedure is performed through a 6-8 cm curvilinear incision along the posterolateral calcaneal body (Fig. 12). If an effort is to be made to remove any existing posterior calcaneal spur, the incision is kept as close to the Achilles tendon insertion site as possible.

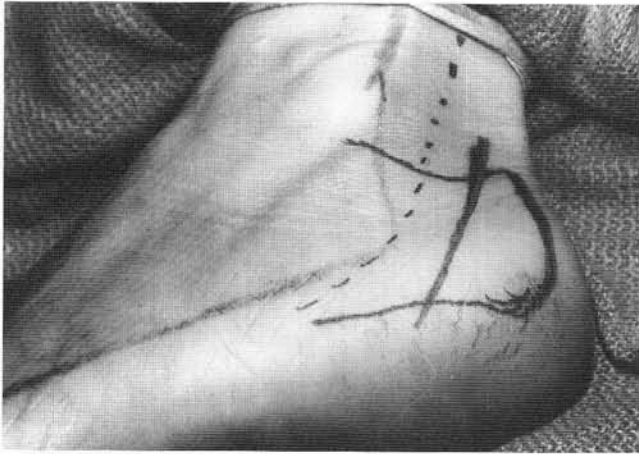


Figure 12. Typical curvilinear incision along the posterior lateral calcaneal body.

As the subcutaneous layer is dissected, care must be taken to identify and retract the sural nerve. When reflecting the superficial fascia from the underlying deep fascia, it is essential to obtain as much visualization of the posterior calcaneal body as possible. This will assure adequate exposure for the execution of the osteotomy. The periosteum is left intact, and the osteotomy is cut from lateral to medial (Fig. 13). The plantar exit of the osteotomy should be just distal to the posteromedial tubercle of the calcaneus. Prior to executing the plantar cut, the soft tissues should be bluntly separated from the plantar surface of the calcaneus, to avoid an

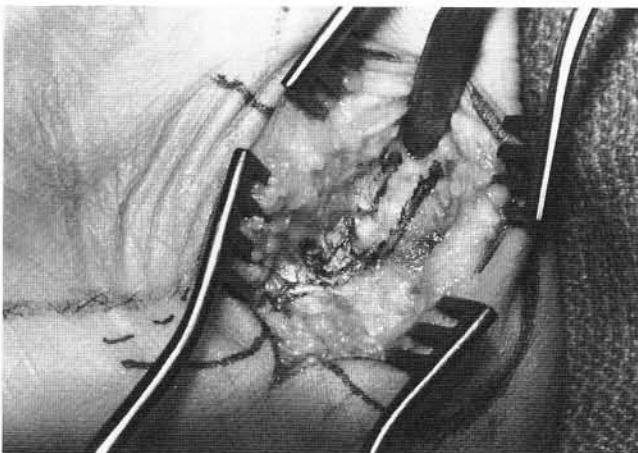


Figure 13. Posterior calcaneal shortening osteotomy.

inadvertent laceration. Once the osteotomy has been completed, a wedge of bone can be easily removed (Fig. 14).

After the wedge is removed, the posterior body is forced forward, closing the osteotomy. Reciprocal planing is used to reduce any residual gapping. A small amount of planing is usually

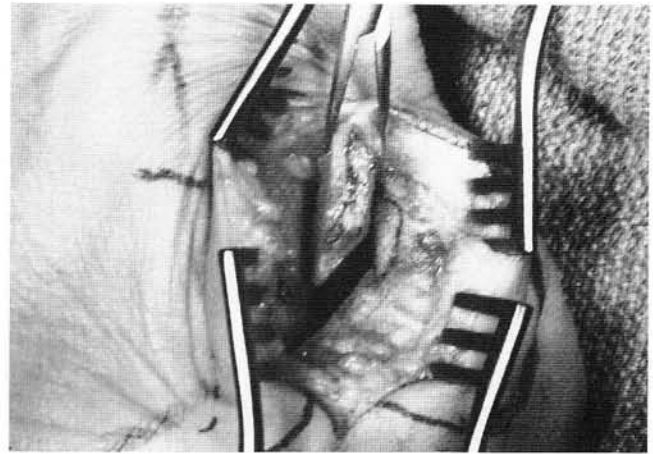


Figure 14. Removal of the superior wedge of bone.

required to achieve a flush fit. Ankle dorsiflexion is evaluated prior to fixating the osteotomy (Fig. 15). If further dorsiflexion is desired, it can be accomplished by performing additional planing. Once satisfactory correction is obtained, internal fixation can be applied. This typically consists of either



Figure 15. After closure of the osteotomy and prior to internal fixation, ankle joint dorsiflexion should be evaluated to assure adequate correction.

screw or staple fixation (Fig. 16A, 16B). Screw fixation requires placement of the screw through the tendon from posterior to anterior. Theoretically this could weaken the tendon. However, it has not been an observed complication.

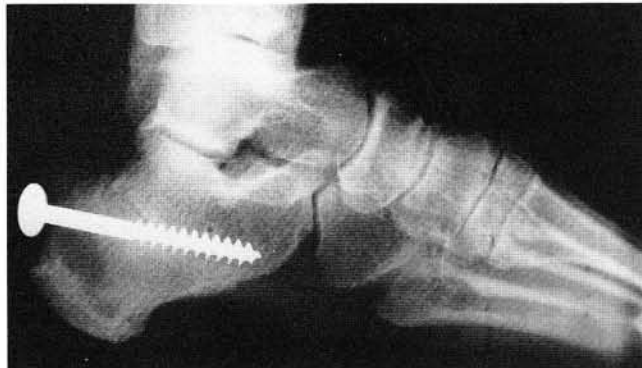


Figure 16A. Rigid internal compression fixation with 6.5-mm cancellous screw.

Postoperatively, the patient is placed in a below-knee cast and kept non-weight bearing for 6 weeks. It is not necessary to use an above-knee cast to neutralize the gastrocnemius muscle. Gentle physical therapy is initiated 4-6 weeks following surgery.

## RESULTS

Over a two-year period, 11 patients have undergone this procedure for retrocalcaneal spur syndrome. The group consisted of 8 females and 3 males, with an age range from 33-68 years. All patients were actively employed, although none engaged in strenuous exercise.

Ten patients presented with radiographic evidence of spurring along the posterior insertion of the Achilles tendon. The eleventh patient showed no evidence of posterior spurring, and primarily exhibited signs and symptoms of chronic recalcitrant Achilles tendonitis.

Early results of this small patient sample have been extremely encouraging from both a symptomatic as well as a functional standpoint. All patients have experienced a dramatic improvement, and in some cases a total resolution, of the preoperative symptoms. All patients have achieved their desired level of activity without recurrence of pain. The patients also relate much more versatility in their choice of shoes.

## COMPLICATIONS

To date, this procedure has been performed without any significant complications. Although the potential for a delayed union or non-union exists,



Figure 16B. Internal fixation with staples.

the rich blood supply of the calcaneus and the use of internal fixation minimizes this risk. There is also the risk of over-correcting the condition and creating a calcaneus deformity by advancing the Achilles tendon too far forward. This is an especially important consideration when the procedure is performed on a younger, more active or athletic individual.

## SUMMARY

A new technique has been presented to address chronic, recalcitrant pain associated with retrocalcaneal spur syndrome. Traditionally, this deformity is a difficult and frustrating clinical condition to treat. The osteotomy presented in this paper offers a surgical alternative that addresses both the static and dynamic components of the deformity, while maintaining the integrity of the Achilles tendon. This technique not only allows for a more predictable and successful outcome, but also reduces morbidity and rehabilitation time.

## REFERENCE

1. Downey MS: Retrocalcaneal exostectomy with reattachment of tendo Achilles. In Camasta CA, Vickers NS, Ruch JA (eds): *Reconstructive Surgery of the Foot and Leg, Update 94*. Tucker, GA, Podiatry Institute Publishing, 1994, pp 32-37.