CHAPTER **33**

ADVANCEMENTS IN PLANTAR FASCIA SURGERY

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INTRODUCTION

It has been estimated that 90% of patients with plantar fasciitis and heel spur syndrome get relief with conservative treatments. Bergmann[1] reported that 15% of all patient visits to a podiatric physician involved heel pain, while Kenzora[2] estimated that 90% or more of all patients receiving conservative care obtained complete relief, in contrast with 70-80% of the patients as reported by Barrett and Day.[3] Conservative treatment includes, but is not limited to, nonsteroidal anti-inflammatory drugs, corticosteroid injections, strapping, orthotic devices, stretching, and physical therapy. When these measures fail, deciding on the surgical treatment best for the individual patient may be cumbersome. Today, the podiatric surgeon has a number of techniques to choose from for the surgical treatment of plantar fasciitis, and often the procedure of choice is dependent on the training of the surgeon. There have been many recent technologic advances that have greatly reduced the morbidity associated with plantar fasciotomies. These advancements have limited the soft-tissue dissection and minimized plantar scars, all while achieving adequate release of the fascia. The senior author (JLB) has also used the ND: Yag Contact laser in the past with success in decreasing postoperative pain and swelling following open heel spur surgery, but discontinued its use due to the associated cost of the laser equipment in a managed care environment.[4]

In this article we will discuss the open heel spur, in-step, endoscopic, and the KobyGard procedures for plantar fasciotomies and discuss the advantages and disadvantages, as well as the senior author's experience with each procedure.

OPEN HEEL SPUR SURGERY

Two previous publications[5,6] outlined the many historic surgical procedures for heel spur resection over the past century beginning with Griffin[7] in 1910. The classic heel spur resection was originally described by DuVries[8] in 1957, and later modified by Ruch.[9]

With the patient in a supine position, a medial incision of approximately 3- to 5-cm is placed low on the heel to avoid the branches of the medial calcaneal nerve. The incision is made over the underlying medial process of the tuberosity of the calcaneus and extends distally and laterally into the arch crossing the plantar fascia 3- to 4-cm distal to its calcaneal insertion. This point is distal to the plantar heel pad where the subcutaneous tissue is then deepened through the superficial fascia and subcutaneous tissue to the level of the deep fascia. The fascial plane is followed proximally to the plantar surface of the heel by reflecting the heel pad inferiorly. The medial edge of the plantar fascia is detached from its insertion on the calcaneus. The spur is identified and can be resected at this point. The central band of the fascia can also be sectioned through this incision. Hemostasis is provided by anatomic dissection, electrocautery, and ligation of any bleeders. The skin is generally closed with a 3-0 or 4-0 nylon or polypropylene suture. The experience by the senior author is that this procedure is associated with a relatively high rate of postoperative pain, edema, and paresthesias. A nonweightbearing course of 3 weeks is also recommended, which may be cumbersome to the patient. Traditional open heel spur procedures with resection of the heel spur may have significant complications including infection, calcaneal fracture, scarring, and nerve entrapment with increased morbidity.

IN-STEP PLANTAR FASCIOTOMY

The in-step plantar fasciotomy is performed through an incision just distal to the heel fat pad as it slopes into the medial arch, as described by Boberg.[10] With the foot and digits dorsiflexed, the medial and central bands of the plantar fascia can be easily palpated. If the fascia cannot be easily palpated proximally, it is advised to outline the fascia distally and extend the borders proximally. A transverse incision approximately 1.5- to 2-cm in length is made in this area over the medial and central bands of the plantar fascia. Once the skin incision is made, the thick subcutaneous tissue can be spread with a Metzenbaum scissors. At this point the fascia is easily palpated within the surgical site and a self-retaining retractor may be utilized to assist with retraction of the subcutaneous tissue. A hemostat is used to identify the medial and lateral borders of the medial and central plantar fascial bands. With the digits dorsiflexed, a knife is then used to perform a

controlled depth incision through the fascia, taking care to preserve the underlying flexor digitorum brevis (FDB) muscle.

The skin is generally closed with a 3-0 nylon or polypropylene. The postoperative course that the senior author recommends is immediate weightbearing in a surgical shoe with a compressive dressing. A period of immobilization after this procedure can lead to scar and adhesions in the area of the fasciotomy secondary to the fascia healing in a shortened position. Stressing the plantar fascia with weightbearing helps mobilize the tissue and prevents adhesions. The in-step plantar fasciotomy has fewer complications; however, with a plantar incision there is the potential of delayed healing, excessive plantar fibrosis, and plantar scarring.

ENDOSCOPIC PLANTAR FASCIOTOMY

The endoscopic plantar fasciotomy (EPF) is another popular technique utilized for surgical management of recalcitrant plantar fasciitis developed by Barrett and Day.[3] With the patient supine, a 0.5-cm incision is made at the medial aspect of the heel, approximately 1-cm distal to the plantar fascia insertion. Dissection is carried through the subcutaneous tissue down the medial aspect of the plantar fascia. An endoscopic trocar and cannula are inserted superficial to the plantar fascia, exiting through a 0.5-cm incision on the lateral aspect of the heel. The endoscopic camera is inserted medially to allow full visualization of the plantar fascia. The cutting knife is then used to section the medial half of the plantar fascia. A blunt probe is utilized to inspect the plantar fascial release. At this point the underlying flexor digitorum brevis muscle can be visualized.

After irrigation the skin is re-approximated with 4-0 nylon or polypropylene suture. The postoperative course is similar to the instep procedure with immediate weight-bearing. The senior author has noted an increase in bleeding and swelling with this procedure, most likely secondary to a forceful use of the EPF instruments. An increase in swelling may also result from violation of the underlying FDB muscle belly. This procedure may be preferred over the instep or open procedures because of the absence of a plantar incision and shortened operative time. The EPF has the disadvantage of 2 surgical incisions, one medial and one lateral, which requires the use of an endoscopic equipment and video monitor in the operating room. The senior author has experienced occasional problems with the endoscopic and monitor equipment, which has prolonged the surgery time in some cases.

KOBYGARD SYSTEM BY OSTEOMED

The KobyGard System (Osteomed, Addison, TX) is designed to isolate and cut the plantar fascia through a single small medial incision. A 1-cm incision is marked 1-cm distal to the medial calcaneal tuberosity on the medial inferior aspect of the heel (Figure 1). Once the incision is made, Metzenbaum scissors are utilized to deepen the incision and start a plane between the plantar fascia and subcutaneous tissue (Figure 2). The tissue locator is then used to extend the plane across the lateral aspect of the plantar fascia. A distinct puckering is noted on the plantar skin when the tissue locator is between the fascia and subcutaneous layers (Figure 3).

Figure 1. A 1-cm incision is marked 1-cm distal to the medial calcaneal tuberosity on the medial inferior aspect of the heel.

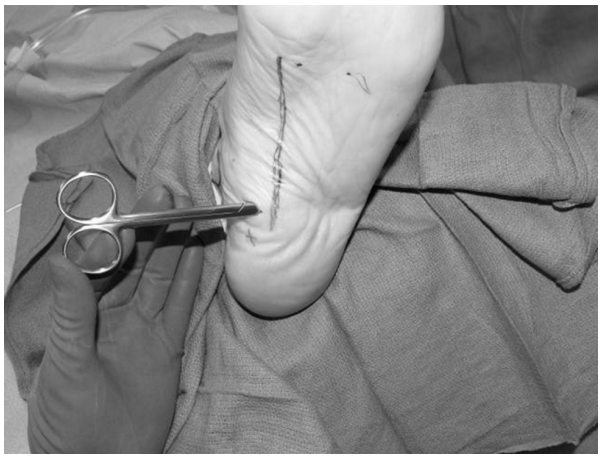

Figure 2. Once the incision is made, Metzenbaum scissors are utilized to deepen the incision and start a plane between the plantar fascia and subcutaneous tissue.

The fascia separator is then used to isolate the fascia between the subcutaneous tissue and the intrinsic musculature (Figure 4). The KobyGard instrument is then introduced around the plantar fascia in the same manner as the fascia separator (Figure 5). The cutting blade is then used to premeasure the medial half of the plantar fascia and marked at the appropriate location on the blade (Figure 6). The blade is then inserted into the KobyGard instrument and advanced forward until the premeasured location is reached (Figure 7). You will be able to feel and hear the fascia being sectioned as the blade is advanced. The tissue locator or hemostat is then used to check that all desired fibers have been sectioned. After irrigation, the incision is closed with 4-0 nylon or polypropylene suture (Figure 8).

The postoperative course used by the senior author is nonweightbearing with a compressive dressing and surgical shoe with crutches or a cane for the first 24 hours postoperatively. The patient can then bear weight in the surgical shoe on postoperative day 1.

With the Kobygard procedure the patient returns to tennis shoes within 1 week. Other advantages of this procedure include lowest direct operative time, with a total procedure time of 10 to 15 minutes. The Kobygard System (Figure 9) is very user friendly and the senior author has not yet encountered problems with equipment. The cost of the disposable Kobygard blade is comparable to the EPF equipment, but without the need for Endoscopic equipment and a video monitor. The advantages of the Kobygard System are that the procedure and instrumentation are simple and easy to use and require only one small medical skin incision with decreased surgical trauma and time. In most patients, there is a significant and notable decrease in postoperative pain and swelling which leads to early ambulation and return to normal activity.

Figure 3. The tissue locator is then used to extend the plane across the lateral aspect of the plantar fascia.

Figure 4. The fascia separator is then used to isolate the fascia between the subcutaneous tissue and the intrinsic musculature the intrinsic musculature.

Figure 5. The KobyGard instrument is then introduced around the plantar fascia in the same manner as the fascia separator.

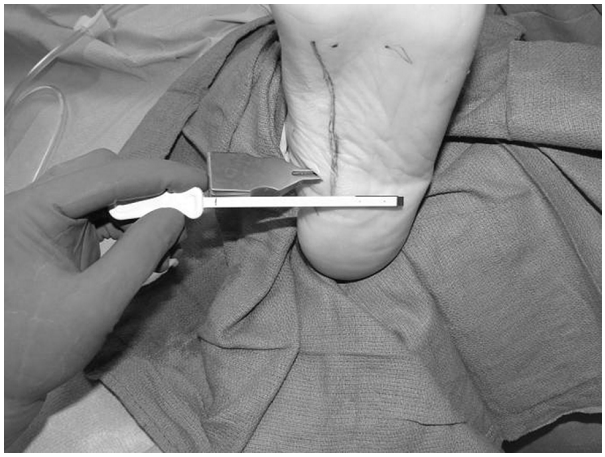

Figure 6. The cutting blade is then used to premeasure the medial half of the plantar fascia and marked at the appropriate location on the blade.

Figure 7. The blade is then inserted into the KobyGard instrument and advanced forward until the premeasured location is reached.

Figure 8. The tissue locator or hemostat is then used to check that all desired fibers have been sectioned. After irrigation, the incision is closed with 4-0 nylon or polypropylene suture.

Figure 9. The Kobygard System.

The only postoperative complication experienced by the senior author was in a patient who remained nonweightbearing for longer than recommended. The patient had stiffness and tightness in the arch that eventually subsided with increased activity and weightbearing.

Lateral column pain and metatarsalgia have been reported in a small number of patients with each of the above-mentioned procedures.[11,12] A study by Brugh[13] showed a correlation between lateral column pain and the amount of plantar fascia resected. He recommended not resecting more than 50% of the plantar fascia in order to reduce the occurrence of lateral column symptoms. Reports show that the open plantar fasciotomy is associated with the highest incidence of painful scarring, wound dehiscence, and painful nerve entrapments of all the procedures discussed. A calcaneal stress fracture was reported by Jerosch[14] after an EPF, which he believes can be attributed to the major alterations of foot biomechanics after release of the plantar fascia. Fischo et al[15] report symptoms of vague dorsal pain after sectioning the plantar fascia. This may be explained by the increase in the strain on the medial arch, which has been shown to cause abnormal joint rotation and arch displacement after plantar fasciotomy. There have also been reports of RSD associated with the release of the plantar fascia. Other reported complications of any of the above procedures also includes, but is not limited to, chronic arch pain, medial arch destabilization, and sural nerve entrapment.

In a retrospective study in 1998,[16] it was found that patients with an open heel spur repair had the highest overall satisfaction rate when compared with the in-step and endoscopic procedure. In contrast, the open heel spur group had the longest time to return to preoperative activity while the endoscopic group had the quickest return. The greatest reduction in preoperative pain was noted in the in-step fasciotomy group.

SUMMARY

In summary, even though there are multiple surgical options to treat plantar fasciitis, all have proven to be effective at relieving pain in the majority of patients who do not respond to conservative management. It is important for the surgeon to choose the best procedure for the patient's needs as well as what they feel most capable of surgically performing. The senior author, who has extensive experience with all of the above procedures, prefers the Kobygard System, because there are minimal postoperative complications and greater patient satisfaction.

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