

Koby ISOGARD™ System: An Innovative Approach for the Treatment of Chronic Plantar Fasciitis

Tara Blitz, BS and Damon Combs, BA

Abstract

This article presents an innovative method of treating plantar fasciitis associated with medial tubercle pain of the calcaneus. Past surgical methods of treatment included traumatic dissection with little to no protection of the vital structures around the transected plantar fascia. Recently, the Koby ISOGARD™ System has been introduced as a surgical option for the treatment of chronic plantar fasciitis. It allows for minimal invasiveness along with surgical isolation of the plantar fascia through the use of specialized instrumentation. This article will present a case in which the Koby ISOGARD™ system was instituted. The instrumentation, method, and materials are discussed to inform the reader of the surgical technique. Koby ISOGARD™ system is compared with other surgical procedures for the treatment of chronic plantar fasciitis.

Introduction

Known as one of the most common causes of heel pain, plantar fasciitis is defined as a distinct enthesopathy at the origin of the plantar fascia on the medial tubercle of the calcaneus.¹ It has been reported that 15% of patients who present with foot complaints have heel pain. Plantar fasciitis is more commonly seen in women, obese patients, athletes and/or people who are required to remain weight bearing for their occupation.² Most patients present complaining of intense pain with the first few steps in the morning or after an extended period of rest. Patients relate pain on palpation of the medial tubercle of the calcaneus or pain with maximally dorsiflexing the first metatarsal phalangeal joint initiating the windless mechanism.³ The exact cause of plantar fasciitis is still unknown; however, there have been a multitude of theories. Some feel that plantar fasciitis may be due to heel spurs or nerve entrapment of abductor digiti

quinti minimi. Others believe that micro-trauma to the fascia, fat pad degeneration or increased intra-osseous pressure may be the culprit.⁴ Crosby and Humble stated that over pronation has a high correlation to the development of plantar fasciitis.² They also state that torsional or angular deformities of the lower extremity can lead to its development. Although the exact causes can not be determined within this study, it can be concluded that plantar fasciitis is related to the inability to dissipate ground reactive forces during gait.

Treatment is initially aimed at conservative measures. Patients are encouraged to rest, ice, elevate and stretch the affected limb. Injections, nonsteroidal anti-inflammatory drugs and ultrasound therapy are common treatment options for immediate pain relief. Arch supports and orthotics may also be instituted early on. In the majority of cases, the pain is diminished with these treatment options and the patient can continue on in their normal lifestyle. Patients must understand that in order to reduce the risk of recurrence, a lifestyle change may be implicated; for example, weight loss. When conservative measures fail, surgical options may be pursued. A plantar incision is the historic approach when trying to resolve plantar fasciitis and is still in use today. Through this approach, the medial 2/3 to the entire plantar fascia is released. In recent years, endoscopic plantar fasciotomy (EPF) has become popular. It is considered a less traumatic procedure when compared to the previous incisional approach. It also differs in the amount of plantar fascia which is released; only the medial 1/3 has been suggested. Following the trend of becoming less invasive, the Koby ISOGARD™ system (K.I.S) is currently being used as a minimally invasive treatment for plantar fasciitis. Isolating the plantar fascia through a 1cm incision located distal to the medial tubercle of the calcaneus, it gives one the option of how much fascia to release intraoperatively.

Case Report

A sixty-seven year old male Caucasian presents with left heel pain. He stated that the pain was insidious in onset that began April 2003. The patient sought treatment previously and was diagnosed with heel spur syndrome. At that time, ultrasound therapy, Celebrex and corticosteroid injections were initiated. When these treatments did not provide relief for the

patient's pain, he was referred to Cleveland Foot and Ankle Clinic (CFAC). On the patient's initial presentation at CFAC, he described his pain as burning and throbbing upon weightbearing. Radiographs were ordered and indicated spurring of the plantar medial tubercle of the left calcaneus. On physical examination, atrophy of the left plantar heel pad was noted along with pain on palpation of the plantar medial heel and pain on side to side compression of the left heel. After physical examination, a low dye strapping with dorsal rest strap was applied to left foot with instruction to return to clinic for follow-up. When the patient returned for his follow-up visit, he stated that his pain was not relieved by the low dye. At this point, further treatment was discussed with patient. Patient was given the options to continue conservative treatment, to discontinue all forms of treatment or to have surgery. The patient felt that conservative options were exhausted and elected surgical intervention. Surgical options were discussed and the K.I.S. surgery was selected. The K.I.S. procedure was discussed with the patient, along with benefits, risks, complications and the post operative period. Surgery was scheduled for February 2004.

Literature Review

Surgical treatment of plantar fasciitis becomes an option only after all conservative treatment options have been exhausted. Once this point is reached, it becomes the choice of the surgeon to decide which surgical option will be best for the patient. This choice is not only determined based on surgeon preference but also on patient selection, patient lifestyle, patient compliance and the length of the post-operative period. Surgical treatment options for plantar fasciitis have advanced from a large plantar incision through which the entire plantar fascia was released to a few millimeter incision in which only a portion of the medial band of the plantar fascia is released.

The traditional open procedure requires a plantar incision that extends perpendicular to the long axis of the foot. This allows for complete visualization of the plantar fascia. The medial band, and in some procedures part of the lateral band, is incised. The open procedures require more traumatic dissection as compared to more modern procedures. Patients will have a prolonged recovery period averaging 8 months. Open procedures are also associated with a high

failure rate and patient dissatisfaction due to reporting moderate to severe pain post-operatively.⁵ When compared to less invasive procedures, open procedures tend to use general anesthesia. Less invasive procedures can usually be performed under local and/or a posterior tibial nerve block.

Koby ISOGARD™ system (K.I.S.) is the newest advancement in minimally invasive procedures. It requires only a 1cm incision placed distal-medial to the medial tubercle of the calcaneus to release the medial band of the plantar fascia. The K.I.S. can be best compared to EPF. Endoscopic Plantar fasciotomy is a procedure which utilizes a 5-7mm incision anterior and inferior to the inferior aspect of the medial calcaneal tubercle. A fascial elevator is then introduced in order to create a channel inferior to the fascia. This allows the obturator/cannula system to be advanced through the medial incision and then exit the foot laterally through a second 5-7mm incision. With the use of an endoscope at the medial aspect of the foot and a fascial probe laterally, the medial slip of the plantar fascia is incised.⁶ EPF consists of an instrumentation system similar to K.I.S. However, surgeons performing EPF need to be extremely careful to avoid incising the superficial aspect of the first intrinsic muscle layer.⁷ Although EPF has camera visualization of internal structures, there is no guarantee that the surgeon will only be isolating the plantar fascia. The K.I.S. allows for direct isolation of the fascia which protects the surrounding soft tissue structures from being damaged. EPF is also a more expensive procedure to perform due to the use of video equipment for visualization. The authors of this paper have found that the only major disadvantage of the K.I.S. is that there will be a learning curve as to the effectiveness of the procedure. In comparison to the other plantar fasciitis procedures, K.I.S. allows for a rapid, straightforward procedure and surgical accuracy.

Treatment Plan

One gram Cefazolin intravenously was administered thirty minutes prior to surgery as per the surgeon's protocol. A pneumatic ankle tourniquet was placed on the patient's left ankle. Prior to inflation of the tourniquet, intravenous sedation was administered and local anesthesia was obtained using a posterior tibial block consisting of 10cc of 2% Lidocaine plain and 0.5%

bupivacaine plain. The foot was scrubbed, prepped and draped in the usual sterile manner and exsanguinated using an Esmarch. The tourniquet was inflated to 250mmHg.

A 1.5cm linear horizontal incision was made 1cm distal to the calcaneus and 1.5cm superior to the plantar aspect of the foot. The incision was deepened through the subcutaneous tissue using sharp and blunt dissection. The Tissue Separator was inserted into the incision to separate the plantar fascia from the subcutaneous tissue. The Fascial Separator was then inserted to separate the fascia from the overlying first layer of musculature and tissue. The Fascia Separator was removed and the ISOGARD™ device, which acts as a fascia isolator, was inserted. The fascia band to be incised was then measured. The pre-calibrated blade was inserted into the ISOGARD™ device. The blade was advanced to cut the pre-measured length of the plantar fascia. This step was repeated two more times to ensure that all of the fibers of the desired amount of plantar fascia were incised.

The wound was flushed copiously with normal saline. The skin was reapproximated and coapted utilizing 4.0 monofilament braided suture in simple technique. Upon completion of the procedure, a post-operative injection consisting of 1cc of dexamethasone phosphate was injected about the incision site. The incision was then dressed with a dry, sterile compressive dressing. Prior to applying the elastic bandage, the tourniquet was deflated and a prompt hyperemic response was noted to all digits of the left foot. Post-operative instructions consisted of keeping the dressing dry and intact, elevating, and icing the left foot when at rest. Patient would begin weight bearing immediately on his left foot with a surgical shoe with the aid of crutches. A prescription for Acetaminophen/Hydrocodon 5.0mg was dispensed with instructions to take one to two by mouth every 4-6 hours as needed for pain. Four days post-operatively on his first visit, patient denied any pain. Minimal pain on palpation was noted in the left medial arch and non-pitting edema was noted in the left plantar heel. Thirteen days post-operatively, the patient returned for suture removal. The patient had minimal signs of pain in medial arch but no signs of edema. He was fitted for orthoses. Twenty-seven days post-op, the patient complained of a mild burning sensation in his left heel, mild discomfort in his medial arch, and mild pain upon weight bearing at his fifth metatarsal area. To date the patient is doing very well without complications.

Discussion

The K.I.S. is a procedure involving an incision a few centimeters in length along the medial tubercle of the calcaneus, which enables the use of minimally invasive instruments to isolate and incise a predetermined amount of plantar fascia.⁸ The procedure can be viewed as superior to endoscopic procedures for plantar fasciitis because of the protection provided for the surrounding structures. The instrumentation was designed with a shorter upper prong and longer lower prong, allowing isolation of only the plantar fascia by gripping the plantar fascia within the 5mm space between the prongs. The surrounding structures are also protected from being incised by the slotted design of the ISOGARD™ device. The pre-calibrated blade is inserted into the handle which prohibits any other vital structures from being insulted.

The minimally invasiveness of this procedure is also significant because patients can begin immediate weight bearing post-operatively as tolerated. It is suggested that patients use either a removable cast boot or a surgical shoe and crutch until sutures are removed. Once the sutures are removed, patients may return to full activity as tolerated. Surgeons should inform the patient that prior symptomatology may be present for at least four weeks after the procedure. The authors of this paper feel that this may be directly correlated with the return to unassisted weight bearing occurring at two to three weeks post-operative. In a study performed between September 2002 and July 2003, thirty-eight patients underwent plantar fasciotomy with the K.I.S. There were forty-four procedures performed with 52.3% of symptoms being reported as completely resolved, 45.5% reported improved symptoms and only 2.3% has no change in symptomatology. Overall, the study provided a 97.7% success rate.⁸

Conclusion

Plantar fasciitis is one of the most common foot conditions that present to a physician's office. Once the physician identifies the problem, conservative treatments should be implemented immediately. Once all conservative treatment options have been exhausted (minimum of six months), surgical intervention may be necessary. The K.I.S. is the most recent addition to the surgical options for plantar fasciitis. It allows for a minimal scar formation, limited

early weight bearing, and short post-operative period. As the 2002-2003 study indicates, there is a high success rate with this procedure. K.I.S has a high success rate for the treatment of plantar fasciitis because it combines the accuracy and efficiency of endoscopy with the simplicity of the open approach.⁸

References

- ¹ Gould JS: "Chronic plantar fasciitis." American Journal of Orthopedics Volume 1: 11-13, January 2003
- ² Crosby W, Humble RN: "Rehabilitation of plantar fasciitis." Clinics in Podiatric Medicine and Surgery Volume 2: 225-231, April 2001
- ³ Fuller EA: "The windlass mechanism of the foot. A mechanical model to explain pathology." Journal of American Medical Association Volume 1: 35-46 January 2000
- ⁴ Davies MS, Weiss GA, Saxby TS: "Plantar Fasciitis: how successful is surgical intervention?" Foot and Ankle International Volume 12: 803-807, December 1999
- ⁵ Boyle RA, Slater GL: "Endoscopic Plantar Fascia Release: a case series." Foot and Ankle International Volume 2: 176-179, February 2003.
- ⁶ Kinley S, et al.: "Endoscopic Plantar Fasciotomy versus Traditional Heel Spur Syndrome: A Prospective Study." Journal of Foot and Ankle Surgery Volume 32: 595-603, November-December 1993
- ⁷ Barrett S, Day S, Pignetti T, Robinson L: "Endoscopic Plantar Fasciotomy: A Multi-Surgeon Prospective Analysis of 652 cases." Journal of Foot and Ankle Surgery Volume 34: 400-406, July-August 1995
- ⁸ Youngswick, F "A Minimally Invasive Technique for Performing Plantar Fasciotomies: A Cadaveric Study." Submitted for poster exhibit at the American College of Foot and Ankle Surgery 2003

Additional References

- Boyle RA, Slater GL: "Endoscopic Plantar Fascia Release: a case series." Foot and Ankle International Volume 2: 176-179, February 2003.
- Brown JN, et al: "Plantar fascia release through a transverse plantar incision." Foot and Ankle International Volume 6: 364-367, June 1999
- Brugh AM, Fallat LM, Savoy-Moore RT: "Lateral column symptomatology following plantar fascial release: a prospective study." Journal of Foot and Ankle Surgery Volume 6: 365-371, November/December 2002
- Jerosch J: "Endoscopic Release of Plantar Fasciitis- a benign procedure?" Foot and Ankle International Volume 6: 511-513, June 2000

Murphy GA et al: "Biomechanical consequences of sequential plantar fascia release." *Foot and Ankle International* Volume 3: 149-152, March 1998

Riddle DL, et al: "Risk factors for plantar fasciitis: a matched case-control study." *The Journal of Bone and Joint Surgery* Volume 5:872-877, May 2003

Young CC, Rutherford DS, Niedfeldt MW: "Treatment of plantar fasciitis." *American Family Physician* Volume 3: 467-474,477-478, February 2001

Figures



Figure 1. Koby ISOGARD™ System Instrumentation. A. Tissue Locator. B. Ligament Separator. C. Fascial Separator D. ISOGARD™ Flex Tip Device E. ISOGARD™ Single Use Blade



Figure 2. Tissue Locator utilized to locate the plantar fascia and create a channel for the Fascial Separator to be inserted.

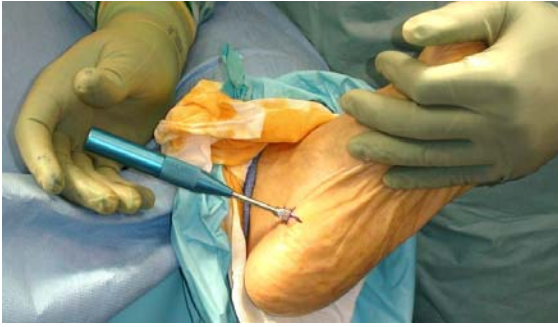


Figure 3. Fascial Separator introduced into the incision site to separate the intrinsic muscle layer and soft tissue from the plantar fascial band



Figure 4. ISOGARD™ Flex Tip Device was placed into the incision site isolating the plantar fascial band. This provided protection for the vital structures of the foot. ISOGARD™ pre-calibrated blade was inserted into the ISOGARD™ device to incise the pre-determined amount of plantar fascia.