

# Endoscopic Plantar Fasciotomy with Gastrocnemius Recession for Chronic Plantar Fasciitis

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## Abstract

**Background:** Plantar fasciitis is one of the most common pathologies seen by foot and ankle surgeon. Treatment is mostly conservative. Further intervention of injections and shock wave therapies have given improvement to many patients. However, when all these therapy fails, surgical intervention is warranted. A thorough investigation is again done to confirm any other cause of pain. MRI usually reveals the thickened medial cord way beyond its normal size. Endoscopic plantar fasciotomy is done to release the thickened medial cord of the plantar fascia. Gastroc recession is added in case of tight gastrocnemius.

**Materials and Methods:** 11 foot (1M/8F) (2-B/L) treated for chronic Plantar fasciotomy with or without Gastroc recession were reviewed in this retrospective study. The mean follow-up was 9 months (range 6 to 24 months). All patients underwent at least 6 months of conservative management. They were further evaluated with proper evaluation and pre op MRI to confirm the thickness of the plantar fascia pre operatively. All patients were operated with endoscopic plantar fasciotomy with or without gastroc recession depending on the tightness of the gastrocnemius.

**Results:** At the follow up improvement was noted in all the patients compared to their pre op status. All patients returned to their pre op activity. No major complication was seen.

**Conclusion:** Endoscopic Plantar fasciotomy with added gastroc recession is a safe and effective procedure for the treatment of chronic plantar fasciitis that gives good relief of symptoms and allow a successful return to normal activity levels

**Keywords:** Chronic Plantar fasciitis, Endoscopic plantar fasciotomy, Heel pain, Gastrocnemius Recession.

## Introduction

Plantar fasciitis is an enthesopathy of the insertion of the plantar fascia at the medial calcaneal tubercle. It is a non inflammatory condition of the plantar fascia, resulting from repeated trauma at the medial process of the calcaneal tubercle, and it is one of the major causes of heel pain. Wolgin et al [1] followed the natural history of plantar fasciitis and showed that, at 4 years, 82% of subjects had a good result, 15% fair, and 3% poor; 21% took more than 6 months to resolve. Most of the cases respond to conservative treatment including nonsteroidal anti-inflammatory drugs, stretching, night splint use, foot orthosis uses and physical therapy. It is only a minority who do not improve with conservative treatment and may be candidates for surgical treatment. However, it is essential that conservative care be exhausted before surgical intervention can

be considered. Zirm and Jimenez [2] suggested conservative therapy for six months to one year before resorting to surgical intervention. If nonsurgical treatment fails, an MRI was taken to see the thickness of the medial cord of the Plantar fascia.

### Anatomy with Imaging findings:

Plantar fascia consists of central, lateral and medial bundles. The central bundle is the thickest and is proximally thick and distally thin. It arises from the medial tubercle of the calcaneus and extends distally covering flexor digitorum brevis muscle plantar surface. Distally, it divides into five digitations that insert into the MTP joints. The lateral bundle is also proximally thick and distally thin. It arises from the lateral margin of the medial calcaneal tubercle, covers the plantar surface of the abductor digiti minimi muscle. It inserts

into the fifth MTP joint capsule. The medial bundle is thinnest and arises from the midportion of the central bundle. It covers the plantar surface of the abductor hallucis muscle and inserts into the first MTP joint capsule [3]. The mean maximal thickness of plantar fascia is reported as 4.0 mm for central bundle, 2.3 mm for lateral bundle and 0.6 mm for medial bundle [4]. Plantar fasciitis represents a low grade inflammation of plantar aponeurosis and perifascial structures. X-rays shows calcaneal spurs many a times but its significance as pain generator is very arguable. US and MRI are considered as first and second line modalities in evaluation of plantar fasciitis. MRI is considered as the most sensitive imaging modality for diagnosing plantar fasciitis [6]. On US plantar fasciitis manifests as thickening, loss of fibrillar architecture, perifascial collections, calcifications and hyperaemia on Doppler imaging. MRI accurately depicts the changes of plantar fasciitis. PF thickening, signal change as well as oedema of adjacent soft tissues and bone marrow are well assessed on MRI. PF tears present with partial or complete fibre interruption. MRI findings of plantar fasciitis include: thickening of plantar

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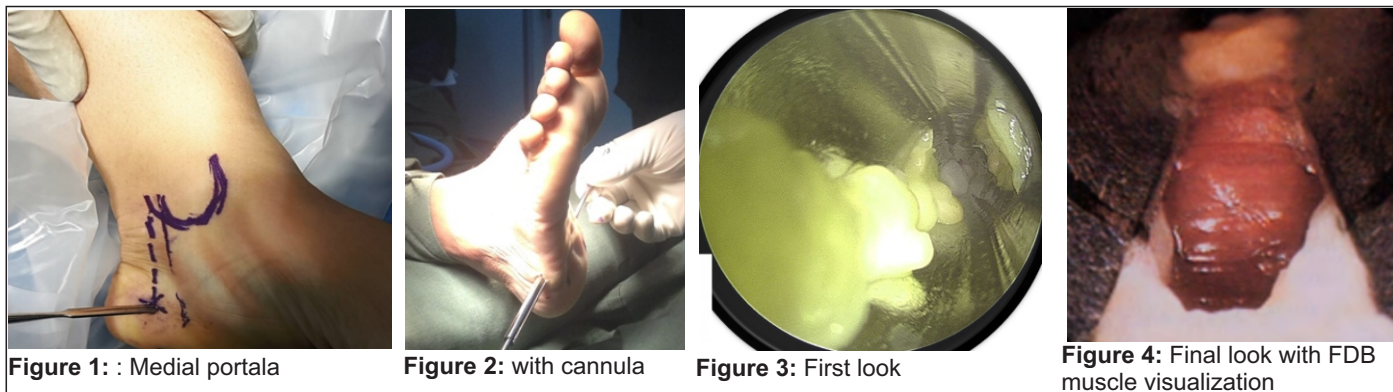
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fascia, most commonly at its calcaneal origin; intrasubstance areas of intermediate signal on T1 and PD weighted sequences and increased signal on fluid-sensitive sequences. Oedema in the adjacent soft tissue and bone marrow oedema of the calcaneal attachment of the PF suggestive of enthesopathy are also seen. Cortical changes at calcaneal attachment of PF with or without spur formation have been correlated with plantar fasciitis. Significance of calcaneal spurs in plantar fasciitis is currently debatable. Calcaneal spurs associated with plantar fasciitis are located within the PF. These are however uncommon as most spurs are located deep below PF [5,6].

### Materials and Methods

From May 2015 to December 2017, nine patients were enrolled for the surgical management with plantar fasciotomies with or without gastrocnemius recession. All patients had undergone a trial time of minimum of 6 months. 6 patients had undergone more steroid infiltration along with physio and other methodology of conservative management but had no relief. After proper pre op evaluation with thorough clinical examination along with other investigations including an MRI was performed. Tight gastrocnemius even after stretching exercises with positive Silverskold test were taken up for Gastroc recession along with Endoscopic Medial partial plantar fasciotomy. Release of thickened medial portion of the plantar fascia usually the medial cord upto medial part of central cord thereby maintaining the bowstring effect and thus preventing the lateral metatarsalgia was done along with open gastrocnemius recession. Percutaneous release is a less invasive surgery and creates less morbidity. Gastroc recession has been advocated by many in view of the tight gastroc pull and also termed as a treatment of its own for heel pain. We combined both the surgery depending on the

tightness of gastrocnemius.

### Surgical Technique:

We used a technique similar to that described by Barrett and Day<sup>8</sup>. Patients were given a general/spinal anaesthetics as per their preference and a tourniquet was used. The width of the thickened medial cord of plantar fascia is measured in MRI and is arbitrarily marked from outside for the arbitrary measurement. The medial portal was established along a line referencing the posterior border of the medial malleolus. The extension of this line to the sole of the footmarks is the site of medial portal. (Fig 1) It is established 1 cm deep to the plantar skin. A Wissinger rod (4mm) is first introduced through a small skin stab incision from medial to lateral side. The rod is pushed gently over the plantar fascia, superficial to it. The fascia can be palpated and the route cleared for passage of the slotted cannula. Great care is taken to make sure the rod is at right angles to the long axis of the foot. When the tip of the rod reaches the lateral border of the foot, it is delivered with another small stab wound. A slotted cannula is then passed from medial to lateral side. It is important that the cannula contacts the fascia as closely as possible medial to lateral and should lie directly in contact with the fascia. The rod is removed and the cannula rotated so that the slot faces proximally directly onto the fascia that is deep to it. (Fig 2) The endoscope is then passed into the cannula from the lateral side. No fluid is used; the tourniquet has ensured a bloodless field. A small hooked probe is passed medially and used to palpate the fascia. The first look endoscopically is usually with the fat pad over the fascia. (Fig 3) The hooked probe can then be used to scrape away the fat to clearly visualize the shiny fibres of the fascia itself. Alternatively, a small suction cannula is inserted to clear the fat granules from the cannula. A small triangular hooked blade is

passed medially. Under direct vision, it is used to completely divide the medial cord fibres of the plantar fascia. The division is complete when the underlying muscle of Flexor Digitorum Brevis is seen. (Fig 4) The thickened medial cord of plantar fascia measured in MRI is arbitrarily measured from outside and is divided with the hooked knife till the underlying muscle is seen. The central and lateral cord is left alone to prevent the failure of windlass mechanism. The hooked probe is then taken again and used to ensure that complete division has taken place. The tourniquet is released. Long-lasting local anaesthetics injected into the operative site. A single suture is placed in each portal. With those patients whose silver skold test was positive a proximal gastroc recession was performed. A 4-centimeter incision was made at the musculotendinous junction. The fascial plane was identified, which divides the gastrocnemius and soleus muscle. Posteriorly, the sural nerve was protected and the soleus muscle protected anteriorly. The foot was dorsiflexed with the knee extended, increasing the tension of the gastrocnemius. After making the incision in the fascia, it was left open, and the skin was closed in layers. A tensor bandage is applied to the foot. Postoperatively patients are allowed non weight bearing for 1st week and graduated increase in weight bearing after that. The foot is kept in night splints for total of 3 weeks. Standard exercise program consisting of stretching and strengthening as used for plantar fasciitis is started post operatively. They are not allowed impact activities such as running or tennis for at least 6 weeks. Athletes are placed on a sports-specific training program, to include muscle hypertrophy, flexibility, and endurance before returning to sports. All patients are advised to wear supportive soft orthotics for at least 6 months. Clinical outcomes were analyzed which included VAS score, AOFAS ankle-hindfoot

scores, weight bearing, return to work and patient satisfaction. We found at the end of 6 months good to excellent results. 2 patients who had undergone simultaneous procedures on both feet took little extra time to recover. Rest all patients were pain free with better mobility at end of 6 months.

### Discussion

Plantar fasciitis was known as “policeman’s heel.” The British origin of the term described policemen wearing ill-fitting shoes and chasing criminals on foot. Although the term is not used commonly today, it describes well the forces that predispose healthy individuals to plantar fasciitis. These people participate in weight-bearing activities with repetitive impacts such as joggers, tennis players, and ballet dancers [9]. Individuals who wear improper shoes, run on their toes, on soft terrain, or up hills are most affected. Patients with pes planus (flat feet) or pes cavus (high arched feet) are also at risk of developing plantar fasciitis because of the abnormal forces acting on the plantar fascia during walking, running, and landing activities. Advancing age and obesity are also risk factors for plantar fasciitis. Patients with systemic diseases may develop plantar fasciitis. Seronegative spondyloarthropathies, such as reactive arthritis, Reiter’s syndrome, and ankylosing spondylitis are known to be associated [10-12]. They are classified as enthesopathies and thus affect the insertion of the plantar fascia at the calcaneus. The presenting problem in many patients is “foot pain.” Because there are many causes of foot pain, one must consider the differential diagnosis. The typical description of foot pain caused by plantar fasciitis is plantar or heel pain that is often localized over the medial calcaneal tubercle. Other sites of pain may include the midsole or proximal to the metatarsal heads. When the pain of plantar fasciitis first appears, it is dull and intermittent. Over time, the same pain becomes sharp and persistent. It is usually worse in the morning, especially after taking the first few steps out of bed, and subsides during the first 30 to 60 minutes of activity. Alternatively, the pain may be present when one starts any activity that involves jumping, running, or jogging. The pain usually diminishes within half an hour of walking. However, it may be difficult for the patient to walk when they start their activity after resting. The pain may force them to rest their feet and return when they attempt the activity again. This represents a cycle in which

the patient’s feet hurt when they walk, forcing them to rest, only to be painful when they walk again. The pain of plantar fasciitis may radiate into the distal calcaneal insertion of the Achilles tendon, but one must also consider other possibilities in the differential diagnosis such as tarsal tunnel syndrome or peripheral neuropathies. Physical examination should include musculoskeletal examination of the lower leg, pulses, neurological examination, and observation of gait and stance. Examination of the patient’s footwear is essential [13,14]. Palpation may reveal tenderness over the medial calcaneal tubercle [12]. Tenderness may also be present over the central fat pad, or over the origin of the abductor hallucis muscle. Passive dorsiflexion of the toes at the metatarsophalangeal joints will usually exacerbate the pain of plantar fasciitis, as the plantar fascia becomes taut in this position. With the toes dorsiflexed, palpation along the length of the plantar fascia, and especially over the medial calcaneal tubercle may reveal exquisite tenderness. Plain radiographs of the foot may show a calcaneal bone spur, and bone scans may reveal hot spots in areas of local inflammation [8]. MRI findings show increased thickness of the generally thin plantar fascia. Particular attention must be paid to the position of pain and tenderness on the plantar surface of the foot. Tenderness directly over the calcaneus, and not over the medial calcaneal tubercle may be indicative of a painful heel pad. Pain that is more medial than the medial calcaneal tubercle may indicate entrapment of the first branch of the lateral plantar nerve [8]. Finally, pain more anterior to the medial calcaneal tubercle but along the plantar fascia may come from plantar fasciitis or a tear of the plantar fascia at that point. Collateral history of injury is helpful with this situation. The treatment of chronic heel pain caused by plantar fasciitis should start with conservative measures. The first line of treatment is always prevention. In the case of plantar fasciitis, education of those most at risk for developing the condition is essential. Gastrocnemius and plantar fascia stretching before the activity will minimize microtrauma associated with running. Good athletic shoes that are comfortable, well fitting, and have good heel supports are essential [14]. Orthotic support devices should have a heel cup to support and stabilize the heel and subtalar joint on impact at heel strike. In addition to heel cups, arch supports are also useful to stabilize the medial

longitudinal arch during toe-off and stance. Night splints holding the foot in the neutral or slightly dorsiflexed position have been shown to help. Nonsteroidal anti-inflammatory medications may be helpful in the acute phase of plantar fasciitis as well as long-term adjuvant treatment [1]. Cortisone injections are included in conservative management. Conservative treatment should be given a 6-month course before moving onto surgical treatment. Bordelon [14] has found that 95% of patients who are treated conservatively respond to treatment within 6 to 10 months. Wolgin et al. [1] studied the natural history and found 85% good results at 4-year follow-up. Surgical treatment of plantar fasciitis is a last resort. Only when all conservative measures have failed, and the patient has had intractable symptoms for 6 months or more, is endoscopic release a reasonable alternative to living with the pain. The stability of the foot can be accounted for by its 3 arches and supporting structures [15]. The medial longitudinal arch is perhaps the most important stabilizer and consists of the calcaneus, talus, navicular, cuneiforms, and the first 3 metatarsals. The lateral longitudinal arch runs through the calcaneus, cuboid, and metatarsals 4 and 5. The transverse arch runs through the bases of the metatarsals, cuboid, and cuneiforms. The plantar ligaments hold these components together and reinforce the stability of the arches. The plantar fascia prevents sagging of the arch during loading by connecting its ends inferiorly. Dividing the plantar fascia decreases the stiffness of the foot, and creates a less rigid and more deformable arch [16-19]. The foot’s main functions of weight bearing and forward propulsion over uneven terrain are accommodated by its multijointed design and are stabilized by the plantar fascia. Dividing this important structure, the plantar fascia, should only be undertaken only with strict indications. We believe that patients should have conservative treatment for at least 6 to 8 months. It should include nonsteroidal anti-inflammatory drugs, stretching and strengthening exercises, physiotherapy, soft orthotics, cortisone injections, and activity modification. The diagnosis should be clearly established on clinical grounds. Other significant pathology such as tarsal tunnel syndrome or peripheral neuropathy should be excluded. The operation is reliable and safe with the proper precautions. The landmarks must be adhered to. There are few complications. We use a technique similar

Barret et al 8 2-portal technique. Our results are comparable with theirs. Placement of the cannula is important. Barrett showed that placement of the cannula should be superficial to the fascia. The portal was established using radiological measurements. Reeve et al. 20 confirms the safety of the portal, but felt that it was not possible to divide all the fascia, especially that over the abductor hallucis. We believe that, using the bony landmarks described, the portals can be reliably and safely established. A prospective study by Kinley et al [21]. showed that the endoscopic group had less pain, returned to activity sooner, and had fewer complications than a comparable open surgery group with similar results in a retrospective review by Tomczak and Haverstock [22]. There is some controversy surrounding the total versus partial release of the plantar fascia. Barrett and Day 8 described releasing the medial two thirds of the plantar fascia. Stability of the

arch is felt to be lost with complete release. There is biomechanical evidence of this. A study was carried out to determine the biomechanical characteristics of the plantar fascia before and after partial and total plantar fasciotomy. Studies found that there was a significant difference between the stiffness of the intact plantar fascia and that following selective partial plantar fasciotomy [15-20]. The clinical efficacy of partial or selective release has not been determined. Attempts at 75% release in cadavers showed this was achieved in a range of 53% to 100%. The deep fascia of the abductor hallucis was not released. There was no damage to the neurovascular structures. However, if some of this important structure can be preserved and still obtain good pain relief, this would be a further advance [23]. Gastrocnemius recession has been advocated as treatment of its own. Hoefnagels and colleagues similarly studied the effect of a gastrocnemius recession for

non-responsive plantar fasciitis [24]. The study consisted of 32 patients not responding to conservative care. At a 12-month follow-up, the authors assessed all who had a gastrocnemius recession after failing conservative care. Ankle joint dorsiflexion increased 16 degrees, the VAS decreased from 78 to 20 (100-point scale) and the authors noted excellent satisfaction rates postoperatively. A comparative study between Plantar fasciotomy Vs Gastroc recession was done which consisted of 30 patients in each surgical group. Clinical outcomes included VAS score, AOFAS ankle-hindfoot scores, weightbearing, return to work, eccentric exercise ability and patient satisfaction. The authors concluded that proximal medical gastrocnemius release became our procedure of choice and fasciotomy only considered in rare cases of gastrocnemius proximal-medial release failure [25]

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