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Research Article

Functional Outcome of Open Calcaneal Spur Resection and its Association with Plantar Fascitis

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ABSTRACT:
Background: Plantar heel pain is a common clinical condition in orthopedic practice, affecting approximately 10% of the population. It has several etiologies, including plantar fasciitis and calcaneal spur. However, assessment of the relationship between plantar fasciitis and calcaneal spur has produced divergent results. Herein, we aimed to assess the outcomes in patients undergoing calcaneal spur resection and its association with plantar fasciitis.
Methods: Twenty-five patients with heel pain who were treated conservatively for at least 12 months between November 2022 and October 2023 were included in the study. The American Orthopaedic Foot and Ankle Score (AOFAS) and Visual analogue scale (VAS) for pain, Roles and Maudsley score were calculated preoperatively and postoperatively, which were then compared.
Results: A calcaneal spur was a potential pathological factor contributing to plantar fasciitis. The AOFAS, VAS, and Roles and Maudsley scores significantly improved postoperatively. Furthermore, there was no recurrence of calcaneal spurs.
CONCLUSION: Surgical excision of calcaneal spurs appears to offer definitive pain relief and is highly effective in managing cases of refractory plantar fasciitis.

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INTRODUCTION

Heel pain attributed to plantar fasciitis is a prevalent condition, affecting approximately 12–15% of the population. It is typically associated with degenerative alterations in the heel fat pad, mechanical irregularities in the arch that heighten tension on the plantar fascia, and demographic factors such as advancing age, obesity, and occupational weight-bearing activities. Other recognized risk factors include inadequate footwear cushioning, excessive foot pronation, and restricted ankle dorsiflexion, which could lead to inflammatory or degenerative changes in the fascia and periostitis of the medial calcaneal tubercle. Chronic plantar pain most frequently results from repetitive microtrauma or compression of neurologic structures [1,2]. Several studies have indicated that a calcaneal spur is one of the causes of plantar fasciitis[3]. Pathologic studies have reported that the calcaneal spur is located on, not in, the plantar fascia. Furthermore, its trabeculae are perpendicular to the plantar fascia, suggesting that the calcaneal spur receives vertical stress from the ground rather than tensile stress from the plantar fascia[3,4]. Numerous surgical techniques have been reported for resolving recalcitrant heel pain, each with variable success. Although endoscopy ablation and other minimally invasive procedures have become popular, open plantar fasciotomy with heel spur resection (OFHR) continues to be performed.

The results of OFHR are similar to those of less invasive alternatives[4]. However, data regarding long-term outcomes, surgical outcomes in specific patient populations such as athletes, diabetics, and those with underlying foot conditions, and consensus on the optimal surgical technique for calcaneal spur excision are limited.

Thus, in this study, we aimed to assess the outcomes of patients undergoing calcaneal spur resection and its association with plantar fasciitis.

MATERIALS AND METHODS

The study was approved by the Institutional Ethics Committee, and informed consent was obtained from the patients. We evaluated 25 patients with heel pain who had been treated conservatively for at least 12 months between November 2022 and October 2023. Heel walking test was conducted, and the patients were asked about their heel pain.

The American Orthopaedic Foot and Ankle Score (AOFAS), Visual Analogue Scale (VAS) for pain, and Roles and Maudsley score were calculated. The inclusion criteria were as follows: patients in whom conservative management for 12 months had failed and patients with a calcaneal spurs on radiographs.

The exclusion criteria were as follows: patients with an active plantar infection; patients with a history of systemic inflammatory or metabolic disease, such as rheumatoid arthritis and diabetes mellitus; patients who have undergone ipsilateral foot or ankle surgery for another condition; patients in whom surgery was performed at another centre; and patients lost to follow-up. Five patients who did not meet the inclusion criteria were excluded from the study.

Surgical procedure:

A 3–4-cm horizontal incision was made on the medial aspect of the heel, centered around the calcaneal spur through the baseline (Fig 1). The proximal-central part of the fascia was loosened, and the lateral and deep fascia were preserved and calcaneal spur was identified (Fig 2). The calcaneal spur was osteotomized under C-arm guidance (Figs 3, 4) and peeled off from the surrounding soft tissue connections.

Any sharp remnant of the calcaneal spur was made blunt with a rasp. The incision was closed in layers (Fig 5). A below-knee splint, which kept the ankle in neutral, was applied for two weeks postoperatively. After the 15th postoperative day, the splint was applied only at night for 1 month. Non-weight-bearing mobilization was initiated for the first 15 postoperative days.

Thereafter, partial weight-bearing was initiated. After 30 days, the patients was mobilized with full weight-bearing without support.

Fig 1. Skin marking of the surgical incision. A 3–4 cm horizontal incision was made on the medial aspect of the heel, centred over the calcaneal spur.

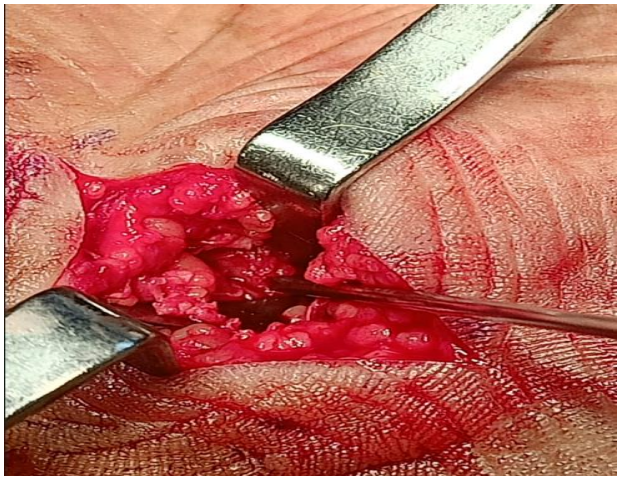

Fig 2 Calcaneal spur identified following exposure

Fig 3 Excised calcaneal spur

Fig 4 Intraoperative C-arm image after excision of calcaneal spur

Fig 5 Final closure of the wound

The preoperative and postoperative AOFAS (Fig 6), VAS (Fig 7), and Roles and Maudsley score (Fig 8) were compared and analyzed. During follow-up, the radiographs were examined for any recurrence of calcaneal spurs

Fig 6. AOFAS Ankle – Hindfoot score

1. PAIN (40 points)	
None	+40
Mild, occasional	+30
Moderate, daily	+ 20
Severe, almost always present	+0
2. FUNCTION (50 points)	
Activity limit	
no limitations, no support	+10
no limitations of daily activities, limitations of recreational activities, no support	+7
limited daily and recreational activities, cane	+4
severe limitation of daily and recreational activities, walker, crutches, wheelchair, brace	+0
Maximum walking distance, blocks	
Greater than six	+5
Four-six	+4
0ne- three	+2
Less than one	+0
Walking surfaces	
No difficulty on any surface	+5
Some difficulty on uneven terrain, stairs, inclines, and ladders	+3
Severe difficulty on uneven terrain, stairs, inclines, and ladders	+0
Gait abnormality	
None	+8
Obvious	+4
Marked	+0
Sagittal motion (flexion + extension)	
Normal or mild restriction (>= 30deg)	+8
Moderate restriction (15 deg-29deg)	+4
Severe restriction <15deg	+0
Hindfoot motion(inversion + eversion)	
Normal or mild restriction (75%-100%	+6
Moderate restriction (25%-74%)	+3
Marked restriction (<25%)	+0
Ankle-hindfoot stability (AP, varus-valgus)	
Stable	+8
Definitely unstable	+0
3. ALIGNMENT (10 POINTS)	
Good, plantigrade foot, ankle-hindfoot well aligned	+10
Fair, plantigrade foot, some degree of ankle Hindfoot malalignment observed, no symptoms	+5
Poor, non-plantigrade foot, severe malalignment Symptoms	+0

Total score (100 points)
---------- pain points
----------function points+
---------- alignment points=

---------- total points/100 points

Fig 7 Visual analog score

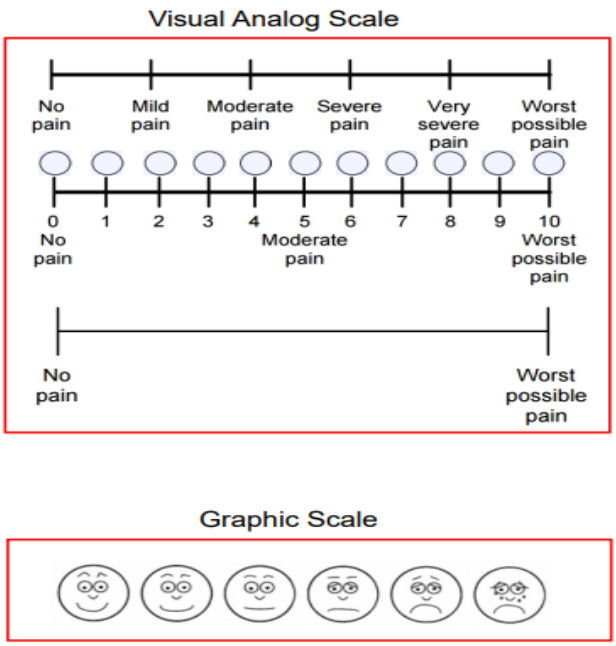

Fig 8 Roles and Maudsley score

	Point	Interpretation
Excellent	1	No pain, full movement and activity
Good	2	Occasional discomfort, full movement and activity
Fair	3	Some discomfort after prolonged activity
Poor	4	Pain-limiting activities

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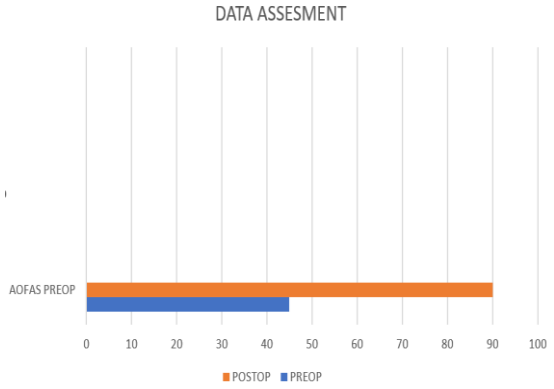
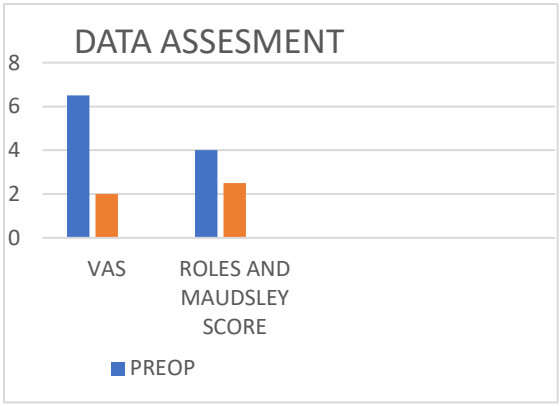
RESULTS

Twenty active adults with heel pain who did not have any chronic diseases underwent operative intervention for a calcaneal spur. Subsequently, 13 patients exhibited significant improvement in symptoms during the follow-up. Five patients demonstrated a good outcome and improved AOFAS, Roles and Maudsley score, and Visual Analog Scale (Fig.9). Two patients continued to experience heel pain.

Fig 9 Average preoperative and postoperative data assessment scores





DISCUSSION

Approximately 12–15% of the population experiences heel pain, which is typically localized at the site of plantar fascia attachment to the medial tubercle of the calcaneus process. The location of the pain suggests that plantar fasciitis is the most common cause of heel pain. While plantar fasciitis is often linked to the presence of calcaneal spurs, the association between them remains a topic of debate because clear evidence is lacking.

The first step in the treatment of plantar fasciitis is conservative treatment [5]. Conservative treatment consists of physical therapy methods to relieve tension in the plantar fascia, orthoses for the plantar region, and anti-inflammatory drugs. Approximately 85–90% of these patients respond to conservative management. However, in patients who do not respond to conservative treatment within 12 months, may require surgical intervention [6]. In our study, surgical intervention was performed in patients with plantar fasciitis and calcaneal spur who did not respond to 12 months of conservative treatments.

Surgical treatment options for plantar fasciitis include conventional open fasciotomy, endoscopic fasciotomy, neurolysis or denervation, osteotomy of the calcaneus, spur excision[8,9,10] These treatment options can be performed alone or in combination with each other. These surgical interventions reportedly significantly improve functional scores in patients who have not benefited from conservative treatment [9-14]. The AOFAS score at 12 months, the VAS score, and Roles and Maudsley score at 12 months are reportedly significantly superior[4] to the preoperative scores. Furthermore, surgical excision of the calcaneal spur result in satisfactory functional results and improvement in pain were reported. Although calcaneal spur excision is reportedly a safe surgery with low complication rates[3], there is no consensus regarding which surgical procedure is superior [10,15-19]. The results of our study were similar to those of previous studies; the AOFAS, VAS, and Roles and Maudsley scores improved significantly postoperatively in 90% of the study participants. Therefore, calcaneal spur excision may offer definitive pain relief in patients with plantar fasciitis.

Our study had some limitations, such as a small sample size, short follow-up period, selection bias, and lack of blinding, which may hinder drawing definitive conclusions regarding effectiveness of surgical management of calcaneal spurs. Randomized control trials with larger sample sizes are required to externally validate our findings, definitely determine the efficacy of open resection, and evaluate the superiority of surgical intervention to conservative treatment.

CONCLUSION:

This study investigated the outcomes of open surgical calcaneal spur resection in a cohort of 20 patients experiencing chronic plantar heel pain and calcaneal spur. Although the small sample size limits generalizability, our findings suggest that open surgical resection may be a viable treatment option for select patients with persistent pain refractory to conservative measures

Consent

Written informed consent was obtained from the study participants.

Conflict of interest statement

The authors declare no conflict of interest in relation to this study. No sources of funding were provided for this work.

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