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Endoscopic Release for Management of Chronic Plantar Fasciitis

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Abstract

Plantar fasciitis is the most prevalent cause of inferior heel pain. The etiology of the disease is not clear in some cases while it may be clear in other cases. Evaluating the early clinical outcome of endoscopic planter fasciitis release operation (subjective and objective). Endoscopic release of plantar fascia was done on 20 feet of 20 patients with chronic plantar fasciitis for at least one year and resistant for at least two measures of conservative treatment for six months. The diagnosis was supported by history and clinical evaluation. The study was carried at the Department of Orthopedics, AL-Zahraa University Hospital, Faculty of Medicine, Al-Azhar University in the period between February 2021 and July 2021. There is a significant change in AOFAS from 44.75±8.61 before the operation to 90.9±13.35 six months after the operation with a mean difference of 46.15. While The VAS score shows a significant change from 6.8±1.06 before the operation to 1.7±2.54 six months after the operation with a mean difference of -5.1. Endoscopic plantar fascia release might be a viable alternative for management of chronic resistant plantar fasciitis with no major complications.

Keywords: Plantar fascia, Plantar fasciopathy, Endoscopic release, Heel pain, micro trauma.

1. Introduction

The Plantar fasciitis is considered one of the most prevalent causes of heel discomfort, often with severe restriction of activity [1]. Variety of names describe heel pain, plantar fasciitis, jogger's heel, tennis heel, police officer's heel. [2]. The etiology of the disease is not clear. It may be a degenerative syndrome as the result of irritation (chronic micro injuries) which lead to overstrain on the planter fascia, that induces pathological deformations such as mucoid degeneration, reparative inflammation, then calcification [3]. The classic symptom of plantar fasciitis is that the worse pain which may be throbbing, dull aching or sharp pain occur with the primary few steps within the morning or at the start of the activity that decrease as they warm up. In more severe cases, pain will be continued all over the day [4]. by examination there is tender to palpation at medial tuberosity of calcaneus [5] with limited ankle dorsiflexion due to a tight Achilles tendon. The condition may be associated with calcaneal apophysitis_ gastrocnemius-soleus contracture and heel pain traid (plantar fasciitis_ posterior tibial tendon dysfunction_ tarsal tunnel syndrome) [6]. Non-surgical treatment of plantar fasciitis such as pain control

therapy, splinting, physical therapy, local injection of PRP or corticosteroid has reported success rate about 90% but it's going to require months to resolve [7]. Many surgical approaches were proposed, with varying degree of success. Surgical procedures included calcaneal drilling, planter fascia release and gastrocnemius recession [8]. Endoscopic plantar fascia release may be superior than open surgery in the treatment of planter fasciopathy because of minimal complications. [9]. The aim of the work to evaluating the early clinicaloutcome of endoscopic planter fascia release in treatment of chronic planter fasciitis (subjective and objective).

2 .Methodology

Endoscopic planter fascia release operation was carried out on 20 patients 11 males (11 feet) 9 females (9 feet) at Al-Azahraa University Hospital _ Faculty of Medicine for Girls (Azhar University) during the period between February 2021 and July 2021 with 6 months follow up. All patients were educated about the operation, the possible complications and results. Written informed consents were obtained and the study approved by the Local Ethical Committee. All patients were clinically assessed preoperatively with respect to the level of pain, function, gait, range of motion, and patient satisfaction to drive the modified American Orthopaedic Foot and Ankle Society (AOFAS) score [16].

2.1. Inclusion criteria

Patients included in the study are adults more than 18 years old, presented by a heel pain with local pressure at the origin of plantar fascia on the medial calcaneal tuberosity for one year, with: Failure of at least two lines of conservative treatment for at least 6 months.

2.2. Exclusion criteria

Patients less than 18 years old presented by pesplanus, pescavus, limb length discrepancy, in-toeing, neuro-muscular disorders, history of generalized polyarthritis, or prior heel surgery were not included in the study.

2.3. Informed consent

Informed consent was taken from every patient to be involved in the study.

2.4. All patients were subjected to the following:

- **History:** Personal history: included (name, age, sex, laterality, occupation and residence), history of present illness, past medical and surgical history.

- **Examination:** Local examination by inspection and palpation tenderness at medial tuberosity of calcenous increased with dorsiflexion of the toes and foot, tenderness at origin of abductor halluces, Special test: The Silverskiold test used to assess for gastrocnemius equinus, Tinel test: percuss along the distal portion of the tibial nerve to rule out tarsal tunnel syndrome, Calcaneus squeeze test: to rule out calcaneal stress fracture. General *examination* to detect other causes of heel pain.

- **Investigations:** the diagnosis is supported by history and clinical examination. However Preoperative x-ray of the calcaneus was obtained for evaluation the presence of heel spur.

- **MRI:** Show Thickening and signal changes in the Planter Fascia as well as oedema of adjacent soft tissues and bone marrow with abnormalities in the fat pad located deep below the Planter Fascia. **U/S:** Show any abnormalities in the planter fascia.

- **Laboratory:** Uric acid, C-reactive protein, and erythrocyte sedimentation rate and rheumatoid factor. Rheumatologic screening can be important in some instances (young patient, multiple sites of pain) so they are useful to rule out inflammatory *arthritis* as RA, Reiter's syndrome.

2.5. All Patients were assessed preoperatively by the following two scores:

- **Morning Pain:** A visual analogue scale ranging from 0 (no pain) to 100 (maximal pain).

- **American Orthopedic Foot and Ankle-Hindfoot Scale (AOFAS):** It includes pain (40 points), function (50 points) and alignment assessment (10 points) (table 7).

- **Follow up:** The first follow up was after removal of stitches and start full weight bearing nearly two weeks after operation**.**

2.6. The patients then assessed for pain and performance improvement at 4 weeks, 3months and 6months postoperatively supported by the following:

1. Morning Pain

2. American Orthopedic Foot and Ankle-Hindfoot Scale (AOFAS). Regarding the bilateral cases the most tender side was operated first then after full weight-bearing other side was done.

2.7. Statistical analysis

The data were tested for normality using the Kolmogorov-Smirnov test and for homogeneity variances prior to further statistical analysis. Categorical variables were described by number and percent (N, %), where continuous variables were described by the mean and standard deviation (Mean, SD). To compare between continuous variables by t-test (One Way ANOVA test was used to compare between more than two groups in related samples and the Paired test was used to compare between two groups in related samples). A two-tailed $p < 0.05$ was considered statistically significant. All analyses were performed with the **IBM SPSS 20.0 software**.

2.7.1. Demographic data

Table (1): Demographic data.

	No. (n=20)	%
Gender		
• Male	11	55.0
• Female	9	45.0
Age		
• Range	18 – 60	
• Mean ± SD	46.9±9.32	
Laterality		
• Left	12	60.0
• Right	8	40.0
Wt (kg)		
• Range	70 – 110	
• Mean ± SD	79.1±8.4	
Ht (m)		
• Range	1.5 - 1.78	
• Mean ± SD	1.66±0.07	
BMI		
• Range	23.18 - 34.89	
• Mean ± SD	28.88±3.52	

2.7.2. Age

Patient age group between 18-60 years, the average of age was 46.9±9.32 as shown in Fig. 1.

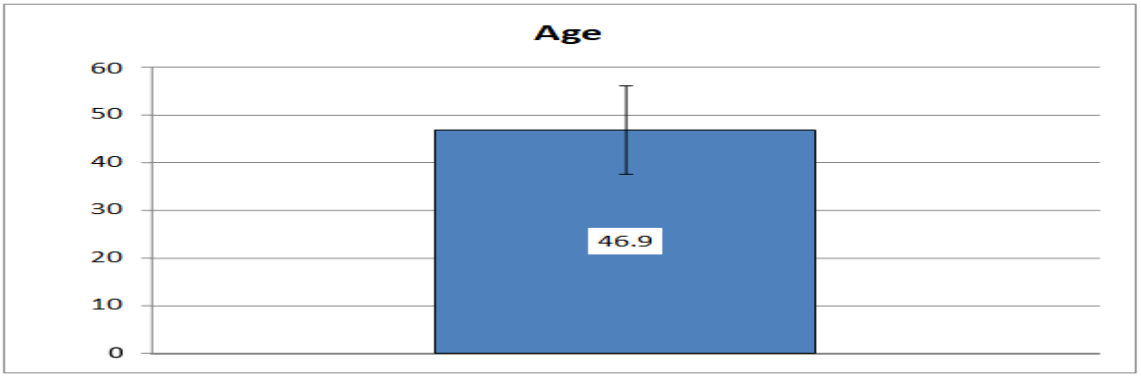

Figure (1): Clustered column chart showing (Mean ± SD) age.

2.7.3. Sex distribution

There were 11 (55%) males and 9 (45%) females as shown in Fig. 2.

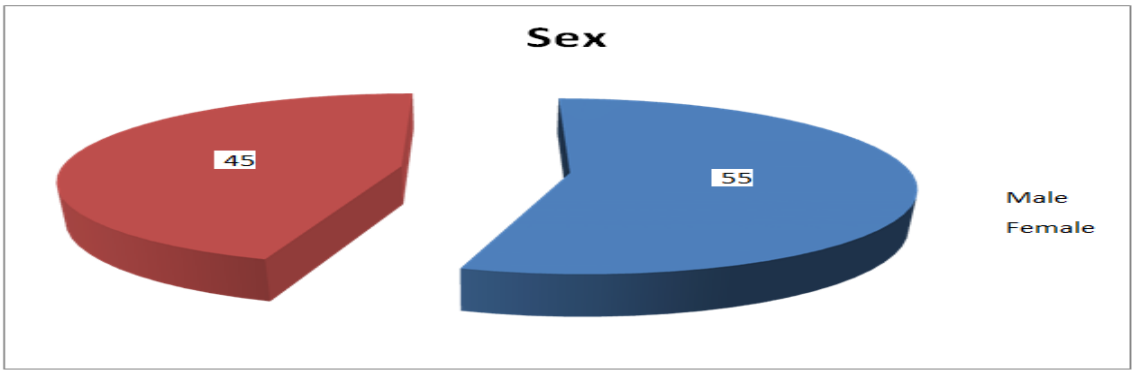

Figure (2): Exploded pie in 3-D chart showing percentage of sex types.

2.7.4. Body mass index

Ranged from 23.18 to 34.89, the average of BMI was 28.88±3.52 as shown in Fig. 3.

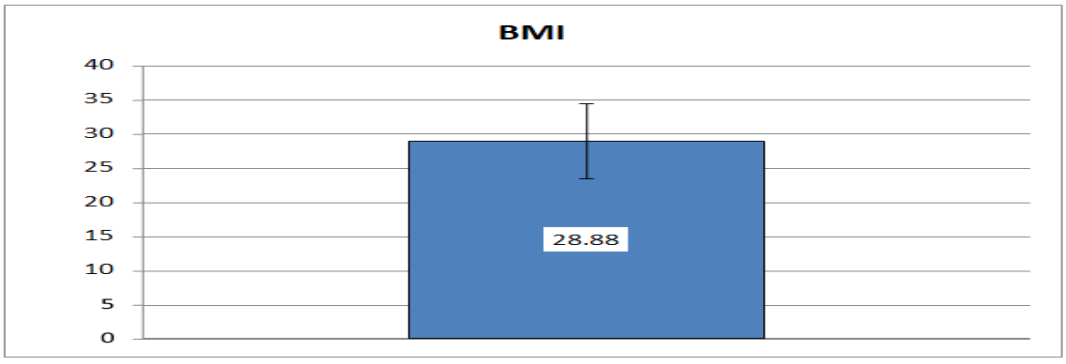

Figure (3): Clustered column chart showing (Mean ± SD) BMI.

2.8. Clinical data

2.8.1. Conservative treatment before procedure

20 (100%) cases are treated conservatively for one year, and all of them received local injection as well (Table 2,3 & Fig. 4,5).

Table (2): Duration of conservative treatment.

	Range	Mean ± S D
Duration of conservative treatment (year)	0.5 – 4	1.58±1.14

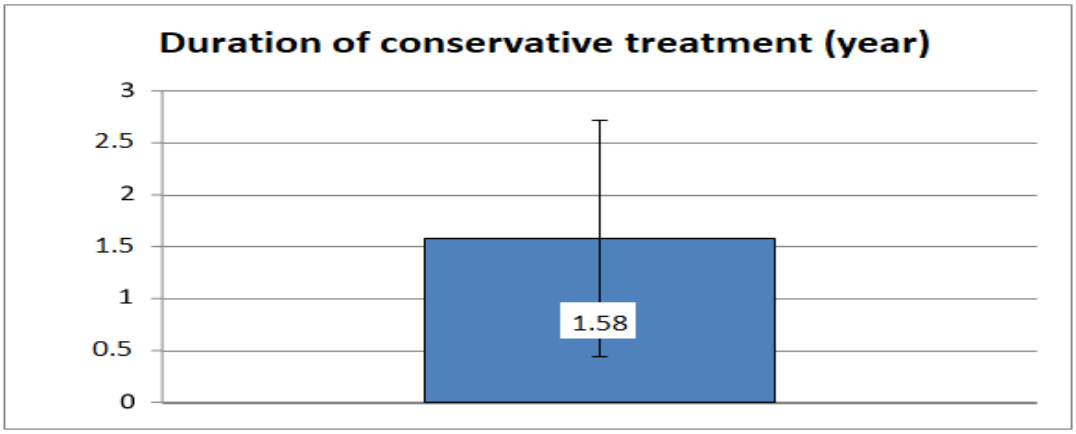

Figure (4): Clustered column chart showing (Mean ± SD) duration of conservative treatment (year).

Table (3): Patients who received local injection as a conservative treatment.

Local injection	No. (n=20)	%
Yes	20	100.0
No	0	0.0

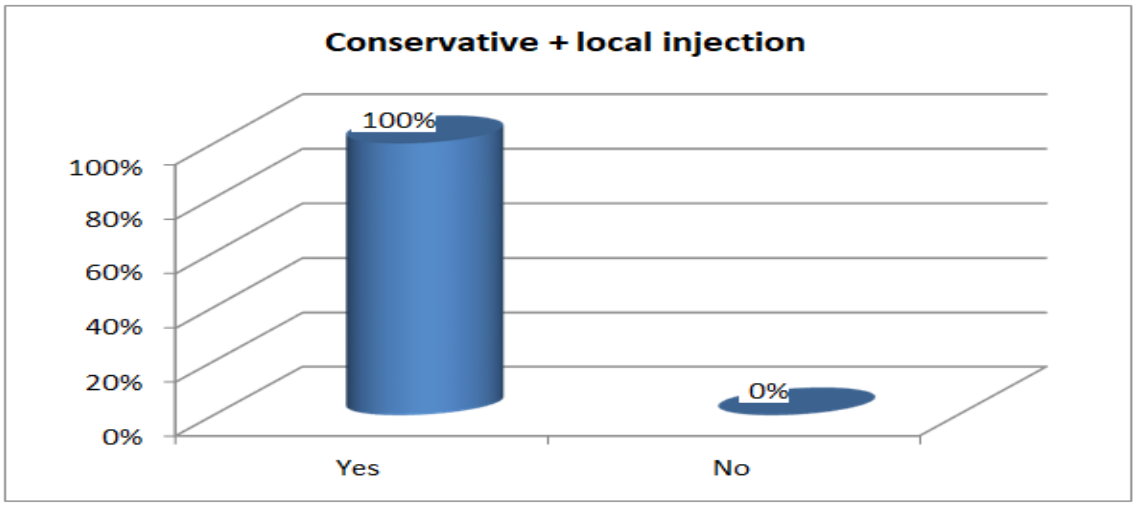

Figure (5): Clustered cylinder chart showing percentage of patients who received local injection.

2.8.2. Diabetic patients

There are no diabetic patients among the cases (Table 4 & Fig. 6).

Table (4): Diabetic patients.

Diabetic	No. (n=20)	%
Yes	0	0.0
No	20	100.0

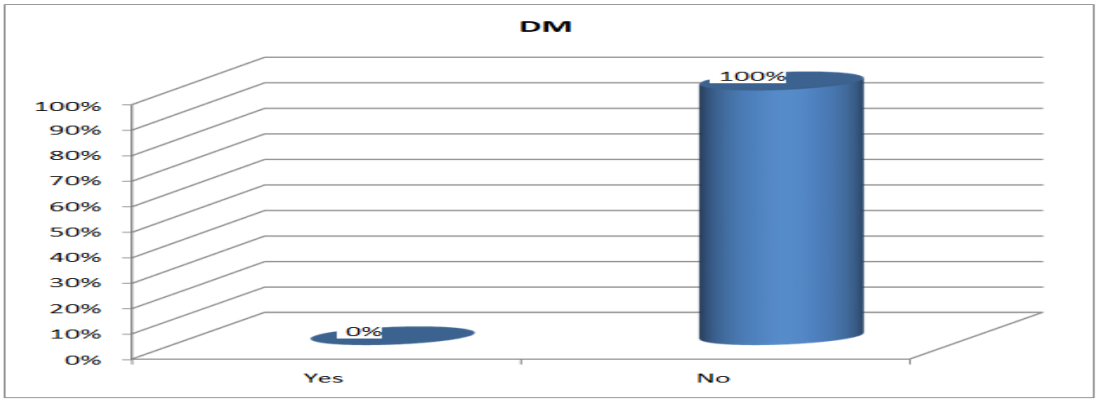

Figure (6): Clustered cylinder chart showing percentage of diabetic patients.

2.8.3. Presence of calcaneal spur

There were 11 (55%) cases had calcaneal spur and 9 (45%) cases did not have in preoperative x-rays (Table 5 & Fig. 7).

Table (5): Calcaneal spur.

Calcaneal spur	No. (n=20)	%
Yes	**11**	**55.0**
No	**9**	**45.0**

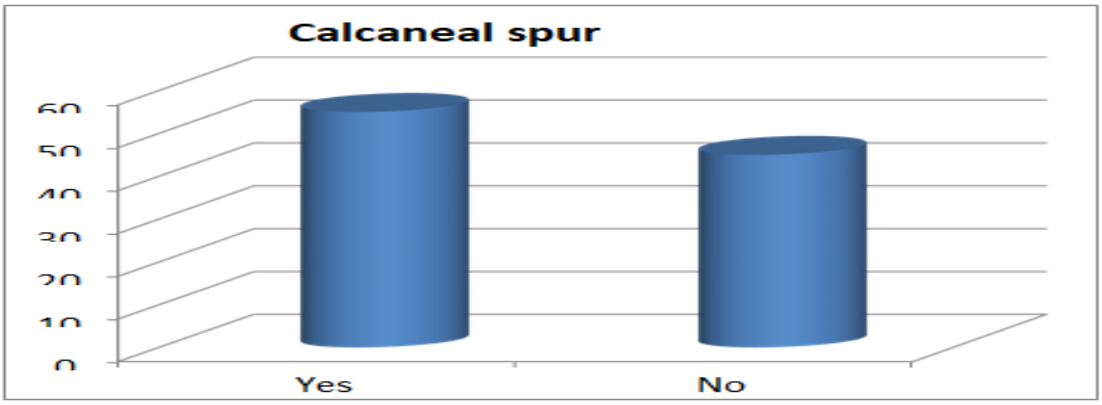

Figure (7): Clustered cylinder chart showing percentage of calcaneal spur.

3. Methods of treatment

Prophylactic broad-spectrum antibiotic in the form of cephalosporin one-hour preoperative, surgery performed under general or spinal anesthesia, in the supine position with the foot hanging outside the edge of the table. A pneumatic tourniquet was maintained on the thigh throughout the procedure. A medial portal was developed 1 cm away from the plantar skin along a vertical line passing through the posterior border of the medial malleolus with the foot in neutral position between red and Wight line. a blunt tip trocar was then introduced transversely in the subcutaneous tissue just inferior to the plantar fascia. A lateral portal was made in the lateral side between the red and Wight line where the trocar emerges Fig. 8. (A, B), open way cannula is then introduced guided by the trocar to emerge from lateral to medial portal deep to planter fascia. A gauze tape was then passed between the medial and lateral portals many times to create a subcutaneous tunnel and to remove the subcutaneous fat (fat bad) over the planter fascia ,endoscope is introduced from lateral portal to see size of the planter fascia then the knife or scissor is then introduced from the medial portal to cut the medial third of the planter fascia until the fleshy fibers of flexor digitorum brevis muscle appear.

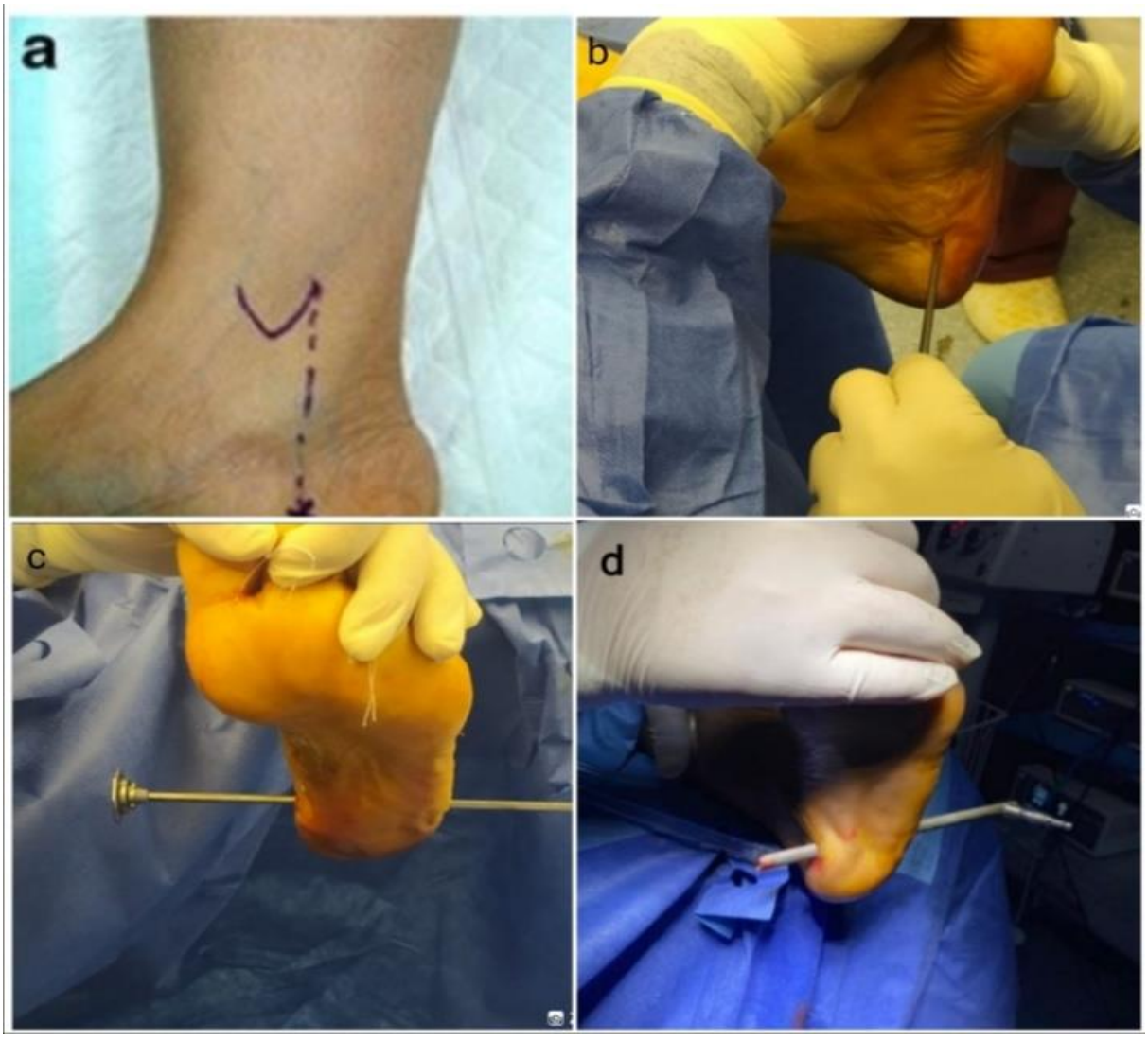

Figure (8): **(A)** Intraoperative photograph showing the landmarks of the medial portal. **(B, C)** Intraoperative photograph showing the blunt trocar transfixing the heel and emerging from the lateral portal. **(D)** Intraoperative photography showing open cannula emerge from lateral portal to medial portal.

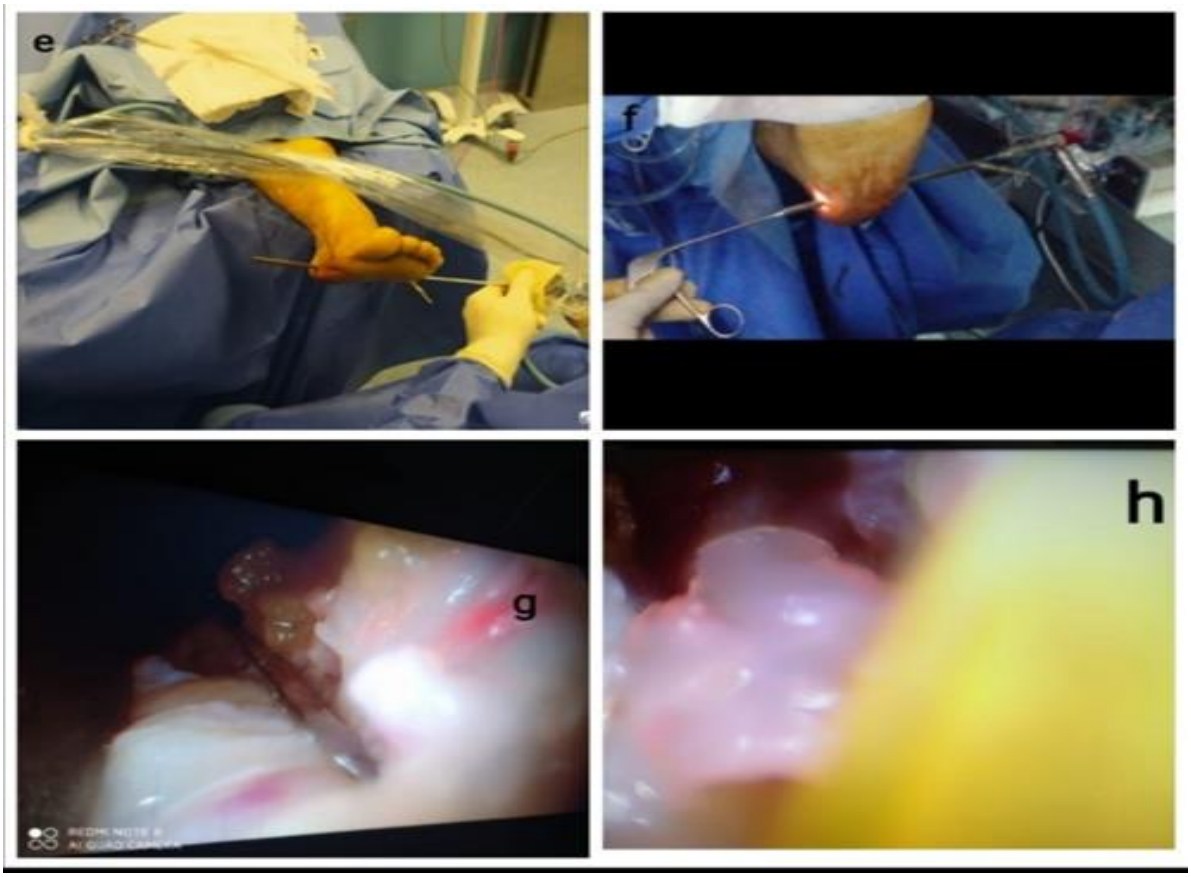

Figure (9): (E, F) Intraoperative photography showing endoscope enter through lateral portal and scissor through medial portal. (**G**, **H**) Intraoperative photography showing cutting of medial third of the planter fascia with appearance of fleshy fibers of FDB muscle.

4. **Post-Operative management**

Prophylactic broad-spectrum antibiotic in the patient was allowed to begin ambulation the next day. The dressings were changed on day 3 and the sutures were removed on day 10. The clinical results were evaluated in terms of pain, activity level, time for return to full activity, and patient satisfaction. Patients were instructed to begin weight-bearing with a surgical or any comfortable shoes with silicone insoles (plantar fasciitis shoe inserts), as tolerated from the second day. Antibiotic prophylaxis in the form of cephalosporin was administered for three days.

5. Time for return to full activity

Ranged from 2 to 6 weeks with an average of 3.85±1.09 (Table 6 & Fig. 10).

6. Assessment of the patients in the postoperative care

The results will be assessed according to American Orthopedic Foot and Ankle Scale (AOFAS) and Visual Analogue Scale (VAS) in both visits in addition to patient satisfaction level and time for return to full activity. Ankle-Hind foot Scale (100 Points Total) [11]. Scores 80-100 were considered as an excellent result, 60-79 as good, 40-59 as fair, as and less than 40 as poor. Patients with excellent and good results were classified as satisfactory while patients with fair and poor results were classified as unsatisfactory. Visual Analog Scale (VAS) [10].

Table (6): Time for return to full activity.

Time for return to full activity	No. (n=20)	%
2 weeks	1	5.0
3 weeks	8	40.0
4 weeks	6	30.0
5 weeks	3	15.0
6 weeks	2	10.0
Range (min – max)	2 – 6	
Mean ±SD (wks.)	3.85±1.09	

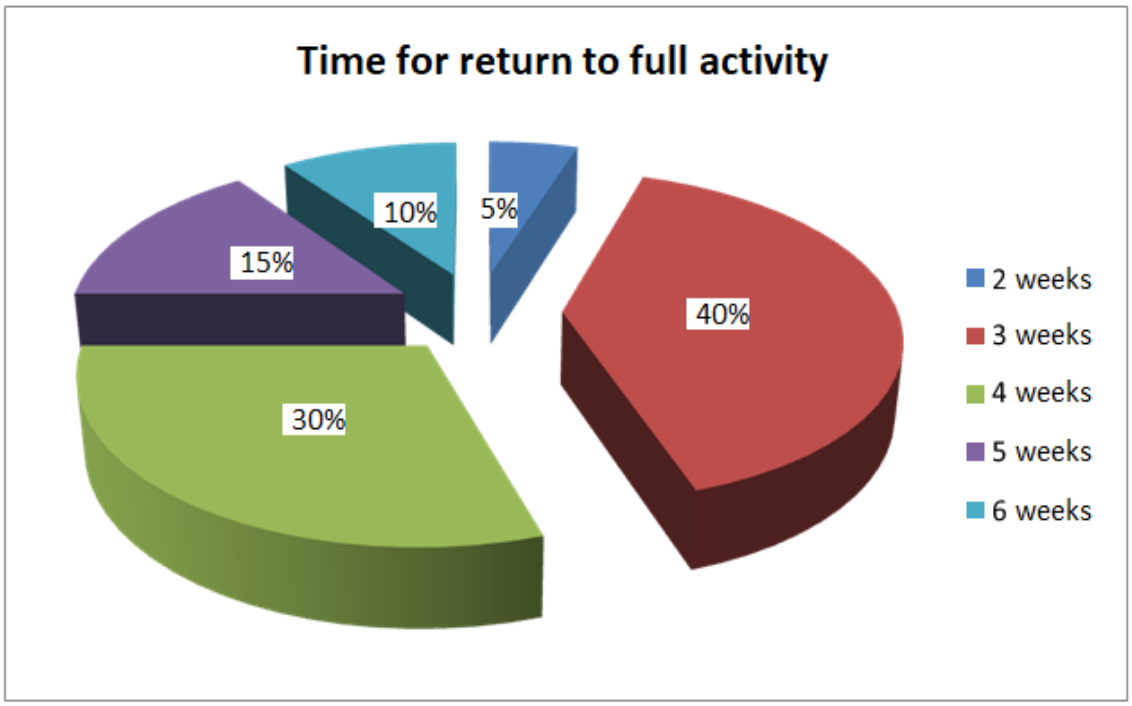

Figure (10): Exploded pie in 3-D chart showing percentage of time to return to full activity.

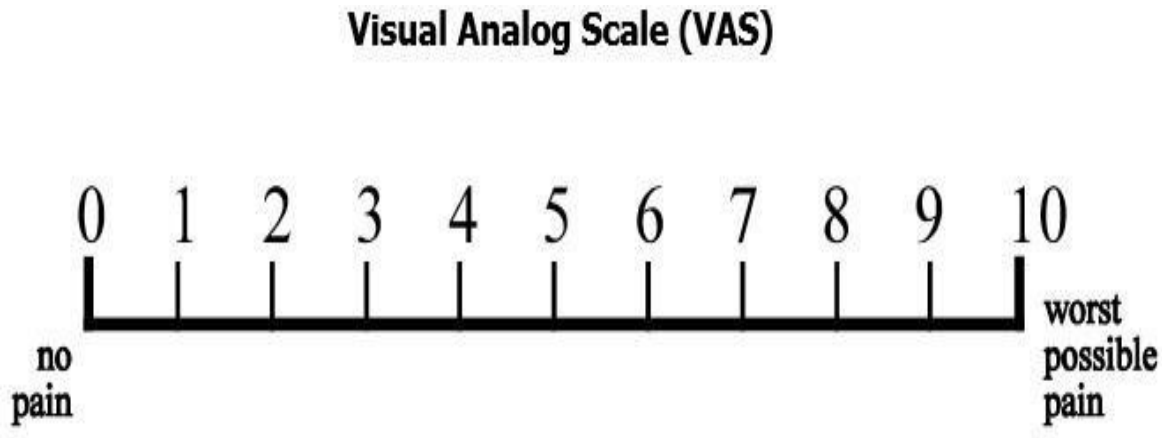

Figure (11): Diagram of visual analog scale.

Table (7): AOFAS Clinical Rating System (Ankle-Hindfoot Scale).

Category	Variable	Score
	- None	30
	- Mild, occasional	20
Pain (40 points)	- Moderate, daily	10
	- Severe, almost always present	0
Function (50 points)		
1) Activity limitations, support requirements	- No limitations, no support	10
	- No limitation daily activities, limitation of recreationalactivities, no support	7
	- Limited daily & recreationalactivities, cane	4
	- Severe limitation daily &recreational activities, walker, crutches,wheelchair, brace	0
2) Maximum walking distance, blocks	- > 6	5
	- 4-6	4
	- 1-3	2
	- <1	0
3) Walking surfaces	- No difficulty on any surface	5
	- Some difficulty on uneven terrain, stairs, inclines,ladders	3
	- Severe difficulty on uneven terrain, stairs, inclines, ladders	0
4) Gait abnormality	- None, slight	8
	- Obvious	4
	- Marked	0
5) Sagittal motion (flexion + extension)	- Normal/mild restriction(≥30°)	8
	- Moderate restriction (15-29°)	4
	- Severe restriction (<15%)	0
6) Hindfoot motion (inversion + eversion)	- Normal/mild restriction (75-100% normal)	6
	- Moderate restriction(25-74% normal)	3
	- Marked restriction (<25%normal)	0
7) Stability (anterior-posterior, Varus-	- Stable	8
valgus)	- Definitely unstable	0
	- 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		100

7. Results

Comparison between pre-operation, 2 months and 6 months post- operation via AOFAS.

There is a significant change in AOFAS from 44.75±8.61 before the operation to 90.45±11.69 in the first follow up visit (two months after the operation) with a mean difference of 45.7 and there is a significant change in AOFAS from 44.75±8.61 before the operation to 90.9±13.35 six months after the operation with a mean difference of 46.15. There is no significant change in AOFAS from 90.45±11.69 two months after the operation to 90.9±13.35 six months after the operation with a mean difference of 0.45 **(Table 8 & Fig. 12)**.

Comparison between pre-operation, 2 months and 6 months post- operation via VAS.

There is a significant change in VAS from 6.8±1.06 before the operation to 1.45±1.96 in first follow up visit (two months after the operation) with a mean difference of -5.35 and there is a significant change in VAS from 6.8±1.06 before the operation to 1.7±2.54 six months after the operation with a mean difference of -5.1.

There is no significant change in VAS from 1.45±1.96 two months after the operation to 1.7±2.54 six months after the operation with a mean difference of 0.25 **(Table 10 & Fig. 12).**

Table (8): AOFAS Ankle-Hind foot Score

AOFAS Ankle-Hind footScore	Range	Mean ± SD	P. value	P1	P2	P3
Preoperative	38 – 64	44.75±8.61	<0.001**	<0.001**	<0.001**	0.723
After 2 months	64 – 100	90.45±11.69				
After 6 months	64 –100	90.9±13.35				

P. value: Comparison between pre, after 2 m and after 6m., **P1:** Comparison between pre and after 2m., **P2:** Comparison between pre and after 6m, **P3:** Comparison between after 2m and after 6m.

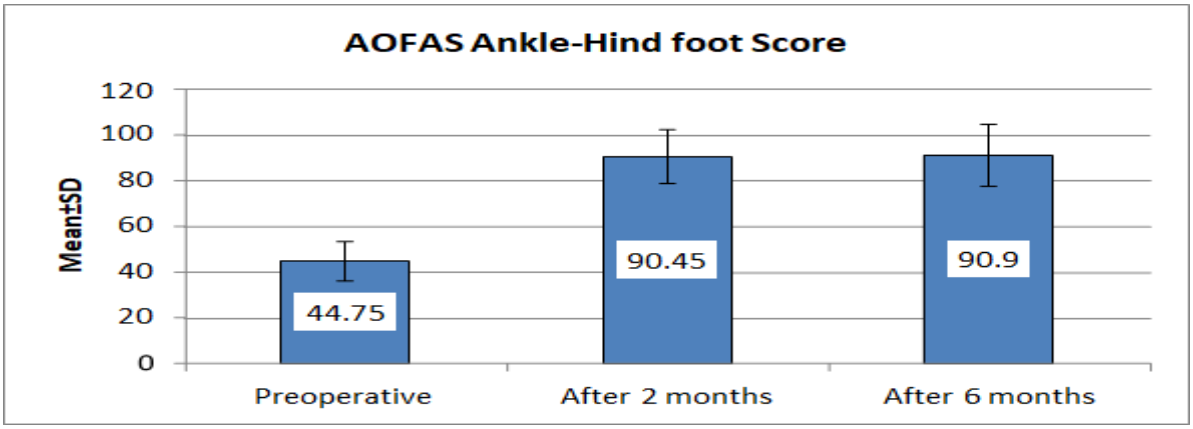

Figure (12): Clustered column chart showing (Mean ± SD) of AOFAS Ankle-Hind foot Score (Preoperative, Postoperative after 2m and 6m).

Table (9): AOFAS Ankle-Hind foot Score

Visual analogue scale	Range	Mean ± S D	P. value	P1	P2	P3
Preoperative	5 - 8	6.8±1.06	<0.001**	<0.001**	<0.001**	0.330
After 2 months	0 - 6	1.45±1.96				
After 6 months	0 - 7	1.7±2.54				

P. value: Comparison between pre, after 2m and after 6m., **P1:** Comparison between pre and after 2m., **P2:** Comparison between pre and after 6m., **P3:** Comparison between after 2m and after 6m.

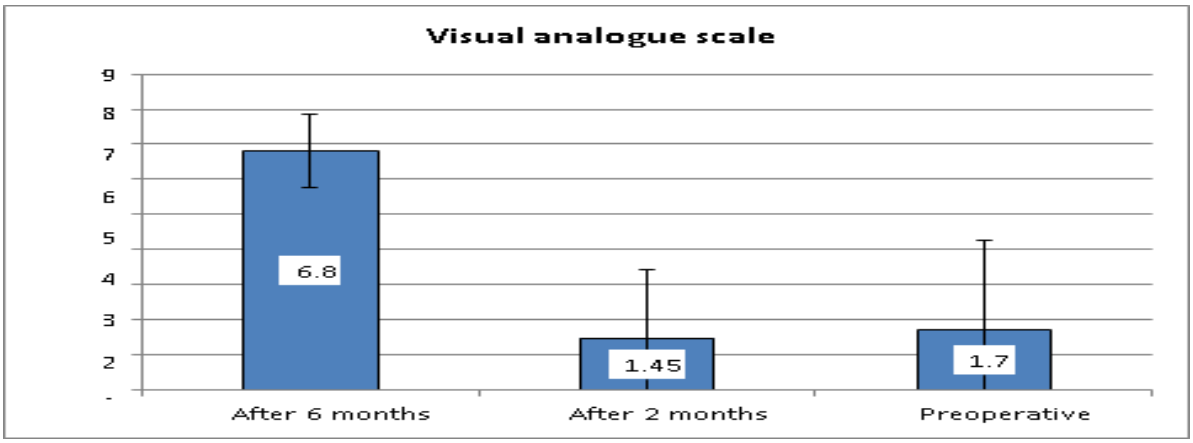

Figure (13): Clustered column chart showing (Mean ± SD) of Visual analogue scale (Preoperative, Postoperative after 2m and 6m).

On subjective evaluations according to pain (Table 11 & fig. 37), 12 of the 20 patients (60%) were very satisfied (no pain), 3 patients (15%) were satisfied with the results of treatment (pain only with heavy use) and 5 of 20 patients (25%) were not satisfied (less but persistent pain at morning and with ordinary activity). All the patients had a full range of ankle motion at the last follow-up examination and returned to their former occupations or activities. All of them were satisfied with the incision scar.

8. Complications of the study

No major complication was noted in our study. Just Superficial infection was recorded in one patient, and it was improved with oral antibiotics. Post-procedural pain was reported by almost all patients which required paracetamol.

9. Discussion

Plantar fasciitis is the most relevant cause of inferior heel pain [12]. In chronic cases after failure of conservative treatment many surgical techniques are reported, like open, endoscopic and percutaneous planter fascia release [13]. Spurs are usually resected but many studies have demonstrated that this makes no difference regarding the result [14]. The complications of open surgery have led to evolvement of less invasive techniques with many advantages and less complications i.e., endoscopic and percutaneous release.[15] The purpose of this study was to clarify the endoscopic technique for plantar fasciotomy in adults with chronic plantar fasciitis and evaluate its effectiveness. The outcomes were assessed by comparing American Orthopedic Foot & Ankle Scale (AOFAS) and Visual Analogue Scale (VAS) before the operation and 2months & 6 months after the operation, and by patient satisfaction levels after the operation. Also, by calculation of time required to return to full activity and monitoring of possible complications. In our study there were 20 patients (20 feet) in which there was an improvement of functional outcomes in the form of a significant change in AOFAS from 44.75±8.61 before the operation to 90.45±11.69 in first follow up visit (two months after the operation) and to 90.9±13.35 in the second visit (six months after the operation). Also, there was an improvement of pain in the form of significant change in VAS from 6.8±1.06 before the operation to 1.45±1.96 in the first follow up visit (two months after the operation) and to 1.7±2.54 in the second follow up visit (six months after the operation) with very mild early postoperative pain which was a distinctive advantage in this procedure. All patients were able to ambulate from the next day after surgery, and no patient was placed in a cast or splint. Regarding postoperative patient satisfaction levels 12 patients were very satisfied (60%) and 3 patients were satisfied (15%) while 5 patients (25%) were not satisfied may as developed recurrence of plantar fasciitis; however, they reported less pain than they had had before surgery. Perhaps this is due to underestimation of the proportion we have to cut wich should not exceed 40% of the fascia to avoid a pronounced decrease in arch height during load bearing and increasing the strain to the plantar ligaments and associated joint capsules, which may be overstretched and lead to subsequent midfoot pain. All patients in this study have returned to their full activity at an average of 3.85±1.09 (range from 2 to 6 weeks), which it is a relatively short period. So patients in the present investigation experienced a significant reduction in pain after their surgical intervention, indicating that this surgical modality can yield satisfying long-term outcome in the treatment of heel pain but this benefit is also found in other surgical modalities, the significant advantages in this procedure over other procedures were mild early postoperative pain experience

which was not present at all in many cases, short time required for return to full activity, and this procedure was a very safe procedure without any complication (we have followed up potential complications such as painful wound scar, wound dehiscence, infection, neurological entrapment, prolonged recovery time, lateral column pain, and midfoot joints pain). Lawrence M. Fallat; et al. [16] Made comparative study of percutaneous plantar fasciotomy and open plantar fasciotomy on total of 53 patients (55 feet) who were diagnosed as plantar fasciitis and treated conservatively for at least 6 months and had no response to conservative treatment modalities, the open plantar fasciotomy with heel spur resection group included 31 patients (32 feet). The percutaneous medial fasciotomy group included 22 patients (23 feet). The purpose of the study was to compare the postoperative outcomes, specifically, postoperative pain and time to return to full activity, assessment of both techniques by comparing interval to a full return to activity and comparing perioperative pain (before operation, 1,3,6,12 months after operation) by VAS in patients undergoing Percutaneous planter fasciitis release versus open fasciotomy with heel spur resection. The mean preoperative pain level in the Percutanous release group was 7.26 and the average within open planter fasciitis release with heel resection group was 7.50 (in our study average preoperative VAS was 6.8). The average time to return Full activity for the percutaneous planter fasciitis release group was 3.37 (range 2 to 7) weeks versus 6.19 (range 3 to 11) weeks for the open planter fasciitis release with heel spur resection group (in our study the average time to return to full range of motion was 3.85). At 3 months postoperatively, the mean pain intensity was 0.45 (range 0 to 5) in the percutaneous group compared with a mean pain intensity of 1.80 (range 0 to 6) for the open group (in our study average pain intensity was 1.45 at 2 months postoperatively). Postoperative complications were also monitored. The open planter fasciitis release group had 3.7 times more complications than the percutaneous planter fasciitis release group. Within the open planter fasciitis release group, 7 patients experienced lateral column pain, 4 developed painful scars, 2 had dehisced wounds, and 1 developed cellulitis while in the percutaneous planter fasciitis release group, 3 patients complained of lateral column pain (in our study no complication noticed). The results of comparison show there is better results with endoscopic planter fasciitis release than open release and percutaneous release with no major complication and more patient satisfaction . Radwan, Y.A; et al., 2012 [17] a prospective comparative study between shock wave and endoscopic plantar fascia release conducted on 70 patients with unilateral chronic plantar fasciopathy. The endoscopic release groups were 31 patients. The AOFAS score for this group was 44 preoperative, improved to 77 six months post operative. while Shock wave group The AOFAS improved from 43 preoperative to 80.5 six months after the operation and this is comparable with our results There is a significant change in AOFAS from 44.75±8.61 before the operation to 90.4 to 90.9±13.35 six months after the operation. The result of comparison show endoscopic plantar fasciotomy gives better results than extra-corporeal shock wave therapy (ESWT) , but with liability of minor complications. ESWT has the advantages of no morbidity, and early resumption of full activities, but a large patient population and a longer follow-up will be needed to determine the curative and the adverse effects of this procedure. ESWT is a reasonable earlier line of treatment of chronic plantar fasciitis before EPF is tried. That is to say that we can use it as a first line of treatment before surgery when conservative treatment fails to control the symptoms of plantar fasciitis after 6 months. So advantages of endoscopic planter fasciitis release

procedure over other procedures were short operation time ,mild early postoperative pain, short time required for return to full activity, and this procedure was a very safe procedure without any complication (we have followed up potential complications such as painful wound scar, wound dehiscence, infection, neurological entrapment, prolonged recovery time, lateral column pain, and midfoot joints pain).There w¬¬ere several limitations to this study as in our study there were short period of follow up (6months)and the sample size was small.

10. Conclusion & recommendations

The endoscopic planter fasciitis release operation is effective in the treatment of chronic plantar fasciitis. The use of this less-invasive procedure for the treatment of plantar fascial pain should be considered as a potential alternative surgical treatment in patients with heel pain not responsive to conservative therapies.

11. Declaration

- **Contributing authors**: Mohamed Ahmed Yehia (Professor of orthopedic surgery Al-Azhar University), Ahmed Sayed Ahmed Elshamy (Lecturer of orthopedic surgery Al-Azhar University).

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- **No kinds of conflicts** (financial, family, personal or company's interests) in our research
- **All information** was available for our research.
- **Informed consent** was taken from every patient to be involved in the study.

References

1. Ogden JA, Alvarez R, Levitt R, Cross GL, Marlow M: Shock wave therapy for chronic proximal plantar fasciitis. Clinical orthopaedics and related research. 2001; 387: 47- 59.

2. Rahaman S: Prevalence of planter fasciitis among patients attended at crp (a retrospective survey) (Doctoral dissertation, Bangladesh Health Professions Institute, Faculty of Medicine, the University of Dhaka, Bangladesh). 2015.

3. Marafko C: Endoscopic partial plantar fasciotomy as a treatment alternative in plantar fasciitis. Acta chirurgiae orthopaedicae et traumatologiae Cechoslovaca. 2007; 74(6), p.406.

4. Lynch DM, Goforth WP, Martin JE, Odom RD, Preece CK, Kotter MW: Conservative treatment of plantar fasciitis. A prospective study. Journal of the American Podiatric Medical Association. 1998; 88(8): 375-380.

5. Tu P and Bytomski JR: Diagnosis of heel pain. American family physician. 2011; 84(8), 909-916.

6. Lee SH, Suh DH, Kim HJ, Jang WY, Park YH, Sung HJ and Choi GW: Association of Ankle Dorsiflexion with Plantar Fasciitis. J Foot Ankle Surg. 2021; 60(4):733-737.

7. Boyle RA and Slater GL: Endoscopic plantar fascia release: a case series. Foot & ankle international. 2003; 24(2): 176-179.

8. Latt LD, Jaffe DE, Tang Y and Taljanovic MS: Evaluation and treatment of chronic plantar fasciitis. Foot & Ankle Orthopaedics. 2020; 5(1):2473011419896763.

9. McMillan AM, Landorf KB, Barrett JT, Menz HB, Bird AR: Diagnostic imaging for chronic plantar heel pain: a systematic review and metaanalysis. J Foot Ankle Res. 2009; 2(32): 3- 5.

10. Aicher B, Peil H, Peil B and Diener HC: Pain measurement: Visual Analogue Scale (VAS) and Verbal Rating Scale (VRS) in clinical trials with OTC analgesics in headache. Cephalalgia. 2012; 32(3): 185-197.

11. Rodrigues RC, Masiero D, Mizusaki JM, Imoto AM, Peccin MS, Cohen M and Alloza JFM: Translation, cultural adaptation and validity of the" American Orthopaedic Foot and Ankle Society (AOFAS) Ankle-Hindfoot Scale". Acta Ortopédica Brasileira. 2008; 16, 107-111.

12. League AC: Current concepts review: plantar fasciitis. Foot & ankle international. 2008; 29(3), 358-366.

13. El Shazly O and El Beltagy A: Endoscopic plantar fascia release, calcaneal drilling and calcaneal spur removal for management of painful heel syndrome. The Foot. 2010; 20(4): 121-125.

14. Zhou B, Zhou Y, Tao X, Yuan C and Tang K: Classification of calcaneal spurs and their relationship with plantar fasciitis. The Journal of Foot and Ankle Surgery. 2015; 54(4): 594-600.

15. Karakayali FY: Surgical and interventional management of complications caused by acute pancreatitis. World Journal of Gastroenterology: WJG. 2014; 20(37), 13412.

16. Fallat, Lawrence M., et al. "A retrospective comparison of percutaneous plantar fasciotomy and open plantar fasciotomy with heel spur resection." The Journal of Foot and Ankle Surgery 52.3 (2013): 288-290.

17. Radwan, Yasser A., Ali M. Reda Mansour, and Walid S. Badawy. "Resistant plantar fasciopathy: shock wave versus endoscopic plantar fascial release." International orthopaedics 36.10 (2012): 2147-2156.