

## DISTRIBUTION OF PATIENTS WITH RESISTANT PLANTAR FASCIITIS AND THEIR RESPONSE TO PERCUTANEOUS PARTIAL PLANTAR FASCIA RELEASE UNDER TIBIAL NERVE BLOCK

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### ABSTRACT

**Backgrounds and objectives:** Plantar fasciitis is considered to be the most popular cause of heel pain. The corticosteroid injection is the second line treatment for these patients whose fail in conservative management of the plantar fasciitis. Surgery is the last line in treatment, that varies into many approaches. This is a clinical trial to assess the benefit of one of these approaches (partial percutaneous plantar fascia release) that would be done under tibial nerve block in various patients with plantar fasciitis that resistant to the previous treatments.

**Methods:** After local medical ethics committee approve a total of 126 patients diagnosed with resistant plantar fasciitis were collected, classified according to different items and treated on by partial percutaneous plantar fascia release under tibial nerve block by ultrasound guidance. The participants were continuously checked up for possible complications during one year.

**Results:** The average age of the patients were participated in this study was  $44.97 \pm 7.3$  years. The majority of the patients were females (almost 78%). The majority of the patients had functional problem at work or home (approximately 80%). This study detected that around 54.0% of the patients had right side plantar fasciitis, about 30% had left side and almost 16% had bilateral. 122 of 126 patients received three times steroid injections for treatment. The patients satisfaction for the percutaneous fasciotomy outcomes were approximately (94%) of the patients.

**Conclusion:** This study showed that partial percutaneous plantar fascia release for plantar fasciitis patients under tibial nerve block is a safe medical surgery with considerable healing ability for them.

**KEYWORDS:** Plantar fasciitis; percutaneous release; tibial nerve block; complication; satisfaction.

### 1.1 INTRODUCTION

Plantar fasciitis is considered as a common medical disorder causing heel pain in adult populations. In the case of myxomatous degeneration, connective tissue calcium deposition, and collagen fibers disorganization in the fascia usually cause Plantar fasciitis. In 5-10% of the patients with plantar fasciitis are requiring surgical management (Thomas J, et al., 2015) and this requirement is needed in the case of not responding of conservative treatment from 6-12 months (Gohiya A, et al., 2016).

An open surgery or endoscopic procedure is required for recovery from plantar fasciitis by cutting entire part of the fascia which involved (Gohiya A, et al., 2016). One of the common complication of the complete or partial release of

the plantar fascia is consider the overload and pain which lead to instability of the medial longitudinal arch of the foot and apart from lateral longitudinal arch (Radwan YA, et al., 2012) & (Anderson JG, et al., 2014). However, in patients with plantar fasciitis, the total success rate of surgical recovery is high (between 70-90%) (Tay KS, et al., 2012), (Landsman AS, et al., 2013) & (Wei M, et al., 2015).

The most popular surgical technique considered in the treatment of plantar fasciitis is a plantar fasciotomy (Saxena A, et al., 2012). This technique was including all of the following procedures: minimal incision, in-step plantar fasciotomy, open and endoscopic. Regarding the results, all of these procedures have high rate of patient's satisfaction with recovery from plantar fasciitis

(Hormozi J, et al., 2011). However, to avoid possible complications in a surgical technique, attention must be paid to the incised amount of the plantar fascia.

A prospective study in 2017, percutaneous plantar fascia release under local anesthesia for chronic plantar fasciitis, around 88% of the patients reported with very satisfied outcomes. The disorders such as lateral column instability, sinus tarsi and metatarsalgia, and wound-related complications were not observed following one year follow-up. Moreover, regarding of the patients with surgery had a considerable percentage satisfaction (Sahu RL, 2017).

It has been mentioned that the ultrasound guided percutaneous fasciotomy could be used to treat persistent plantar fasciitis (Finnoff JT, et al., 2011). There are a few researches that estimate the clinical outcomes in patients with chronic plantar fasciitis after percutaneous plantar fascia release. This study review the partial percutaneous release for plantar fasciitis under tibial nerve block for pain, sinus tarsi, metatarsalgia, lateral column instability, and wound complications. Furthermore, to measure the satisfaction rate in patients were participating in this study.

## **2.1 PATIENTS AND METHODS**

### **2.1.1, Study design and sampling**

The study was clinical trial evaluation. After approval by the Ethics Committee of health institution of Duhok in Kurdistan region of Iraq, a total of 126 patients were included in the study after verbal agreement. This study estimated clinically and physically the patients who had heel pain due to plantar fasciitis and classify them according to different factors. The patients were scanned for the eligibility criteria and collected in the time between January 2018 and January 2020, followed-up for one year in the orthopedic department of Duhok Emergency Teaching Hospital. All the selected patients were operated on under tibia nerve block.

### **2.1.2, Inclusion criteria**

Any patient who proved to have plantar fasciitis that resistant to conservative and corticosteroid injections for six months or more and of 18 years old or more regardless of their socio-demographic aspects were included in the study.

### **2.1.3, Exclusion criteria**

The cases that experienced previous surgeries or other deformities such as rheumatoid arthritis,

osteoarthritis or any other heel medical issues were excluded from this study regarding orthopedic side. Also regarding nerve block, any patient with bleeding tendency and infection at the site of local injection were excluded also.

### **2.1.4, Anesthesia and surgical technique**

The percutaneous partial plantar fascia release was performed under tibia nerve block. By the guide of ultrasound the tibial nerve is oval structure pass posterior to the medial malleolus at the level of the ankle posterolateral to the posterior tibial artery. The 4-5 cm length and 22 – 25 gauge needle was inserted in an in-plane orientation after appropriate skin anesthesia. The needle was inserted from the side of the probe. The needle tip was identified and directed towards the deep border of the nerve. After getting the nerve movement by the movement of the needle as seen by ultrasound, a small amount of local anesthetic was injected. The needle was advanced and redirected towards the opposite surface of the nerve if the anesthetic didn't spread evenly or adequately around the nerve (Redborg KE, 2009) (**Figure 1**). 5 - 8 cc of 0.5 % bupivacaine was injected. Then the operators waited for paresthesia and the anesthesiologist would give the permission to surgeon to do his incision only after getting good block. (Chin KJ, et al., 2011)

The medial and lateral aspects of the median band of the plantar fascia are marked by surgeons through manually blurring following the injection. An incision was made about 1-2 cm over the prominent fascial band on the lower aspect of the heel fat pad. The incision was placed in distal aspect of the heel by a surgeon, where the thickness of the fatty tissue is less than the other areas for minimizing postoperative scar. The incision continued carefully over the plantar fascia with sharp dissector until it reached into a blind way since there are no vital structures in the region, to prevent any injury.

Once the fascia was ended with bleeding a self-retaining retractor was entered. After that the retractor was separated from the fascial margins. Any deep fibers of the fascia were severed, a deep horizontal retention suture of 4-0 non-absorbable material was applied for the management. Then, the main wound edges were re-approximated with simple sutures of 4-0 prolene and with small bandage of gauze was used. The patients had enough rest after 3 days the bandage was changed and a week later the material of the suture removed. The complications such as pain, activity level and

patient satisfaction, and wound infection were reported for clinical outcomes.

### 2.1.5, Diagnostics and Measurement criteria

The plantar fasciitis was evaluated due to patient history, risk factors and physical examination findings (Thomas JL, et al., 2010). The outcomes of the surgery were estimated according to the classification of Grundberg and Dobson (Grundberg AB, Dobson JF, 2000) as the following:

The excellent results were given to those patients who had no pain, returned to work (their normal activities) and were satisfied. A good result was given to those patients who had pain only when they had heavy use, returned to the work and were satisfied. While, poor result used with the patients whose continuous pain, not returned to their activities and were not satisfied.

### 2.1.6, Statistical methods

The mean, standard deviation and percentage were used for descriptive purposes of the study. The frequency and percentage were applied to the surgery outcomes such as wound complications and lateral column instability. The Fishers' exact test was used with the patients variable wound complications and different characteristics. The P-value of less than 0.05 was considered a statistically significant difference. The Statistical Package for Social Sciences 24 (SPSS 24; IBM Corp; USA) was examined with statistical calculations.

## 3.1 RESULTS

The average age of the patients in this study was almost 45 years. The percentage of females' patients was higher than males approximately (78%). The majority of the patients were housewives (57%), employees (25.4%) and the least were engineers. The most common cause that the patients has reported in this study was functional impairment at work or home-around (80%) (Table 1). Over half of the patients had the plantar fasciitis in their right foot (54%), around 30% in left foot and almost 16% had bilateral. The mean period of plantar fasciitis in the patients was approximately 8.5 months. About 98.4% of the patients received drug, physiotherapy and rest while only 82.5% used splinting as conservative treatment. The majority of the patients (around 97%) received three steroid injections for treatment and only 3.2% received couple of the injections (Table 2). The possible complications of partial percutaneous plantar fasciitis release; regarding the pain, it has

showed that most of the patients had no pain and only in six patients pain did not change. Meanwhile, sixteen patients were unable to return to their work. Lateral column instability, sinus tarsitis, and metatarsalgia were not observed in any patients. Furthermore, wound infection and poor result of the surgical outcomes were found in 8 patients. Lastly, the patients' satisfaction with the surgery was found to be around 90.5% (Table 3). The study found that the patients had plantar fasciitis in their left side less than the right side but wound infections were more likely to happen in the left side after surgery with a significant P-value of 0.047. Furthermore, there was a difference in wound infections between male and female patients of no significance ( $P=0.567$ ), and regarding age categories, the patients between 30-49 years were more prone to complications than those who were over 50 years old ( $P=0.364$ ). Moreover, there was no significant statistical difference found between patients who had functional impairment before surgery and those who had not ( $P=0.572$ ), and neither those who returned or didn't return to their activity ( $P=0.075$ ) (Table 4).

## 4.1 DISCUSSION

Most of the patients in this study who were subjected to partial percutaneous plantar fasciitis release had no pain, returned to work and were satisfied with the surgery outcome. The only adverse effect found during follow up was wound infection in around 6.3% of the patients. The patients' surgery outcomes were mostly excellent, some good and few poor results. The most significant result found in this study was that the patients who had plantar fasciitis in their left foot were more likely to have wound infections (15.8% vs. 10.0% in patients with bilateral plantar fasciitis;  $P=0.047$ ).

A study conducted to estimate the outcome results of percutaneous plantar fasciitis release under local anesthesia for chronic plantar fasciitis in India; it included 78 patients for around 9 months and assessed them for a complete year. And pain relief in surgery was achieved at eight weeks after surgery and the researchers reported that the outcomes were mostly excellent in about 88.46% and good in 6.41% of the patients. While, the other complications were not reported (lateral column instability, sinus tarsitis and metatarsalgia, and wound-associated complications) (Sahu RL,

2017). However, we found wound complications in patients (around 6.3%) following complete year of assessment. In addition to satisfaction with the surgery in our study, this was about 90.5% (114/126) of the patients.

Sahu (Sahu RL, 2017) suggested that in order to allow the lateral band to release or at least a quarter of the ligament to be intact, plantar fascia must be released percutaneously and carefully with medial and central bands. The important factor that plays a role in the surgery complication is the extent of plantar fascia that is released percutaneously. The patients who underwent complete fascial release had usually pain complications. Therefore, the complete percutaneous release procedure is avoided. Another important factor is the incision location. The complications related to nerve involvement were more in the patients who underwent distal incisions through the fat pad. Thus, to decrease the common complications of lateral column instabilities and providing rapid recovery from the incision, less amount of the plantar fascia recommended cutting during surgical treatment.

To decrease the effect of normal foot arch stability and maintain biomechanics, some surgeons recommended partial plantar fascia release of less than 40% (Morsy M, Elsheikh M, 2014). Researchers reported that the patients who underwent 50% release in the plantar fascia had more complications of the lateral column (Cutts S, et al., 2012). Recently, Oliva and others reported the issues in minimum skin healing, wound infections, nerve injuries, and early return to normal activities following a percutaneous plantar fascia release (Oliva F, et al., 2017)

Previously, the percutaneous plantar fascia release was evaluated anatomically using a conventional hypodermic needle in a study (Çatal B, et al., 2019). In this study they used 14 fresh-frozen cadaveric trans-tibial amputation specimens. Percutaneous plantar fasciotomy with a conventional hypodermic needle was performed. The width of the plantar fascia, the thickness of the medial border, and the width of the cut segment were documented following a suitable dissection. The muscle change on the flexor digitorum brevis and damaged area depth were reported as well. The surgeons did not cause any change in the lateral plantar nerve. And since the mean difference from the deepest point of the fasciotomy up to Baxter's nerve was  $8.62 \pm 2.62$  mm, this study showed that partial

plantar fasciotomy could be achieved through percutaneous plantar fascia release with a conventional hypodermic needle without any nerve damage.

## 5.1 LIMITATIONS OF THE STUDY

The findings reported in the study must be used with caution since the patients were selected from one clinical context that creates difficulties to generalize the findings to other contexts across the country. Also, we did not make a comparison in other techniques of anesthesia and surgery.

## 6.1 CONCLUSIONS

This study showed that partial percutaneous plantar fascia release for plantar fasciitis under tibial nerve block is a safe medical surgery with impressive results regarding healing and returning normal life.

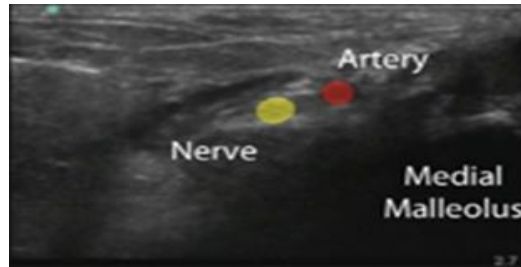
## Conflict of interest

The author has no conflict of interest.

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**Fig.(1):-** Prob position and sonic for picture for in plane technique of tibial nerve block

**Table (1):-** General information of patients

Patients' characteristics (n=63)		Number	Percent
Age; Range: 35-60 years; Mean/SD		44.97	7.30
Gender	Male	28	22.2
	Female	98	77.8
Occupation	House Wife	72	57.1
	Employee	32	25.4
	Barber	8	6.3
	Worker	8	6.3
	Engineer	6	4.8
Functional impairment at work or home		100	79.4

**Table (2):-** Sides of plantar fasciitis and its treatments

Plantar fasciitis side and treatment (n=63)		Number	Percent
Side of Plantar Fasciitis	Right	68	54.0
	Left	38	30.1
	Bilateral	20	15.9
Plantar Fasciitis Duration (Per Month)		8.51	1.89
Conservative Treatment	Drug	124	98.4
	Physiotherapy	124	98.4
	Rest	124	98.4
	Splinting	104	82.5
Number of Steroid Injection	2 Injections	4	3.2
	3 Injections	122	96.8

**Table (3):-** Outcomes of percutaneous plantar fascia release under local anesthesia

Surgery outcomes (n=63)		Number	Percent
Pain	No	104	82.5
	Pain on heavy use only	16	12.7
	Unchanged pain	6	4.8
Activity	Returned to work	110	87.3
	Not returned to work	16	12.7
Lateral Column Instability		0	0.0
Sinus Tarsitis		0	0.0
metatarsalgia		0	0.0
Wound infections	Yes	8	6.3
	No	118	93.7
Patients' Satisfaction	Satisfied	114	90.5
	Unsatisfied	12	9.5
Surgery Outcomes	Excellent results	100	79.4
	Good results	18	14.3
	Poor results	8	6.3

**Table( 4):** -Association of general and clinical characteristics with wound complications

Patients' Characteristics		Wound Complications		P-Value
		Presence	Absence	
Gender	Male	0 (0.0)	28 (100.0)	0.567
	Female	8 (8.2)	90 (91.8)	
Occupation	House Wife	36 (8.3)	66 (91.7)	1.000
	Barber	0 (0.0)	8 (100.0)	
	Employee	2 (6.3)	30 (93.8)	
	Worker	0 (0.0)	8 (100.0)	
	Engineer	0 (0.0)	6 (100.0)	
Side of plantar fasciitis	Right	0 (0.0)	68 (100.0)	0.047
	Left	6 (15.8)	32 (84.2)	
	Bilateral	2 (10.0)	18 (90.0)	
Age Categories (year)	30-39	4 (11.8)	30 (88.2)	0.364
	40-49	4 (6.7)	56 (93.3)	
	50 And More	0 (0.0)	32 (100.0)	
Before surgery functions Impairment	Yes	8 (8.0)	92 (92.0)	0.572
	No	0 (0.0)	26 (100.0)	
Activity	Returned To Work	4 (3.6)	106 (96.4)	0.075
	Didn't Return To Work	4 (25.0)	12 (75.0)	

Fishers' Exact Test Was Performed For Statistical Analyses.  
The Bold Number Shows The Significant Difference.