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A COMPARISON OF THE EFFECT OF BOTULINUM TOXIN TYPE A AND CORTICOSTEROID INJECTIONS IN CHRONIC PLANTER FASCIITIS

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ABSTRACT

Background: Plantar fasciitis is a common musculoskeletal disease. It showed mainly chronic degenerative processes rather than inflammation. Injections of corticosteroids are a popular treatment for plantar fasciitis because they reduce inflammation and pain. Another approach has recently been proposed for the management of plantar fasciitis: injection with botulinum toxin type A. **Aim of study:** To compare between the effect of steroid and botulinum toxin type A injection for planter fasciitis. **Patient and Methods:** An interventional clinical trial that was conducted in Ghazi Al-Hariri Hospital and Baghdad pain clinic, Baghdad, Iraq during a period of one year from April 2024 to April 2025. It included 40 patients who complained about heel pain at the origin of the plantar fascia (anteromedial calcaneal tuberosity) and diagnosed with plantar fasciitis. They were divided into two groups: Steroid group included 20 patients received a single application of 1 ml methylprednisolone 40 mg (depomedrol) with local anesthetic 2 ml of lidocaine 1% and 2 ml of normal saline (Total volume of 5 ml) and Botox group included 20 patients received a single application 50 U of BoNT-A in a total volume of 2 ml. Numerical rating scale of pain and planter fascia thickness by ultrasound were evaluated at one week, three weeks and two months after injection. **Results**: In this study, the level of pain was significantly decreased in both groups after one week, three weeks, and two months compared to that at baseline. One week after intervention, the mean level of pain was significantly higher in the steroid group than that in Botox group. Thickness of plantar fascia was significantly decreased in both groups after three weeks and two months compared to that at baseline. **Conclusion**: Both steroid and Botox injections can significantly relieve pain and thickness associated with plantar fasciitis, but the early comparative advantage of Botox in pain relief may warrant further exploration in larger studies to verify sustained benefits.

KEYWORDS: Plantar fasciitis, Pain management, Botox injection.

INTRODUCTION

The degenerative irritation of the plantar fascia origin at the medial calcaneal tuberosity of the heel and its accompanying perifascial tissues causes plantar fasciitis, a common and frequently frustrating condition. Despite its name, this illness is characterized by a lack of inflammatory cells. Plantar fasciitis is a common musculoskeletal disease. Histological findings of patients with PF showed mainly chronic degenerative processes rather than inflammation.[1] In addition to mechanical factors, such as repetitive stress and reduced ankle dorsiflexion, Plantar fasciitis is linked to rheumatologic diseases and genetic factors. It is the main cause of the millions of people who have heel pain in the United States yearly. Although it has many underlying causes, overuse stress is frequently the main one, manifesting as

acute localized heel pain and, occasionally, a heel spur. The main therapeutic strategy is non-surgical, yet recurrent pain can be frustrating for both patients and healthcare providers.[2]

The most frequent reason for heel pain that patients present with in an outpatient environment is plantar fasciitis. Although the precise prevalence and incidence of plantar fasciitis by age are unknown, estimations indicate that the condition accounts for about 1 million medical visits per year. About 10% of runner-related injuries and 11% to 15% of all foot complaints that call for expert medical attention are caused by this condition.[3] About 10% of the overall population suffers from plantar fasciitis, and 83% of those affected are active, working people between the ages of 25 and 65. The general population between the ages of 40 and 60 has the highest incidence.

Additionally, women have a higher prevalence of plantar fasciitis than men, in those aged 45 to 64 versus those aged 18 to 44, and in those with a body mass index >25 kg/m2. Some literature shows that runners' prevalence rates are as high as 22%.[2]

AIM OF STUDY

To compare between the effect of steroid and BTX type A injection for planter fasciitis.

PATIENTS AND METHODS

This was an interventional clinical trial that was conducted in Ghazi Al-Hariri Hospital and Baghdad pain clinic, Baghdad, Iraq during a period of one year from April 2024 to April 2025.

Administrative approvals were granted from pain medicine supervising committee/scientific council of Anesthesia and Intensive Care.

This study involved 40 patients who complained from heel pain at the origin of the plantar fascia (anteromedial calcaneal tuberosity) and diagnosed with plantar fasciitis. They were divided into two groups:

- Steroid group: 20 patients received a single application of 1 ml methylprednisolone acetate 40 mg (depomedrol) with local anesthetic 2 ml of lidocaine 1% and 2 ml of normal saline (Total volume of 5 ml).
- Botox group: Included 20 patients received a single application 50 U of BoNT-A Maxitox in a total volume of 2 ml.

Exclusion criteria

- Patients who had any anatomic or pathological alterations in the knee, foot, or ankle.
- Patients who had seronegative arthritis; rheumatoid arthritis; ankylosing spondylitis; Reiter syndrome.
- Patients who had psychiatric pathology, and psychomotor impairment.
- Patients had skin infections or a history of infection at the application site in the previous three months.
- History of previous surgery on the affected foot or ankle.
- Pregnant or breastfeeding women.
- Patients who voluntarily declined to participate in the study.

The data was collected by a well-designed questionnaire including the following information

- General characteristics (Age, sex, and occupation).
- Side of plantar fasciitis.
- Body Mass Index level, which is calculated by weight in (kilograms) divided by the square of height in (meters). Weight and height are measured by the same scale for all the subjects. BMI = Weight (Kg) / Square height (m^2)

Participants were classified according to BMI as:

- Normal (≤ 24.99 kg/m^2)
- Overweight (25 - 29.99 kg/m^2)
- Obese (≥ 30 kg/m^2)

Ultrasound imaging was performed with Samsung and GE devices and a 10 MHz linear transducer.

Subjects were examined in a prone position with their feet hanging over the edge of the table.

The probe was placed against the heel parallel to the plantar fascia.

Pressure was applied on the heel while the plantar fascia was examined.

The fascial thickness was measured (in mm) near the insertion point of the calcaneal tendon.

The patient is positioned in a prone position with the leg fully extended and the foot hanging off the edge of the treatment couch.

A rolled towel between the anterior aspect of the ankle and the couch can help stabilize the ankle further.

The plantar fasciitis is traced by placing the transducer in a LAX orientation along the length of the foot and with the calcaneum in view.

The plantar fasciitis is seen attaching on to the calcaneum and typically the medial bundle is thickened.

Rotating the transducer 90 degrees, the plantar fasciitis can be seen in the SAX with the calcaneum beneath it.

The plantar fasciitis is viewed in the SAX orientation, and the needle is introduced using an IP technique from the medial aspect with the bevel facing up. It should ideally be as parallel to the transducer as possible. Brought to rest between the plantar fasciitis and calcaneum.

The solution can be injected but care must be taken not to inject into the plantar fasciitis itself due to risk of rupture.

Once the tissue planes are separated, the solution is injected, if not the needle is repositioned if needed.

In both groups, plantar fascia stretching exercises were initiated after seven days following the injection.

Numerical rating scale (NRS) of pain and planter fascia thickness by ultrasound were evaluated at one week, three weeks and two months after injection.

Patients who had incomplete follow-up (less than three visits) were dropped.

Statistical analysis was performed using SPSS windows version 26 Software. The data presented as mean, standard deviation and ranges. Categorical data presented by frequencies and percentages. Independent t-test (two tailed) was used to compare the continuous variables between study groups. Paired t-test was used to compare the continuous variables before and after intervention. P value < 0.05 was considered significant.

RESULTS

The total number of study patients was 40. All of them were diagnosed with plantar fasciitis. They were divided into two groups: Steroid group included 20 patients treated with steroid injection and Botox group included 20 patients treated with Botox injection.

The distribution of study patients by age and sex is shown in figures (1 and 2). Study patients' age ranged from 25 years to 60 years with a mean of 45.2 years and a standard deviation (SD) of ± 7.95 years. The highest proportion of study patients in steroid and Botox groups was aged < 50 years (55% and 75% respectively).

Regarding sex, proportion of females was higher than males in both groups (75% versus 15% in both groups).

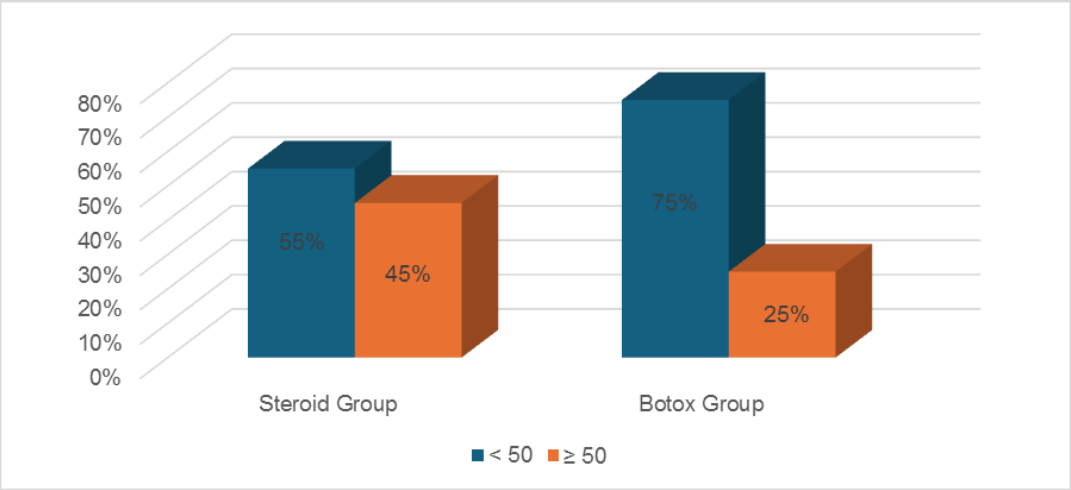

Figure 1: Distribution of study groups by age.

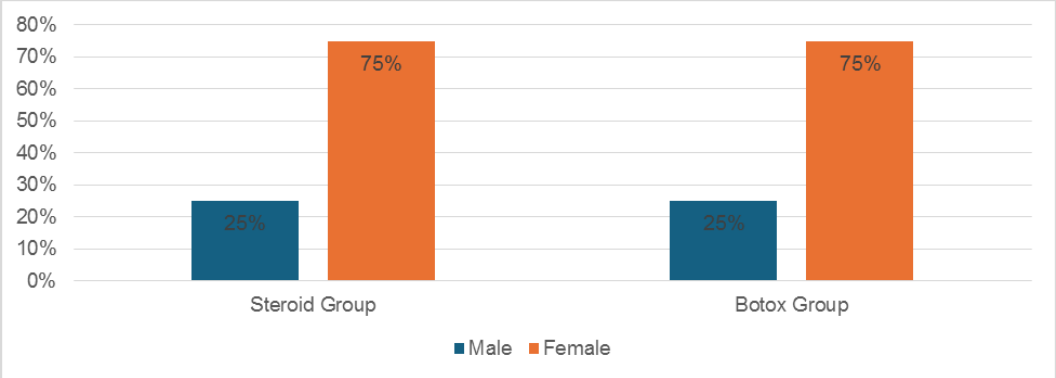

Figure 2: Distribution of study groups by sex.

As shown in table 1, 50% of steroid group and 55% of Botox group were obese, 55% of steroid group and 45% of Botox group were complaining from plantar fasciitis in the right side, and 45% of steroid group were housewives while and 55% of Botox group were employee.

Table 1: Distribution of study groups by general characteristics.

General characteristics	Study group		Total (%) n= 40
	Steroid (%) n= 20	Botox (%) n= 20	
BMI Level			
Normal	1 (5.0)	0 (0)	1 (2.5)
Overweight	9 (45.0)	9 (45.0)	18 (45.0)
Obese	10 (50.0)	11 (55.0)	21 (52.5)
Side			
Right	11 (55.0)	9 (45.0)	20 (50.0)
Left	9 (45.0)	11 (55.0)	20 (50.0)
Occupation			
Housewife	9 (45.0)	6 (30.0)	15 (37.5)
Employee	8 (40.0)	11 (55.0)	19 (47.5)
Retired	2 (10.0)	1 (5.0)	3 (7.5)
Freelance	1 (5.0)	2 (10.0)	3 (7.5)

In comparison between study groups by age and BMI level, we noticed that there were no significant differences ($P \geq 0.05$) in age and BMI between study groups as shown in table (2).

Table 2: Comparison between study groups in general characteristics.

Variable	Study Group		P - Value
	Steroid Mean ± SD	Botox Mean ± SD	
Age (Year)	46.6 ± 9.0	43.8 ± 6.7	**0.272**
BMI (kg/m^2)	29.78 ± 3.0	29.64 ± 2.2	**0.864**

The comparison in NRS score of pain at baseline and after intervention between study groups is shown in figure and table (3). One week after intervention, the mean level of pain was significantly higher in the steroid group than that in the Botox group (4.75 versus 3.1, P= 0.001). No statistically significant difference ($P \geq 0.05$) in mean level of pain between study groups at baseline and three weeks or two months after intervention.

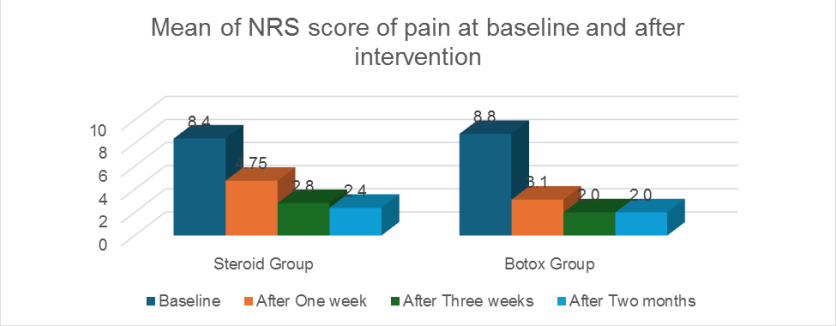

Figure 3: Mean of NRS score of pain at baseline and after intervention.

Table 3: Comparison between study groups in NRS score of pain.

NRS score of pain	Study group		P- Value
	Steroid Mean ± SD	Botox Mean ± SD	
Baseline	8.4 ± 0.82	8.8 ± 1.0	**0.176**
After one week	4.75 ± 1.6	3.1 ± 1.3	**0.001**
After three weeks	2.8 ± 1.2	2.0 ± 1.3	**0.053**
After two months	2.4 ± 0.9	2.0 ± 1.5	**0.325**

As shown in table 4, the level of pain was significantly decreased in steroid group (P < 0.05) after one week, three weeks, and two months compared to that at baseline.

Table 4: Comparison in NRS score of pain of steroid group between different times of intervention compared to baseline score.

Time	NRS score in steroid group Mean ± SD	P - Value
Baseline	8.4 ± 0.82	**0.001**
After one week	4.75 ± 1.6	
Baseline	8.4 ± 0.82	**0.001**
After three weeks	2.8 ± 1.2	
Baseline	8.4 ± 0.82	**0.001**
After two months	2.4 ± 0.9	

The level of pain was significantly decreased in Botox group (P < 0.05) after one week, three weeks, and two months compared to that at baseline (Table 5).

Table 5: Comparison in NRS score of pain of Botox group between different times of intervention compared to baseline score.

Time	NRS score in Botox group Mean ± SD	P - Value
Baseline	8.8 ± 1.0	**0.001**
After one week	3.1 ± 1.3	
Baseline	8.8 ± 1.0	**0.001**
After three weeks	2.0 ± 1.3	
Baseline	8.8 ± 1.0	**0.001**
After two months	2.0 ± 1.5	

The comparison in plantar fascia thickness at baseline and after intervention between study groups is shown in figure (4) and table (6). No statistically significant difference (P ≥ 0.05) in thickness of plantar fascia between study groups at baseline and one or three weeks or two months after intervention.

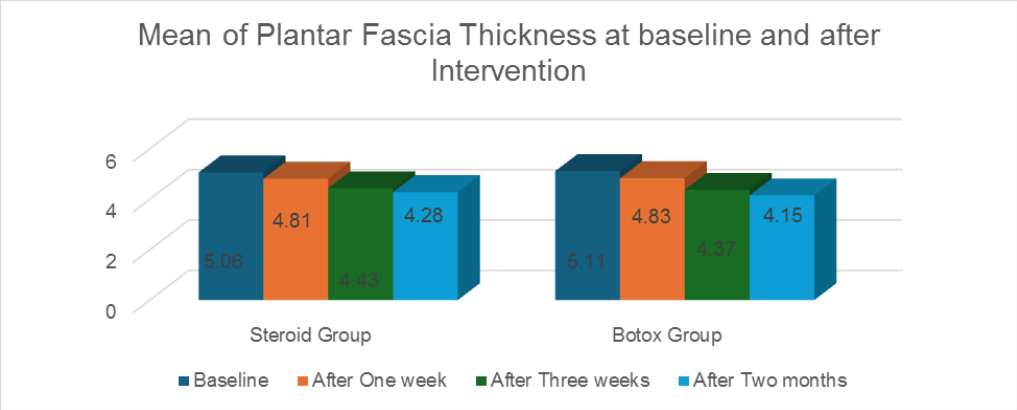

Figure 4: Mean of plantar fascia thickness at baseline and after intervention.

Table 6: Comparison between study groups in thickness of plantar fascia.

Thickness of plantar fascia (mm)	Study group		P - Value
	Steroid Mean ± SD	Botox Mean ± SD	
Baseline	5.06 ± 0.97	5.11 ± 0.64	**0.849**
After one week	4.81 ± 0.96	4.83 ± 0.67	**0.94**
After three weeks	4.43 ± 0.8	4.37 ± 0.63	**0.795**
After two months	4.28 ± 0.81	4.15 ± 0.6	**0.586**

As shown in table 7, thickness of plantar fascia was significantly decreased in steroid group (P < 0.05) after three weeks and two months compared to that at baseline. No significant change detected after one week (P= 0.641).

Table 7: Comparison in thickness of plantar fascia of steroid group between different times of intervention compared to baseline score.

Time	Thickness of plantar fascia in steroid group Mean ± SD	P - Value
Baseline	5.06 ± 0.97	**0.641**
After one week	4.81 ± 0.96	
Baseline	5.06 ± 0.97	**0.025**
After three weeks	4.43 ± 0.8	
Baseline	5.06 ± 0.97	**0.001**
After two months	4.28 ± 0.81	

As shown in table 8, thickness of plantar fascia was significantly decreased in Botox group (P < 0.05) after three weeks and two months compared to that at baseline. No significant change detected after one week (P= 0.739).

Table 8: Comparison in thickness of plantar fascia of Botox group between different times of intervention compared to baseline score.

Time	Thickness of plantar fascia in Botox group Mean ± SD	P - Value
Baseline	5.11 ± 0.64	**0.739**
After one week	4.83 ± 0.67	
Baseline	5.11 ± 0.64	**0.021**
After three weeks	4.37 ± 0.63	
Baseline	5.11 ± 0.64	**0.001**
After two months	4.15 ± 0.6	

DISCUSSION

The connective tissue known as fascia firmly covers the surfaces of organs and tissues, giving them exceptional elasticity and toughness that allow them to resist deformation and mechanical stress. According to recent research, fascia tissue is essential for proprioception, as well as for transmitting force and perceiving injuries.[4] Fasciitis can cause various pain syndromes, including back pain, plantar fasciitis, periarthritis of the shoulder, and cervical pain, among others.[5] Moreover, fascial tissue has been proven to have active contractile properties, which can lead to mechanical imbalances in the musculoskeletal system. Therefore, the treatment of fasciitis should consider the interdependence between the fascia, muscles, and pain.[6] One of the most common injection therapies for plantar fasciitis patients is corticosteroids. However, this treatment has been shown to only slightly reduce heel pain for up to one month, which is not maintained for up to 6 months. Moreover, adverse events are related to the use of corticosteroids.[7] Another injection option is botulinum toxin-A, which has been increasingly considered as an alternative treatment for chronic musculoskeletal conditions such as multiple sclerosis, lateral epicondylitis, or torticollis. Intralesional botulinum toxin-A has been previously studied for the treatment of plantar fasciitis, showing significantly reduced pain intensity for 0-6 months, it had been reported that botulinum toxin-A provided a significant short-term advantage over placebo for pain relief, and the effect was still present at 6 months.[8] Trials reporting the use of injection therapies (especially corticosteroids) in combination with an anesthetic are widespread, but reports including a treatment group with a control arm using anesthetic alone are scarce.[7] In the current study, 40 patients diagnosed with plantar fasciitis were enrolled. They were divided into Steroid group (20 patients treated with steroid injection) and Botox group (20 patients treated with Botox injection).

In this study, the mean and standard deviation (SD) of age was 45.2 years ± 7.95, ranging from 25 days to 61 years with highest proportion in steroid and Botox groups was aged < 50 years (55% and 75% respectively). Regarding gender, females' patients outnumbered the males in both groups (75% versus 15% in both groups), there were no significant differences in age and gender between study groups (P ≥ 0.05).

In Elizondo-Rodríguez e al study, 78 patients enrolled and divided into 3 groups: group 1, anesthetic only; group 2, corticosteroid; and group 3, botulinum toxin A. The mean and SD of age was 46.4±11.0 years for steroid

group and 44.0±12.5 years for Botulinum toxin-A group. Female predominance observed in both groups, as constituted 76% and 57% respectively. There was no significand difference between study group regarding the age and gender (P>0.05).[12] In Díaz-Llopis et al study, the mean and SD of 28 patients with planter fasciitis and treated by Botulinum toxin-A was 51.50±14.79 years, female patients outnumbered the male patients (67.86%), with female to male ratio was 2.1:1. There were no significant differences in age and gender Botulinum toxin-A and steroid groups (P>0.05).[9]

Actually, one of the most important and well-established risk factors for the development of plantar fasciitis is age; people in their middle years are more likely to get it. The plantar fascia and accompanying structures are among the tissues in the body that experience physiological changes as people age. As people age, the collagen fibers in the plantar fascia may lose their elasticity and resilience, increasing the fascia's vulnerability to microtears and degeneration.[2] On the other hand, the majority of the available data points to a higher incidence of plantar fasciitis in women, especially middle-aged women. Anatomical, biomechanical, hormonal, and lifestyle factors are probably responsible for this discrepancy, with footwear selection and greater ligamentous laxity frequently mentioned as major contributing factors.[3]

This study revealed that 50% of steroid group and 55% of Botox group were obese, 55% of steroid group and 45% of Botox group had plantar fasciitis in the right side, and 45% of steroid group were housewives while and 55% of Botox group were employee. In Elizondo-Rodríguez e al study, left foot was the most affected site in 52% of patients with planter fasciitis and treated by steroid and in 52.1% of other patients treated with Botulinum toxin A. The enrolled patients in both groups were obese, as mean of BMI in both groups was 29.7±4.8 Kg/m2 in steroid group and 31.4±5.5 Kg/m2 in Botulinum toxin-A group.[12] Different findings observed in a study done by Díaz-Llopis and others, in which nearly one-third of participants were obese and constituted 32.14% of the enrolled patients. Also, a close finding observed regarding the involved site, as they found that both right and left site affected equally (50% for each site).[9]

Generally, obesity causes microtrauma and degenerative changes in the tissue by overloading the plantar fascia, increasing tensile stress, and changing foot biomechanics. Treatment and prevention of plantar fasciitis in obese people therefore depend heavily on controlling weight. While not directly caused by obesity, a heavier load can accelerate the wear and tear or compression of the heel fat pad, which acts as a natural shock absorber. Reduced cushioning can transmit more direct force to the plantar fascia origin.[10]

One week after the intervention, the mean level of pain was significantly higher in steroid group. No statistically significant difference ($P \geq 0.05$) in mean level of pain between study groups at baseline and three weeks or two months after intervention.

In the same concern, Ahadi and colleagues compare the efficacy of ultrasound-guided injection of botulinum toxin type-A with corticosteroid in 35 patients with chronic plantar fasciitis. Results of both groups revealed that patients' pain and function improved significantly up to 3-weeks after injection. In the botulinum toxin type A group, pain score improved significantly 12-weeks after intervention and the improvement was sustained for another 3 months.[11] Elizondo-Rodríguez and other co-authors noticed that there was a sustained improvement in pain outcomes in each of the treatment groups (Botulinum Toxin A and Corticosteroid group) after 24 weeks. Pain perception in patients significantly improved from week-2 ($P < 0.001$). No significant differences between the groups at 24 weeks ($P > 0.05$).[12] To evaluate the efficacy of botulinum toxin-A for the treatment of plantar fasciitis through a meta-analysis of randomized controlled trials conducted by Acosta-Olivo et al, a similar result obtained. They reported that botulinum toxin-A injections resulted in significant pain relief and functional improvement ($P<0.05$). A sub-analysis indicated that pain relief was sustained 12-months thereafter.[13] Ahmed et al study concluded that using botulinum toxin-A to treat plantar fasciitis resulted in significantly better improvement in foot function and pain. It also lessened the need for operative treatment of plantar fasciitis. They observed in 6 months that the pain score decreased from 7.2 to 3.6 of 10 within the botulinum toxin-A group. These postinjection scores were significantly better than the placebo group ($P = 0.01$).[14]

Better clinical outcomes were observed with botulinum toxin type A as compared to corticosteroids had been approved in Samant et al study, in which no significant differences in botulinum toxin A and steroid groups at baseline. Patients in both the groups had significant improvement in pain scores over a 12-month follow-up. After 12 month follow up, the pain score was significantly lower in the botulinum toxin A group ($P=0.001$).[13]

This study revealed that the level of pain was significantly decreased in steroid group ($P < 0.05$) after one week, three weeks, and two months compared to that at baseline. Besides, the level of pain was significantly decreased in Botox group ($P < 0.05$) after one week,

three weeks, and two months compared to that at baseline. In comparison to Elizondo-Rodríguez e al study et al study, an agreement observed in that patients treated with corticosteroid showed a significant improvement in pain and functional scales compared with the initial values.[12] In an earlier study done by Babcock et al, who used application approach of 70 U of botulinum toxin A applied to two different sites (40 and 30 U). They found a significant improvement in patients who received botulinum toxin A in the evaluation of pain and function in a follow-up of 3-8 weeks[15], which align Ahadi et al study, as found in the botulinum toxin type-A group, that morning pain improved significantly at 12-weeks after intervention and the improvement was sustained for another 3-months after baseline, whereas in the corticosteroid group, the improvement was significant only when comparing follow-ups values to baseline.[14]

The difference reported among the studies mentioned above can be attributed to the difference in study design and methodology, sample size, Control Groups (such as saline injection, corticosteroids, or others), different scores for pain evaluation, duration of follow-up, severity of symptoms, comorbidities and contributing factors, dose or technique used for drug administration and presence of concomitant treatment.

In patients with plantar fasciitis, Botulinum Toxin-A has a complex mechanism of pain alleviation that includes both a direct analgesic action on pain pathways and a decrease in mechanical strain. One main argument is that the calf muscles become less tense when injected with Botox-A. Because it increases the pull and tensile stress on the plantar fascia at its origin on the heel bone, tightness in these muscles is a known contributing factor to plantar fasciitis. Botox-A relieves the strain on the plantar fascia by temporarily weakening or paralyzing these muscles, which promotes healing and lessens pain.[16] In addition to relaxing muscles, Botox-A directly affects sensory nerve fibers. It prevents the release of certain neurotransmitters that are involved in neurogenic inflammation and nociception, or the transmission of pain. These consist of calcitonin gene-related peptide (CGRP), glutamate, and substance-P.[17] Furthermore, Botox-A efficiently reduces the pain signals coming from the inflammatory or deteriorated plantar fascia by preventing the production of these pain-related neurotransmitters. Regardless of muscular relaxation, this "anti-nociceptive" effect greatly reduces chronic pain in patients with planter fasciitis.[18]

Essentially, regarding the role of steroid in planter fasciitis management, the main way that intralesional steroids reduce pain in plantar fasciitis is by quickly lowering localized inflammation and the pain signals that go along with it. But because of the condition's underlying degenerative nature, their function is frequently viewed as a short-term fix to interrupt the pain cycle so that more conservative, long-term management techniques may be put into place.[2]

The current study reported a non-significant difference in the mean level of Thickness of plantar fascia between study groups at baseline and one or three weeks or two months after intervention ($P \geq 0.05$).

Similarly, results published in Elizondo-Rodríguez et al study agreed with current one in that no significant differences in the mean level of Thickness of plantar fascia were detected between Botox-A and steroid groups at 24 weeks, as assessed by ultrasonographic measurement of the plantar fascia thickness baseline and at the end of the study ($P>0.05$).[12] The current results contradicted the results published in Samant et al study, when there was a significantly less plantar fascia thickness in the group of patients who received botulinum toxin as compared to those who received corticosteroids at the 3-week, 3-month, 6-month and one-year follow up.[13]

On the other hand, thickness of plantar fascia was significantly decreased in steroid group ($P < 0.05$) after three weeks and two months compared to that at baseline. Besides, thickness of plantar fascia was significantly decreased in Botox group ($P < 0.05$) after three weeks and two months compared to that at baseline. No significant change detected after one week ($P= 0.739$). This finding differed from that published in Elizondo-Rodríguez e al study, in which observed that the thickness of the plantar fascia was measured before steroid treatment and at the end of the study, showing a diminished thickness in all patients, with no differences between groups, but similar to the current study, the patients in the botulinum toxin group showed a significant improvement in pain during the follow-up.[12]

The discrepancy reported ahead among studies is multifactorial and might attributed to the difference in sample size, study design, patient characteristics, injection technique of the material, the dosage used, or the specific measurement methods used, leading to different outcomes compared to other published research. It highlights the variability in treatment response and the need for more standardized and comprehensive studies comparing these modalities.

Through a complex process that mainly involves muscular relaxation, pain relief, and an anti-inflammatory impact, Botox-A improves the increased thickness in the plantar fascia in cases of plantar fasciitis. Together, these measures lessen the inflammation and mechanical stress that cause the plantar fascia to

thicken.[19] According to numerous studies, the Achilles tendon and, by extension, the plantar fascia are considerably strained when the calf muscles (gastrocnemius-soleus complex) are tense. The temporary paralysis of these muscles caused by Botox-A injections promotes relaxation and lessens the tensile strain on the plantar fascia. It is thought that this mechanical unloading promotes healing and lessens compensatory thickening in the fascia.[20] Botox-A provides direct anti-nociceptive (pain-reducing) and anti-inflammatory effects in addition to paralyzing muscles. At the injection site, it is known to inhibit the release of several neurotransmitters, including substance P and glutamate, that are implicated in inflammation and pain transmission. Botox-A can directly aid in the healing process and the elimination of the inflammation that causes fascia thickening by lowering these mediators of pain and inflammation.[21]

Study limitations

While significant short-term improvements were observed, long-term outcomes remain uncertain. The study also did not include a placebo or saline control group, which could have helped isolate the true pharmacological effects from the procedural or placebo effect.

The absence of functional outcome measures (e.g., foot function index) limits interpretation of full clinical benefit.

CONCLUSION

Both steroid and Botox injections can significantly relieve pain and thickness associated with plantar fasciitis. While both therapy approaches have their benefits, Botox injections may offer certain advantages over steroid injections for certain people with plantar fasciitis, particularly those wishing to avoid dangers associated with steroids.

REFERENCES

1. Tseng WC, Chen YC, Lee TM, Chen WS. Plantar Fasciitis: An Updated Review. J Med Ultrasound, 2023; 31(4): 268-74.
2. Buchanan B, Kushner D. Plantar Fasciitis. 2022 May 30. StatPearls [Internet] Treasure Island (FL): StatPearls Publishing, 2023; 469-80.
3. Nahin RL. Prevalence and pharmaceutical treatment of plantar fasciitis in United States adults. The journal of pain, 2018; 19(8): 885-96.
4. Mørk M, Soberg HL, Heide M, Hoksrud AF, Groven KS, Brunborg C, et al. Predictors for pain and functioning in patients with plantar fasciopathy one year after inclusion in a treatment trial in specialist care. BMC Musculoskelet Disord, Dec. 20, 2024; 25(1): 1049.
5. Rabadi D, Seo S, Wong B, Chung D, Rai V, Agrawal DK. Immunopathogenesis, early Detection, current therapies and prevention of plantar Fasciitis: A concise review. International immunopharmacology, 2022; 110: 109023.
6. Schleip R, Gabbiani G, Wilke J, Naylor I, Hinz B, Zorn A, et al. Fascia is able to actively contract and may thereby influence musculoskeletal dynamics: a histochemical and mechanographic investigation. Frontiers in physiology, 2019; 10: 336.
7. David JA, Sankarapandian V, Christopher PR, Chatterjee A, Macaden AS. Injected corticosteroids for treating plantar heel pain in adults. Cochrane Database Syst Rev., 2017; 6(6): Cd009348.
8. Tsikopoulos K, Vasiliadis HS, Mavridis D. Injection therapies for plantar fasciopathy ('plantar fasciitis'): a systematic review and network meta-analysis of 22 randomised controlled trials. British journal of sports medicine, 2016; 50(22): 1367-75.
9. Díaz-Llopis IV, Rodríguez-Ruíz CM, Mulet-Perry S, Mondéjar-Gómez FJ, Climent-Barberá JM, Cholbi-LLobel F. Randomized controlled study of the efficacy of the injection of botulinum toxin type A versus corticosteroids in chronic plantar fasciitis: results at one and six months. Clinical rehabilitation, 2012; 26(7): 594-606.
10. Maktouf W, Ferhi H, Boyas S, Beaune B, Gaied Chortane S, Portero P, et al. The influence of obesity and fat distribution on ankle muscle coactivation during gait. Plos one, 2024; 19(3): e0294692.
11. Ahadi T, Nik SS, Forogh B, Madani SP, Raissi GR. Comparison of the Effect of Ultrasound-Guided Injection of Botulinum Toxin Type A and Corticosteroid in the Treatment of Chronic Plantar Fasciitis: A Randomized Controlled Trial. Am J Phys Med Rehabil, 2022; 101(8): 733-7.
12. Elizondo-Rodríguez J, Simental-Mendía M, Peña-Martínez V, Vilchez-Cavazos F, Tamez-Mata Y, Acosta-Olivo C. Comparison of botulinum toxin A, corticosteroid, and anesthetic injection for plantar fasciitis. Foot & Ankle International, 2021; 42(3): 305-13.
13. Samant PD, Kale SY, Ahmed S, Asif A, Fefar M, Singh SD. Randomized controlled study comparing clinical outcomes after injection botulinum toxin type A versus corticosteroids in chronic plantar fasciitis. Int J Res Orthop, 2018; 4(4): 672-5.
14. Ahmad J, Ahmad SH, Jones K. Treatment of plantar fasciitis with botulinum toxin: a randomized,

controlled study. Foot & ankle international, 2017; 38(1): 1-7.
15. Babcock MS, Foster L, Pasquina P, Jabbari B. Treatment of pain attributed to plantar fasciitis with botulinum toxin a: a short-term, randomized, placebo-controlled, double-blind study. American journal of physical medicine & rehabilitation, 2005; 84(9): 649-54.
16. Li Q, Zhang J, Sun J, Gao C, Zhao J. Therapeutic efficacy and safety of botulinum toxin A injection in plantar fasciitis: A systematic review and meta-analysis. PLoS One, 2024; 19(12): e0312908.
17. Ramachandran R, Yaksh TL. Therapeutic use of botulinum toxin in migraine: mechanisms of action. British Journal of Pharmacology, 2014; 171(18): 4177-92.
18. Sim WS. Application of botulinum toxin in pain management. Korean J Pain., 2019; 24(1): 1-6.
19. Latt LD, Jaffe DE, Tang Y, Taljanovic MS. Evaluation and treatment of chronic plantar fasciitis. Foot & ankle orthopaedics, 2020; 5(1): 2473011419896763.
20. Zhao H, Ren Y, Roth EJ, Harvey RL, Zhang L-Q. Concurrent deficits of soleus and gastrocnemius muscle fascicles and Achilles tendon post stroke. Journal of Applied Physiology, 2015; 118(7): 863-71.
21. Gupta I. Therapeutic and Cosmetic Correction of Massetric Hypertrohy with Botulinum Toxin Injection and Assessment of Structural and Functional Changes in the Masseter Muscle Following the Treatment: Rajiv Gandhi University of Health Sciences (India), 2018.