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A Comparative Study of Gastrocnemius Release and Open Plantar Fasciotomy for chronic Plantar Fasciitis

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ABSTRACT

Background: For chronic plantar fasciitis (CPF), plantar fascia release was traditionally advised, but success rates vary, with risks including lateral column pain, nerve injury, wound complications, and fascia rupture. Gastrocnemius recession at the musculotendinous junction is another technique used for treatment**.**

Objective: This study aimed to compare the results obtained from open plantar fasciotomy (OPF) with those obtained from proximal medial gastrocnemius release (PMGR) in the treatment of chronic PF.

Patients and methods: This prospective study was conducted in the Orthopedic Department at Menoufia University Hospitals between April 2022 and May 2024. The sample included 20 patients with chronic PF unresponsive to conservative treatment.

Results: A significant improvement in functional scores was achieved in both groups at 3, 6, and 12 months compared to the preoperative status (Repeated measures ANOVA, P = .000). By running a post-hoc analysis, no significant improvement in pain scores was reported with the OPF group in 6- and 12-months follow-up compared to the 3-months follow-up (Bonferroni test, P > .05). On the other hand, a significant improvement was observed between 3 and 6 months in the PMGR group (Bonferroni test, P = .013).

Conclusion: PF is often a self-limiting illness, with the majority of patients experiencing complete symptom relief with conservative treatment. PMGR and OPF were useful and safe surgical treatments for CPF patients. Both operations produced positive results in terms of pain, function, satisfaction, and health perception.

Keywords: Plantar fasciitis, PMGR, OPF, VAS for pain.

INTRODUCTION

About 11-15% of adult foot problems need professional care, with plantar fasciitis (PF) being one of the most severe and prevalent causes of heel pain. The 40–60 age range is when incidence peaks [(1)]. Repetitive microtrauma from heel strikes causes traction periostitis and inhibits the body's natural healing mechanism, which causes persistent fascial inflammation. Overweight people who stand for extended periods of time, high arched feet, excessive foot pronation, and leg length disparity are risk factors for developing PF [(1)].

The patient's medical history and physical examination are used to make the diagnosis of PF. When the patient initially gets out of bed, they experience discomfort, which subsides as their activity level steadily increases and is detected by palpating the medial plantar calcaneal area [(2)].

Treatment options for PF include non-pharmacological, pharmaceutical, and surgical approaches. The most prevalent non-pharmacological methods are shoe embeds, ice backs, extracorporeal shock wave therapy, and plantar fascia lengthening exercises, while the most popular medications are corticosteroid injections and non-steroidal anti-inflammatory drugs (NSAIDs) [(3)].

Various surgical techniques have been suggested as treatments for this illness. Most of them are predicated on releasing tension and overload at the plantar fascia's calcaneal origin. In the past, the preferred course of therapy was partial or total open plantar fasciotomy (OPF). Some issues have been brought up about this approach, such as the loss of the windlass effect and iatrogenic flat foot or lateral column overload brought on by a change in the foot's center of pressure [(4)].

It has recently been hypothesized that PF and restricted ankle dorsiflexion, which results from tight gastrocnemius muscles, are strongly related. For RPF, gastrocnemius release was therefore recommended as a viable surgical treatment. It can be done at the head of the medial gastrocnemius, more proximally, or distally [(5)]. Proximal medial gastrocnemius release (PMGR) has been used to treat PF in a number of trials with satisfactory to outstanding outcomes [(6)]. Therefore, this study aimed to compare the results obtained from OPF with those obtained from PMGR in the treatment of chronic PF.

PATIENTS AND METHODS

This prospective study was conducted in the Orthopedic Department at Menoufia University Hospitals between April 2022 and May 2024. The sample consisted of 20 patients with chronic PF unresponsive to conservative treatment. The patients were divided into two groups: 10 in the open plantar fasciotomy (OPF) group and 10 in the medial gastrocnemius release (MGR) group. All cases were evaluated clinically and physically both preoperatively and postoperatively.

Inclusion criteria: Patients over 18 years old having a clinical diagnosis of PF. Patients who were nonresponsive after undergoing conservative therapy for at least nine months.

Exclusion criteria: Patients who had nonsteroidal anti-inflammatory medications within a week, physical therapy within six weeks, or a local steroid injection

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within six months. Patients with a history of foot deformity or previous foot surgery. Patients with a confirmed diagnosis of neuropathy. Patients with significant cardiovascular, hepatic, or renal disease.

Surgical Technique:

Open plantar fasciotomy (OPF): The patient had spinal anesthesia while lying supine with a thigh tourniquet applied. The exposed area, including the foot and ankle, was disinfected with the appropriate antiseptic. A 3-cm incision was made medially to the plantar fascia's calcaneal insertion. Blunt dissection from medial to lateral was carried out when the plantar fascia was exposed. The fascia's width was roughly measured with a ruler and a mosquito clamp (Figure 1). After that, a piece of the fascia's medial third was made, around 2 to 3 cm from where it was inserted (Figure 2). By feeling the release and palpating the medial third, the plantar fascia's release was verified (Figure 3). After that, absorbable sutures were used to seal the skin, and a heavy compression dressing was placed on the foot for a whole day.

Figure (1): Identifying of planter fascia.

Figure (2): Sectioning the medial third of planter fascia

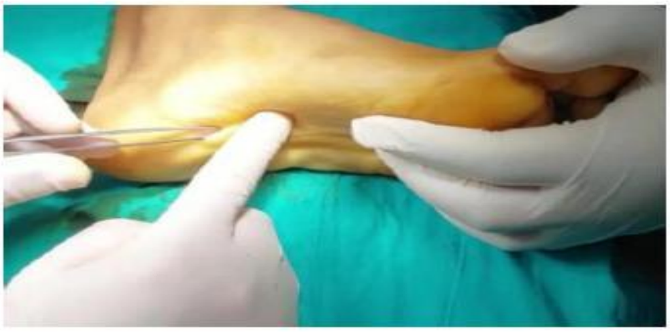

Figure (3): Sense the release of planter fascia.

Proximal medial gastrocnemius release (PMGR): After receiving spinal anesthesia, the patient was placed in the prone decubitus position and secured with a thigh tourniquet. The proper antiseptic was used to sterilize the exposed region. Ten centimeters below the popliteal crease on the posteromedial side of the knee, a 3- to 4-cm transverse incision was created (Figure 4). The gastrocnemius's proximal medial head was exposed using a blunt tool, and a hemostat was subsequently utilized to isolate it (Figure 5). The semi-circumferential release at the anterior side of the medial head of the gastrocnemius was completed by applying ankle dorsiflexion while cutting the aponeurosis with a scalpel (Figure 6). This allowed both ends to separate. Increased ankle dorsiflexion was examined, and any remaining tightness was palpated to assist evaluate possible incomplete recession. After that, a little adhesive dressing was put on and absorbable sutures were used to seal the skin.

Figure (4): Incision planning for PMGR.

Figure (5): Exposure of the proximal medial head of the gastrocnemius.

Figure (6): Gastrocnemius recession

Postoperative care: The same postoperative analgesic, antibiotic, and anti-inflammatory protocol was used for the first 15 days in both groups. For weight bearing, all patients in the OPF group were instructed to remain immobilized for at least 3 weeks, followed by another 3 weeks of partial weight bearing. In contrast, patients in the PMGR group were instructed to bear full weight one day after the operation. Each of the study's subjects had three planned clinical appointments. They were assessed to inspect the wound and remove sutures at 15 days after surgery, and then again after 3, 6, and 12 months. Every clinical appointment included the collection of study variables.

Functional score: Functional outcomes were assessed using three measures. The visual analogue scale (VAS) scored pain on a 10-cm line, with 0 indicating no pain and 10 representing the worst imaginable pain. The American Orthopedic Foot and Ankle-Hindfoot Scale (AOFAS) evaluated pain, function, and alignment, with a total score ranging from 0 (severe impairment) to 100 (no symptoms), comprising nine items: 40 points for pain, 50 for function, and 10 for alignment. Postoperative satisfaction was assessed using a 4-point Likert scale (1, extremely satisfied; 2, satisfied; 3, not totally happy; 4, very dissatisfied), and calf power was determined by counting the number of successive single-heel raises on the operated side at the conclusion of the follow-up.

Rehabilitation: As soon as pain permitted, patients were directed to perform calf stretching exercises and forced dorsiflexion exercises starting on the first day. Modifications in lifestyle can hasten healing and provide lasting alleviation. Possible weight reduction and modifications to workout regimens are among the adjustments.

Ethical approval: The Ethics Committee of Menoufia Faculty of Medicine has given its approval to this investigation. Every patient gave informed permission. Throughout its implementation, the study complied with the Helsinki Declaration.

Statistical analysis

SPSS Version 22.0 was used to compute the mean ± SD for quantitative variables and the frequencies and percentage for qualitative variables. The Shapiro-Wilk test was used to determine that the data had a normal distribution. The independent sample t-test was utilized for numerical variables and the X^2- test for categorical variables in order to compare preoperative and postoperative data across groups. Results at various follow-up periods were compared using post-hoc analysis and a general linear model (repeated measures ANOVA). A P value ≤ 0.05 was deemed statistically significant.

RESULTS

As regards demographic characteristics, there was no significant changes between both groups in all parameters. No significant differences were found between the groups in terms of age, gender, BMI, operated side and duration of symptoms, or follow-up period (Table 1).

Table (1): Comparing demographic data between groups

	PMGR (n=10)	OPF (n=10)	P value
Age (years) *	39.1 ± 12.3	38.8 ± 9.6	0.952[a]
BMI (kg/m^2) *	33.4 ± 5.1	31.8 ± 4.5	0.468[a]
Gender **			0.606[b]
Male	3 (30%)	2 (20%)	
Female	7 (70%)	8 (80%)	
Operated Side **			0.639[b]
Right	7 (70%)	6 (60%)	
Left	3 (30%)	4 (40%)	
Duration of complaint (months) *	25.6 ± 5.4	29.5 ± 4.8	0.107[a]

PMGR: proximal medial gastrocnemius release; OPF: Open plantar fasciotomy; BMI: Body mass index. * Data are presented as mean ± standard deviation; ** Data are presented as number (percentage).
[a]:Independent sample t test; [b]: Chi-square test.

Outcome measures: The average operating time in the PMGR group was 22.4 ± 2.2 minutes (range: 17–25 minutes), while the OPF group had a similar operating time with a mean of 21.2 ± 3.1 minutes (range: 16–25 minutes). The average postoperative hospital stay was 1.4 ± 0.3 days (range: 1–2 days) in the PMGR group and 1.6 ± 0.3 days (range: 1–2 days) in the OPF group.

1- Visual analogue scale (VAS) for Pain:

The mean preoperative VAS for pain in the PMGR and OPF groups was 7 ± 0.8 and 7.3 ± 0.6 (range: 6–8), respectively, with no statistically significant difference between groups regarding preoperative pain levels (Independent sample t-test, P = .531). A statistically significant difference was observed in pain scores at the 3-month follow-up, favoring the PMGR group (Independent sample t-test, P = .034). However, at the 6- and 12-month follow-ups, both groups showed similar pain levels (Independent sample t-test, P = .391 and P = .567, respectively) (Table 2 & figure 7).

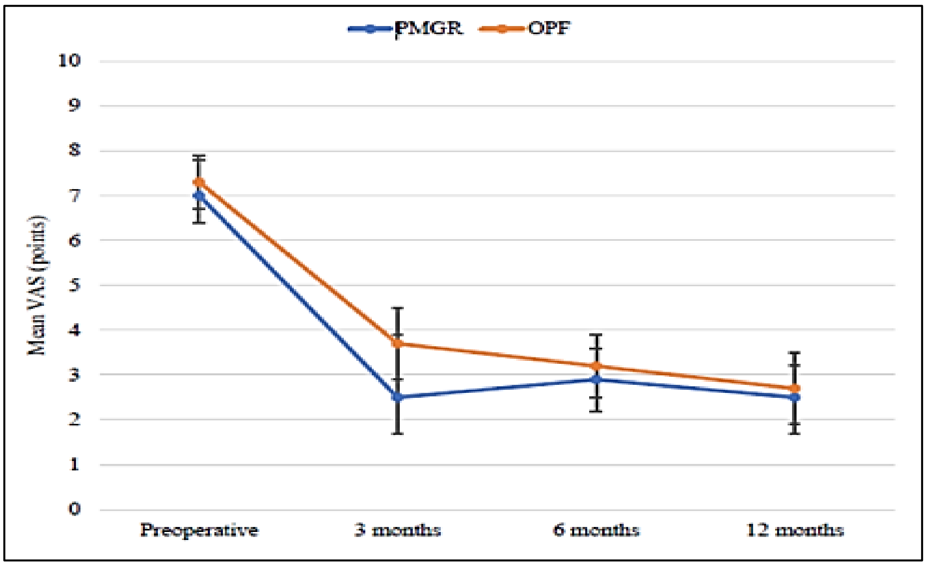

Figure (7): Comparing VAS between groups represents changes in VAS for pain from preoperative values across different follow-up intervals in PMGR and OPF groups.

Table (2): Comparing visual analogue scale for pain between groups

VAS for Pain Preoperative	**PMGR (n=10)**		**OPF (n=10)**		***P value a***
	Mean ± SD	Range	Mean ± SD	Range	
Preoperative	7 ± 0.8	6 – 8	7.3 ± 0.6	6 – 8	.531
3 months	2.5 ± 1.4	0 – 5	3.7 ± 0.8	3 – 5	.034
6 months	2.9 ± 0.7	2 – 4	3.2 ± 0.7	2 – 4	.391
12 months	2.5 ± 0.7	2 – 4	2.7 ± 0.8	2 - 4	.567
P value b	.000		.000		

PMGR: proximal medial gastrocnemius release; OPF: open plantar fasciotomy; VAS: Visual Analogue Scale.
a Independent sample t test (comparison between groups); b Repeated measures ANOVA (comparison within groups).

A significant reduction in pain scores was achieved in both groups at 3, 6, and 12 months compared to the preoperative status (Repeated measures ANOVA, P = .000). By running a post-hoc analysis, no significant improvement in pain scores was reported with the PMGR group in 6- and 12-month follow-up compared to the 3-month follow-up (Bonferroni test, P > .05). On the other hand, a significant improvement was observed between 3 and 12 months in the OPF group (Bonferroni test, P = .006) (Table 3).

Table (3): Comparing visual analogue scale for pain within groups

Pairwise Comparisons	**PMGR (n=10)**			**OPF (n=10)**		
	MD	**SD**	***P value***	**MD**	**SD**	***P value***
Preoperative Vs 3 months	4.8	0.5	0.000	3.6	0.4	0.000
Preoperative Vs 6 months	4.4	0.3	0.000	4.1	0.4	0.000
Preoperative Vs 12 months	4.8	0.2	0.000	4.6	0.4	0.000
3 months Vs 6 months	0.4	0.5	1.000	0.5	0.2	0.167
3 months Vs 12 months	0.0	0.4	1.000	1.0	0.2	0.006
6 months Vs 12 months	0.4	0.2	0.221	0.5	0.2	0.090

Post-hoc analysis by Bonferroni test.

2-American Orthopaedic Foot & Ankle Society (AOFAS) Score: The mean preoperative AOFAS score was 38.2 ± 5.4 (range, 30 – 47) and 42.3 ± 4.4 (range, 36 – 49) in the PMGR and OPF groups respectively. No statistically significant difference was found between groups regarding preoperative AOFAS scores (Independent sample t test, *P* = .079). A statistically significant difference was observed between groups in AOFAS scores during the 3-months follow-up in favor of the PMGR group (Independent sample t test, *P* = .001). In 6- and 12-months follow-ups, both groups were associated with similar functional scores (Table 4 and figure 8).

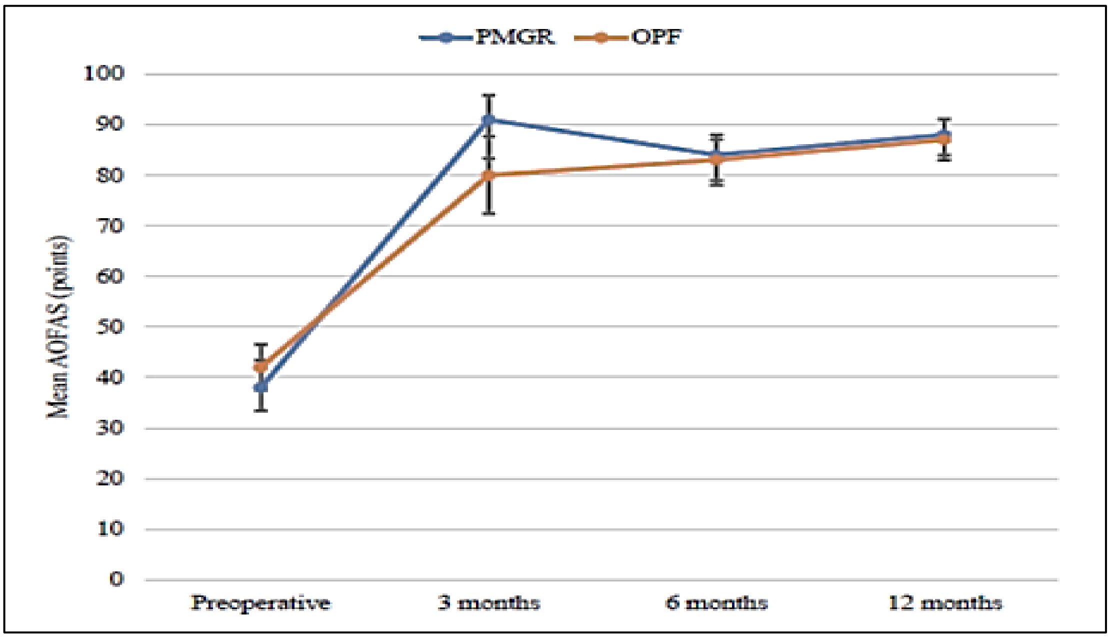

Figure (8): Comparing AOFAS between groups represents changes in the AOFAS scores from preoperative values across different follow-up intervals in PMGR and OPF groups.

Table (4): Comparing AOFAS scores between Groups

AOFAS	PMGR (n=10)		OPF (n=10)		*P value* [a]
	Mean ± SD	**Range**	**Mean ± SD**	**Range**	
Preoperative	38.2 ± 5.4	30 – 47	42.3 ± 4.4	36 – 49	0.079
3 months	91.4 ± 4.8	86 – 99	79.9 ± 7.6	70 – 90	0.001
6 months	84 ± 3.1	81 – 88	83.1 ± 5	76 – 90	0.634
12 months	87.9 ± 3.1	82 – 92	86.6 ± 4.1	81 - 91	0.430
P value [b]	0.000		0.000		

[a] Independent sample t test (comparison between groups); [b] Repeated measures ANOVA (comparison within groups)

As demonstrated in table (5), a significant improvement in functional scores was achieved in both groups at 3, 6, and 12 months compared to the preoperative status (Repeated measures ANOVA, *P* = .000). By running a post-hoc analysis, no significant improvement in pain scores was reported with the OPF group in 6- and 12-month follow-up compared to the 3-month follow-up (Bonferroni test, *P* > .05). On the other hand, a significant improvement was observed between 3 and 6 months in the PMGR group (Bonferroni test, *P* = 0.013).

Table (5): Comparing AOFAS Scores within Groups

Pairwise Comparisons	PMGR (n=10)			OPF (n=10)		
	MD	**SE**	***P value***	**MD**	**SE**	***P value***
Preoperative Vs 3 months	53.2	2.7	0.000	37.6	3.5	0.000
Preoperative Vs 6 months	45.8	2.4	0.000	40.8	2.2	0.000
Preoperative Vs 12 months	49.7	2.3	0.000	44.3	1.7	0.000
3 months Vs 6 months	7.4	1.7	0.013	3.2	2.1	1.000
3 months Vs 12 months	3.5	1.3	0.145	6.7	2.8	0.227
6 months Vs 12 months	3.9	0.9	0.948	3.5	2.3	0.966

Post-hoc analysis by Bonferroni test.

3- Satisfaction: At the 12-month follow-up, the majority of patients were satisfied with either procedure. The overall satisfaction rate was 85% (90% PMGR and 80% OPF). In the PMGR group, six patients were very satisfied, three were satisfied, one was incompletely satisfied and none was dissatisfied. In the OPF group, five patients were very satisfied, three were satisfied, two were incompletely satisfied and none was dissatisfied. As shown in table (6), no statistically significant difference was observed in the levels of satisfaction between the two techniques (Chi-square test, *P* = .809).

Table (6): Comparing satisfaction levels between groups at 12-month follow-up

	PMGR (n=10)		**OPF (n=10)**		***P value***
	No.	**%**	**No.**	**%**	
Satisfaction Level					0.809
Level IV (Very Satisfied)	6	60	5	50	
Level III (Satisfied)	3	30	3	30	
Level II (Incompletely Satisfied)	1	10	2	20	
Level I (Dissatisfied)	0	0	0	0	

PMGR: proximal medial gastrocnemius release; OPF: open plantar fasciotomy. * Chi-square test.

4- Complications: As demonstrated in table (7), five (25%) patients in our series developed at least one postoperative complication. However, none reported major complications. In the PMGR group, only one patient experienced recurrence of pain. One reported superficial wound infection that was resolved by antibiotic therapy. In the OPF group, two patients complained of recurrence of pain. One patient had superficial infections that was resolved successfully by daily dressing and antibiotic therapy. No statistically significant difference was detected in the complication rate between groups (Chi-square test, *P* =0.361).

Table (7): Comparing Postoperative Complications between Groups

	PMGR (n=10)		OPF (n=10)		***P value***
	No.	**%**	**No.**	**%**	
Complication					.361
Recurrence of Pain	1	10	2	20	.531
Wound Dehiscence	0	0	0	0	-
Wound Infection	1	10	1	10	1.000
Osteomyelitis	0	0	0	0	-
Hematoma	0	0	0	0	-
Hypertrophic Scar	0	0	0	0	-
Neuropathy	0	0	0	0	-

* Chi-square test.

DISCUSSION

PF is a prevalent cause of heel discomfort for both athletes and non-athletes. It accounts for 10-15% of all foot pain cases referred to orthopedic surgeons, and around 10% of the population may experience heel pain at some point in their lives. The specific cause is unknown, however it is assumed to be mechanical overload. While most cases resolve with conservative treatment, around 10% of individuals develop lasting problems, resulting in chronic pain and impairment, which can have a major impact on quality of life [(7)]. PF is the main cause of heel pain, with almost 1 million cases treated each year in the United States. About 90% of patients improve with conservative treatment within 6 months. However, 10% develop recalcitrant plantar fasciitis (RPF) and may require surgery [(8)].

Achilles and fascia stretches, shoe inserts, night splints, castings, steroid injections, anti-inflammatory drugs, and shock wave therapy are examples of non-operative therapies for PF. While, these measures are often effective, some patients do not respond. For refractory PF, plantar fascia release was traditionally advised, but success rates vary, with risks including lateral column pain, nerve injury, wound complications, and fascia rupture. Gastrocnemius recession at the musculotendinous junction is another technique used for treatment [(9)].

This prospective study compared PMGR and OPF in treating chronic PF. A total of 20 patients (10 in each group) were followed for at least 12 months. No significant differences were found between the groups in terms of age, gender, BMI, operated side, duration of symptoms, or follow-up period. Our results align with **Gamba *et al.*** [(10)] who also found no significant differences between OPF (21 patients) and PMGR (17 patients) groups in terms of age, gender, BMI, side, or duration of symptoms. **Monteagudo *et al.*** [(11)] studied 60 patients, with 30 in each group: PPF (mean age 42, duration 13 months) and PMGR (mean age 44, duration 14 months). Both groups were similar in age, sex, height, weight, BMI, and symptom duration.

Operative intervention for PF is typically considered after at least 6 months of conservative treatment. If conservative therapies fail, plantar fasciotomy (partial or complete fascia release) may be an option. Recently, gastrocnemius recession has emerged as an effective treatment for refractory foot pain with minimal morbidity [(12)].

Our study found no significant difference in operating time between the PMGR (22.4 ± 2.2 min) and OPF (21.2 ± 3.1 min) groups (P = .292) or in hospital stay (PMGR 1.4 ± 0.3 days, OPF 1.6 ± 0.3 days; P = .174). Preoperative pain scores were similar (PMGR 7 ± 0.8, OPF 7.3 ± 0.6; P = .531). At 3 months, PMGR showed significantly lower pain scores than OPF (P = .034), but both groups had similar pain levels at 6 and 12 months (P = .391 and P = .567). Both groups showed significant pain reduction at 3, 6, and 12 months (P = .000), with PMGR not improving further after 3 months, while OPF showed significant improvement between 3 and 12 months (P = 0.006). Our results align with **Monteagudo *et al.*** [11] who found significant pain reduction with fasciotomy (VAS: 8.1 pre-op, 4.5 at 6 months, 3.1 at 12 months) and PMGR (VAS: 8.2 pre-op, 1.8 at 6 months, 0.9 at 12 months). However, **Gamba *et al.*** [10] found no discernible variation in VAS scores between groups at any stage after surgery. **Abbassian *et al.*** [13] followed 21 heels in 17 patients after PMGR, with 81% reporting significant pain relief. Most experienced improvement within 1–2 weeks, with some requiring a corticosteroid injection for further relief. **Ficke *et al.*** [9] examined 18 instances of chronic PF in individuals who were overweight, showing a significant pain reduction from 8.3 pre-op to 2.4 at final follow-up (P < 0.01). **Pickin *et al.*** [14] carried out a systematic-review of 7 researches, finding a significant postoperative pain reduction in all six studies using the VAS with a 76.06% mean pain reduction at 12 months. **Wheeler *et al.*** [15] reported a 79% pain reduction in 68 patients after a follow-up of 7 years. **Ginés-Cespedosa *et al.*** [16] found no significant change in plantar fascia thickness postoperatively after PMGR but noted clinically significant reductions in pain, AOFAS scores, and physical subdomains of the SF-36.

The preoperative AOFAS scores were similar between the PMGR (38.2 ± 5.4) and OPF (42.3 ± 4.4) groups (P = .079). At 3 months, PMGR showed significantly better AOFAS scores (P = .001). However, at 6 and 12 months, both groups had similar functional scores (P = .634 and P = .430). Both groups showed significant functional improvements at 3, 6, and 12 months (P = .000). Post-hoc analysis revealed no significant improvement in the OPF group between 3, 6, and 12 months (P > 0.05), but PMGR showed significant improvement from 3 to 6 months (P = .013). In **Gamba *et al.*** [10], both PMGR and OPF groups showed significant improvements, but no differences in pain or AOFAS scores at follow-up. In contrast, **Monteagudo *et al.*** [11] found that PMGR led to significant improvements in both VAS and AOFAS scores with VAS reducing from 8.2 pre-op to 1.8 at 6 months and 0.9 at 12 months and AOFAS scores improving from 46 pre-op to 85 at 6 months and 90 at 12 months. Notably, 20% of PMGR patients improved within one week, 60% between weeks 1–8, and 20% between 2–6 months. In the PPF group, no improvements were seen within six weeks.

In this study, At 12 months, 85% of patients were satisfied with either PMGR (90%) or OPF (80%). In the PMGR group, 6 were very satisfied, 3 satisfied, 1 incompletely satisfied, and none dissatisfied. In the OPF group, 5 were very satisfied, 3 satisfied, 2 incompletely satisfied, and none dissatisfied. No significant difference in satisfaction was found between the two techniques (P = .809). In line with our results, **Gamba *et al.*** [10] found high satisfaction, with 85.8% of PMGR and 89.5% of OPF patients reporting being satisfied (P = .27). **Monteagudo *et al.*** [10] reported 80% satisfaction in the PMGR group (excellent), compared to 10% excellent, 30% good, 20% satisfactory, and 40% poor in the PPF group. **Wheeler *et al.*** [15] reported 84% satisfaction after 7 years, while **MacInnes *et al.*** [17] questioned its clinical value due to poor outcomes and prolonged recovery. **Gibbons *et al.*** [8] found a median global satisfaction score of 85.4 out of 100, with higher satisfaction (91.7) in patients who had surgery 5 or more years ago compared to those within 5 years (79.2). Satisfaction increased from 63.4% within 5 years to 81.8% after 5 years (P = 0.081). A small positive correlation was found between time post-surgery and satisfaction (rho = 0.279, P = .016).

The majority of research on gastrocnemius recession demonstrates that Strayer-like techniques yield a range of outcomes, while studies on PMGR for RPF generally report good outcomes. **Abbassian *et al.*** [13] found 88% satisfaction with minimal complications. **Mulhern *et al.*** [19] found that combining open PMGR with endoscopic plantar fasciotomy had favorable outcomes in a group of 23 patients (25 foot), noting significant pain relief despite a short follow-up (up to 3.7 months). However, 24% of patients experienced nerve injury. They suggested reserving fasciotomy for recurrent pain after PMGR to avoid its secondary effects.

PMGR is associated with complications like hematomas and deep venous thrombosis, while OPF can lead to biomechanical issues such as plantar fascia rupture, lateral column pain, and flatfoot. These concerns prompted the development of PMGR to achieve similar outcomes without the biomechanical risks. In our study, 25% of patients had postoperative complications, but none were major. In the PMGR group, one patient had pain recurrence and one had a superficial infection, while in the OPF group, two patients had pain recurrence, and one had a superficial infection. No significant difference in complication rates was found between groups (P = 0.361) [16]. Our results align with **Gamba *et al.*** [10] who found no loss of calf strength and minimal complications, including a sural nerve lesion in one PMGR patient due to an excessively lateral incision. **Monteagudo *et al.*** [11] reported mild complications in PPF (painful scars, one nerve neuropraxia, one superficial infection) and a calf hematoma in PMGR. **Abbassian *et al.*** [13] noted no major complications, with one minor wound drainage issue. **Pickin *et al.*** [14] also found no major complications and highlighted the consistent pain reduction with gastrocnemius release, confirming its potential as an effective treatment. **Mulhern *et al.*** [19] reported no major complications, with minor issues including nerve injury (24%), scar tissue adhesions (12%), hematomas (4%), RPF (4%), posterior stiffness (4%), muscle weakness (4%), and an infected incision (4%) that resolved with oral antibiotics.

CONCLUSION

PF is often a self-limiting illness, with the majority of patients experiencing complete symptom relief with conservative treatment. However, 10% of individuals may not respond to conservative treatment and experience prolonged symptoms. Chronic RPF can cause severe pain and impairment, reducing quality of life. PMGR and OPF were useful and safe surgical treatments for RPF patients. Both operations produced positive results in terms of pain, function, satisfaction, and health perception. As a primary therapeutic application of our research, patients receiving surgical therapy of RPF should be advised that PMGR may be linked with a somewhat shorter recovery duration than OPF. Aside from that, the authors believe PMGR is the preferred approach since it eliminates the possibility of biomechanical difficulties associated with OPF.

RECOMMENDATION

PF, a prevalent source of foot discomfort, offers many treatment options, but the lack of high-quality randomized controlled trials makes definitive recommendations challenging. Through a comprehensive history, examination, and imaging, the goal of first care should be to rule out alternative causes of foot pain. Physical therapy should be the first-line treatment due to its low cost, effectiveness, and lack of side effects. Additional research with larger sample sizes is required to validate present findings and demonstrate that both PMGR and OPF are safe and effective surgical treatments for patients with RPF.

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REFERENCES

1. **Schwartz E, Su J (2014):** Plantar fasciitis: a concise review. Perm J., 18: 105–7.
2. **Gautham P, Nuhmani S, Kachanathu S (2015):** Plantar fasciitis-an update. Bangladesh Journal of Medical Science, 14 (1): 3-8.
3. **Vahdatpour B, Kianimehr L, Ahrar M (2016):** Autologous platelet-rich plasma compared with whole blood for the treatment of chronic plantar fasciitis: a comparative clinical trial. Adv Biomed Res., 5: 84. doi: 10.4103/2277-9175.182215.
4. **Oliva F, Piccirilli E, Tarantino U *et al.* (2017):** Percutaneous release of the plantar fascia. New surgical procedure. Muscles Ligaments Tendons J., 7 (2): 338-340.
5. **Cychosz C, Phisitkul P, Belatti D *et al.* (2015):** Gastrocnemius recession for foot and ankle conditions in adults: evidence-based recommendations. Foot Ankle Surg., 21 (2): 77-85.
6. **Gurdezi S, Kohls-Gatzoulis J, Solan M (2013):** Results of proximal medial gastrocnemius release for Achilles tendinopathy. Foot Ankle Int., 34 (10): 1364-9.
7. **Mao D, Chandra Kumara D, Zheng Q *et al.* (2019):** Endoscopic plantar fasciotomy for plantar fasciitis: A systematic review and network meta-analysis of the English literature. The Foot, 41: 63-73.
8. **Gamba C, Sala-Pujals A, Perez-Prieto D *et al.* (2018):** Relationship of plantar fascia thickness and preoperative pain, function, and quality of life in recalcitrant plantar fasciitis. Foot Ankle Int., 39 (8): 930–934.
9. **Ficke B, Elattar O, Naranje S *et al.* (2018):** Gastrocnemius recession for recalcitrant plantar fasciitis in overweight and obese patients. Foot Ankle Surg., 24 (6): 471-473.
10. **Gamba C, Serrano-Chinchilla P, Ares-Vidal J *et al.* (2020):** Proximal medial gastrocnemius release versus open plantar fasciotomy for the surgical treatment in recalcitrant plantar fasciitis. Foot Ankle Int., 41 (3): 267-74.
11. **Monteagudo M, Maceira E, Garcia-Virto V *et al.* (2013):** Chronic plantar fasciitis: plantar fasciotomy versus gastrocnemius recession. Int Orthop., 37 (9): 1845–1850.
12. **Latt L, Jaffe D, Tang Y *et al.* (2020):** Evaluation and Treatment of Chronic Plantar Fasciitis. Foot & Ankle Orthopaedics, 5 (1): 247301141989676. doi: 10.1177/2473011419896763.
13. **Abbassian A, Kohls-Gatzoulis J, Solan M (2012):** Proximal medial gastrocnemius release in the treatment of recalcitrant plantar fasciitis. Foot Ankle Int., 33 (1): 14-9.
14. **Pickin C, Elmajee M, Aljawadi A *et al.* (2021):** Gastrocnemius recession in recalcitrant plantar fasciitis: A systematic review. The Journal of Foot and Ankle Surgery, 61 (2): 396-400.
15. **Wheeler P, Boyd K, Shipton M (2014):** Surgery for patients with recalcitrant plantar fasciitis: good results at short-, medium-, and long-term follow-up. Orthopaedic Journal of Sports Medicine, 2 (3): 1-6.
16. **Ginés-Cespedosa A, Ugarte I, Ares-Vidal J *et al.* (2021):** Clinical and plantar fascial morphologic changes after proximal medial gastrocnemius release treatment of recalcitrant plantar fasciitis. Foot Ankle Orthopaedics, 6 (3): 24730114211027323. doi: 10.1177/24730114211027323.
17. **MacInnes A, Roberts S, Orth F *et al.* (2015):** Long-term outcome of open plantar fascia release. Foot Ankle Int., 37 (1): 17-23.
18. **Gibbons R, Mackie K, Beveridge T *et al.* (2018):** Evaluation of long-term outcomes following plantar fasciotomy. Foot Ankle Int., 39 (11): 1312-1319.
19. **Mulhern J, Protzman N, Summers N *et al.* (2018):** Clinical outcomes following an open gastrocnemius recession combined with an endoscopic plantar fasciotomy. Foot Ankle Spec., 11 (4): 330-334.