

Radiofrequency Microtenotomy with Concurrent Gastrocnemius Recession Improves Postoperative Vitality Scores in the Treatment of Recalcitrant Plantar Fasciitis

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Abstract

Introduction: Gastrocnemius recession and radiofrequency microtenotomy treat plantar fascia via different mechanisms. While studies have shown additive effects in performing plantar fasciotomy in conjunction with gastrocnemius recession, no such study exists examining the effects of performing radiofrequency microtenotomy with gastrocnemius recession. We hypothesised that performing both gastrocnemius recession and radiofrequency microtenotomy concurrently for recalcitrant plantar fasciitis is more effective than performing either procedure individually. **Materials and Methods:** We analysed all patients who underwent either a radiofrequency microtenotomy, a gastrocnemius recession, or both procedures concurrently between 2007 and 2014. The American Orthopaedic Foot and Ankle Society (AOFAS) Ankle-Hindfoot Scale, the SF-36 Health Survey, and 2 questions regarding patient satisfaction and met expectations were assessed preoperatively and postoperatively up to 1-year. **Results:** Patients who underwent both procedures concurrently had significantly higher vitality scores on the SF-36 Health Survey at 1-year postoperatively compared to patients who underwent either procedure individually. Type of intervention offered and preoperative factors were not predictive for patient outcomes. **Conclusion:** Combining radiofrequency microtenotomy and gastrocnemius recession in patients with recalcitrant plantar fasciitis and an underlying gastrocnemius contracture shows favourable medium-term outcomes compared to performing either procedure in isolation.

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Introduction

Plantar fasciitis has been reported to be the most common cause of heel pain.¹⁻³ Conservative treatment options include rest, non-steroidal anti-inflammatory drugs (NSAIDs) medication, physiotherapy, night splinting, orthotics, corticosteroid injections, extracorporeal shock wave therapy (ESWT) and laser therapy.^{1,4-8} While up to 90% of plantar fasciitis resolve with conservative treatment, 1 in 10 patients will go on to develop recalcitrant plantar fasciitis that usually requires some form of surgical intervention.⁹⁻¹² Surgical treatment for plantar fasciitis is reserved for patients who have failed conservative therapy and is generally viewed as a last resort. Potential complications include poor wound healing, chronic pain and arch collapse. Surgical options include plantar fasciotomy, cryosurgery, nerve ablation, tendoachilles lengthening and gastrocnemius recession.

Despite a name suggestive of inflammatory pathology, histopathological studies of the plantar fascia in plantar fasciitis reveal an absence of inflammation and instead show myxoid degeneration, disorganised collagen hypertrophy and angiofibroblastic hyperplasia with features consistent with a non-inflammatory degenerative fasciosis similar to tendinosis.¹³⁻¹⁷ Consequently, the radiofrequency microtenotomy is a surgical procedure that has gained popularity as a safe, effective, and minimally invasive means of treating recalcitrant plantar fasciitis.^{9,18-21} The procedure relieves pain via an anti-nociceptive effect of acute degeneration and/or ablation of sensory nerve fibres in the early period,²² followed by regeneration of nerve fibres within 90 days.²³ The transient anti-nociceptive response is later replaced by a longer term angiogenic healing response.²⁴

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Gastrocnemius tightness has been shown to cause altered foot biomechanics, giving rise to various foot pathologies including plantar fasciitis.^{6,25-27} Up to 80% of patients with plantar fasciitis have been found to have isolated gastrocnemius contractures²⁸⁻³⁰ and trials have shown that gastrocnemius release³¹ is successful in treating recalcitrant cases of plantar fasciitis.³² While studies have shown additive effects in performing a plantar fasciotomy in conjunction with a gastrocnemius recession, no such study exists examining the effects of performing radiofrequency microtenotomy with a gastrocnemius recession.^{33,34}

As the procedures act to relieve the symptoms of plantar fasciitis via separate mechanisms, we hypothesised that performing a gastrocnemius recession in conjunction with a radiofrequency tenotomy of the plantar fascia in patients with plantar fasciitis and gastrocnemius contracture results in improved outcomes compared to performing either procedure individually.

Materials and Methods

Patient Recruitment

We reviewed the prospectively collected data of all patients who underwent radiofrequency microtenotomy with or without a gastrocnemius recession from May 2007 to July 2014 at our institution. The inclusion criteria of this study was designed to include only patients with clinically documented plantar fasciitis with a tight gastrocnemius (presence of a positive Silfverskiöld test) who had failed at least 6 months of conservative therapy inclusive of stretching exercises, orthotics, and analgesia, had undergone radiofrequency microtenotomy and/or a gastrocnemius recession, and had a full set of clinical data for at least 1 year postoperatively. Patients who were lost to follow-up, had an incomplete set of data, had other concurrent lower limb conditions, or who underwent surgery of the lower limbs concurrently or during the follow-up period were not included for analysis. The full selection criteria is shown in Table 1. Data collected included the patient’s

age, gender, height, weight, body mass index (BMI), procedures performed, if bilateral surgery was performed, length of operation (LOP), length of surgery (LOS), and outcome metrics.

Surgical Procedures

Radiofrequency microtenotomy was performed using a TOPAZ microdebrider device (Arthrocare, Sunnyvale, CA), connected to a System 2000 generator set at setting 4 (175V-RMS). Access to the plantar fascia was obtained either via an open incision or percutaneously, the TOPAZ tip was connected to a sterile isotonic saline drip with a flow of 1 drop every 1 to 2 seconds. The microtenotomy was performed in a grid-like pattern over the most painful aspect of the plantar surface. Following microtenotomy, the wound was washed with saline and closed in layers.

The gastrocnemius recession was performed either proximally or at the level of the proximal tibia or distally at the musculotendinous junction of the gastrocnemius muscle. The open proximal medial gastrocnemius release was where the fascia of the medial head of the gastrocnemius is released via an open medial popliteal skin crease incision.

The distal gastrocnemius recession was performed via an endoscopic technique which involves a small medial and lateral skin incision at the level of the gastrocnemius aponeurosis. This was at the level where the Achilles tendon is palpated to fan out (musculotendinous junction). An obturator was inserted from medial to lateral, between the subcutaneous fat and gastrocnemius layers to develop the correct plane. A 4.0 mm scope was inserted into the medial cannula portal and the hook blade is inserted through the lateral cannula portal. The hook blade was advanced medially, to engage the medial edge of the aponeurosis, before it was withdrawn laterally to transect the aponeurosis.

Outcome Metrics

The primary aim of this study was to measure and compare the clinical and patient-reported outcomes of patients who had undergone either radiofrequency microtenotomy, gastrocnemius recession, or both procedures concurrently. Specifically, we focused on reduction in pain scores, improvement in functional scores, meeting expectations regarding surgery, and patient satisfaction scores. Patients were evaluated preoperatively during their initial hospital stay and postoperatively at the 3-month, 6-month, and 12-month follow-up appointments by trained physiotherapists and staff using a standardised foot and ankle assessment form. Consisting of both objective and patient-reported outcome metrics, the form included the American Orthopaedic Foot and Ankle Society (AOFAS) Ankle-Hindfoot Scale, the Short Form (36) Health Survey (SF-36), and 2 questions adapted from the North American

Table 1. Study Selection Criteria

Inclusion	Exclusion
• Clinical diagnosis of plantar fasciitis	• Incorrect diagnosis
• Gastrocnemius contracture	• Incomplete data
• Failed at least 6 months of conservative therapy	• Concurrent foot and ankle condition
• Underwent radiofrequency microtenotomy, isolated gastrocnemius recession or both procedures concurrently	• Underwent other lower limb surgery concurrently or during the follow-up period
• Full set of clinical data available for at least 1 year postoperatively	

The inclusion and exclusion criteria of this study were designed to select only patients with recalcitrant plantar fasciitis who had undergone radiofrequency microtenotomy with or without gastrocnemius recession only.

Spine Society (NASS) questionnaire specifically written to assess patient satisfaction and met expectations with regard to their operation.

The AOFAS Ankle-Hindfoot Scale is a clinical outcome scale designed to include both objective and subjective measures with the aim of comprehensively assessing function and pain following foot and ankle surgeries. In particular, we focused on pain as measured on a Visual Analogue Scale (HINDVAS) and daily function as measured using the overall Ankle-Hindfoot Score (HINDTOT). HINDVAS is measured on a scale of 0 to 10 (the minimum score representing no pain; the maximal score representing the worst pain imaginable). HINDTOT is measured from 0 (the minimum and worst score) to 100 (the maximum and best score).

The SF-36 Health Survey is a patient-reported health survey used to assess for general health and quality of life that is frequently used in health economics and cost-effectiveness analyses. The survey broadly assesses 8 domains—physical functioning (SFPF), role functioning-physical (SFRP), bodily pain (SFBP), general health (SFGH), vitality (SFVI), social functioning (SFSF), role functioning-emotional (SFRE), and mental health (SFMH)—which can further be averaged into a physical component score (PCS), a mean of the SFPF, SFRP, SFBP, and SFGH scores, and a mental component score (MCS), a mean of the SFVI, SFSF, SFRE, and SFMH scores.

At the postoperative visits only, the patients were asked 2 questions adapted from the NASS regarding whether or not the surgery met their expectations (EXP) and if they were satisfied with the results of their surgery (SAT). Met expectations was measured on a Likert scale from 1 to 7, where a score of 1 represented fully met expectations and a score of 7 represented expectations not met all. Similarly, satisfaction was measured on a Likert scale of 1 to 6, where a score of 1 represented maximal satisfaction, while a score of 6 represented no satisfaction. For the purposes of regression analyses, met expectations and patient satisfaction scores were further coded as binary variables. Expectations were considered met if the score was 1 to 4 and not met if the score was 5 to 7, while patients were considered satisfied if their score was 1 to 3 and unsatisfied if their score was 4 to 6.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) version 22 was used for all statistical analyses in this study. Results are presented as means with standard deviations and percentages of the total number of feet in the patient group. Analysis of variance (ANOVA) with Bonferroni correction was used to compare outcome metrics between patients who underwent radiofrequency microtenotomy

only, patients who underwent gastrocnemius recession only, and patients who underwent both procedures concurrently. Linear logistic regression was used to identify whether or not preoperative measurements and the type of intervention could predict HINDTOT, HINDVAS, SF-36 component scores, SFPCS, and SFMCS scores, while binary logistic regression was used to identify whether or not the same factors could predict for met expectations and patient satisfaction. Statistical significance was defined as $P < 0.05$.

Results

Patient Demographics

A total of 51 feet belonging to 43 patients met the selection criteria for this study and were included for analysis. Of these patients, 10 feet belonging to 8 patients underwent gastrocnemius recession only, 34 feet belonging to 28 patients underwent radiofrequency microtenotomy only, and 7 feet belonging to 7 patients underwent both procedures concurrently. All procedures were performed by a fellowship-trained foot and ankle surgeon. No patients who underwent both procedures concurrently underwent a bilateral operation. There was no statistically significant difference in age, gender, preoperative height, preoperative weight, preoperative BMI, length of operation, and length of stay ($P > 0.05$). Patient demographics are shown in full in Table 2.

Comparison of Intervention Efficacy

ANOVA with a Bonferroni correction for multiple comparisons showed that mean SFVI scores measured 1 year postoperatively were significantly higher for patients who underwent both procedures concurrently compared to patients who underwent either procedure individually ($P < 0.05$). Additionally, mean SFMCS scores measured at 1 year postoperatively were significantly higher in patients who underwent both procedures concurrently compared to patients who underwent gastrocnemius recession only ($P < 0.05$), but not compared to patients who only underwent radiofrequency microtenotomy ($P = 0.08$). There was otherwise no statistically significant difference in HINDTOT, HINDVAS, individual or component SF scores, EXP scores, and SAT scores measured 1 year postoperatively ($P > 0.05$). There were no statistically significant differences in HINDTOT, HINDVAS, individual or component SF scores, EXP scores, or SAT scores at the 3-month or 6-month differences ($P > 0.05$). The mean values for each patient group at each time frame are shown in full in Table 3.

Regression Analyses

Measurements included for regression analyses included age, gender, height, weight, BMI, whether or not both

Table 2. Patient Demographics

	Gastrocnemius Recession	Radiofrequency Microtenotomy	Both
Number of feet (patients)	10 (8)	34 (28)	7 (7)
Gender			
Male	4 (50%)	19 (68%)	5 (71%)
Female	4 (50%)	9 (32%)	2 (29%)
Age (years)	45.59 ± 10.13	45.42 ± 9.15	48.67 ± 12.83
Preoperative height (cm)	166.56 ± 11.47	160.43 ± 8.81	160.14 ± 7.40
Preoperative weight (kg)	73.31 ± 12.16	69.88 ± 11.93	71.81 ± 12.48
Preoperative BMI (kg/m ²)	26.46 ± 3.99	27.07 ± 3.35	27.87 ± 3.68
Bilateral operation	2 (25%)	6 (21%)	0 (0%)
Length of operation (min)	23.33 ± 7.64	20.32 ± 11.78	32 ± 7.58
Length of stay (day)	0.56 ± 0.60	0.53 ± 0.84	0.49 ± 0.49

BMI: Body mass index

Values are shown as means with standard deviations and percentage of the patients within the patient group. There were no statistically significant differences in age, gender, preoperative height, preoperative weight, preoperative BMI, length of operation, and length of stay.

feet were operated on, type of intervention offered, and the baseline HINDVAS, HINDTOT, and SF-36 scores. Linear regression showed that none of the preoperative measurements or the type of intervention performed were found to be predictive for HINDTOT, HINDVAS, SF-

component scores, SFPCS, or SFMCS scores ($P > 0.05$). Similarly, binary logistic regression showed that none of the preoperative measurements or the type of intervention performed were found to be predictive for met expectations or patient satisfaction ($P > 0.05$).

Table 3. Mean Outcome Metrics

	Gastrocnemius Recession	Radiofrequency Microtenotomy	Both
Preoperative			
HINDVAS	6.86 ± 1.57	7.21 ± 1.69	6.86 ± 1.77
HINDTOT	39.14 ± 15.91	42.00 ± 13.47	50.57 ± 18.75
SFPF	54.38 ± 18.60	54.46 ± 26.75	72.86 ± 26.75
SFRP	18.75 ± 37.20	17.86 ± 31.07	46.43 ± 50.89
SFBP	33.00 ± 11.17	25.68 ± 14.67	38.43 ± 26.01
SFGH	53.75 ± 27.87	65.64 ± 24.58	73.57 ± 24.38
SFVI	62.50 ± 22.52	61.79 ± 21.27	68.57 ± 25.45
SFSF	71.88 ± 33.91	48.66 ± 34.75	57.14 ± 47.25
SFRE	86.50 ± 35.36	95.24 ± 15.48	66.67 ± 43.03
SFMH	83.50 ± 11.20	79.29 ± 13.60	79.43 ± 19.65
SFPCS	39.97 ± 14.80	40.91 ± 18.54	57.82 ± 27.96
SFMCS	76.34 ± 10.45	71.24 ± 15.06	67.95 ± 29.57
3-months			
HINDVAS	2.43 ± 2.57	3.65 ± 2.85	3.14 ± 3.81
HINDTOT	78.86 ± 13.31	71.64 ± 19.44	73.17 ± 22.45
SFPF	73.13 ± 13.08	68.7 ± 22.27	79.29 ± 22.44
SFRP	34.38 ± 44.19	41.30 ± 43.04	50.00 ± 43.30

EXP: Met expectations; HINDVAS: American Orthopaedic Foot and Ankle Society (AOFAS) Ankle-Hindfoot Visual Analogue Scale; HINDTOT: American Orthopaedic Foot and Ankle Society (AOFAS) Ankle-Hindfoot Score; SAT: Satisfied with results of surgery; SFBP: Bodily pain (SF-36 Health Survey); SFGH: General health (SF-36 Health Survey); SFMCS: SF-36 Health Survey Mean Component Score; SFMH: Mental health (SF-36 Health Survey); SFPCS: SF-36 Health Survey Physical Component Score; SFPF: Physical functioning (SF-36 Health Survey); SFRE: Role functioning-emotional (SF-36 Health Survey); SFRP: Role functioning-physical (SF-36 Health Survey); SFSF: Social functioning (SF-36 Health Survey); SFVI: Vitality (SF-36 Health Survey)

Values are shown as means with standard deviations.

*Statistically significant difference compared to patients undergoing both procedures concurrently.

†Statistically significant difference compared to patients undergoing radiofrequency microtenotomy only.

‡Statistically significant difference compared to patients undergoing gastrocnemius recession only.

Table 3. Mean Outcome Metrics (Cont'd)

	Gastrocnemius Recession	Radiofrequency Microtenotomy	Both
3-months			
SFBP	52.63 ± 24.80	48.96 ± 22.09	54.43 ± 28.76
SFGH	62.38 ± 18.12	64.00 ± 24.90	67.29 ± 26.51
SFVI	70.00 ± 13.09	61.96 ± 20.44	66.43 ± 23.93
SFSF	90.63 ± 12.94	82.71 ± 25.21	87.50 ± 27.95
SFRE	100.00 ± 0.00	85.51 ± 34.56	71.43 ± 48.80
SFMH	84.00 ± 11.90	77.57 ± 12.86	78.29 ± 15.12
SFPCS	55.63 ± 16.16	55.74 ± 22.08	62.75 ± 25.17
SFMCS	86.16 ± 6.26	75.91 ± 17.98	75.91 ± 25.60
SAT	0.75 ± 0.46	0.74 ± 0.45	0.71 ± 0.49
EXP	0.75 ± 0.46	0.70 ± 0.47	0.71 ± 0.49
6-months			
HINDVAS	2 ± 2.65	2.39 ± 2.90	4.00 ± 2.10
HINDTOT	85.29 ± 14.12	81.07 ± 21.27	75.40 ± 15.18
SFPF	82.50 ± 18.13	75.00 ± 20.77	81.67 ± 19.41
SFRP	56.25 ± 49.55	58.93 ± 44.73	58.33 ± 49.16
SFBP	64.88 ± 24.39	57.39 ± 21.23	72.67 ± 22.57
SFGH	68.88 ± 9.23	65.36 ± 23.33	76.67 ± 19.51
SFVI	65.00 ± 20.00	63.04 ± 19.12	74.17 ± 15.63
SFSF	84.38 ± 25.66	88.39 ± 25.89	93.75 ± 10.46
SFRE	100.00 ± 0.00	97.62 ± 12.60	83.33 ± 40.82
SFMH	88.00 ± 5.24	84.14 ± 10.18	84.67 ± 17.66
SFPCS	68.13 ± 19.73	64.17 ± 21.41	72.33 ± 25.42
SFMCS	84.34 ± 8.51	83.30 ± 10.66	83.98 ± 14.65
SAT	0.63 ± 0.52	0.75 ± 0.44	0.50 ± 0.55
EXP	0.63 ± 0.52	0.79 ± 0.42	0.83 ± 0.41
1-year			
HINDVAS	1.57 ± 2.30	1.50 ± 2.43	1.29 ± 2.22
HINDTOT	87.00 ± 12.95	88.54 ± 16.79	90.71 ± 13.51
SFPF	86.88 ± 6.51	82.50 ± 16.69	90.71 ± 9.76
SFRP	59.38 ± 49.89	72.32 ± 34.25	89.29 ± 19.67
SFBP	58.88 ± 21.54	60.86 ± 29.58	73.71 ± 25.60
SFGH	59.88 ± 10.91	65.79 ± 28.11	88.14 ± 8.51
SFVI	63.75 ± 15.76*	51.96 ± 19.78*	89.29 ± 14.27†‡
SFSF	76.56 ± 30.21	91.96 ± 17.75	96.43 ± 9.45
SFRE	91.67 ± 23.57	96.43 ± 13.88	100.00 ± 0.00
SFMH	84.00 ± 8.82	843.43 ± 13.10	90.29 ± 15.64
SFPCS	66.25 ± 17.13	70.37 ± 17.56	85.46 ± 13.57
SFMCS	78.99 ± 12.34*	83.45 ± 11.49	94.00 ± 5.21‡
SAT	0.63 ± 0.52	0.82 ± 0.39	0.86 ± 0.38
EXP	0.50 ± 0.54	0.86 ± 0.36	0.86 ± 0.38

EXP: Met expectations; HINDVAS: American Orthopaedic Foot and Ankle Society (AOFAS) Ankle-Hindfoot Visual Analogue Scale; HINDTOT: American Orthopaedic Foot and Ankle Society (AOFAS) Ankle-Hindfoot Score; SAT: Satisfied with results of surgery; SFBP: Bodily pain (SF-36 Health Survey); SFGH: General health (SF-36 Health Survey); SFMCS: SF-36 Health Survey Mean Component Score; SFMH: Mental health (SF-36 Health Survey); SFPCS: SF-36 Health Survey Physical Component Score; SFPF: Physical functioning (SF-36 Health Survey); SFRE: Role functioning-emotional (SF-36 Health Survey); SFRP: Role functioning-physical (SF-36 Health Survey); SFSF: Social functioning (SF-36 Health Survey); SFVI: Vitality (SF-36 Health Survey). Values are shown as means with standard deviations.

*Statistically significant difference compared to patients undergoing both procedures concurrently.

†Statistically significant difference compared to patients undergoing radiofrequency microtenotomy only.

‡Statistically significant difference compared to patients undergoing gastrocnemius recession only.

Discussion

The aetiology of plantar fasciitis is multifactorial. Inflammation was once thought to be the source of pain in plantar fasciitis but histological studies have since shown that it is a non-inflammatory degenerative fasciosis similar to tendinosis. As such, the use of radiofrequency microtenotomy addresses this pathology and has been demonstrated to have high success rates with quick recovery times in various forms of chronic tendinosis including that of the plantar fascia.^{9,18-24}

It has also been shown that tightness of the posterior muscle group has a statistically significant relationship with the presence of plantar fasciitis.³⁵ This suggests that evaluating patients for gastrocnemius contracture and addressing the equinus deformity in patients with plantar fasciitis may alleviate the symptoms. In recent years, isolated gastrocnemius recession has been shown to be a viable treatment option for refractory foot pain with limited patient morbidity.^{31,32,36,37}

A recent study with an average follow-up of 3.7 months for the 23 patients involved, showed the additive effects in performing a plantar fasciotomy in conjunction with a gastrocnemius recession in patients with plantar fasciitis and gastrocnemius equinus recalcitrant to conservative treatment,³³ but there is a paucity of literature evaluating the clinical outcomes following concurrent radiofrequency microtenotomy and gastrocnemius recession in such patients.

In light of the above, combining radiofrequency microtenotomy with gastrocnemius recession in patients with plantar fasciitis and an underlying gastrocnemius contracture appears to make sense. Our study shows that vitality scores were higher in patients undergoing combined procedures compared to either one individually. In addition, the mental component scores in those undergoing combined procedures was higher than gastrocnemius recession alone. This suggests a possible synergistic effect of both procedures as they work via different mechanisms to address the symptoms of plantar fasciitis.

There are limitations to our present study. The sample size for patients undergoing both procedures was modest as radiofrequency microtenotomy is a relatively newer procedure that has not been fully characterised. As we wanted to character the full course of postoperative recovery, patients who were lost to follow-up or had incomplete data sets were excluded from analysis, which further reduced the sample size. Furthermore, our medium-term follow-up period is 1-year postoperatively, which limits our study's conclusions regarding long-term efficacy of the interventions studied. That being said, many similar studies^{9,19,31} had at a maximum of 12 months follow-up, with others^{4,18,20} only having a maximum of 6 months

follow-up. Unlike our previous studies analysing outcomes for radiofrequency microtenotomy in conjunction with plantar fasciotomy, we did not distinguish between open, percutaneous, and endoscopic approaches in view of low patient numbers. Nonetheless, studies¹⁹ have shown no significant difference in SF-36 scores between open and percutaneous radiofrequency microtenotomy at 1-year follow-up, hence this is unlikely to affect the significant improvement in SFVI and SFMCS scores that we have found in our combined procedures (both radiofrequency microtenotomy and gastrocnemius recession) group at 1-year follow-up.

Conclusion

In summary, we found that performing radiofrequency microtenotomy in conjunction with gastrocnemius recession significantly improves vitality scores measured 1-year postoperatively compared to performing either procedure individually. Additionally, we found that the type of intervention and preoperative factors were not predictive for clinical outcome, met expectations, or patient satisfaction scores. Presently, this is the only study to have compared outcomes in patients suffering from chronic plantar fasciitis and gastrocnemius contracture who underwent gastrocnemius recession, radiofrequency microtenotomy, and both procedures. Randomised controlled trials with sufficient patient numbers and longer follow-up periods are needed to fully characterise the long-term efficacy and safety of performing radiofrequency microtenotomy with gastrocnemius recession in the treatment of recalcitrant plantar fasciitis.

Combining radiofrequency microtenotomy and gastrocnemius recession in patients with plantar fasciitis and an underlying gastrocnemius contracture shows favourable medium-term outcomes compared to performing either procedure in isolation.

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