Management of Plantar Fasciopathy and Plantar Heel Pain

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As is often the case, understanding how to best manage plantar fasciopathy (PF) and plantar heel pain (PHP) has been a challenge, because although there is a lot about it in the literature, arriving at a consensus of opinion is difficult: much of the evidence is of low quality and studies involve a mixture of treatment modalities. This second of three articles presents the available evidence for the different treatment options and discusses the best practice guide for these conditions, which gives you a clear plan of how best to approach an individualised treatment for PF and PHP. Read this article online https://bit.ly/3CtkV78

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Background

Plantar fasciopathy (PF; aka plantar fasciitis) is a common reason for referral to orthopaedic surgeons, physical and manual therapists, podiatrists, doctors and pharmacists. In the general population, its prevalence has been estimated at 7%, predominantly affecting sedentary middle-aged and older adults, and is estimated to account for 8% of all injuries related to running (1*). The condition is characterised by first-step pain and pain during weight-bearing tasks, particularly after periods of rest (1*). Patients may present with pain at varying degrees from slight, irritating, and intermittent discomfort to almost incapacitating pain under the heel and sole of the foot. As suggested in the previous article, 'Plantar Fasciopathy: Epidemiology, Risk Factors, Diagnosis and Biomechanics' (https://bit.ly/3qMUx5S), the importance and/or presence of a bony spur and inflammation is not conclusive of either diagnosis or prognosis. Although still not fully understood, it has now been demonstrated that pathophysiologically the condition is related to degenerative changes at the proximal insertion of the plantar fascia (especially around its medial band) and micro-trauma to the plantar fascia and plantar aponeurosis (2). A biomechanical fault is often present in these cases. Any factor which is responsible for mechanical overloading of the plantar fascia should be addressed during treatment, including altered foot arch, body mass index (BMI), obesity, decreased dorsiflexion range of movement (ROM) and tightness in calf muscles.

The primary approach to the disease is agreed upon worldwide and is based on general non-surgical measures. These include:

- stretching;
- manual therapy;
- local icing;
- exercises to eccentrically strengthen muscles of the posterior chain: in particular, the triceps surae to reduce the amount of mechanical stress transmitted at the plantar fascia;
- dry needling;
- shockwave therapy;
- physical agents:
  - electrotherapy
  - low-level laser therapy
  - phonophoresis
  - ultrasound;
- lifestyle counselling;
- anti-inflammatory injections; and
- mechanical treatments such as:
  - taping
  - rocker shoes
  - (ankle-)foot orthoses [(A)FOs] including night splints (3*).

In case of failure of such treatment, some authors advocate the surgical release of the fascia or fasciotomy. Surgical results are contradictory and the value of fasciotomy is still debated (4*).

In athletes, PF or plantar heel pain (PHP) might significantly affect the level of function, negatively influencing performance and resulting in prolonged periods of rest. Surgery in elite athletes represents a potentially career-ending event, especially in case of rupture of the fascia, which makes the decision-making process even more complex for these patients (4*).

The best practice guide (BPG) described in the most recent review by Morrissey et al. (a mixed-methods study synthesising systematic review with expert opinion and patient feedback) suggests the core treatment for people with PHP should include taping, stretching and individualised education (1*). Patients who do not optimally improve may be offered shockwave therapy, followed by custom orthoses. Video 1 gives a brief overview of the paper. Where, you may ask are the exercise and manual therapy components? The published literature is dominated by systematic reviews, guidelines and meta-analyses that include low-quality

THE PRIMARY APPROACH TO THE DISEASE IS AGREED UPON WORLDWIDE AND IS BASED ON GENERAL NON-SURGICAL MEASURES

trials with small sample sizes, which may inflate effect sizes and lead to incorrect interpretation (1*). A significant difference in results may not necessarily translate to minimal clinically important difference. That is the smallest change in a treatment outcome that an individual patient would identify as important, indicating a change in the patient's management or condition. The failure to achieve optimal outcomes in those suffering from PF or PHP is especially true in athletes who experience a median recovery time of 5 months (5*). In fact, a study has shown that 54% of all patients followed for approximately 10 years reported symptoms of approx. 2 years in duration and the remainder were still symptomatic at follow-up (6*).

Owing to their overlap in the literature, clinical presentation and management, this article will detail the management approaches for PF and PHP combined. Focusing on the research, or lack thereof, for physical therapy and mechanical treatment options, without delving into medical and surgical protocols.

Treatment Options

PF is the most common musculoskeletal condition of the foot in the general population and in the running community. Even though inflammation may play an important role in the early disease process, PF (similar to tendinopathy) has been characterised by degeneration of collagen. This does not mean that inflammation and degeneration represent a continuum of disease but rather reflect two distinct or often coexisting processes. Mounting evidence suggests that PF is caused by repetitive tensile loads applied to the plantar aponeurosis. This is due to excessive deformation of the foot's longitudinal arch facilitated by weakness of the intrinsic foot muscles (5*).

A lack of full understanding of the causes, the disease process and pathophysiology may explain why multiple treatment modalities and protocols have been researched in this field, with little homogeneity and even less conclusive outcomes to guide management.

Extracorporeal Shockwave Therapy (ESWT)

ESWT appears to provide better longer-term outcomes over corticosteroid injection and most interventions studied. There is high heterogeneity across studies, resulting in conflicting evidence regarding optimal type and energy level of ESWT. A recent study showed that similar functional gains were seen between radial shockwave and radial shockwave combined with focused shockwave therapies while using a standardised physical therapy protocol. The standardised physical therapy programme entailed an exercise programme focusing on intrinsic foot muscle strengthening. Collectively, the study suggests that the majority of patients with chronic PF may achieve functional gains using either form of shockwave therapy, with no acknowledgement of the possible contribution from the exercise programme (7).

ESWT has shown greater reduction in visual analogue scores and a success rate of improving heel pain by 60% over placebo when taking first steps and during daily activities. Studies have also shown an overall reduction in PF thickness using ESWT treatment. Authors have found that complications during the first year of follow-up are highly unlikely and concluded that both low- and high-dose ESWT are safe for treating PF (8*).

Dry Needling and Acupuncture

Although studies using acupuncture therapies have been associated with symptom reduction, a major limitation is the significant heterogeneity of methods. Myofascial trigger point needling may be associated with a significantly greater reduction in pain at 1, 6, and 12 months. However, poor quality methods and small sample sizes limit the ability to recommend dry needling for PF or PHP (9*).

Low-Level Laser Therapy (LLLT)

LLLT has been found to significantly improve pain and function and decrease plantar fascia thickness compared to other therapies, such as exercise. Again the low-quality evidence and large variation in treatment parameters of LLLT limit its use (9*).

Strengthening Exercise Therapy

Strength training approaches to treating PF and improving intrinsic foot strength come with significant differences in the literature. Huffer et al. classified strengthening interventions into three distinct categories: (i) minimalist running shoe intrinsic foot muscle (IFM) strengthening, (ii) IFM foot exercises, and (iii) plantar aponeurosis loading (10). Although the authors found that these minimalist running shoes and toe flexion against resistance may improve intrinsic foot musculature in asymptomatic populations, high-load

Video 1: Best Practice in Plantar Heel Pain | SYNOPSIS (Courtesy of YouTube user Physiotutors) https://youtu.be/qSdxnpE279Y

A BIOMECHANICAL FAULT IS OFTEN ALSO PRESENT AND SHOULD BE ADDRESSED DURING TREATMENT

plantar fascia resistance training has not been shown to change plantar fascia thickness. It has not been shown to what extent strengthening interventions for intrinsic foot musculature may benefit symptomatic or at-risk populations of PF. There is limited evidence validating toe flexion exercises against resistance and minimalist running shoes to improve IFM function and what this means to the patient. High-load plantar fascia resistance training had no effect on changing plantar fascia thickness; however, it may aid in reducing pain and improving function (10).

Patients with PF and PHP often present with weaker foot muscle strength and smaller foot muscle volume. Modern footwear use is associated with weaker IFMs, a greater prevalence of flat feet and subsequent changes to the shape of the foot (5*). Over millions of years, the human foot evolved to walk and run barefoot on a variety of natural surfaces. The invention of footwear and artificial surfaces represents a rapid change in the physical environment experienced by the foot. Using this evolutionary perspective, barefoot running on grass has been shown to improve pain associated with PF at 6 and 12 weeks. Participants were required to run barefoot on a grass field for 15 minutes, at an intensity that represented a rate of perceived exertion of 11, every second day for 6 weeks (21 sessions). It may seem counterintuitive to both patients and clinicians to prescribe or adopt vigorous loading activities (running) on a regular basis – and without shoes – when symptomatic (5*). However, barefoot running was shown to improve symptoms while allowing patients to continue running – often a highly valuable component of mental health to an active individual. Barefoot running may address some biomechanical impairments of the foot associated with PF (5*).

One study compared the use of insoles on all patients, with one group receiving the addition of a plantar-fascia-specific stretching programme (10 stretches held for 10 seconds each, 3 times a day), and the other group the addition of a strength training programme (11*). High-load strength training consisted of unilateral heel raises with a towel inserted under the toes to further activate the windlass mechanism. The towel ensured that the patients had their toes maximally dorsal flexed at the top of the heel rise. The patients were instructed to perform the exercises every second day for 3 months. Every heel rise consisted of a 3-second concentric phase (going up) and a 3-second eccentric phase (coming down) with a 2-second isometric phase (pause at the top of the exercise). The high-load strength training was slowly progressed throughout the trial. Patients started at a 12-repetition maximum (RM) for 3 sets. 12RM is defined as the maximal amount of weight that the patient can lift 12 times through the full range of motion while maintaining proper form. By using a backpack with books, patients increased the load after 2 weeks and reduced the number of repetitions to 10RM, simultaneously increasing to 4 sets. After 4 weeks, they were instructed to perform 8RM and perform 5 sets, again increasing the load in the backpacks. If they could not perform the required number of repetitions, they were instructed to start the exercises using both legs until they were strong enough to perform unilateral heel raises. Patients were instructed to keep adding books to the backpack as they became stronger. This is explained in Video 2.

The results showed a 29-point greater improvement in foot function index (FFI) in patients randomised to high-load strength training at the primary endpoint of 3 months. This difference exceeded the 7 points, which is considered the minimally relevant difference in FFI and suggests clinical relevance. Interestingly, the high-load strength training was not associated with a larger reduction in the thickness of the plantar fascia on ultrasound. By 6 and 12 months there was no significant difference between groups in pain and function. It was suggested therefore that a simple progressive exercise protocol, performed every second day, resulted in superior self-reported outcomes after 3 months compared with plantar-specific stretching. High-load strength training may aid in a quicker reduction in pain and improvements in function (11*). This was the first trial of its kind for PF.

At present, however, reviews and guidelines have concluded there are no definitive benefits of strength training interventions in patients with PF. The evidence is low quality, small samples, and heterogenic and more research is needed specific to PF and PHP; regardless of the literature supporting eccentric loading and the use of heavy load strength training in other tendinopathies.

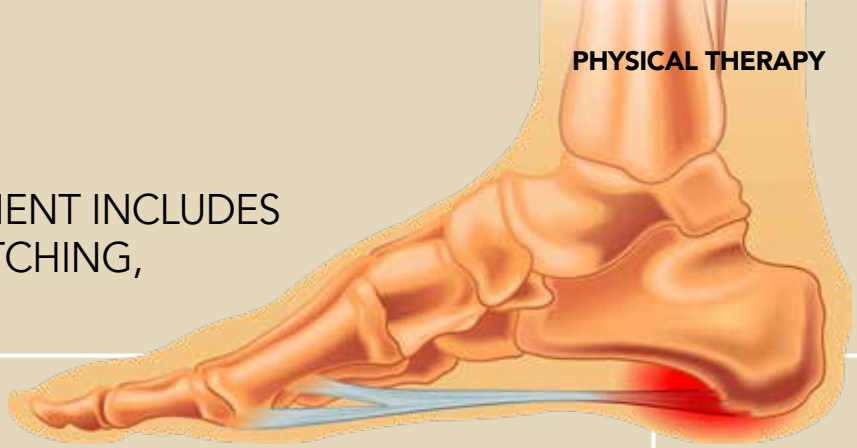
Stretching Exercise Therapy

It is difficult to comment on the relative effectiveness of different stretching regimens because of the large degree of heterogeneity in techniques, dosages and comparison groups between individual studies. Patients seem to improve in pain and function (12*).

Preliminary evidence supports the use of static plantar fascia stretching in improving pain and function, but does not support static calf stretching for patients with PHP (13). These findings were largely consistent with a report by Siriphorn et al. (14) who conducted a systematic review with meta-analysis of eight randomised controlled trials (RCTs) and found that there was moderate quality evidence in favour of plantar-fascia-specific stretching (PFSS)

Video 2: Best Exercise for Plantar Fasciitis | Plantar Fasciitis (Courtesy of YouTube user Physiotutors) https://youtu.be/U3wbu0l8OZ0A

PHYSICAL THERAPY TREATMENT INCLUDES PLANTAR-FASCIA-SPECIFIC STRETCHING, ESWT AND TAPING



over Achilles tendon or calf stretching in reducing pain in the short term (less than 3 months) (14).

PFSS Description

Patients should be instructed to perform this exercise while sitting. First, cross the affected leg over the contralateral leg. Resting the ankle of the affected foot on the knee of the unaffected leg. Using the hand of the affected side, they should place their fingers across the base of their toes on the sole of the foot [distal to the metatarsophalangeal (MTP) joints]. Pull the toes back toward the shin until they feel a stretch in the arch of their foot. They can confirm the stretching is correct by palpating the tension along the plantar fascia with the opposite hand while holding the stretch. A modification to the original protocol may include instructing patients to use the heel of the opposite hand to impose an additional longitudinal stretch on the plantar fascia. Each stretch must be held for a count of ten and to repeat the stretch ten times. The stretching routine should be performed 3 times per day. The first set of stretching should be done in bed, before taking the first step in the morning (15). This programme of manual stretching exercises specific to the plantar fascia was shown to be superior to repetitive low-energy radial ESWT in improving acute symptoms of proximal PF (15). A programme of non-weight-bearing PFSS stretching exercises is superior to the standard programme of weight-bearing Achilles tendon-stretching exercises for the treatment of symptoms of proximal PF (16). Video 3 demonstrates PFSS.

Manual Therapy

Manual therapies are grouped here as interventions performed by clinicians directly on patients using their hands or other parts of their body, tools, and/or other modalities to apply force to tissue and joints. Treatments include, but are not limited to, soft tissue massage, joint mobilisations, manipulations, myofascial trigger point releases and contract–relax stretching.

There is low to moderate level evidence supporting the use of manipulative therapies of the ankle and foot on patients with PF in the short term (1–5 weeks) when combined with multimodal or exercise therapies. Myofascial release and soft tissue therapy, but not trigger point therapy, was shown to be effective in the management of PHP.

Instrument-Assisted Soft Tissue Mobilisation (IASTM)

Studies have shown that IASTM using Graston Technique (GT) instruments, in addition to stretching exercises, improved pain and function in chronic PHP patients (17). When compared with low-intensity ESWT and stretching exercises, IASTM was more effective at 8 weeks and at a 6-month follow-up (18). A recent study applied IASTM using the GT-4 instrument for 7–10 minutes along the medial and lateral gastrocnemius muscle, and along the medial and lateral Achilles tendon. This was compared with myofascial release (MFR) performed along the same anatomical area: using the knuckles of the dominant hand of the physiotherapist in broad strokes to release superficial restrictions, strokes were applied at 45° of hand in relation to calf muscle and small restrictions were released with deep thumb massage. Treatments were performed 3 times a week for 4 weeks. Both modalities were effective in reducing pain and improving functional ankle and foot mobility in chronic PHP patients, the IASTM being more effective than MFR (19*).

Deep Transverse Friction Massage (DFM)

DFM has been shown to have a minimal effect on PF. This was performed in a study with a protocol of 7 sessions (10 minutes each) of DFM performed every other day, with the reinforced thumb applying a friction massage transversely across the plantar fascia from proximal to distal on the most tender point, in a rate of about 2 to 3 cycles per second within the patient's tolerance. The fact that the results are not significant is interesting, as DFM has been shown to reduce pain in other tendinopathies including lateral epicondylitis, supraspinatus tendon impingement and patellar tendinopathy. This may be due to differences in pathogenetic mechanisms, microstructure or the relatively deeper position of the plantar fascia. Further, larger-scale studies with long-term follow-up are needed (20*).

A study by Bayer et al. showed the acute effects of DFM on endurance athletes with PF (21*). DFM performed daily – with the same protocol as above – for 15 consecutive days, significantly reduced pain (measured with a pressure pain algometer) and thereby improved endurance performance (yo-yo intermittent endurance test). This

Video 3: Plantar Fascia Stretch | Plantar Fasciitis (Courtesy of YouTube user Physiotutors) https://youtu.be/A6xAC0RGGaQ

EDUCATION OF THE PATIENT ABOUT PF/PHP AND ITS TREATMENT FORMS A KEY PART OF ITS MANAGEMENT

study had a small sample size (N=12) and greater research into the benefits or effects on athletes and performance is needed.

Extremity Manipulation

Extremity manipulation, as a singular treatment (22*) or in combination, may be an option in PF management (23*). This would be determined based on individual assessment of ankle and/or foot ROM limitations.

Cross-Friction Massage

Research by Yelverton et al. indicated that cross-friction massage of the plantar fascia and stretching of the gastro-soleus complex showed the greatest overall improvement in terms of reducing pain and disability in patients with chronic PHP (23*). Whereas the combination of massage, stretching and manipulation showed the greatest increase in plantar flexion.

Chiropractic Techniques

Chiropractic manipulation included the following techniques (23*,24).

- **Mortise (tibiotalar joint) separation**
  The participant was placed supine with either hand of the researcher grasping the medial and lateral border of the foot with the thumb on the sole of the foot and fingers on the dorsum. The foot was then motioned through dorsiflexion, internal rotation and eversion with an impulse thrust delivered parallel to the researcher.
- **Mortise shear**
  The participant was placed supine with the involved knee in flexion. One hand was placed proximal to the mortise joint and the other hand was placed distal to the joint. The joint was then sheared in an anterior to posterior direction.
- **Foot figure of eight**
  The participant was placed supine and one hand was placed on the lateral aspect of the ankle and calcaneus, holding it from underneath. The other hand was placed on the medial aspect of the midfoot with the thumb on the sole of the foot and the fingers on the dorsum. The ankle was kept stable, while the forefoot and midfoot was moved through a combination of inversion with abduction and eversion. The motion has a medial to lateral orientation (figure of eight).
- **Metatarsal shear**
  The participant was supine. The foot was grasped on either side with the thumbs placed on the metatarsal head on the sole of the foot. Each metatarsal head of the affected foot was translated back and forth.
- **Hallux mobilisation technique**
  The participant was supine and the researcher was at the foot of the table, with one hand stabilising the foot and the other hand grasping the patient's hallux, mobilising it in all directions with a medial thrust.
- **Tarsal–metatarsal shear**
  The participant was placed supine with the knee flexed and the researcher at the side of the table, with one hand grasping the foot firmly, contacting just proximal to the tarsal–metatarsal joint. The foot was kept dorsiflexed. The other hand was placed firmly distal to the tarsal–metatarsal joint, and sheared the joints in a dorsal to plantar and backward direction while the other hand held the heel firmly on the ground.
- **General calcaneal technique**
  The participant was placed prone. The researcher stood at the foot of the table so that the sole of the patient's foot was firmly fixed to the researcher's abdomen. The calcaneus was grasped on either side with interlaced fingers and then moved through a circular motion.

Across RCTs and systematic reviews, authors have found that manual therapy combined with stretching or strengthening led to greater improvements in function and pain pressure thresholds. Patients' pain seemed to improve over time across interventions (9*). This may be in part due to the self-limiting nature of the condition and a philosophy of 'wait and see' (where patients receiving no intervention ultimately improve in symptom severity over time). The effectiveness or superiority of one manual technique versus another can not be determined as a result of the heterogeneity of study designs and the variety of manual techniques.

Mechanical Approaches

Insoles

Insoles come in different shapes and materials, either covering the whole foot (providing a larger area of contact between the insole and the foot) or simply a heel cup. Studies have shown that a larger contact area improves pressure distribution under the foot, possibly minimising peak pressures at the insertion of the plantar fascia. Insoles with contours may support the longitudinal arch, which is associated with less plantar fascia strain.

Studies into the effects of insoles in the treatment of plantar fasciitis reveal mixed findings. Significant improvements in both pain and function in patients using insole orthotic devices in the short term (less than 6 weeks), medium term (6–12 weeks), and long term (more than 12 weeks) have been shown in systematic reviews. Despite the biomechanical differences between full-length insoles and heel cups, few studies have reported significant decreases in pain when comparing the two. Interestingly customised insoles, individually adapted to the anatomy of a person's foot, are comparable (not superior) to prefabricated insoles (3*).

A number of studies have reported limited or no benefits from insoles compared to other interventions. Custom orthoses (versus sham orthoses) significantly improved function, but not pain, after 12 weeks. Custom orthoses were shown to be less effective in improving pain and function compared to treatments consisting of manipulation, mobilisations and stretching (25*).

It has been concluded that insoles may not be superior for improving pain, function or self-reported recovery compared to other conservative interventions (26*).

Rocker-Soled Shoe

Shoe adaptations, such as a rocker-soled shoe with a stiff insole and proximal apex may be prescribed to relieve symptoms. A more proximal apex position facilitates early heel rise, minimising external plantar flexion moments and plantar forefoot pressure. This reduces tractional forces of the Achilles tendon, which leads to reduced plantar fascia strain during gait. A proximal apex position, in a more rigid shoe further minimises plantar fascia strain by preventing excessive bending of the MTP joints (3*).

Prescribing rocker shoes alone or in combination with contoured insoles led to an even larger pain reduction. Contoured sandals also seem to have a positive effect on pain related to PF. However, evidence about shoe adaptations is limited, and more research is needed to evaluate the effects of shoe sole design on PF (3*).

Ankle–Foot Orthoses (AFOs)

Where mechanical devices, discussed above, aim to relieve pain and promote healing processes by reducing plantar fascia strain during gait, the purpose of AFOs (often in the form of a night splint) is to increase tension on the plantar fascia during rest. Sleeping positions, and tightly tucked-in bed linen, often result in the plantar fascia being in a shortened and non-functional state overnight. An AFO worn at night, producing slight dorsiflexion at the ankle joint, maintains the plantar fascia in a lengthened state, resulting in the first step and morning weight-bearing being more tolerable. AFOs differ in design (posterior versus anterior) and time of wearing (day vs night); however, they all have a positive effect on pain and function. AFOs seem to be as effective as insoles or stretching. Enhanced improvements in pain and function can be achieved by combining night splints and insoles rather than use in isolation (3*).

Taping

The above-mentioned mechanical interventions for PF or PHP are options that are prescribed for long-term use, for more than a month. Taping on the other hand is usually short term (less than a month), used to improve biomechanics or for acute pain reduction.

One study demonstrated good quality and power criteria, evaluating the efficacy of low-Dye taping and sham ultrasound versus sham ultrasound alone (27*). Taping reduces pain for 'first step' at 1 week. Some patients expressed the positive role of taping to alleviate symptoms (9*).

Several taping techniques have been used across studies, most often low-Dye taping (Fig. 1). All resulted in improvements in pain and function in the short term. Again, it may be hard to determine if taping is a superior technique to insoles or vice versa, or whether a combination would be optimal. Some evidence exists that a combined intervention of taping and stretching may be superior to stretching alone (3*,9*).

Mechanical treatments overall may be beneficial in symptom reduction. However, owing to methodological limitations of studies and co-interventions, comparisons between modalities regarding relative effectiveness and interpretation of the role of each intervention are lacking.

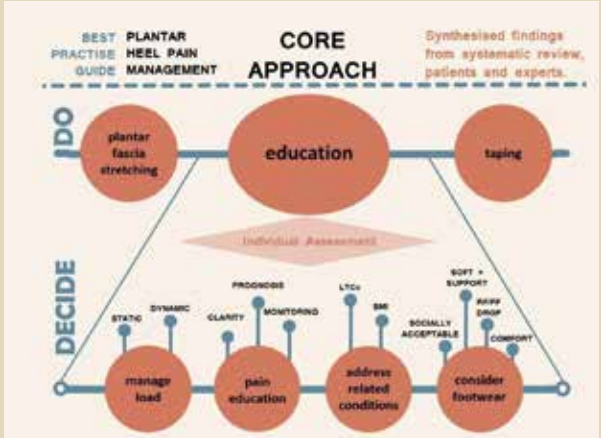
Perspective

Available evidence does not suggest that any of the commonly used treatments for the management of PHP or PF are significantly better than any other. Corticosteroid injections alone or in combination with exercise are effective treatments for reducing pain and improving function in the short term. However, the benefit of corticosteroid injections is modest, and the potential for adverse effects (such as pain, fat pad atrophy, nerve injury and rupture of the plantar fascia) requires careful consideration (28*).

Exercise as a stand-alone treatment has not consistently been shown to be beneficial in reducing pain and improving function. There is a lack of evidence regarding the most effective exercise dose or delivery method. Often stretching and strengthening exercises are combined in a routine, confounding efficacy specific to any one 'modality' (28*).

Most of the evidence for PHP and PF treatment is of low quality. The most recent BPG, using only high-quality evidence, supplemented with expert clinical reasoning and patient values concluded that stretching, foot taping and educational interventions should form the core management approach for people with PHP/PF. A core and stepped approach to the management of people with PHP was formulated, which will prove immediately useful to clinicians who treat, and to those who suffer from, plantar heel pain

Figure 1: Low-Dye taping technique *Radford JA, Landorf KB, Buchbinder R, Cook C. Effectiveness of low-Dye taping for the short-term treatment of plantar heel pain: a randomised trial. BMC Musculoskeletal Disorders 2006;7:64 (27*). Reproduced under the terms of the Creative Commons Attribution 2.0 Generic (CC BY 2.0) License http://creativecommons.org/licenses/by/2.0*



The top layer ('DO') of taping, stretching and education are required initial interventions with each patient. The individual assessment ('DECIDE') is of which specific educational aspects are needed. BMI, body mass index; FF, forefoot; LTC, long-term condition; RF, rearfoot.

Figure 2: Core approach to the management of plantar heel pain based on the best available evidence, expert opinion and the patient voice *Morrissey D, Cotchett M, Said J'Bari A et al. Management of plantar heel pain: a best practice guide informed by a systematic review, expert clinical reasoning and patient values. British Journal of Sports Medicine 2021;55(19):1106–1118 (1*). Reproduced under the terms of the Creative Commons Attribution 4.0 Unported (CC BY 4.0) License https://creativecommons.org/licenses/by/4.0/*

(Fig. 2) (9*). Patients have demonstrated a poor understanding of PHP or PF, including the causal factors, underlying pathology, efficacy of certain treatments, understanding of how treatments work, as well as knowledge regarding expectations, prognosis and how to progress when treatment is failing. Therapists must consider how education is being delivered, ensuring their guidance is clear on treatment and behaviour change, fears are allayed and that learning is checked or discussed rather than simple information provision (29*).

What happens if patients do not get better with the core intervention protocol after 4 weeks? It is suggested that the core interventions continue and ESWT is introduced. Following this, orthoses, dry needling, corticosteroid injection, and strength training may be added.

Conclusion

It should be recognised that even in the research 'plantar heel pain' or 'plantar fasciitis' are generalised terms encompassing a broad range of pathologies that may include peripheral nerve entrapment, the presence of calcaneal spur, or other potential undefined contributors. Studies often use the terms PHP and PF (fasciitis or fasciopathy) interchangeably without strict distinction between pathologies and symptoms, which negates any influence on outcomes. Many studies include co-interventions (using more than one modality), be it stretching, mechanical treatments, devices, and manual therapies, making it difficult to isolate the relative effect of a given intervention on improvements in pain or function. Although the prognosis may be a positive one it is critical that the patient understands this may take weeks or months. That being said, cost-effectiveness of interventions needs to be considered on an individual basis.

The most common identified risk factor in non-athletes is higher BMI. Management should include interventions to target underlying risk factors. In the athletic population, risk factors have been poorly described. Some kinetic variables such as load rates have been implicated, thus advice on load management may be beneficial. PF shares many pathologic characteristics with degenerative tendon pathologies (30); however, the evidence specific to strength training for PF is limited. Weaker foot muscle strengths and smaller foot muscle volume evident in PF patients (31*) may motivate the use of high-load strengthening interventions, demonstrated to be effective in other tendinopathies (32*). High-quality studies on this topic are still required.

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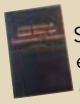
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KEY POINTS

- Plantar heel pain (PHP) and plantar fasciopathy (PF; previously called plantar fasciitis) are common in active individuals as well as those with a sedentary lifestyle.
- PHP and PF have a negative impact on physical and mental health.
- Existing guidelines lack clear, high-quality recommendations for treating patients. This may be due to heterogeneity in terminology, lack of understanding of pathology, poor study methodology and outcome measures, and interventions often being multimodal.
- Best practice guidelines now define a core approach consisting of simple but active, supported self-management interventions of plantar fascia stretching and taping as well as education.
- Education must be individualised, address expectations and prognosis, and provide advice on footwear and load management.
- Underlying risk factors must be addressed including altered biomechanics and co-morbidities such as type 2 diabetes and high BMI.
- Physical therapy treatment includes plantar-fascia-specific stretching, ESWT and taping.
- There is low-quality or insufficient evidence supporting the use of manual therapy and manipulation, dry needling, and electronic equipment such as ultrasound and laser.
- Although promising, high-load strengthening exercise therapy requires more research.
- Mechanical devices can be 'add-on' therapies including the use of orthoses.

RELATED CONTENT

- Plantar Fasciopathy: Epidemiology, Risk Factors, Diagnosis and Biomechanics [Article] https://bit.ly/3qMUx5S
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- Spontaneous Rupture of the Plantar Fascia in a Professional Football Player [Article] https://bit.ly/43GIBk7
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DISCUSSIONS

- How do you manage patients' expectations, where their recovery is leading to frustration, poor motivation and the potential of looking for solutions elsewhere?
- Do you use strengthening exercises with your PF or PHP patients and how do they respond?
- Would you consider allowing running, with a reduced load, or even barefoot running in some athletic patients, considering the benefit it may have on their mental health?

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She was a competitive athlete holding national and provincial colours for swimming, biathlon, athletics, and surf lifesaving, and has a passion for sports and exercise physiology. She has presented research at the annual American College of Sports Medicine congress in Baltimore, and at South African Sports Medicine Association in 2000 and 2011. She is Co-Kinetic's technical editor and has taken on responsibility for writing our new clinical review updates for practitioners.
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