Case report

Trigger point therapy and plantar heel pain: A case report

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ARTICLE INFO

Article history:
Received 20 October 2009
Received in revised form
15 September 2010
Accepted 27 September 2010

Keywords:
Treatment for heel pain
Trigger points and plantar heel pain
Ischaemic compression and heel pain
Myofascial trigger points and plantar heel pain
Plantar heel pain
Causes of plantar heel pain

ABSTRACT

The cause of plantar heel pain and fasciitis has continued to be a diagnostic challenge even though it is one of the most common musculoskeletal disorders of the foot and ankle. The subject has evoked strong emotions and sparked intense debate regarding the likely causes and effective treatment options. Myofascial trigger point as a treatment option for plantar heel pain and fasciitis has been inconspicuous. The full extent of its significance and potential is largely unexplored in podiatric literature and medicine. Myofascial trigger point may offer an alternative explanation of the etiology of plantar heel pain and fasciitis.

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1. Introduction

Plantar heel pain is soreness or tenderness of the heel confined to the sole of the foot. Pain often radiates from the central part of the heel pad or the medial tubercle of the calcaneum, and may extend along the plantar fascia into the medial longitudinal arch of the foot. Severity may range from discomfort to disabling pain, which is most noticeable on rising after rest or first-step pain in the morning. This excludes clinically evident underlying disorders; for example, calcaneal fracture, and calcaneal nerve entrapment [1].

In January 2007 Landorf and Menz conducted a systematic review concerning the quality of the evidence and efficacies of various treatment modalities of plantar heel pain and fasciitis (PHP&F) [1]. To appreciate the many different philosophies and their varying degrees of effectiveness in the treatment of PHP&F, the modalities examined by Landorf and Menz are summarised in Table 1. Although extensive, the summary is not an exhaustive list of all treatments currently used by clinicians.

In keeping with this theme, this paper wishes to allude readers that PHP&F, as described by Landorf and Menz [1] may result from myofascial trigger points (MTrPs), often mentioned but has not been recognised in podiatry, as one of the effective treatments for PHP&F. Mennell described the situation facing podiatrists of his time: “During the time I have been associated with the School of Podiatric Medicine in San Francisco I have been struck by the fact, well-trained in medicine as the students are, they have little to offer patients with foot pain in the way of therapy other than shoe modifications, the prescription of orthoses or some surgical procedure. This frustrates most of the students who rotate through my service” [2].

Several hypotheses have been advanced to explain the pathological process of PHP&F; namely the inflammation theory, the sagittal plane facilitation theory [3], tissue stress theory [4] and more, reflected by the number of modalities currently being used to treat PHP&F. However, no appraisals of the efficacies of myofascial trigger points (MTrPs) in the treatment of PHP&F were assessed. It is possible that the study design, criteria, search method, and data requirements may have precluded some papers from the Landorf and Menz review.

Myofascial trigger point is a hyperirritable spot in skeletal muscle and is associated with a hypersensitive palpable nodule in a taut band. The spot is painful on compression and can give rise to characteristic referred pain, referred tenderness, motor dysfunction and autonomic phenomena [5].

One of the methods used to relieve these symptoms is ischaemic compression (IC). IC consists of “applying sustained pressure to the trigger point with sufficient force and duration to inactivate it. Upon release, the skin will be blanched, but will shortly display reactive hyperaemia. It is hypothesised that changes in skin perfusion correspond to muscle circulatory status. The proposed mechanism entails local stretching of the shortened sarcomeres, an ischaemic nerve block, emptying of capillaries, and, thereafter, a
rebound hyperaemia with subsequent flushing away of metabolites and substances that foster muscle contraction” [6].

Prominent researchers and authors of the subject in general have been Simons and Travell with their trigger point manuals [5,7] and Travell’s associates Bonica, Stockman, Good, Mennell, Gutstein and others [8]. Due to their professional background and the era of these pioneers, these factors have added to the obscurity of the methodology in contemporary podiatric medicine.

In the past, podiatrists have poked at MTrPs, but lost interest going by the meagre number of publications on the subject. There have been three papers in podiatric literature, which reported heel pain with direct reference to MTrPs. Cinzio [9] was perhaps the first author to attempt to explain the various types of myofascial syndromes seen in the lower extremity in greater detail. Mennell [2,10], Mandel and Berlin [8] followed and referenced earlier work done on the lower extremity by Travell and Rinzler [11]. Mandel and Berlin conveyed the impression that myofascial pain syndromes are commonly overlooked by podiatrists with reference to diagnosis and treatment of foot and ankle pain and disability. In another paper, Mance et al. discussed the definition, etiology, symptomatology of the myofascial pain syndrome, and presented the current forms of treatment [6].

2. Case report

A 29 year old male athlete who competes in long distance running both at professional and amateur levels in 1500 m, 3000 m, 5000 m and cross country upwards of 21.5 km races.

The athlete averages 100–130 km’s of training and 3 gym sessions per week, focused on high repetitions-low weights including; bench press, shoulder press, bicep curls, dips, triceps extensions, push ups, upright rows, various sit-ups and 20 min of core strength. Sessions varied from 45 to 90 min.

He first noticed pain under his left heel while walking (but no real evidence of pain during running), mainly post exercise and always in the morning. He persevered with the pain for 10–12 months until it progressively got worse. He decided to consult a health professional who diagnosed the complaint as plantar fasciitis. The health professional treatment consisted of calf stretching, light massages, and a few days rest from running. Adjunctive therapy included self-massage, calf stretching, ice, use of tennis ball and soft drink bottle under the foot at home. The treatment only lessened the pain for 2–3 days before the pain returned. He persisted with the advice for 8 weeks. However, the symptoms continued after each training run and would take up 1–2 days to recover and he could not walk more than 1 km or less without pain.

He decided to consult a colleague who did a biomechanical assessment and prescribed customised orthotic therapy but had limited success after a three week period trialling the orthoses. He was then referred to seek treatment with the author. I reassessed him and explained my approach in treating his heel pain and he agreed. The author proceeded to treat his plantar fasciitis with IC and he got immediate significant pain relief after treatment and calf stretching. He reported feeling lighter immediately after treatment. Pain reduced further after 2 days with ischaemic compression and stretching. He now runs pain free without orthoses and is back to his pre-injury levels of running.

3. Ischaemic technique

Before any treatment, awareness of the differential diagnosis is important to ensure systemic factors are considered such as nutritional, metabolic, endocrinologic, psychologic, visceral, or inflammatory disorder that may contribute to or cause the muscle pain [12]. Other factors that also need consideration are bone and joint integrity, muscle tear, bursitis and direct trauma. The diagnosis of myofascial pain is best made through a careful analysis of the history of pain and supported by clinical evidence [13].

The patient is requested to lay prone on the treatment couch with both ankles overhanging to allow leg muscles to be at their resting length and comfortable. IC technique is an interactive process where it is essential the patient gives feedback in locating the TrPs. “Myofascial pain is referred from trigger points in specific pattern characteristic of each muscle” [5]. However, they do not follow any dermatomal or myotomal pattern. The referred pain is often described as dull, aching, and deep, and it can be constant or sporadic [14]. The severity and extent of the referred pain pattern depends on the degree of irritability and chronicity of the trigger point, not on the size of the muscle [7]. From personal experience, familiarity of these pain patterns and agonist muscle movements that aggravate pain is useful to isolate the muscle most likely harbouring the trigger points. The author uses IC technique from proximal to distal end of the suspected muscle(s). Observe for jump sign (A general pain response of the patient, who winces, may cry out, recoils, and may withdraw in response to pressure applied on a trigger point) [5]. From personal experience, trigger

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<table>
<thead>
<tr>
<th>Table 1</th>
<th>Treatment options for PHP&amp;F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likely to be beneficial</td>
<td>Unknown effectiveness</td>
</tr>
<tr>
<td>• Casted custom made insoles improved function but not pain at 3 months. There was no difference between casted and prefabricated orthoses</td>
<td>• Corticosteroid injection used in the short term alone</td>
</tr>
<tr>
<td>• Taping (low dye or anti pronatory taping). Limited evidence of pain relief at 1 week and no evidence beyond 1 week</td>
<td>• Corticosteroid injection plus local anaesthetic injection with NSAIDs or heel pads</td>
</tr>
<tr>
<td></td>
<td>• Night splints combined with NSAIDs</td>
</tr>
<tr>
<td></td>
<td>• Heel pads only or with (corticosteroid plus local anaesthesia, stretching exercises, paracetamol, casted orthoses plus taping, plantar fascia stretching)</td>
</tr>
<tr>
<td></td>
<td>• Local anaesthetic injection</td>
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<tr>
<td></td>
<td>• Electrotherapy</td>
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<td></td>
<td>• Extracorporeal shock wave therapy</td>
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<td></td>
<td>• Ultrasound</td>
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<tr>
<td></td>
<td>• Lasers</td>
</tr>
<tr>
<td></td>
<td>• Surgery (no direct information about efficacy)</td>
</tr>
<tr>
<td></td>
<td>• Stretching exercises (Achilles tendon and plantar fascia stretching)</td>
</tr>
</tbody>
</table>

Adapted from Landorf and Menz [1].
points can be at any point along the length of the affected muscle, not specific to any acupoints, and trigger point charts should be used as a guide only. This enables accurate location of TrPs and allows efficient treatment.

The first general area of interest is the posterior superior iliac spine region. Controlled elbow pressure was used to compress the muscles of this area due to the thickness and depth. Tenderness was detected at the origin of the gluteus medius, glutaeus minimus and piriformis following the rim of the superior and medial gluteal border. TrP pain diminished with time and sustained compression for about 60 seconds at each of the trigger points.

The next area of interest was the vicinity proximally to the medial and lateral femur epicondyles. From the author’s experience, TrPs from muscles tracking through these regions often result in patellofemoral pain. TrPs were located on the medial side of the knee. IC was applied in similar manner previously.

The last area of investigation was immediately inferior and also posteriorly to the medial tibial condyle along the medial head of the gastrocnemius and down to the soleal line. With thumb pressure, a deep aching sensation was felt by the patient at the trigger points. IC was used to release the trigger points.

After the TrPs were inactivated, the patient was asked to do calf stretches with the “wall-push technique” and hamstring stretches. Patient was advised to hold each of the stretches for about 20 s at maximum tension but before pain. After completing the stretches, the patient was asked to walk and he felt an immediate reportable reduction in pain and the treated side felt “lighter”. MTrPs pain should only be present for 7–10 days depending on the hyperirritability of the TrP with daily IC and muscle stretching.

4. Discussion

Treatments of PHP&F by health professionals have traditionally converged on the site of pain. To diagnose pain associated with MTrPs, clinicians need to be aware MTrPs are remote from the complaint in the majority of cases, and a trigger point is not located until direct firm compression is applied over it. These syndromes constitute a group of disorders characterized by the presence of a very hypersensitive region, the so-called trigger area (also called trigger zone, trigger point, myalgic spot or myalgic area), in one of the muscles or in the connective tissue, together with a specific syndrome of pain, muscle spasm tenderness, stiffness, limitation of motion, weakness, and, occasionally, autonomic dysfunction in an area of reference that is usually at some distance from the trigger point [15]. This is not so obvious when clinicians are not cognisant of referred pain as a possibility in PHP&F and where the pain is referred from. With their unusual nature and symptomatology, they are often misdiagnosed and mistreated as other entities [8]. This would explain why medical treatments for PHP&F are so many and varied, with the use of different modalities in treating essentially the same complaint.

The foot is a bony lever with its mechanical leverage dependent on the actions of the extrinsic muscles located in the leg. Based on personal observations, PHP&F are usually referred from trigger points in the leg muscles that are tight or de-conditioned through prolonged rest, for example recovering after surgery, muscle atrophy from sedentary lifestyle, a sudden increase in muscular activity, repetitive microtrauma to the muscle, and muscular damage with abrupt concentric/eccentric contractions. The literature suggests exercise habits, posture, biomechanics, work ergonomics and stress [14]. Muscular trauma, anxiety, muscle ischaemia, visceral pain referral, radiculopathic compression of motor nerves and climatic causes [16]. Low-level muscle contractions, uneven intramuscular pressure distribution under contraction, direct trauma, unaccustomed eccentric contraction, eccentric contraction in unconditioned muscle and maximal or sub-maximal concentric contractions [17]. Once trigger points have been produced by any of these mechanisms, they may be activated by pressure, by motion that stretches the structure containing them, or by intense heat or cold [8,15].

Sufferers of PHP&F often complained of first-step pain in the morning. This can be explained by TrPs in the leg muscles being stretched from their resting equinus position. MTrPs pain is characteristically aggravated by placing the involved muscle in a shortened position for a prolonged and particularly, pain and stiffness are often at their worst when the patient gets out of bed in the morning, or when getting up from a chair after sitting immobile for a while [5]. So much so, in fact, that the source of the musculoskeletal pain is unlikely to be where the pain is described by the patient and must be sure to look for a TrP origin of referred pain [18]. One exception to this is when the intrinsic foot muscles are affected. Trigger points in the abductor hallucis or plantar musculature can have characteristics of plantar fasciitis pain. Another observation of PHP&F sufferers is that they often limp into the clinic either on their forefoot or in an inverted position of the affected foot. Each of these positions effectively reduced the dynamic range of motion of the triceps surae. This paper proposes MTrPs predominantly in the foot extrinsic muscles, cause plantar heel pain, not inflammation or tissue stress on the plantar musculature. If the latter were true, traction on the plantar musculature from the windlass mechanism would aggravate the pain further. Although authors writing on the subject until recently, describe inflammation as being present in plantar fasciitis, they provide no objective clinical or histologic evidence to support their claims [19]. Furthermore, clinicians also mistakenly believe that the etiology of pain in most musculoskeletal conditions is due to inflammation, which various researchers have shown is not the scenario as evidenced by microscopic histological examination [20].

There are many treatment modalities currently available to treat PHP&F. They can be described broadly as pharmacologic, nonpharmacologic and muscle stretching [12]. In the author’s opinion, the reason the author prefers ischaemic compression as a modality over others, is its direct action on the muscle and musculophyiology as it is a muscular phenomena. Furthermore, it is safe, effective, non-invasive and convenient.

Calf muscle stretching is an important adjunctive therapy and also an integral part of the long term treatment plan for PHP&F. There have been three recent studies (two on calf and one fascia-specific) intended to establish if stretching alone could improve PHP. However, PHP&F cannot be effectively treated by calf muscle stretching alone. The first paper performed a participant-blinded randomised trial to assess the effectiveness of calf muscle stretching alone, a commonly used short-term treatment for plantar heel pain. It advised no statistically significant benefit in “first step” pain, foot pain, foot function or general foot health compared to not stretching [21]. The second study involved painful eccentric calf stretching for 12 weeks, twice daily, seven days/week to treat patients with chronic painful mid-portion Achilles tendinosis. In 90 of the 101 Achilles tendons (89%) with chronic painful midportion Achilles tendinosis, treatment was satisfactory and the patients were back on their pre-injury activity level after the 12-week training regimen [22]. The pain, age, practicality and duration of this technique could impact on the success of this method. The third study looked at plantar fascia-specific stretching exercises. The paper claims a plantar fascia stretching protocol as the key component of treatment for chronic plantar fasciitis. The reliability of the results is questionable by the influence of co-interventions. All patients received prefabricated full-length soft insoles, a three-week course of NSAIDs, and viewed an educational video on plantar fasciitis. Attrition rates of about 20% at the eight-week study period and again at the two-year follow-up evaluation and by the authors’ own admission, could have led to altered results [23]. One recent
review reported; present evidence suggests that eccentric exercise alone is no better than other non-invasive treatments for Achilles tendinitis. There is, however, moderate evidence to suggest that when eccentric exercise is combined with other non-invasive treatment modalities, there are significant improvements in outcome measures [24]. In the author’s opinion, IC allows muscles to relax, reduces pain, increases flexibility and improves range of motion of the injured muscle. IC, when augmented with muscle stretching from the author’s experience, is the most rapid, effective and immediate method of relieving myofascial TrP pain and reduction of muscle contracture.

From personal experience, muscular integrity has priority over strength at the initial phases of the rehabilitation of unconditioned muscles. Other features, not critically evaluated and not to be missed but strongly characteristic of TrPs, are limited stretch range of motion and increased tension of the muscle observed during the patient examination [3]. Strength training at the initial phases would further facilitate muscle tightness and is only indicated once there is an absence of TrPs and muscular tightness. Based on symptoms of injured muscles, the author’s proposed sequence of muscle conditioning is:

1. inactivation of MTrPs and muscle stretching
2. proprioception exercises
3. muscle strength
4. muscle power
5. muscle endurance

In contrast the current literature [25] suggests there are four components of muscle conditioning:

1. muscle activation and motor re-education
2. muscle strength
3. muscle power
4. muscle endurance

Kinch and Lambert have suggested muscle activation and motor re-education are crucial in the rehabilitation process, but often overlooked, aspects, of muscle conditioning. Injury causes pain and swelling, both of which have an inhibitory effect on muscle’s ability to contract [25]. Before a patient can be taught to activate an inhibited muscle, MTrPs need to be identified and inactivated, as characteristics of MTrPs are increased muscle tension and limited stretch range of motion [5]. Stretching techniques can be taught to patients for self-management of myofascial pain, maintenance and may be particularly useful for preventing or treating recurrence [16]. Our current knowledge of biomechanics, orthotic therapy and therapeutic techniques are adequate to counter the underlying pathomechanics if necessary.

Another popular treatment technique is acupuncture/dry needling. Unlike IC, acupuncture exerts dual action by promoting analgesia at regions remote from the site of stimulation [23]. “Acupuncture may be used to alter pain threshold and/or pain perception either at acute or chronic stages of an injury. This type of analgesia might be explained by the physiological phenomenon referred to as “diffuse noxious inhibitory controls” where transmission of nociceptive information can be blocked by the application of a second new noxious stimulus at acupoints remote from the region of injury” [26]. A recent literature review investigating how might acupuncture work reported 79 acupuncture trials were identified [27]. The majority (only 42%, 33 of 79) of these papers suggest acupuncture has a neurochemical effect on the nervous system. The net effects of acupuncture on muscle conditioning, flexibility and permanency of pain relief need further investigation.

Landorf and Menz in the course of their appraisal noted the prognosis of PHP&F is partially self-limiting after initial complaints [1]. It is not known the duration or the conditions required to produce these outcomes for each individual. It is preferable and reassuring for both clients and clinicians to have an understanding of the underlying etiology to deliver effective, predictable, consistent and timely outcomes for the clients. Proper treatment according to accurate diagnosis frequently results in prompt cure; incorrect therapy results in ineffective treatments and chronic disability [8,15]. The cost to society associated with failing to recognise and effectively treat myofascial pain syndrome as a source of pain and disability has not been estimated, but is likely to be high [28].

To illustrate the implications myofascial TrP has for the treatment of musculoskeletal disorders for the entire body and depending on the location of the trigger points, here are examples of its different manifestations. Using the same IC technique on the foot and with patients’ consent, I have had successes with treatment of: medial and lateral heel pain, non-specific patellofemoral pain, sciatica [29] in patients with inconclusive medical imaging of radiculopathy, burning feet in absence of other causes, lateral dorsal foot pain, Achilles tendinitis with no obvious thickening, shoulder pain, Sever’s disease, wrist pain, low back pain [30], and leg cramps. The author also suspects MTrPs could contribute to tarsal and carpal tunnel syndromes but do not have enough data other than anecdotal at present. Nutritional, metabolic, and endocrine conditions should be noted for differential diagnosis e.g. iron, magnesium, calcium, vitamins B1, B12 deficiencies or hypothyroidism [12]. Caution should be exercised and the effects communicated to the elderly or clients with oedema or vascular issues, as there will be some bruising and tenderness at the compressed area after treatment.

5. Summary

Pain can be attributed to mechanical, traumatic, neurological, bony or muscular origins. We have inherited some awareness of MTrPs from our predecessors. Unfortunately, MTTrP pain associated with musculoskeletal disorders are not well documented in podiatry. Furthermore, current treatment modalities are skewed towards orthotic construction methods, electrotherapies, pharmacological agents and surgical interventions, based on current theories. This case report illustrates that MTrPs have a direct impact on PHP&F and is a valuable tool for musculoskeletal disorders in the absence of other reasonable explanations or causes. The clinical literature suggests more research is required into the underlying pathophysiological mechanisms of MTrPs.

Conflict of interest

The author declares that there are no competing interests or conflict of interest.

Acknowledgements

I would like to thank Mark Gilheany who has been an inspirational podiatrist and has influenced my clinical practice. He had kindly made available his time to peer review the paper. Karl Landorf for sharing his collection of research articles, time, research skills and provided helpful suggestions. Christopher Adda who has helped with sourcing papers, proofreading and gave helpful advice.

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