

Heel pain and HIV-associated lipodystrophy: a report of two cases

Maja Stupar BSc, DC, MSc candidate*
Anthony Tibbles BSc, DC, FCCS(C)**

Plantar fasciitis is diagnosed based on a pathognomonic clinical presentation and physical examination including plantar heel pain with the initial few steps after a period of inactivity. People living with HIV/AIDS, who are taking anti-retroviral medications, often have an associated redistribution of body fat (lipodystrophy). Lipoatrophy of the extremities may involve the heel fat-pad in this population and result in the signs and symptoms of plantar fasciitis. Two cases of plantar heel pain in HIV-associated lipodystrophy are presented to discuss the possible clinical association between the two conditions. Although conservative therapies have limited evidence, they are commonly used and have been seen, clinically, to result in a resolution of symptoms. In the presented cases, the individuals benefited from soft tissue therapy, modalities, activity modification and education on proper footwear. Clinicians should be aware that the association between these two conditions may be a significant cause of morbidity in a population of patients with HIV.

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KEY WORDS: heel pain, lipodystrophy, HIV, chiropractic

La fasciite plantaire est diagnostiquée selon un signe clinique pathognomonique comprenant la talalgie plantaire lors des premiers pas suivant une période d'inactivité ainsi qu'un l'examen physique. Les personnes vivant avec le VIH/sida qui prennent des médicaments antirétroviraux connaissent souvent une redistribution associée de la graisse corporelle (lipodystrophie). La lipoatrophie des extrémités peut impliquer le coussinet adipeux du talon au sein de cette population et mener aux signes et symptômes de la fasciite plantaire. Deux cas de talalgie plantaire lors d'une lipodystrophie associée au VIH sont présentés dans le but de discuter de l'association clinique possible entre les deux conditions. Bien que les traitements conservateurs aient fourni des preuves limitées, ils sont couramment utilisés et ont mené, en clinique, à une résolution des symptômes. Dans les cas présentés, les personnes ont bénéficié d'un traitement des tissus mous, de modalités, d'une modification des activités et d'information relative aux choix de chaussures adéquates. Les cliniciens doivent savoir que l'association entre ces deux conditions peut constituer une cause importante de morbidité au sein d'une population de patients vivant avec le VIH.

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MOTS CLÉS : talalgie, lipodystrophie, VIH, chiropratique

* Department of Health Policy, Management and Evaluation, Faculty of Medicine, University of Toronto. Centre of Research Expertise in Improved Disability Outcomes (CREIDO), University Health Network, Rehabilitation Solutions, Toronto Western Hospital, 399 Bathurst Street 4 Fell-144 Toronto, ON M5T 2S8.
Tel: (416) 851-7715 email: mstupar@uhnresearch.ca
Canadian Memorial Chiropractic College, Division of Clinical Education.

** Division of Clinical Education, Graduate Education and Research Programs, Canadian Memorial Chiropractic College.
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Introduction

Heel pain can result from injuries to the osseous and soft tissue structures of the foot as well as from various systemic diseases.^{1,2,3} The most common aetiology of heel pain is mechanical and the most common plantar heel pain cause is plantar fasciitis. The diagnosis and treatment of plantar fasciitis results in one million patient visits per year in the United States.⁴ The lifetime prevalence of this condition has been estimated to be 10–15% in runners and in similar proportion in the general population.^{1,5,6} Diagnosis is based on the pathognomonic clinical presentation and physical findings.^{3,7} The clinical features of plantar fasciitis include intermittent plantar heel pain of gradual onset occurring when individuals initially stand up or start walking. The pain usually diminishes with continued walking but may return with prolonged time spent weight-bearing.^{1,3,6,7} The typical finding on physical examination is tenderness of the calcaneal tuberosity that may be aggravated by passive dorsiflexion of the toes. Other physical features that could cause pain associated with the plantar fascia may be pes planus, pes cavus, decreased subtalar joint mobility and a tight Achilles tendon.² These physical impairments may create a biomechanical imbalance that could increase stresses on the plantar fascia.

Certain patient populations may be more predisposed to developing plantar fasciitis. In patients of advanced age and in those with obesity, heel pad atrophy may be present.^{1,5,8} Heel fat pad atrophy or hypertrophy can change the stiffness and elasticity of the structure and affect the pad's function as a shock absorber.^{9,10} It has been estimated that the heel fat pad may absorb approximately 20–25% of the contact force at heel strike.⁹ If deficits in this function of the heel pad occur, it is likely that other structures in the foot including the plantar fascia may have to compensate and undergo a greater amount of biomechanical stress; thereby resulting in the development of clinical conditions. Individuals with HIV commonly have associated lipodystrophy, a condition in which a redistribution of lipid stores occurs with lipoatrophy of the peripheral or subcutaneous fat and a lipohypertrophy of abdominal lipid stores.^{11,12} The peripheral decrease in subcutaneous fat may affect the stiffness/elasticity of the heel pads, change the biomechanical function and predispose the individual to developing plantar fasciitis. No previous literature has reported the possible predisposi-

tion for plantar fasciitis in individuals with HIV-associated lipodystrophy. If this association is present, it may contribute to a significant clinical burden in this population. Two cases of plantar fasciitis are presented in individuals with HIV followed by a discussion of the clinical implications of the possible link between the two conditions.

Case Presentation

Case 1

A 42 year-old male presented to a chiropractic clinic with right heel pain. The pain was located on the medial side of the calcaneal attachment of the plantar fascia. The complaint was attributed to a new vigorous training program. Approximately four months prior, the patient increased his workout to include running three times per week. The pain was described as dull and achy. He denied any radiation further into the foot or proximally into the leg. The pain was aggravated by the initial few steps in the morning. It was also painful approximately one to two hours after a run and the day after a run. Relief was obtained if running was avoided. He rated the pain as five to six out of ten.

His medical history revealed that he was diagnosed with Human Immunodeficiency Virus (HIV) infection four years prior to the onset of foot symptoms. Management of this condition included a combination of medications including lamivudine, abacavir and efavirenz. He did not report taking any other medications at the time of his presentation. Prior treatment had been sought from the chiropractor for musculoskeletal injuries due to post-training injuries and generalized musculoskeletal soreness from the HIV medications. He reported that he was a non-smoker and he only drank alcohol socially. He had been a competitive tri-athlete for four years prior to his initial presentation. He reported to have a high level of activity and he was also working as a fitness instructor.

On physical examination, the right medial foot was very tender on palpation at the plantar fascia attachment to the calcaneous and the structure felt firm. The plantar aspect of the calcaneous was also tender to palpation. Joint play and all ranges of motion were full and pain free.

The patient was diagnosed with a right plantar fasciitis secondary to a possible right bone spur of the calcaneous. He was treated with soft tissue techniques and laser ther-

apy to the plantar fascia, home exercises, modification of activities, and a corn bandage to decrease the pressure. Education on obtaining appropriate running footwear was also provided. He iced the area when his running activities aggravated the condition. The patient experienced complete resolution of symptoms in approximately six months of treatment with a gradual progression from passive to active therapy in order to return to his regular high level of activity.

Case 2

A 49 year-old male presented to a chiropractic clinic with bilateral, plantar foot pain. The pain was more prominent in the left foot. The complaint was described as dull when sitting but sharp and worse with walking. He denied experiencing any paraesthesia or weakness in the feet. He also described generalized fatigue and that he is feeling 'drained' but he denied that it was feeling like a cold. His sleep was undisturbed.

His medical history revealed that he was diagnosed with Human Immunodeficiency Virus (HIV) infection 13 years prior. Due to significant muscle wasting and loss of protein at the time of diagnosis, he was being treated with testosterone. The patient had experienced a significant associated loss of strength and muscle soreness. In addition, he weight-trained five times per week to increase and maintain his muscle mass. At the time of the present complaint, the HIV infection was managed with zidovudine, zalcitabine, D4T, DDI, testosterone, DHEA and androstenedione. He had experienced several gastrointestinal complaints including indigestion, diarrhea and constipation due to the medications. His previous treatment included chiropractic management for a variety of chronic recurrent spinal and extremity sprain/strain type injuries.

On physical examination, he experienced plantar foot pain on active dorsiflexion with more pain in the left foot. All other ranges of motion were full and pain free. Soft tissue palpation revealed a very tender attachment of the plantar fascia bilaterally. All orthopaedic testing was unremarkable except plantar fascia tenderness bilaterally with pain more significantly felt in the left foot.

The patient was diagnosed with bilateral plantar fasciitis. The condition was managed with soft tissue therapy to the plantar fascia. He experienced complete resolution of symptoms by the end of six weeks of treatment.

Discussion

Etiology and Epidemiology

Traumatic, arthritic, neurologic, mechanical and other causes can be implicated in the development of heel pain. Most commonly the cause is mechanical with the most common plantar heel pain developing due to plantar fasciitis.^{1,2} The exact aetiology of this syndrome is unknown and, although it is most likely multifactorial, recent studies suggest that it is not an inflammatory condition as originally described and as the name would indicate. Based on the pathological and histological findings suggesting a more degenerative rather than an inflammatory process, Lemont et al¹³ recommended that a more appropriate term would be plantar fasciosis. No population-based studies have been performed to determine its population prevalence and incidence. The only recent study on the prevalence of plantar fasciitis was performed in the United States between 1995 and 2000 using a national medical care survey. The prevalence of patient visits to office-based physicians and hospital outpatient departments for the diagnosis and treatment of plantar fasciitis was found to be approximately 1 million per year.⁴ With the lifetime prevalence estimated to be ten to fifteen percent in runners and assumed to be similar in the general population,^{2,5,6} this clinical condition is a significant health burden. Plantar fasciitis affects both genders and can be bilateral in approximately a third of the cases. In the general population, it occurs more commonly in individuals between 40 and 60 years but in runners, it peaks in the younger age groups.^{2,14}

Clinical Presentation

The typical clinical picture was demonstrated in the two presented cases. The patients described an intermittent pain of gradual onset that is typically worse during the first few steps in the morning with a diminishing progress of symptoms on continued static or dynamic weight-bearing. Prolonged or excessive weight-bearing may also initiate symptoms as demonstrated by the running patterns in the first case. In the second case, the patient described the character of pain becoming sharp and more severe with gait initiation which is a common presentation.^{2,7} Although many intrinsic and extrinsic risk factors have been suggested to have an association with the development of plantar fasciitis, little or no evidence of the

association is demonstrated in research literature.^{8,15,16} A recent matched-case control study found that work-related time spent weight-bearing, obesity and reduced ankle dorsiflexion have been shown to be independent risk factors in a non-athletic population.¹⁵ In athletes, other proposed risk factors with limited or absent evidence include sudden change in running intensity, wearing faulty shoes and running on unyielding surfaces.^{2,10} The patient in case one reported the change in training intensity as an initiating factor and he was educated on obtaining appropriate footwear.

Along with the typical symptomatology, physical examination findings specifically tenderness of the calcaneal tuberosity that may be aggravated by passive dorsiflexion of the toes contribute to the diagnosis of plantar fasciitis. Pes planus, pes cavus, decreased subtalar joint mobility and a tight Achilles tendon have been suggested as contributing factors in the development and maintenance of plantar heel pain symptoms.² One study suggested that the sagittal movement of the medial longitudinal arch remains unchanged in individuals with plantar fasciitis but due to its small sample size and stance measurement limitations, the findings cannot be accepted until a methodologically stronger study can show similar results.¹⁹ The authors of this study found that digital flexion may have a protective role in preventing bilateral symptoms and they suggest that arch mechanics may influence the severity of plantar fasciitis but not contribute to its development. Although adjacent muscles, tendons and ligaments contribute to and help the plantar fascia in the dynamic and static maintenance of the arches of the feet,²⁰ the findings of a changed arch shape and mechanics or decreased ankle mobility may create a biomechanical imbalance that could increase stresses on the plantar fascia. Reduced ankle dorsiflexion has been purported to be the most important risk factor for the development of plantar fasciitis.¹⁵ In runners with plantar fasciitis, deficits in flexibility and strength of supporting musculature of the posterior calf and the foot result in abnormal foot biomechanics, which is proposed as a mechanism for clinical symptoms.²¹ These findings should be identified on physical examination and treatment should be tailored on a case-by-case basis to address the deficits of each individual patient.

Plain film imaging is usually unnecessary and uninformative in plantar fasciitis and its diagnosis is based on

the distinctive clinical presentation and physical findings.^{3,7} Radiographs may be indicated to rule out traumatic and systemic causes of heel pain such as fractures and rheumatologic disorders. They may also demonstrate heel spurs which are not associated with the pain of plantar fasciitis.^{1,7} Ultrasonography and magnetic resonance imaging are more useful in the examination of the plantar fascia and may play a role in the outcomes of management but they are not necessary in its diagnosis.^{17,18} The patients in the presented cases did not obtain any form of imaging.

Heel pad atrophy can present on its own or be another contributing factor in the development of plantar fasciitis. It may be present in patients of advanced age and obese individuals.^{1,5,8} Atrophy or hypertrophy of the heel fat pad can change the stiffness and elasticity of this structure and, in turn, affect the shock-absorbing property of the fat pad.^{9,10} If the heel fat pad absorbs 20–25% of the contact force at heel strike as suggested by some authors,⁹ deficits in the shock absorbing function of the heel pad would likely affect other structures in the foot. Plantar fascia and the surrounding supportive soft tissues may have to compensate in that situation and undergo a greater amount of biomechanical stress; thereby resulting in the development of clinical syndromes.

Special Populations

Although the prevalence of heel pad atrophy is unknown in the HIV-population, individuals living with the virus often have associated lipodystrophy. Lipodystrophy results in a redistribution of the body's lipid stores; specifically selective loss of subcutaneous fat from the face, buttocks and extremities occurs with the accumulation of lipid stores in the abdomen, thoracic and dorsocervical regions.^{11,12} The etiology of the condition is unknown but its prevalence has increased with the introduction of new treatment medications for HIV. More than half the individuals taking high activity antiretroviral therapy (HAART) especially the protease inhibitors seem to have associated lipodystrophy.^{11,12,22} The incidence of lipodystrophy including peripheral atrophy and central hypertrophy was estimated to be approximately 33% in one study.¹¹ This peripheral decrease in subcutaneous fat or the peripheral lipoatrophy may have an effect on the stiffness/elasticity of the heel pads and, in turn, change the biomechanical function and predispose the individual to

developing plantar fasciitis. Further studies should investigate the presence of heel pad atrophy in patients living with HIV/AIDS, develop objective measuring techniques and, if atrophy is present, determine the subsequent effects on the biomechanical stresses that are placed on the plantar fascia and that may lead to the most common development theory of overload leading to plantar fasciitis.

Management

Management strategies for plantar fasciitis are usually conservative and they may include ice, rest, stretching and strengthening, various modalities and orthoses. Common medical treatment also includes non-steroidal anti-inflammatory medications and corticosteroid injections.^{2,6,7} Most patients benefit from conservative therapy but approximately five percent of unremitting cases have been reported to require surgical intervention mainly involving fascial release. Evidence on interventions used to treat plantar heel pain has demonstrated limited effectiveness.⁶ The patients presented in this case report both benefited from conservative therapies involving soft tissue therapy, modalities, activity modification and footwear education. In the second case, the patient achieved complete symptom resolution in six weeks while the patient in the first case required six months for symptom resolution and return to regular activity. One purported reason for the difference in the prognosis may be due to the delay in obtaining therapy in the two presented patients. Another explanation may be that the activity type and level differs among the patients. The training routine of the patient in case one included an increase in running intensity which is the athletic activity most commonly implicated in plantar fasciitis whereas the patient in case two was also active but focused on weight-training which is less likely to stress the feet. The tri-athlete in case one re-aggravated his condition throughout the treatment period with his training activities, possibly with mechanical injury in adjacent supporting structures, but he gradually returned to the very high level of activity that is normal for him. Prognostic studies report that most patients achieve complete resolution of symptoms without surgery for plantar fasciitis in approximately 12 months.² Treatments for lipodystrophy are controversial at the present time. Dietary modifications, abstinence from medications and cosmetic surgery have all been proposed as treatments.¹¹

Differential Diagnoses

Several conditions that may cause heel pain need to be differentiated from plantar fasciitis. The plantar fascia can develop into plantar fasciitis due to a mechanical overload but it can also rupture due to trauma or weakening of the tissue. Rupture of the plantar fascia is characterized by the sudden onset of plantar pain of a tearing character. It is accompanied by the inability to weight-bear after physical activity and it is not characterized by morning-specific pain. Physical findings that may accompany this condition and differentiate it from plantar fasciitis include a unilateral flattening of the longitudinal arch, swelling, bruising, and deformities of the structure and movement of the toes.²³ Heel pad atrophy can result in heel pain and may need to be differentiated from plantar fasciitis unless it contributes to its development as proposed in this case report. Atrophy of the fat-pad occurs mostly in the elderly and it may also be a finding in the immunocompromised. If the plantar fascia is not affected, the pain and tenderness due to heel pad atrophy would be more central to the heel and not be associated with the first few steps in the morning. Atrophy of the fat pad may also be visible on physical examination.^{2,7}

With excessive or repetitive weight-bearing exercise such as may be involved in common sporting activities that lead to plantar fasciitis, calcaneal stress fractures and bone bruises need to be differentiated. The plantar fasciitis typical location of pain is at the insertion of the plantar fascia into the calcaneus. Pain due to a calcaneal stress fracture may be vague, improve with rest and be aggravated by weight-bearing but not exclusive to the first few steps after periods of inactivity. Similarly, pain associated with a bone bruise would be generalized over the inferior heel following a single or repetitive trauma to the foot.^{1,2} These conditions may require special imaging to be ruled out. Radiography may demonstrate increased sclerosis in the calcaneus or show no signs of abnormality. Bone scans and magnetic resonance imaging would be helpful in detecting or ruling out both a stress fracture and a bone bruise in ankle injuries.^{1,24,25} People living with HIV/AIDS are more predisposed to developing various medical conditions. Also, as a consequence of treatment with medications, these individuals may be more likely to have osteoporosis resulting in a higher risk for fracture. Secondary infections such as Madura's foot also occur in populations living with HIV/AIDS.²⁶ Maduramycosis is

a chronic, granulomatous, fungal infection usually observed in tropical areas. Usually this condition presents as a single, hard, painless lump under the skin of the foot that may persist for many years but it progresses slowly to involve the underlying muscles and bone. It is diagnosed by culture of the pus produced by the lesion and imaging may be useful to determine the extent of tissue involvement.²⁶

Without obvious trauma but with inappropriate and tight footwear, individuals can develop retrocalcaneal bursitis. The pain due to bursitis would be located in the posterior heel and it can be accompanied by erythema and swelling.^{1,7} Various nerve entrapment and compression syndromes can also produce pain in the location of the heel. These syndromes are commonly accompanied by a paresthesia distal to the site of nerve injury in a peripheral nerve distribution or a dermatomal pattern.

Systemic diseases that cause heel pain also need to be ruled out but they are commonly associated with other signs and symptoms not attributable to plantar fasciitis. Enthesopathies including reactive arthritis, ankylosing spondylitis and psoriatic arthritis can cause heel and foot pain.²⁷ These conditions will be accompanied by other signs and symptoms that can help distinguish them from plantar fasciitis including inflammatory joint disease affecting other joints, back pain and morning stiffness for all the named enthesopathies. Psoriatic arthritis can also be accompanied by psoriatic skin lesions. Other systemic but more rare causes of heel pain include infection and cancer. Ruling out the named differentials assists in reaching the appropriate diagnosis and in the administration of an appropriate management of plantar fasciitis especially in this specific patient population.

Conclusion

Two cases of plantar heel pain due to plantar fasciitis were presented in individuals living with HIV/AIDS. Currently, it is not known whether this population has a higher prevalence and morbidity of plantar fasciitis. Heel fat-pad atrophy was proposed as part of lipodystrophy, a prevalent condition in people living with HIV/AIDS, to be a possible biomechanical deficit contributing to the development of plantar fasciitis in this population. Future research should test the association, determine the strength of this association and develop objective measures for its detection and treatment. Clinicians should be aware of the pos-

sible increase in prevalence of plantar fasciitis in the population living with HIV/AIDS and of the differentials to rule out prior to proposing a treatment starting with conservative therapies.

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