
Common Foot Disorders

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Patients often seek advice first from their primary care physicians regarding the diagnosis and treatment of their foot problems. The role of the physician is to recognize and treat the underlying condition, prevent further injury or deformities, and educate the patient about his/her disease. In order for this to occur, physicians require a basic understanding of the anatomy, pathophysiology, and biomechanics of the foot. This article focuses on three of the most common conditions of the foot seen by primary care physicians in the ambulatory setting: bunion, plantar fasciitis, and Morton's neuroma.

Evaluation of Foot Disorders

Evaluation begins by taking a thorough history which includes questions regarding the quality, location, radiation, severity, duration, and exacerbating and/or relieving factors related to the pain. A family history of congenital or acquired disorders of the foot should be sought. Additional information should include a history of previous injuries, occupational and recreational activities, and any recent changes in the type or amount of activity. The physician should also inquire about the effectiveness of current or previous treatment(s). Observation of the patient's gait and foot position and inspection of his/her footwear should be performed since tight fitting shoes may exacerbate the foot condition, and modifications may prevent further injury.

Common Foot Disorders

Bunion

Bunion is derived from the Latin word meaning turnip. It is a bursa sac that develops over the first metatarsophalangeal (MTP) joint as a result of a hallux valgus deformity of this joint. Hallux valgus refers to the lateral deviation of the first toe. However, in common parlance, "bunion" has come to denote any bump or associated deformity of the first MTP joint with deviation of the lateral great toe. Bunions can be primary in the absence of any known underlying diseases or secondary to a variety of metabolic, structural or inflammatory disorders.

The pathophysiology of bunions is poorly understood, but is thought to be secondary to both hereditary and environmental factors. The fact that bunions occur commonly in families suggests a genetic predisposition from ligamentous laxity and hyperpronation of the foot. The higher incidence in women compared to men is

believed to be due to tightly fitting women's footwear. However, footwear alone is not sufficient to explain this condition. The complex relationship of the first ray biomechanics and hindfoot mechanics influence bunion development. Additionally, any disorder resulting in first MTP joint inflammation may weaken MTP soft tissue restraints, predisposing to bunion formation.

The pain associated with a bunion is caused by pressure and frictional force exerted on the skin, soft tissue, and bursa at the medial prominence of the first MTP joint. Over time, callous formation and progression of the foot deformity cause internal subluxation with abnormal mechanics resulting in articular deterioration. A painful callous may also occur under the lateral subluxed medial sesamoid.¹ Additionally, changes in the biomechanics of the foot result in an imbalance which causes the patient to shift his/her weight laterally and, in turn, increases pressure and pain at the head of the metatarsals (metatarsalgia). Progressive lateral great toe deviation produces a retrograde load on the first metatarsal, which deviates medially allowing for great toe shifting, and begins a vicious cycle. Subsequently, the great toe may either override the second toe or, more commonly, go beneath the second toe. Elevation of the second toe may result in significant second MTP joint pain and a hammer toe deformity of the second toe. Frequently, the hammer toe may be the greater source of discomfort. Relief of hammer toe pain may require addressing an associated bunion deformity simultaneously.

Initial treatment is primarily conservative and must first address the patient's footwear. Foot padding, taping, night splints, foot exercises, orthotic devices, nonsteroidal anti-inflammatory medications, or a combination of these treatment modalities may be prescribed. Allowance should be made for adequate space in the shoe to prevent further injury. Orthotic devices may provide short-term symptomatic pain relief for mild to moderate hallux valgus deformity,² although there is no evidence to support their effectiveness in preventing its progression.³ Surgery should be considered if pain or functional disability persists or progresses despite conservative measures.

Plantar fasciitis

The plantar fascia or plantar aponeurosis is a fibrous band of connective tissue located on the plantar surface of the foot. This fascia assists in forming the longitudinal arch of the foot. The plantar fascia originates near the medial process of the calcaneal tubercle and inserts onto the plantar ligamentocapsular complex of the first through fifth metatarsal heads. The origin of the plantar fascia is the most "fixed" point of this structure, and it is this site that is most prone to injury. It should be noted that heel spurs or calcaneal osteophytes have no relationship to plantar fasciitis. In fact, heel spurs occur in 15% to 20% of the asymptomatic population and are absent in many people with plantar fasciitis.⁴ Additionally, the plantar calcaneal spur originates at a different anatomic layer of the foot than the plantar fascia.

Plantar fasciitis is a clinical diagnosis that is most commonly seen in younger runners and patients between the ages of 40 and 60 years of age⁵ who are often slightly overweight and may be deconditioned. Other contributing factors include obesity, recent weight gain, and occupations that require prolonged standing. Recently, it has been demonstrated that individuals suffering from plantar fasciitis develop a secondary contracture of the gastrosoleus complex that may perpetuate the inflammation of the plantar fascia. Rarely is it associated with a systemic inflammatory condition such as spondyloarthropathy or infection. Examination shows focal plantar medial pain over the medial process of the calcaneal tubercle that may extend throughout the longitudinal arch (figure 1). This pain may be exacerbated by the forced dorsiflexion of the toes that stretches the aponeurosis. Pain that is located posteriorly to the medial calcaneal tubercle or which occurs with compression of the calcaneus from a medial to lateral direction suggests another diagnosis such as stress fracture, a heel pad disorder, a plantar nerve entrapment ("jogger's foot"), or periostitis.

Foot pain associated with plantar fasciitis occurs immediately after standing or walking, especially when preceded by prolonged sitting ("start-up pain"). Thus, patients will complain of pain, particularly in the morning, occurring after taking their first step. During the early phase of the disease, pain often improves or resolves with continued walking. When pain occurs at night or persists in the prone position, other causes of heel pain should be sought, including stress fracture or a nerve entrapment syndrome. Additionally, symptoms that persist despite treatment for plantar fasciitis should prompt a search for alternative diagnoses that affect the heel.

Plantar fasciitis may be caused by overuse and/or other biomechanical factors. The pathophysiologic mechanism, particularly in runners, is thought to be due to overuse caused by repetitive microtrauma of the plantar fascia. In this group of patients, plantar fasciitis has been attributed to changes in footwear, running on hard surfaces, excessive or increased



Figure 1. The point of maximal tenderness for plantar fasciitis is along the plantar medial heel (point of finger).

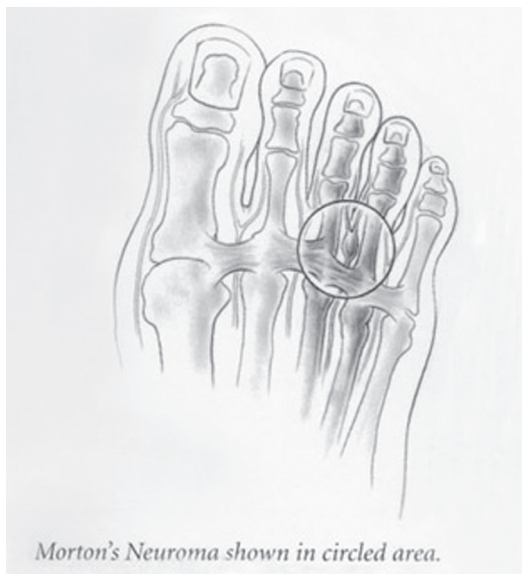


Figure 2. Interdigital plantar (Morton's) neuroma. Reproduced with permission. Copyright 2005 American College of Foot and Ankle Surgeons. All rights reserved.

running distance, or anatomical abnormalities such as a pes cavus, high arch deformity, or a shortened Achilles tendon.⁵

Patients with biomechanical abnormalities affecting the leg and thigh (e.g., excessive femoral anteversion, lateral tibial torsion, or leg length discrepancy), ankle (e.g., equines), arch (e.g., pes planus or pes cavus), or hindfoot (e.g., flexible rearfoot varus) are at increased risk of developing plantar fasciitis.⁶ These conditions cause abnormal pronatory forces that, in turn, translate into excessive biomechanical stress. This results in microtrauma to the plantar fascia leading to collagen degeneration. The end result, found pathologically, is a loss of collagen fibers and an increase in the vascularity and connective tissue matrix with chronic inflammatory changes.⁷

Diagnostic testing should be reserved for cases in which the diagnosis is unclear in patients who have failed to respond to appropriate treatment. Treatment typically proceeds in a stepwise fashion with more conservative, noninvasive mechanical approaches used initially. Recent evidence suggests that non-weightbearing stretching exercises to the plantar fascia provide improvement in pain and mobility compared to weightbearing Achilles tendon stretching exercises.⁸ Patients should be instructed to avoid wearing flat shoes and walking barefoot⁵ and started with a cushioned heel cup and Achilles and plantar fascia stretching regimen. Arch taping, heat, ice massage, and ice baths or packs may be added. These modalities are continued for 6 to 8 weeks. For patients with continued symptoms, night splinting is added. Casts or inserts may help in certain patients with abnormal biomechanical examinations. For patients who are physically active, recommendations should include temporary avoidance of weightbearing exercises. Although nonsteroidal anti-inflammatory medication is commonly used, there have been no randomized, clinically controlled trials to support their benefit.⁵ However, a short course of

corticosteroids may provide short-term pain relief. Injections may be painful and may, inadvertently, result in plantar fasciia rupture. Custom semirigid orthotics with a silicone heel cup may be beneficial for patients with preexisting biomechanical abnormalities of the foot, such as pes planus or pes cavus deformities. For refractory patients, iontophoresis or casting treatment should be considered. For cases resistant to the above measures for 12 months, radiofrequency lesioning or surgical fasciotomy techniques are performed.

Morton's neuroma

Morton's neuroma, initially described by Morton in 1876, is a reactive fibrosis of a communicating branch of the third nerve and, histopathologically, is not a true neuroma.¹ The neuroma is believed to be mechanically induced and most commonly affects the third common digital nerve located in the region of the third webspace of the foot (figure 2). Anatomic factors along with injury, irritation, or pressure from wearing pointed and/or high-heeled shoes result in compression and irritation of the third common digital nerve and lead to nerve fiber degeneration, intraneural and juxtaneural fibrosis, and hypertrophy of the nerve. Anatomical factors that may contribute to this condition include excessive motion of the third and fourth metatarsals, juxtaposition of the third and fourth metatarsal heads and the branches of medial and lateral plantar nerves between the third nerve, and the third transverse intermetatarsal ligament overlying the third common digital nerve and its communicating branches.¹

Pathologic findings alone are insufficient to explain the symptoms of Morton's neuroma, since these same findings may occur in asymptomatic individuals. The diagnosis of Morton's neuroma is suspected clinically when patients complain of pain located in the webspace of their toes. Early in the course, patients may describe burning or tingling in this region. These symptoms may progress to the more typical paroxysmal, severe, sharp, lancinating pain that occurs with weightbearing and walking and is relieved by sitting, removing the shoes, and massaging and manipulating the affected region of the forefoot. The pain, as previously noted, typically involves the third and occasionally the fourth webspace and may radiate to the third and fourth toe.

The webspace compression test is used clinically for the diagnosis of Morton's neuroma and takes advantage of the pathophysiologic process responsible for this condition. With the patient in a sitting or prone position, the examiner squeezes the third and fourth metatarsal heads together with one hand and, using the other hand, compresses the soft tissue in the involved webspace. A positive test results in pain. Ultrasonography may be used in cases of diagnostic uncertainty, however, Morton's neuroma remains a clinical diagnosis.

Treatment options for Morton's neuroma include avoiding pointed and/or high-heeled shoes, using metatarsal pads, and administering local corticosteroid injections, the latter of which must be approached with caution. Inadvertent extravasations into the toe adjacent to the MTP joint may result in significant MTP joint instability. In refractory cases,

neurolysis, transposition, or surgical excision of the nerve is performed. Recurrence of symptoms must provoke a search for a “stump neuroma” or pathology of adjacent structures, such as the MTP joints. Recurrence after surgical excision is most commonly associated with incomplete nerve release or excision.

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