PHYSIOTHERAPY MANAGEMENT OF COMMON FOOT CONDITIONS IN THE PRIMARY CARE SETTING

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Foot and toe conditions can comprise approximately 6% of all musculoskeletal complaints in primary care [1]. A sound knowledge of the biomechanics of the lower limb and gait cycle is required to identify any deviations that contribute to foot pain. Foot function is not solely determined by foot posturing but also by the biomechanics of pelvis, hip and knee. The role of the physiotherapist, in the management of lower limb conditions, is to assess the movement patterns and determine the root cause. Movement patterns are optimised through manual therapy and targeted exercise programmes. Biomechanical correction of the foot is achieved with specific exercise and orthotics. The aim of this article is to outline some common musculoskeletal conditions that respond to physiotherapy intervention.

The foot has two prime functions. It facilitates shock absorption and foot propulsion and helps maintain the body’s equilibrium during the gait cycle. When these mechanisms are faulty, extra stresses are applied to foot structures which lead to abnormal motion and ultimately tissue damage. These abnormal movement patterns contribute to the development of abnormal joint positioning such as Hallux Valgus. Stabilising muscles have to work longer and harder, which can result in muscle fatigue and overuse injury.

When considering the foot anatomy, three regions are identified, REAR FOOT (calcaneus, talus and ankle joint), MID FOOT (navicular, cuboid, cuneiforms) and the FOREFOOT (metatarsals and toes). The foot supports and distributes the weight of the body via three arches; medial and lateral longitudinal and transverse arch under the metatarsal heads. Poor positioning in any of these areas affects the function of the rest of the foot.

Hallux Valgus and Rigidus:

Pain around the forefoot/metatarsal heads can often be linked to degenerative changes in the 1st and subsequent Metatarsophalangeal joints (MTP). These can develop into Hallux Valgus, Hallux Rigidus or Limitus each of which can impair normal gait function, particularly during the propulsive phase. The 1st MTP joint is essential for normal gait with approximately 60º of movement required at this joint for normal push-off. The first toe should be able to extend passively while the foot and body move forward over the flexed foot. The flexibility at the 1st MTP contributes to maintaining the longitudinal arches and plantar fascia taut which is significant in maintaining correct foot posture [2]. There is limited evidence where physiotherapy has been shown to alleviate symptoms in people with OA of 1st MTP joint [3]. Physiotherapy helps to restore range of movement (ROM) through joint mobilisation, muscle stretching and provision of orthotics to correct abnormal foot biomechanics.

Rheumatoid Arthritis:

Patients with rheumatoid disease frequently present with foot pain and/or disability. The role of the physiotherapist is to work with the Multidisciplinary Team and Podiatrist to improve aerobic fitness and overall lower limb muscle balance and where appropriate, provide orthotics [4].
Morton's Neuroma:
Morton's neuroma is a thickening of the interdigital plantar nerves secondary to compression or irritation in the metatarsal region. This is due to poor positioning of the metatarsal joints. This can present as a burning pain, often associated with tight shoes or tight lacing over the forefoot. Joint mobilisation and toe flexion exercises combined with metatarsal supports alleviates the pressure on the interdigital nerves and prevents recurrence. People with bunions and other foot deformities are at an increased risk of developing this syndrome.

Figure 2 Stretching the posterior calf muscles to restore ankle dorsiflexion

Plantar Fasciitis:
Heel pain can be a common site of foot pain [5]. Chronic conditions include inflammation of plantar fat pad (under the calcaneus) and degeneration of the plantar fascia[6]. Plantar pain can be associated with obesity and over-pronation of the foot. Symptoms are generally worse after inactivity e.g. in the morning. The plantar fascia extends from the medial tubercle of the calcaneus to the proximal phalanges and its primary role is to stabilise the long arch of the foot during weight bearing. During heel raise, it becomes taut (known as the windlass or winching mechanism) as a result of passive dorsiflexion of the toes and shortening of the medial arch. Patients with plantar fasciitis generally present with irritation of the medial band as it inserts into the calcaneus. Many of these cases exhibit a foot with prolonged pronation of the sub-talar joint during weight-bearing, secondary to restricted dorsiflexion at the ankle joint. The flexibility of the plantar fascia can be assessed by the ‘Great toe extension test’ (figure 3). The first MTP joint is passively dorsiflexed. A normal response is an increase in the medial arch, stiffening the foot. Physiotherapy can help the resolution of symptoms through restoring joint mobility and stretching tight muscles, in particular the posterior calf muscles and long toe flexors. Soft gel heel pads can help alleviate the symptoms. Targeted exercise and provision of orthotics to correct the excessive pronation will treat the cause of the condition and therefore provide a long term solution.

Figure 3 Great toe test

Common condition in younger adults:
Variations in foot biomechanics can cause many lower limb syndromes in young, active adults.[7] Patients presenting with Anterior Knee Pain, Patellar Tendonopathy, Achilles Tendonopathy or lateral hip pain should be evaluated for alteration in their foot mechanics. It must be noted that rehabilitation of acquired muscle imbalance is essential to the overall success of any intervention to correct foot mechanics. In the very active adult, stress fractures of the metatarsal should be considered if pain persists in the forefoot [8].

Active teenagers who present with persistent pain post ankle injury may have Osteochondritis Dissecans of the talus. This is a result of sub-chondral softening, with possible avascular bone necrosis of the dome of the talus and requires further investigation.

Adolescents often present with activity related pain, swelling and weakness with possible clicking or locking. If a loose body is present this will require an orthopaedic evaluation to prevent early degenerative changes occurring. Sesamoid pain can occur in young athletes who repetitively push off the ball of their feet during activities. It is common in jumping sports and ballet, presenting with inflammation, fracture or sprain of a bipartite sesamoid bone.

Many children are referred to primary care over concerns regarding their foot posture/architecture or gait patterns. For an understanding of the normal variations in growing children, readers are directed to other articles. If symptom related poor foot posture is present in normally developing children, early intervention of exercise and orthotics can be used to alleviate painful symptoms as the child develops; [9] In both children and adults, movement of the ankle and foot can be restricted following any prolonged period of immobilisation such as post fracture/surgery. Physiotherapy treatment is directed at restoring normal joint range of movement, muscle strengthening and gait re-education. It is critical that normal proprioception and range of movement is restored, to minimise the risk of early degenerative changes and deformity or increased risk of further injury.
Orthotics

Orthotics can be made from a wide variety of materials. Their function is to correct abnormal movement of the foot during the gait cycle. This is achieved by correcting the rearfoot and/or forefoot depending on the presenting foot posture. This corrected positioning allows optimal biomechanical functioning, thereby alleviating excessive stress on any one foot joint / tissue. A specialist physiotherapist in this area would perform a full biomechanical assessment, and using a POP cast or pressure plate technology will acquire a mould from which the device is manufactured. This will be made in what is deemed to be the most appropriate material.

Summary

In conclusion, a lower limb biomechanical assessment identifies which parts of the lower kinetic chain are contributing to the patient’s presenting symptoms. Each of the issues must be addressed to restore optimum function. Table 1 illustrates a sample of conditions with which the Chartered Physiotherapist can aid recovery and/or promote self-management. The treatment protocol involves stretching programs, specific muscle strengthening and joint mobilisation, aimed at restoring optimal movement control so as to minimise risk of recurrence of symptoms or deformity. Advice on shoe selection/or modification with temporary inserts may be advised or custom-made orthotics fitted where appropriate.

Table 1 Common cause of foot pain amenable to physiotherapy rehabilitation

<table>
<thead>
<tr>
<th>Common causes of adult foot pain</th>
<th>Common causes of childhood foot pain</th>
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<tbody>
<tr>
<td>Rheumatoid arthritis</td>
<td>Juvenile Arthritis</td>
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<tr>
<td>Stress fractures- metatarsals, calcaneus</td>
<td>Hypermobility syndrome</td>
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<tr>
<td>Sesamoid strain/sprain</td>
<td>Turf toe</td>
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<td>Hallux Ridigus /Valgus</td>
<td>Mid foot ligament sprain</td>
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<tr>
<td>Inflamed Plantar fat pad</td>
<td>Severs disease</td>
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<tr>
<td>Plantar fasciitis</td>
<td>Stress fractures - osteochondritis dissecans</td>
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<tr>
<td>Achilles Tendonopathy (degenerative)</td>
<td>Achilles Tendonopathy (inflammatory)</td>
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