Dynamic Chiropractic

SPORTS / EXERCISE / FITNESS

Running Injuries -- Starting Off on the Right Foot -- Part I

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Recent trends toward health promotion coupled with a societal emphasis on physical appearance have compelled many to embark on personal fitness programs. Running has become an essential element in many of these programs. It provides aerobic activity, is relatively inexpensive, and requires no special talent or facilities. However, it does require preparation. Novice runners are frequently ill-prepared to begin a sound training program and often overestimate their capabilities. Consequently, they experience recurring injuries and frustration. While appropriate chiropractic intervention can obviate symptomatology, improper training habits left uncorrected will render the runner susceptible to further injury. Ultimately this cycle of unmet expectations and injury may prove overwhelming and compel the runner to abandon running or exercise altogether.

The chiropractic physician can serve a pivotal role in breaking this cycle by addressing both palliation and prevention. A thorough investigation of the patient's biomechanics, injury history, running style, and training habits is necessary to adequately evaluate any runner. However, it is especially important to focus upon these aspects in the novice runner, where relatively minor changes and recommendations may deter further injury and disappointment.

While most running injuries involve the lower extremity, the majority of these can be related to improper foot biomechanics. This article will focus on both the causes and effects of altered foot biomechanics and address the evaluative and compensatory mechanics critical to proper intervention.

The evaluation of the runner should include an assessment of the amount of pronation and supination exhibited while weight bearing. Pronation and supination occur primarily at the subtalar (talocalcaneonavicular) joint. Pronation comprises the motions of dorsiflexion, eversion and abduction, and provides flexibility, while supination can be described as plantar flexion, inversion and adduction, and creates stability or rigidity. The degree of pronation and supination can be easily determined. A truly overpronated foot can be detected when the longitudinal arch is absent upon weight bearing and a medial bulge is prominent. Less pronounced overpronation is determined by drawing lines to bisect the Achilles tendon and calcaneus. When weight bearing or when the subtalar joint is in the neutral position, these lines should be in close alignment. The pronated foot will demonstrate a valgus heel to tendon alignment, while the supinated heel will demonstrate a varus position. Navicular drop can also be measured to assess pronation. The approximate midpoint of the navicular is marked with the foot in neutral. This position is marked in relation to the floor. It is remeasured with weight bearing. A drop greater than 15 mm indicates hyperpronation.

Pronation and supination are essential elements in the gait cycle, and when properly performed and sequenced result in minimal energy expenditure by local musculature. Imbalances in these motions can manifest in a variety of injuries. Overpronators frequently present with heel pain, shin splints, stress fractures, bunions and medial and lateral knee pain.

The most common cause of heel pain in runners is plantar fascitis. This is an inflammatory reaction due to chronic traction on the plantar aponeurosis at its insertion into the calcaneus. Hyperpronation stretches this fascia and may result in pain or heel spurs.

Shin splints, typically resulting from posterior tibial muscle strain can occur when hyperpronation causes excessive traction on the tendon, tibial periosteum or interosseous membrane. Pain is present along the course of the tendon or at the medial and distal two-thirds of the tibial border. Periostitis resulting from posterior tibial muscle strain may progress to a tibial stress fracture. Increased symptomatology and nuclear imaging are useful in differentiating these entities.

Bunions are also prominent in hyperpronated runners. Increased pronation results in a laxity of the peroneus longus tendon. The tendon attaches to the first metatarsal and typically exerts a lateral pull. The laxity associated with hyperpronation allows the metatarsal to adduct. Shoe irritation and concomitant bursal inflammation may result in a painful deformity.

Nonspecific medial knee pain frequently occurs in hyperpronated runners. It is speculated that weight bearing shifts medially in the pronated foot, and that these stresses are transmitted medially up the leg to the knee. Internal tibial rotation is associated with both hyperpronation and medial knee pain.

Lateral knee pain may result from iliotibial band or popliteal tendinitis. Hyperpronation may predispose runners to these conditions. Internal tibial rotation associated with pronation stresses both tendons, resulting in irritation.

Hyperpronation often leads to a valgus deformity of the knees. This angulation results in an increased lateral pull of the patella during quadriceps contraction and may result in tacking disorders.

Achilles tendinitis may also result from hyperpronation. As described above, the valgus torque placed on the insertion of the tendon during pronation can result in irritation.

Although true oversupination is relatively rare, the resultant injuries may be served. The supinated foot is rigid and does not transmit force well. Therefore, the ground reactive forces associated with running are poorly dissipated and stress fractures may result.

The heel pain associated with plantar fascitis may also be found in the supinated foot. The plantar fascia in the high-arched foot acts as a windlass and results in a traction irritation at the fascial insertion.

Ankle sprains are common in oversupinated runners. As these runners land in an inverted or varus position at heel strike, they are prone to overinversion particularly on an irregular surface.

Biomechanical stresses from other body regions may also impact foot function. Several of these kinematic interrelationships are illustrated below. A tight or shortened Achilles tendon will reduce dorsiflexion. The foot compensates for this lack of motion through supination of the forefoot resulting in subtalar or hindfoot pronation which facilitates dosiflexion.

Femoral anteversion also manifests this biomechanical interdependency. A runner with femoral anteversion must internally rotate the leg to position the hip joint in neutral alignment. Conversely to position the leg in neutral, the hip must be externally rotated. As this position decreases hip joint congruity, the joint receptors are stimulated and the tibia and subtalar joint internally rotate to compensate. This constant internal rotation predisposes the runner to hyperpronation and its sequelae.

Injuries associated with hyperpronation may also occur in runners with supinated feet. Runners that are supinated or have tibial varum land on the extreme lateral borders of their feet at heel strike. To achieve adequate congruency with the ground at midstance, the foot must excessively pronate and hyperpronation symptomatology may manifest.

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