Dynamic Chiropractic

SPORTS / EXERCISE / FITNESS

Working With the Injured Runner

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As the number of participants in recreational and competitive running continues to increase, so does the number of chiropractic patients who need treatment for running-associated injuries. Some researchers have estimated up to 60 percent of runners will experience an injury that will limit their activities.[1] While some of these injuries are due to actual trauma, the vast majority fall into the category of overuse syndromes.

Conditions Lead to Injuries

Most running injuries are not the result of recent acute injury; they develop gradually, over a period of weeks or months. These "overuse" or "misuse" conditions are caused by excessive and/or repetitive motion. The end result is a microtrauma injury - the body is unable to keep up with the repair and re-strengthening needs, so the tissue begins to fail and becomes symptomatic. If it is not particularly painful (or if the pain is eliminated by painkilling drugs), the runner continues to run, eventually leading to complete failure, such as a stress fracture or ligament tear. The causes of these types of injuries are often categorized into extrinsic and intrinsic sources.[2]

Extrinsic factors. Causes of microtrauma injuries external to the runner are often the easiest to modify, and should be addressed immediately in treatment. Extrinsic factors include the training program (such as mileage per week, number of speed or hill workouts, recent mileage increases, and amount of rest time); running surfaces (such as asphalt, artificial track, or natural trails); and equipment (design and materials of running shoes). Yeung and Yeung report that exposure to a high training load (duration, frequency, or running distance) increases the risk of injury; thus, modification of the training schedule can reduce the incidence of injury.[3] Modifications in the running routine (such as less mileage on more forgiving surfaces) and newer, better shoes should be introduced at the start of the rehab program for any running injury. One often-overlooked extrinsic source of problems is the forced pronation and "environmental" leg-length discrepancy caused by repetitive running on a banked surface, such as along the sides of roads that have a pronounced slant for water run-off.[4]

Causes of Microtrauma Injuries	
Extrinsic Factors	Intrinsic Factors
training program	muscle imbalance
running surfaces	structural alignment
equipment (shoes)	biomechanical function

Intrinsic factors. The individual variables associated with overuse injuries are either muscle imbalances or structural alignment problems. These factors are more difficult to modify, but a good

rehab program should be able to make significant progress once the problem has been identified. In fact, this is actually the most difficult part - recognizing the intrinsic source of the runner's symptoms. A well-designed examination is necessary to investigate the structural, biomechanical and dynamic aspects, searching for evidence of muscle imbalances, misalignments and dysfunctions. Frequently, several intrinsic factors combine to interfere with a runner's musculoskeletal efficiency and performance. When the runner tries to push harder, the system breaks down and becomes symptomatic.

This type of categorization, however, is oversimplified. When a runner possesses sound alignment and muscle balance, even a strenuous training program is well-tolerated. Runners with biomechanical problems, however, can't withstand even a moderate training program without developing various types of overuse injuries. A change in running surface or shoes may bring out the fact that a runner has an underlying foot or leg alignment problem that had previously gone unrecognized. In other words, the intrinsic and extrinsic factors are closely intertwined, and both contribute significantly to most running injuries.

Implementing Rehab for Runners

The extrinsic factors must be addressed first. This entails changing the training program to decrease stress, selecting different running surfaces, and upgrading the runner's shoes. Next, all involved intrinsic factors need to be evaluated, and any problem areas treated. This often includes support for structural alignment and biomechanical improprieties.

Muscle imbalance. Muscle imbalance inhibits normal joint function and limits the functional range of motion. Improving the flexibility of shortened and tight muscles after many miles of running is often necessary. Slow, sustained stretching must be performed regularly. Stretching is most effective when the muscles are warm (at the end of a run). Stretching and gentle, passive movement of involved joints should also be initiated soon after an injury to improve flexibility and prevent adhesions. If an injury is particularly acute, an initial period of relative rest with cryotherapy may be needed; however, during this time frame, exercise of the opposite leg should be encouraged. Vigorous exercise of the uninvolved contralateral leg muscles produces a neurological stimulus in the injured muscles (called the "crossover effect"), and helps to prevent atrophy.[5]

Weaker or injured muscles can be strengthened safely with the use of controlled, isotonic resistance exercises. The resistance can come from a machine, weights, elastic tubing, or the weight of the body. More important than the equipment used is whether the exercise is done in an open- or closed-chain position. The muscles and joints of the leg form part of a closed kinetic chain when the foot is fixed (usually on the ground). Exercises performed in this position mimic the way we use the leg during most daily and sports activities, as they require the co-contraction of accessory and stabilizing muscles.

Alignment problems. The knees, hips, ankles and feet all must be in proper alignment during the repetitive striding performed during running. The arches of the foot are particularly important for providing combined strength and flexibility to support the stress of body weight during running. Interestingly, the arches are seldom symptomatic in the earlier stages of biomechanical stress, and are capable of tolerating extreme stresses for long periods before breaking down and failing. This strength is also a weakness, since many foot failures seem to come on suddenly, when they actually have been developing for a long time.

Biomechanics. The structures and functioning of the foot, ankle and knee are all exposed to greater stresses during running. The most important biomechanical action during running is the timing and amount of pronation at the foot and ankle. If there is too much pronation, or if the foot stays in pronation too long (prolonged pronation), the biomechanics of gait are altered, and running is less efficient.[6] Excessive pronation also increases the internal rotation of the tibia, placing additional stress on the knee.[7] When running is a dominant component of the individual's recreational activities, the natural biomechanics must be able to sustain these higher forces.

Pronation Research

A recent study by Bennett, et al., revealed that navicular drop test measurements (along with gender determinants) correctly identified a group of high-school cross-country runners who developed medial tibial stress syndrome (MTSS) with 76 percent accuracy. The researchers concluded that their study "supported the hypothesis that a pronatory foot type is related to MTSS."[8]

Another study looked at the foot biomechanics of running athletes who reported recent foot and leg overuse problems, and compared them to a control group of uninjured runners.[9] The researchers wanted to determine whether excessive pronation (measured while weightbearing) correlated with the likelihood of developing various types of "overload" sports injuries. Specifically, the researchers looked at runners who had needed treatment for iliotibial band syndrome, Achilles tendinitis, stress fracture of the tibia, tibial periostitis, and plantar fascitis. The amount of pronation during standing and while running at "regular speed" was determined by measuring the angles of the footprints of 66 injured runners and 216 matched, uninjured control runners. The investigators found a significant correlation: Athletes with more pronation had a much greater likelihood of having sustained one of the overuse athletic injuries. They also found that the amount of pronation seen in the static weightbearing footprint was more predictive than the footprint obtained during running. This reinforces the value of checking the alignment of our running patients' feet in the standing position.

Help for the Running Patient

Overuse injuries in runners are a good example of the individual interacting strenuously with the environment. Problems can arise from the environment (extrinsic factors) or the individual's biomechanics (intrinsic factors). Rehabilitation should consider both sources of structural stress and strain, then apply cost-effective treatments. Immediate treatment should include modifications of training and improvements in muscle balance - stretching of tight muscles, and strengthening of weakened areas. For long-term improvement, biomechanical alignment problems will need to be addressed, often with the addition of custom-made orthotics. Failure to recognize these intrinsic complicating factors may result in a patient suffering recurring - and possibly variable - complaints.[10] A comprehensive approach to the rehabilitation of running injuries provides the best hope for many years of recreational enjoyment.

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FEBRUARY 2003