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Repetitive Use Injury - Which came first the chicken or the egg?

Overuse injuries often occur as an abnormal compensation for limitations or weakness at adjacent joints or regions of the body. For example a runner who had suffered with chronic pain in the ball of the foot (metatarsalgia) had a history of injury to the knee on the same side as the foot pain. Multiple treatments were attempted to solve the foot problem by changing shoes, using ice and medication, and using pads and shoe inserts without success. Slow motion video analysis revealed that his knee failed to fully extend when he was pushing off on the ball of the foot while running. The question arises was he failing to fully extend the knee because of pain on the ball of the foot, or was he unable to fully extend the knee leading to increased stress on the ball of the foot. This is the paradox of which came first the chicken of the egg.

In this example the patient's first injury was a sprained knee years ago. The current ball of the foot pain was successfully treated by performing flexibility and strengthening exercises for the knee and consciously modifying his running form to accentuate knee extension at toe off. He was able to diminish the excessive abnormal compensatory stresses to the ball of the foot, by improving the fitness of the adjacent joint – in this case the knee.

A weakness or limitation on one side of the body can lead to abnormal compensation and injury on the same side of the body, but it can also lead to abnormal compensation of the opposite of the body. This is analogous to driving a car with a soft/flat tire on left side of the car. If you press on the accelerator and fail to hold on to the steering wheel the car will deviate towards the left. If you pull or push the steering wheel towards the right, the car can progress straight ahead. The same would hold for running. If the left calf is small and weak from a previous muscle strain, in order to run straight ahead you must utilize adjacent muscles to push or pull you towards the right. A recent patient comes to mind who had suffered a partial rupture of the left Achilles and nine months latter was suffering with right Achilles tendonopathy. On examination the right calf muscle was larger than the left. The length of the right Achilles (range of motion of the ankle joint) was normal. The right Achilles tendon was swollen and tender to touch. The strength of the left Achilles was weak; he had difficulty completing a unilateral heel raise through the full range of motion. Common treatment recommendations for Achilles tendonopathy is to do stretching and strengthening exercises. Neither stretching nor strengthening exercise was indicated for his right Achilles

pain. He needed to rest the right Achilles, and he needed aggressive rehabilitation including strengthening exercise for the left calf muscle.

The assumption is the right side body should match the left side of the body. There should be symmetry. In the real world some degree of asymmetry is expected. When assessing strength the right side of the body should be within 15% of the left side of the body. More than a 15% difference in strength is considered significant. There should be no difference between the right side and the left side when comparing the amount of joint motion or muscle length. Studies have shown when there are significant differences between the right and left side of the body in terms of muscle strength, range of motion, and balance/coordination there is an increased risk of developing an injury.

The metaphor of which came first the chicken or the egg often applies when searching for answers of what caused a repetitive use injury. The answer to this paradox is elusive. What is important is that if you see eggs (a problem) make sure to look for the chicken. If you have suffered a repetitive use injury take the time to look up the leg, down the opposite leg for weakness or limitations, which can be contributing to stress to the injured area. Treatment which focuses on the symptoms and fails to search for the cause is unwise. If you just patch up the egg and fail to find the chicken, the egg will likely crack again. If you patch up the injured chicken you still need to make sure the egg was not broken.