Low Back Pain: Role of the Transverse Abdominis and Lumbar Multifidus

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Low back pain is a common affliction in athletes. While some have an injury precipitating the pain, many others have an insidious onset. Back pain is generally self-limiting, with most athletes being pain free within 90 days. This is why the athlete with first-episode back pain is generally treated conservatively, deferring x-ray, CT, MRI, etc., unless the clinical evaluation indicates otherwise.

Athletes with chronic or recurrent back pain, however, require a more in-depth evaluation. Often the diagnostic tests are inconclusive, leaving the treating athletic trainer or therapist with a diagnosis of mechanical low back pain or dysfunction without identifiable pathology.

Treatments such as joint mobilization and manipulation, stretching, strengthening, and core stability exercises all have variable success rates when used for mechanical low back pain.

In the search for verifiable pathology and/or dysfunction as the cause of this back pain, physiotherapists in the Department of Physiotherapy at the University of Queensland, Australia, explored the co-contraction function of the transverse abdominis and lumbar multifidus muscles in stabilizing the lumbar spine. They also investigated whether these muscles function differently in individuals with vs. those without a history of back pain.

Lumbar and abdominal musculature is arranged in layers. The superficial lumbar musculature assists in moving the upper extremity and in respiration. The deep lumbar musculature comprises the erector spinae, the transversos spinal muscles (including the multifidus), and the minor deep back muscles. The lumbar multifidus originate from all mammillary processes, cross 1 to 3 vertebrae, and insert onto a single spinous process. They actively rotate the vertebral column to the opposite side.

The abdominal musculature consists of the rectus abdominis anteriorly and the external oblique, internal oblique, and transverse abdominis laterally. The transverse abdominis is the deepest lateral abdominal muscle, originating from the lateral inguinal ligament, iliac crest, thoracolumbar fascia, and cartilages of the lower ribs and inserting through the aponeurosis to the linea alba and pubis and pectineal line. It actively compresses the abdomen and depresses the ribs.

The physiotherapists at the University of Queensland used fine wire and surface EMGs to record muscle firing sequence of the lumbar multifidus and transverse abdominis relative to the other abdominal musculature. They also explored whether these muscles function differently in individuals with a history of back pain.
The study used matched subject pairs with and without a history of back pain. Individuals with a history of low back pain had minimal to no back pain during the study. Stabilizing muscle activity was provoked by having the patients perform various shoulder movements in response to a visual stimulus.

In those without a history of back pain, the transverse abdominis was almost always active prior to shoulder motion, followed by the other abdominal muscles. In those with a history of back pain, transverse abdominis contraction was delayed, generally occurring after the other abdominal musculature. Multifidus EMG activity showed no consistent firing pattern between groups.

In another study, these same researchers looked at lumbar multifidus cross-sectional area, as measured by ultrasound, in patients with acute, first-episode low back pain. One group received medical treatment only, the other received medical and exercise treatment.

After 10 weeks, even though patients in both groups had returned to normal activity and were pain free, multifidus size on the involved side was decreased by 5–25% in the nonexercise group as compared to the exercise group.

While not conclusive evidence, these studies support the theory that co-contraction of the transverse abdominis and multifidus help stabilize the lumbar spine and that these muscles function differently in individuals with a history of back pain. As athletic trainers and therapists, we must be cognizant of this and use proper exercises to help these athletes regain size and control of the multifidus and transverse abdominis and, hopefully, prevent further episodes of low back pain.

The next issue will address specific exercises and how to perform them.