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Letter to the Editor

Response letter to the role of proprioception of lateral elbow tendinopathy

The sensorimotor system is the body's complex motor control system that maintains synergistic relationships between the central and peripheral nervous systems and the musculoskeletal system to provide neuromuscular control using feedforward and feedback mechanisms.[1] Proprioception is a subcategory of the sensorimotor system that greatly contributes to functional (dynamic) joint stability and motor control/planning of humans by sensing movement and the position of the body. This occurs on a conscious level through the sensorimotor cortex and on an unconscious level through the cerebellum.[2] Therapists recognize the role of proprioceptive retraining in rehabilitation as it relates to ligamentous strains or laxity. In fact, joint proprioception retraining has been established as an evidence-based intervention for a variety of neurologic and musculoskeletal disorders.[3]

Stasinopoulous puts forth an important commentary regarding the need to further examine the role of proprioception in the development or perpetuation of lateral elbow tendinopathy (LET). We believe that it is also important for therapists to recognize all the conscious and unconscious mechanisms that help to control movement around the joint including both the role that the contractile units play in providing both dynamic stability and gross motor actions around the limb in general.[4] All periarticular tissues, including ligament, tendon, and muscle, contain important mechanoreceptors to collect sensory information that is communicated to the central nervous system. Proprioceptive capabilities of periarticular tissues ensure accurate information about the joint and muscles to enable precise neuromuscular control.[1] Therefore, deficits in proprioception could contribute to poor neuromuscular control and thus injury.

There are a number of physiological mechanisms through which proprioceptive input is potentially altered in patients with LET. Structural changes are known to occur to the tendon in tendinopathy (especially chronic tendinopathy) that include angiofibroblastic degeneration, mucoid degeneration, poorly developed vasculature, disorganized collagen bundles, and scar tissue.[5] It stands to reason that impairment of proprioception may result if mechanoreceptors are damaged in the process. Related to structural changes of the tendon, local edema can create a chemical milieu that negatively impacts sensorimotor control.[6] In addition, the perception of pain in the upper extremity has been linked to altered joint position sense acuity.[7]

Preliminary evidence has demonstrated poor proprioception in elbows with LET when compared with normal elbow.[8] Yet, the likely deficiency in elbow proprioception appears to be a single addition to the enumeration of motor control and pain-related impairments found in patients with LET. Previous studies have suggested that motor performance measured in terms of reaction times, speed of movement, coordination, and accuracy is decreased in LET when compared with healthy subjects.[9,10] Furthermore, several other studies have identified additional motor deficits in the upper extremity. When compared with control groups, patients with LET demonstrate cervical thoracic impairments,[11-13] diminished scapular muscle performance,[14,15] rotator cuff dysfunction,[16] and shoulder, scapular, and wrist stabilizer imbalances.[14,16]

It has been hypothesized that these dysfunctions, abnormal activation patterns, and deficits in regional muscle performance contribute to the development of high recurrence rates of the condition.[9,10,16]

Coombes et al[17] have proposed an integrative model of LET that considers tendon pathology, motor system impairments, and pain system changes. Perhaps, further examination of joint proprioception as it relates to sensorimotor system impairments is warranted. Evidence does support the use of proprioceptive training to improve motor function in many disorders.[3] Unfortunately, there have been few studies to examine the effectiveness of proprioceptive training in upper extremity musculoskeletal pathologies. Preliminary evidence supports an integrative sensorimotor approach for treating patients with various forms of shoulder impingement.[18-20] Dilek et al[21] examined the effectiveness of upper extremity loading in attempts to stimulate joint proprioceptors in patients with shoulder impingement syndrome, finding improved proprioceptive acuity but no differences in functional outcomes when compared with traditional therapy. Therefore, it may be prudent to also explore the combined effects of sensorimotor retraining in the context of specific tasks, in addition to closed kinetic chain exercises as Stasinopoulos suggests. For example, exploring effort and force production sense (avoiding unnecessary overexertions/co-contractions), coordination training (for the entire kinetic chain—including core and lower extremity motor sequencing), plyometric training (to improve reaction times/motor timing/speed of movement), and task-specific motor training (putting everything together for specific athletic and work activities).

As the elbow functions as the vital link in the upper extremity kinetic chain between the shoulder and the hand, it would be interesting to see more research that examines motor control and sensorimotor function along the kinetic chain of individuals with LET, including the status of joint proprioceptive function (joint position sense, kinesthesia, etc.). If, in fact, these sensorimotor impairments are consistently present in this population, it may provide more confirmatory evidence as to why certain

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interventions such as taping, exercise, and joint mobilizations seem to have a positive effect in LET.[22,23]

The multifactorial etiology of LET has made finding that one effective treatment intervention is elusive and unlikely. We believe that the apparent lack of proprioceptive input in patients with LET may be a symptom of a larger sensorimotor problem. It is possible that a multifaceted treatment method addressing tendon pathology, the pain system, along with fine tuning proprioception and motor control, as a comprehensive sensorimotor reintegration approach may be the answer to more efficiently and effectively resolving symptoms of LET and eliminating its recurrence.

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