

## Soft Tissue Approach for the Neural Arch Ligamentous Stocking

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F.H. Willard, PhD<sup>1</sup> has described the ligaments of the lumbar vertebral column and sacrum as a continuous connective tissue stocking extending from the posterior thoracolumbar fascia to the anterior longitudinal ligament. The ligaments are all connected to each other and function as a single unit. Proof of this concept is attained when the osseous components of the neural arch are removed with minimal disturbance to the associated ligamentous structures. He divides, for the sake of discussion, the ligaments into neural arch ligaments, capsular ligaments and ventral ligaments. This article will deal with the neural arch ligaments, since they are posterior and reachable by soft tissue methods.

Willard refers to the posterior neural arch portion as the interspinous-supraspinous-thoracolumbar (IST) ligamentous complex. The superficial portion is composed of the thoracolumbar fascia and multifidus sheath, which is directly anchored to the supraspinous ligament. The posterior border of the interspinous ligament thickens to form the supraspinous ligament. The anterior border of the interspinous ligament continues anteriorly and fans out as the ligamentum flavum. The medial fibers of the ligamentum flavum are between the laminae of adjacent vertebra, and its lateral fibers attach to the facet joint capsule, so we can visualize a connection from the surface of our backs to the facet capsules.

The ligamentum flavum resists the separation of the vertebrae during flexion. The interspinous ligament acts as an anchor, transmitting the anteroposterior pull of the thoracolumbar fascia, into which it is attached via the supraspinous ligament, into an increased tension in the ligamentum flavum. "This increased tension assists in preventing the latter ligament from buckling onto the spinal cord and also serves to assist in alignment of the lumbar vertebrae."<sup>1</sup>

Due to a decrease in elastic fibers, an increase in density of collagen fibers, and deposition of calcium in the ligamentum flavum with its consequent loss of tension, the problems of spinal stenosis, cauda equina syndrome and lumbar radiculopathy occur, especially in the elderly.

The IST complex anchors the major fascial planes of the back to the lumbar spines. "Thus it is possible for the interspinous and supraspinous ligaments to act as force transducers, translating the tension of the thoracolumbar fascia, developed in the extremities and torso, into the lumbar vertebral column."<sup>1</sup>

Bogduk and Twomey<sup>2</sup> state that caudal to L4, the supraspinous ligament is less organized and becomes part of the thoracolumbar fascia.

After the third decade, chondrification of the osseous borders of the interspinous ligaments may begin and diminish the ability of the thoracolumbar fascia to influence the alignment of the lumbar

vertebrae, thereby increasing their risk of destructive injury.<sup>1</sup>

I have written about treatment of fascial restrictions in the thoracolumbar fascia which, as we can see, directly relates to the ligamentous system. The supraspinous, interspinous and ligamentum flavum ligaments are innervated by the medial branch of the dorsal ramus. Fibers containing substance P (nociception) and receptors dealing with proprioception and sympathetic efferent axons have also been found in the neural arch ligaments of the lumbar spine.

Recently, a patient with lower left-sided lumbar pain of three months duration was not responding to a variety of adjustive and soft tissue methods. There was sharp localized tenderness at the interspinous ligament between L3 and L4 spinouses. All of the surrounding soft tissue and vertebral areas appeared functional and painless. Deep friction massage over the L3/L4 supraspinous ligament relieved his pain after two visits.

### *References*

1. Willard FH. The muscular, ligamentous and neural structure of the low back and its relation to back pain. In: Vleeming A, Mooney V, Snijders CJ, et al. *Movement, Stability and Low Back Pain: The Essential Role of the Pelvis*. New York: Churchill Livingstone, 1997.
2. Bogduk, Twomey LT. *Clinical Anatomy of the Lumbar Spine*. New York: Churchill Livingstone, 1991.

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