Taping the Deep Longitudinal Subsystem for Dynamic Postural Control

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The long term goal of chiropractic should be optimal restoration and function of the body so patient’s can enjoy a healthy lifestyle doing the things they love better. Pain relief is just one piece of the puzzle and most often the easiest part to resolve. Moving beyond site of pain mentality and venturing into discovery of the underlying source of pain takes a full body approach. A clinical thought process observing the body in static and dynamic movement patterns reveals dysfunctions and compensations you might not see with a client lying on an exam table. Movement never lies. The body reveals what words cannot. There are no independent structures in the human form. The very act of standing still requires movement via postural control. Balance is dynamic; gravity is constant. The living body is recalibrating all the time in response to its physical and emotional environment. How clients move is a reflection of how they view the world and a culmination of a lifetime striving for stability and safety. When observing static and dynamic posture it is essential to view the subsystem slings to help paint a picture of each patient’s movement patterning. The body thinks in terms of patterns and slings when moving by implementing an exquisite dance of muscle sequencing. Helping to optimize function of these movement slings via taping techniques often helps breakthrough recovery plateaus. The identification and treatment of a specific muscle dysfunction is important when restoring global stabilization and for understanding why parts of a sling may be inextensible (tight) or too flexible. Taping helps with either one.

What are the movement slings? Slings of the muscular and fascial system which help stabilize the pelvis regionally (between the thorax and legs) and globally. Although individual muscles are important for regional stabilization as well as for mobility, it is critical to understand how they connect and function together. The global system of muscles is essentially an integrated sling system that produces forces.

**Anterior Oblique**

* External Obliques
* Abdominal Fascia
* Contralateral Anterior Adductors

**Posterior Oblique**

* Latissimus Dorsi
* Thoracolumbar Fascia
* Contralateral Gluteus Maximus

**Lateral**

* Adductors
* Gluteus Medius
* Contralateral Quadratus Lumborum

**Deep Longitudinal**

* Spinal Erectors
* Sacrotuberous Ligament
* Biceps Femoris
* Head of Fibula
* Peroneus Longus
* Tibialis Anterior

**Intrinsic**

* Transverse Abdominis
* Diaphragm
* Pelvic Floor
* Multifidi Intrinsics

All subsystems interrelate with each other; intrinsic being the fundamental foundation. However, we will be concentrating on the Deep Longitudinal (DLS) and its effect on dynamic posture, gait, and SI joint stability. The DLS is responsible for stabilization of the SI joint and longitudinal arch of foot, eccentric deceleration of forward leg swing and heel strike, and a key player in the proprioceptive mechanism – especially in response to ground reaction forces. So every time a patient takes a step this system is activated for stabilization of the sacrum and optimal alignment of the sacroiliac joint.  The biceps femoris via fascial slips runs nearly continuous with the sacrotuberous ligament, which is most often facilitated in the sequencing pattern.  How many patients, especially runners complain of pain on or near the ischial tuberosity. When the biceps femoris contracts this force is transmitted through the sacrotuberous ligament and aids in optimal stabilization of the sacrum.  Commonly the biceps femoris (and the DLS) becomes synergistically dominant for an underactive glute complex leading to relative counter-nutation (tucking under) of the sacrum and anterior tilting of the ilium, contributing to SI joint dyskinesis. 1

The Deep Longitudinal Subsystem (DLS) is usually overactive. This subsystem becomes reflexively hypertonic in response to SI joint and lumbar spine dyskinesis, and is commonly paired with under-activity of the Intrinsic Stabilization Subsystem and Posterior Oblique Subsystem, and over-activity of the Anterior Oblique Subsystem.

In lumbopelvic hip complex dysfunction the DLS is often overactive compensating for an underactive posterior oblique subsystem. Dysfunction in the cross body posterior oblique sling is often the catalyst for a cascading domino effect on the other systems. Because of commonly inhibited glute max and latissimus, the thoracolumbar fascia becomes restricted altering pelvic control. The DLS uses the thoracolumbar fascia and erector spinae muscles to transmit kinetic energy above the pelvis, while using the biceps femoris to communicate between the pelvis and the lower extremity. Because of this global relationship between upper and lower body the DLS is known as the GREAT COMMUNICATOR. In essence, the DLS is “synergistically dominant” for an inhibited posterior oblique sling.

In the lower-leg dysfunction the DLS is often overactive.  Pronation, femoral adduction and internal rotation, and sacral counter-nutation may be viewed as both the concentric action of this subsystem and the “characterization” of a predictive model of lower-leg dysfunction.  The DLS may be the link between lower-leg dysfunction and the common occurrence of SI joint dyskenisis.

During gait the DLS should eccentrically decelerate forward leg swing, followed by stabilization of the SI joint, and act as a proprioceptive mechanism to relay information about ground reaction forces upon heel strike, ensuring optimal recruitment of prime movers during mid-stance and toe off.  Its function as a mechanism of proprioception is a priority and relays vital information to the core. **This is where taping can help a patient get propiroceptive feedback about the function of this sling. Patients don’t know what they don’t know. Meaning, they often believe their dysfunction is normal because it is what they have adapted to in order to survive. They have what is known as subconscious dysfunction. Patients become consciously aware of dysfunction when pain strikes, or evaluations and assessments reveal asymmetries. The taping technique below helps a patient become consciously aware of proper function (how it’s supposed to feel). With time and practice they may arrive at subconscious function where they move properly without thinking about it.**

**So how can movement-based taping help postural control? The elasticity of the tape stimulates the skin to give proprioceptive feedback to the brain for body awareness. The brain and skin are developed from the same embryological tissue, so there is high stimulatory effect. (REFERENCE PITCTURE) Note in picture tape is applies over clothes for visibility effect. When taping a patient it should be on skin.**

**When taping the DLS, tape is applied along the entire chain: tibialis anterior > Peroneus Longus>head of the fibula> biceps femoris> sacrotuberous ligament> SI joint> spinal erectors. Due to the pivotal role of the fibular head in relationship to SI joint dysfunction (Karel Lewit),you can add a tweak tape to bring the fibular head more anterior. When applying the tape, stretch the tissue not the tape. Application of taper along the thoracolumbar fascia contributes to the elastic recoil effect of both the POS and DLS and helps with awareness of diaphragmatic breathing.**

**After application of the tape have client practice gait patterning in sagittal plane and frontal plane (side stepping). Begin in an unloaded supine position and transition into loaded patterns. You may apply the tape bilaterally depending on your evaluation. The SI joints are an important source of pain and activity dysfunctions. Force closure of the SI joint requires proper sequencing of the muscular, ligamentous, and fascial structures.** Transitioning a patient into dynamic movement stability is a critical component of ongoing maintenance care. Once people have experienced pain they often have a subconscious fear of movement. They are scared of getting hurt again with even the simplest activities of daily living; subsequently poor movement patterns and compensations. Stiffness and tightness take hold in an effort to obtain safety and security. Just because the pain has gone away, does not mean optimal function and postural/movement efficiency has been restored. Integrate taping methods into your program for increased recovery and patient compliance.

Works Cited:

"B2C Fitness - Intergrated Education System." *B2C Fitness - Intergrated Education System*. N.p., n.d. Web. 12 Mar. 2013.

Chek, Paul. *Movement That Matters: A Practical Approach to Developing Optimal Functional Movement Skills*. Encinitas, CA: C.H.E.K. Institute, 2000. Print.

Cook, Gray. *Movement: Functional Movement Systems : Screening, Assessment, and Corrective Strategies*. Aptos, CA: On Target Publications, 2010. Print.

"RockTape." *RockTape*. N.p., n.d. Web. 14 Mar. 2013

Vleeming, Andry. *Movement, Stability, and Low Back Pain: The Essential Role of the Pelvis*. New York: Churchill Livingstone, 1997. Print.

Schleip R, Muller D. Training principles for fascial connective tissue: Scientific and suggested practical applications. J Body Move Ther 2012