Dynamic Chiropractic

PAIN RELIEF / PREVENTION

The Lateral Subsystem and Lower Extremity Pain

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Human locomotion is an incredible demonstration of muscle activation, timing, sequencing and patterning. The very idea that we can stand upright and put one foot in front of the other to get from point A to point B without falling down is miraculous. Take a moment and think about all the necessary coordination that must occur from the body and brain to keep us mobile. Sadly, it's a gift we often take for granted until we lose the ability to do it. In fact, it seems so simple a thing to do, yet we often joke about it: "Can't you walk and chew gum at the same time?"

Dysfunctional gait patterning may be linked to numerous musculoskeletal pain conditions that do not resolve with traditional site-of-pain treatment approaches. During movement, the body simultaneously utilizes four subsystems and one intrinsic stabilization system for locomotion. The four systems are the lateral subsystem (LSS), the deep longitudinal subsystem (DLS), the posterior oblique subsystem (POS) and the anterior oblique subsystem (AOS).

It's important to remember that each system works together to produce integrated functional movement. If one is dysfunctional, it can carry over with negative impact to the others. The single-leg-stance portion of the gait cycle involves control of frontal-plane forces via the lateral subsystem. If this subsystem is dysfunctional, repetitive-impact forces travel to the lower extremity, causing injury.

The Lateral Subsystem

What are the components of the lateral subsystem? The system is comprised of the gluteus medius, tensor fascia latae (TFL), adductor complex (adductor magnus, adductor brevis, adductor longus, gracilis and pectineus) and the contralateral quadratus lumborum. In single-leg movement, the LSS complex controls the femur at both proximal and distal ends due to the origins and insertions of the gluteus medius and gracilis (adductor complex).

During single-leg movements, pelvic and spinal stabilization rely heavily on the LSS for stability. Walking up and down stairs adds tremendous external load to stabilization requirements of the central axis. Impact forces will now be transmitted into peripheral joints, which may be recruited for stability that is absent from proper recruitment of the subsystems. Joints and soft tissue become more vulnerable to injury and overuse syndromes.

How many of your patients must walk up and down stairs? Almost 99.9 percent? Therefore, it is essential to evaluate the function and performance of the LSS.

Common Recurrent Symptoms

What are some of the signs of a dysfunctional lateral subsystem? Observing movement patterns and recurrent symptoms can help zero you in on involvement of this system:

- Recurring knee pain despite localized therapy or even surgical intervention

- Lumbopelvic hip pain
- Iliotibial band syndrome (ITBS) pain
- Pulled groin and adductor injuries
- Quadratus lumborum spasm
- Chronic gluteus medius trigger points
- Hip impingement and/or clicking / popping
- Sacroiliac pain and subluxation
- Plantar fasciitis
- Sciatica pain
- Runner's knee

Dysfunctional Movement Patterns

Assessment of the lateral subsystem is commonly performed in a dynamic environment, such as during single-leg stance, overhead mini-squats, lunges or gait analysis. Always begin with less-dynamic options to observe underlying compensations and increase external load. Starting an assessment on the table in an open-chain position should precede a standing dynamic, closed-chain assessment. Obviously you need to cater to patient-specific pain tolerances and ranges of motion.

Manual muscle testing of the quadratus lumborum, gluteus medius, TFL and functional adductor is appropriate. You will often find one of the muscles in the group inhibited (downregulated) in relationship to another that will be neurologically facilitated (upregulated). The site of most pain, stiffness, tightness and spasm is often the facilitator, but not always. Never assume anything in an evaluation. There are no absolutes. The weaker muscles are inhibited.

Now proceed to more dynamic protocols such as gait, Trendelenburg, mini-squat, mini pistol squat and dynamic forward lunge.

Gait: Observe foot strike, leg swing, thoracic rotation, hip range of motion and stride. Most often you will observe an internally rotated hip and a hip hike with reduced leg stride on the affected side of QL dysfunction.

Trendelenburg (single-leg stance): The classic hip drop on the non-weight-bearing leg due to the gluteus medius inhibition on the stance leg. The stance leg hip has less stability and pops out in the frontal plane.

Overhead mini-squat: Legs shoulder-width apart and hands over head. Toes are forward and the palms face each other overhead. Patient has no shoes or socks on. Have them do a mini-squat and look for knee valgus, foot pronation, hip external rotation and frontal-plane deviation to one side.

Mini pistol squat: Single-leg stance, hands over head; patient squats down to 20-30 degrees. This is a more dynamic control movement requiring stability of movement forces against gravity. Observe for knee valgus, balance control and hip drop on the non-weight-bearing leg.

Dynamic forward lunge: This will reveal an underlying LS dysfunction in high-end compensators such as competitive athletes. Neural control and patterning are maximized, and subtle cheats may become apparent. Have the patient put their hands over their head and then lunge forward. Observe for knee valgus, foot pronation, upper-torso rotation, side bending (frontal-plane dysfunction), lack of control and pain. Now have them return to the starting position and maintain observation. This is a great way to see acceleration and deceleration force control of the subsystem.

Corrective Strategies for This Subsystem

Individual muscles will need to be treated with inhibitory, lengthening, and activation techniques to restore proper sequencing of the system. Remember, there are no cookie-cutter muscle interactions in the LS dysfunction. A quadratus lumborum on one patient may be inhibited in relationship to the opposite adductor complex, yet on another patient the quadratus lumborum may be facilitated against the adductors. Treat what you find.

Mobilize fixated joints (lumbar spine, sacrum, hip, ankle, thoracic spine) and then lock it in with stability correctives for the central core and lumbopelvic hip complex (LPHC). Stabilize the system via elastic taping techniques to add proprioceptive feedback to the movement system. Tape the QL, GM / TFL and adductors.

The exercises used to integrate the LS should be low-load, frontal-plane dominant: side-step patterns, step-ups, single-leg deadlifts (no weight), reverse lunges. Maintain quality and control of the movements at all times. Quality over quantity rules the corrective exercise road. Retest the abnormal patterns after a few sessions of treatment intervention and observe improvements. If there are none, then you need to look deeper or regress stability requirements of the correctives you chose to prescribe.

Observing the body as a fully integrated kinetic chain involving the lateral subsystem can reveal underlying compensatory patterns that are lurking in the shadows, causing chronic pain. So, if your patient has hit a roadblock of improvement, take a step back and assess the functional patterning of the body. I promise you, that is how the body is moving with every single step you take.

Resources

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DECEMBER 2013