

Local Stabilizer Rehabilitation: Myths and Understandings

By Marc Heller, DC

What are the local stabilizers of the lumbar spine? You may know them better as the inner core or the deep segmental fibers of the multifidus and the transversus abdominals. The inner core could also be defined as including the posterior fibers of the psoas, the pelvic floor muscles and the respiratory diaphragm.

These muscles have been of interest to rehab-oriented doctors for many years since a group of Australian physiotherapists documented significant changes in muscle function of the local stability system in the presence of pain and pathology.¹ The research continues and a better understanding of motor-control changes in the local system has continued to grow.

Local stabilizers are single-joint muscles designed to reduce segmental translation, rather than to control range of motion. In normal function, they often demonstrate an anticipatory response to rapid multidirectional limb and trunk movement, preparing the spine for unexpected perturbations.² This anticipatory response, the early activation of these muscles, prepares and stabilizes the spine in advance of sudden movement. The exercises I will feature in this article are all about retraining early activation of the deep segmental fibers of the multifidus.

Abdominal hollowing is a strategy that comes from this research. It is an attempt to wake up or activate the transverse abs, a key local stabilizer. But abdominal hollowing is not a useful strategy when one is confronted with a substantial load. Why? Because these muscles are relatively small and are not designed for heavy lifting. Bracing the whole abdomen is a better strategy when faced with a load. Abdominal hollowing is an exercise that helps activate the transverse abs. Once you activate the transverse abs and improve their recruitment, they should be able to team up better with the bigger global stabilizers to provide more efficient, more stable motion patterns.

How does pain and pathology fit in with local muscle retraining? I'll detour to a brief story. I have problems with discogenic pain in my lower lumbar spine. I have retrained my inner core muscles, although they are not as fully functional as I would like them to be. When I have a disc flare-up, my local stabilizers immediately lose function. I have to go back to square one and reactivate and retrain these muscles once again. The pain and pathology create a vicious cycle in the patient who doesn't know how to get their muscles going again.

Research shows that after an injury, the inner core muscles do not automatically return to normal function.³ With retraining, they have a better chance to pull out of the pattern more quickly and decrease recurrences.

These local stabilizer muscles are key to preventing uncontrolled translation resulting from aberrant, abnormal/unexpected motions. To stop or control translation is also often key. Think about the feeling of stepping off a curb. No big deal. Now, think about the feeling of stepping off of a curb that you don't see. It's somewhat of a shock, even to a normal back.

To control this sudden motion, you need your local stabilizers to quickly fire. In the patient with back pain or a history of recurrence, in the patient whose local stabilizers aren't working efficiently, the shock of stepping off an unseen curb is more significant. The deep multifidi and/or TrA fail to activate at the right moment. They still fire and react; they just have a timing delay and don't fire prior to the impact. When this firing pattern is delayed, any sudden movement stress, or a sudden turn or twist can cause or aggravate back pain. What is happening? The local stabilizers don't anticipate and/or activate early enough, and thus the weak link segments in the spine can translate or move aberrantly. This can create a protective spasm, and start up the whole vicious cycle of acute or recurrent back pain.

This phenomenon is at the junction of pathology and function. Many patients have degenerative segments, bulged discs and some degree of stenosis. When these same people also have poor muscular function, they are likely to have pain or recurrent pain. There is not much we can do for their anatomy. We can make a significant intervention in helping the patient retrain more normal muscular function.

Some rehab authors seem to always start with retraining the local stabilizers, quoting the Australian research. Others, such as those who follow Stuart McGill, would likely say that these muscles are not special and thus do not need specific retraining. I think that in this case, there can be a middle ground.

The kinetic control model has an algorithm that makes sense to me. Retrain the local stabilizers as a priority under the following clinical scenarios:

- The patient has a significant history of insidious recurrence of back pain.
- Their pain is associated with low-load normal daily function and/or static positions, such as in sitting, walking, standing, and/or while lying down.
- Their pain is associated with nondirection-specific unguarded movements. This contrasts with global stabilizer priority when the mechanism of pain production is specifically related to either flexion, extension or rotation.
- Poor voluntary low-threshold recruitment. In other words, the patients have trouble isolating the transverse abs by hollowing and they have trouble with the multifidi exercise described below. The trouble could be not being able to find the muscle or difficulty isolating the local muscles due to overactivity of the bigger mobilizer muscles.

Retraining the local stabilizers does not mean you ignore simultaneous or parallel training of the global stabilizer muscles. The patient can train multiple types of stability muscles at the same time.

Retraining the Local Multifidi

Here is a simple way to tune into the activation of the multifidi. Stand in a walking gait position, left leg in front of the right (as if you are walking). Put your fingers on your lower back at L5, next to the spine on the right side. Note that the thumb or fingers are just above the iliac crest, and just lateral to the L5 or L4 spinous process. Now shift your weight slowly forward. As you rock forward, feel the activation and the swelling of the muscle on the right rear side, under your fingers. If you or your patient cannot feel it at all, put all the weight on the front foot by lifting the rear foot up, and feel the muscle swell. In more normal function, the activation will occur early as you begin to rock forward. If the multifidi have a timing delay, you won't feel the swelling as early in the forward weight shift. Typically, the right side of the multifidi has more timing problems; the left side usually activates earlier. If you are having trouble activating the right multifidi; you can reverse the posture, and start on the left side, which is often easier.

If there is minimal or no activation of the right multifidi, focus on activating the left gluteus medius. If you are "leaking out" of the left hip, you will not fire the multifidus. Another posture that inhibits the multifidi is excessive lumbar extension or flexion. To make this into an inner core rehab exercise, consciously keep the multifidi muscles turned on as you bring the weight back toward the rear foot. Hold this activation for 10 seconds at a time, relax for two seconds, and repeat six to 10 times. This is an example of unloading; decreasing the load to the muscle, but still asking it to activate. You are using the conscious mind to override and train motor control. Initially, a high sensation of effort might be needed to perform this low-load/no-load action. High levels of perceived effort imply an inefficient facilitation of slow motor-unit recruitment and dysfunction of normal muscle spindle responses. Once these inner core muscles are working, you shouldn't need to consciously activate them. They are designed to work automatically.

The Psoas as a Spinal Stabilizer

The psoas is a muscle in which many body workers, chiropractors and PTs have an interest. I used to think that the psoas was usually too tight. The modified Thomas test certainly is positive in plenty of patients with hip or back pain. There are plenty of other hip flexors, such as the rectus femoris and iliopsoas, that will cause a lack of ability to extend at the hip. There is mounting evidence which may suggest a lumbar stability role for the psoas instead of the traditional hip-flexion role.

Recent research has given us a new perspective on the psoas. The psoas is segmentally innervated. The psoas atrophies at the same level and same side of disc herniation, which is a very similar pattern seen in the deep fibers of the multifidus.^{4,5}

The anatomy of the psoas is not ideal for a hip flexor; it's clearly too close to the spine. The psoas is ideal to help stabilize and prevent translation of the lumbar spine. It's also well-designed to stabilize the hip and suck it up into its socket. (Perhaps the subluxation pattern that I have written about, in my hip dysfunction articles is not primarily a lack of

internal rotation, but instead a femoral head that has subluxed anterior and lateral due to an inhibited psoas, and thus stops internal rotation early.⁶⁾

Sean Gibbons has written extensively on the psoas. I've referenced both his short description of psoas anatomy and function, as well as a longer article with details on how to test for psoas related hypermobility, and step-by-step rehab instructions.^{7,8}

Rehab is so critical to optimal success with chronic or recurrent pain. If you become a rehab doctor, great. If you just start thinking a bit more along these lines, add a few more exercises, take a few minutes to coach movement with your patients, that's great, too. If you just recognize that you need to find a PT who does spinal rehab well, or an accomplished Pilates instructor or personal trainer, that's fine. Make a place for rehab in your own model.

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