Dynamic Chiropractic

CHIROPRACTIC TECHNIQUES

Muscle Activation Concepts

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Judith is a 59-year-old female who consistently comes to my twice-weekly exercise classes. I train and teach clients in everything from low-load exercises to multiplanar lunges; from bands to balance training; from exercise sticks to Swiss balls; and from plyos to kettlebells. Jude, as I affectionately like to call her, also occasionally chooses to come to my office for a session when she is in pain. Her usual areas of discomfort are in the upper back/lower neck area or the lumbopelvic region. Jude also comes to see me when she feels like she is "off" regarding her posture or her workouts. Sometimes she comes to me because something in her workout hurts her, or because she notices after sitting for long periods during the day (hunched over a computer) or in a vehicle, that she has become really stiff and tight. On this particular day, it was Jude's lumbopelvic region that bothered her.

Jude is no ordinary lady. She is health conscious, a savvy business woman, a smart consumer, and appreciates that specialization of treatment for care is the key to progress. Jude likes what I have to offer (and is willing to pay out of pocket): small-group exercise classes, diet and nutrition recommendations, soft-tissue and joint-therapy choices, cutting-edge knowledge and experience.

I have taught Jude how to use the foam roll for self myofascial release, how and what muscles to stretch for her overactive muscles, and drilled technical proficiency in all of her exercises. So I was surprised when Jude presented to my office and I discovered she had the same tightness in her calves and hamstrings (biceps femoris) that I noticed in her previous treatment three months earlier. I thought I had given her the recipe for relief on the prior visit: daily use of the foam roll at home, stretching, specific low-load exercises, and continuation of my exercise class, in which I have been teaching kettlebell training (high-load, whole-body exercises).

If I could interview the calf and hamstring muscles what would they say? Why was Jude experiencing overactive calf and hamstring muscles despite the fact that she told me she was using the foam roll, and stretching her calves and hamstrings. I was certain she was doing whole-body exercises because I was there to instruct her.

The "muscle whisperer" in me knew something was wrong or missing here. I did a checkup of her feet and gait analysis. Nothing obvious jumped out at me. I had her perform the "arms overhead" squat test. This movement observation revealed the feet turning outward very slightly as she descended into the squat. The second toe had moved outward about 20 degrees from a line drawn straight down from the center of the tibia. I also observed the heels rise during the squat decent. The "arms overhead" squat evaluation confirmed overactivity of the soleus and gastrocnemius muscles.

I also observed that her low backwas rounding very slightly when she performed the "arms overhead" squat. This indicates overactivity of the hamstrings, especially of biceps femoris muscle.

Why were her same muscles still tight? I was concerned because I know that if your calves or hamstrings are in the "on" position all the time (meaning they don't know when to lengthen) and they don't allow the ankles to dorsiflex, or the hips to hinge properly, you will bend from the back

instead, and eventually develop other compensations that lead to discomfort, pain or injury. Jude was paying me to figure this stuff out and help keep her injury free.

I reviewed the corrective exercise treatment strategy equation:

- Inhibit the overactive muscles.
- Lengthen the overactive muscles.
- Isolate and activate the underactive muscles.
- Perform whole-body integrated exercises.

For the inhibition part of the equation, muscles can to be treated using foam roll, ischemic compression, instrument-assisted soft-tissue techniques, deep muscle stimulator or any other technique. For each muscle that requires inhibition and lengthening, there is often an opposing muscle that needs specific low-load isolated exercises to activate it. Activation refers to the stimulation (or re-education) of underactive myofascial tissue.

Here lies the explanation for what I did that made a change in Judith's recurrent muscle overactivity: Not all muscles have a clear singular role. But all muscles have both slow (tonic) and fast (phasic) motor units. Certain muscles are more tonic and respond to too much loading or too much inactivity by getting and staying shorter. The National Academy of Sports Medicine (NASM) refers to this condition as "overactive." Examples of tonic muscles are the hamstrings, the adductors and the hip flexors. The phasic muscles such as the middle/lower trapezius, gluteus medius and anterior tibialis are prone to getting weak and stretched out with too much or too little use. The NASM calls these muscles "underactive." Altered muscle lengths go back to the length-tension relationship.

If the calves (soleus, gastrocnemius) are overactive, it is likely that their functional antagonist muscles (posterior tibialis) are underactive. If the biceps femoris are overactive, it is likely that the gluteus maximus/minimus is underactive.

Judith was doing everything right except she was missing one important part of the equation. A corrective exercise program that stretches the short muscle, such as the hamstring, does not concurrently shorten the lengthened muscle, such as the lumbar back extensors. Corrective exercise therapy needs to shorten the elongated muscle while simultaneously stretching the short muscle.

The keys to preventing and alleviating spinal dysfunction are: have the trunk muscles hold the vertebral column and pelvis in their optimal alignments; and prevent unnecessary movement. To achieve these goals, the muscles must be the correct length and strength and be able to produce the correct pattern of activity. The new treatment plan for Jude was to perform everything she was doing, with the addition of the following:

- specific exercises to isolate the anterior/posterior tibialis muscles;
- low-load exercise retraining the hip extension pattern;
- single-leg Romanian dead lifts for the gluteus maximus/minimus muscles; and
- prisoner squats for ankle mobility, calf lengthening, hip flexion, and gluteal strength.
- After only three weeks of care, Jude showed tremendous improvement.

References

1. Comerford M. Lumbo-Pelvic Stability. Course notes.
2. National Academy of Sports Medicine. Corrective Exercise Specialist. Course notes.