Core Training – Supplemental Notes

Core Stability for Spinal Stability

The essence of core stability is for spinal stability and ultimately comes from co-contraction of the abdominal musculature, not in isolating individual muscles. Famed spinal biomechanics professor, Dr. Stuart McGill, Ph.D., states that "true spinal stability is achieved with a 'balanced' stiffening of the entire abdominal musculature including the rectus abdominis and the abdominal wall, quadratus lumborum, latissimus dorsi and the back extensors of longissimus, iliocostalis and multifidus" (McGill, 2010).

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The Sternal Crunch

- Beginning in a neutral spine position, take a deep breath in and feel how your lower ribs and chest lift up.
- Next take a full exhale breath out and perform a slight sit-up by lifting your upper torso off the ground.
- Feel your upper abdominals engage as the sternum does mini-crunch at the zyphoid process.
- Notice how your lower ribs move down as if the front ribs were moving toward the back ribs while the lateral rib cage flattens out to the sides.

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The Sternal Crunch

- You will also notice that your low back flattens out a bit when performing this motion, but be certain to keep the pelvis in a neutral position. Make sure there is no anterior pelvic tilt.
- Try to perform this crunch isometrically without raising or curling the upper torso. This is the "sternal crunch."
- Now add the abdominal brace (described on the next slide) and hold both techniques without holding your breath. This is not easy! But, this is the most effective way to co-contract the abdominal muscles and the best current scientifically proven method of improving spinal stability. Adapted from (Liebenson, 2007).

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Abdominal Bracing

- Beginning in a neutral spine position, bisect the top of the ilium and the 12th rib. Go medial from there ½" to 1" and push your fingers into the soft spot of the abdomen as if they were knife edges. Then, use the lateral contraction of the abdominal musculature to push the fingers out. For further reference, try laughing and notice how each bellow of laughter pushes your fingers and sides outward. This is the first action we are aiming at training – a lateral brace.
- Next contract your anterior abdominals as if bracing for a punch or as if someone were going to drop a weight on your stomach. Don't suck them in; brace and clench them. Feel the abs harden and stick out a little. Concurrently, brace posteriorly while remaining in a neutral spine and feel the lumbar extensors harden.

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Abdominal Bracing

- Contract the abs in all directions and you have a girdle of support all the way around your spine from back to front. The abs have three layers; contracting them hard in this way makes all the layers stiffen together, for an extra-stiff or solid effect similar to the layered stiffness of plywood. You've locked your ribcage to your pelvis, or locked in the neutral spine. This is the "abdominal brace." Adapted from (Mason, 2009).

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IAP: Intra Abdominal Pressure

Uddiyana Bandha and the Core

- *While it still may be applied for energetic purposes,* the abdominal hallowing procedure, known in yoga as *uddiyana bandha* (the belly lock), was the most ineffective stabilization maneuver for control of spine motion and stability [when compared with abdominal bracing and a natural spine strategy] (Lederman, 2009).
- In addition, it has been reported that "the instability of the hallowing position reduces the potential energy of the spinal column causing it to fail at lower applied loads" (McGill, 2009) and "there seems to be no mechanical rationale for using an abdominal hallowing…to enhance stability" (Grenier, 2007).
- On the other hand, the previously described abdominal bracing technique improved stability [over hallowing] (Lederman, 2009) and "bracing creates better patterns that better enhance overall stability" (Grenier, 2007) providing that the yoga practitioner has no preexisting spinal compression issues like disc pathology or neurologic compromise.

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