

Do All Muscle Groups Respond the Same to Rehabilitation?

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Abstract: Embryological evidence reveals the posterior spinal muscle groups—transversospinal muscles—multifidus intertransversari and interspinales are primary back extensors with bilateral contraction and rotators are unilateral contractors appear to function and rehabilitate differently than the trunk flexor muscle groups. Regarding the rehabilitation of the vertebral subluxation complexes there is clinical evidence that strengthening appears to be maximize with sustained asymmetric isometric exercises. Rehabilitation efficiency also appears to increase with asymmetric isometric exercises strengthening the weakened side.

Clarence Gonstead, D.C. dedicated a large part of his life to treating patients and teaching chiropractic technique guidelines demonstrating how and what he did. His goal was to advance practicing chiropractic doctors' adjusting abilities to improve their clinical results. According to the Gonstead Seminars that I have attended, Doctor “G’s” basic teaching principles to reduce or eliminate the neurological ramifications of the vertebral subluxation were consultation/orthopedic/neurologic examinations that included visualization, motion and static palpation, instrumentation scoping and weight bearing x-rays. Gonstead seminars teach adjusting vertebral segments with the patient in a relaxed position in a minimal to no muscle tensioned (sweet spot) stabilization with specific contact on the high side of the rainbow, posterior to anterior in the plane line of the disc, and if needed torquing to close the wedge. In the cervical spine an inferior to superior thrust may be necessary. Sustaining the post-adjustment contact helps the patient from guarding. Finally, re-checking with palpation and instrumentation scoping the adjusted segment to see if the body responded positively. (Cox 1982)

If the patient complied with treatment recommendations and if a post x-ray change is likely be observed that would impact case evaluation and management, post x-rays may be recommended for evaluation of change to the subluxation pattern. (Plaugher 1993) Those who have applied these protocols understand that the foundation of repeated clinical success is grounded in the basics. “As a chiropractic doctor is there anything other than a “G” note that can be done for the patient to support the adjustment and increase clinical results? “I am aware that Dr. Gonstead continually strived to further develop himself and his technique to better serve his patients. In that self-challenging spirit, I continue to look for increased clinical successes by recommending effective and efficient exercises to patients as an adjunct to the adjustment. In the past, Gonstead seminars supported cross crawl exercises and balance exercises and if used have shown increased clinical success.

Research will be cited for my clinical conclusions; however many other opinions are valuable and valid for increased chiropractic clinical success. My hope for this article is that it elicits thought provoking discussions for the betterment of Gonstead chiropractic doctors helping us to serve our patients better.

It makes sense to me that once vertebral motion unit is successfully restored by specific intersegmental adjustments, targeted patient exercise assignments may assist intersegmental flexibility and strength. Many patients in the labor trades, carpenters, plumbers, welders, etc. will

tell you that they have strong muscles because of their rigorous daily physical activities. Their statement bears some truth, but what may be lacking, from a spinal biomechanical evaluation, is symmetry in a static position or dynamic motion. Body muscle mass and fascial adhesion asymmetry leads to recurring micro trauma, over time leading to macro spinal biomechanical complications. Through corrective adjustments and adjunctive rehabilitative maneuvers or exercises, the musculoskeletal system can respond positively and the brain and nervous system regains control and coordination of the body's innate healing properties.

To this point (MacDonald 2009) reported, "In summary, the current experiment presents evidence that even though patients are pain-free and thus between episodes of lower back pain, recurrent unilateral lower back pain patients do not control their back muscles in the same way as their healthy counterparts. These findings raise the possibility that this abnormal pattern of muscle control, in the absence of pain, may leave the spine vulnerable to (re)injury and hence predispose to recurrent episodes. Finally, this finding implies that pain and functional performance should not be the only outcome measures of interest after an acute episode of lower back pain." How then do we begin to reach the goal of an exercise protocol for intersegmental spinal biomechanical symmetry in all axes of motion for under-performing vertebral segment or segments? Asymmetric isometric exercise is one option. The use of isometric exercises for changes in spinal biomechanics focusing on biomechanical symmetry is not new and was applied by Fredrick Alexander in the 1890's. He created the Alexander Technique which continues to be successfully taught throughout the world. In the 1970's Ron J Aragona, DC of Manchester, New Hampshire, via clinical experimentation developed a similar exercise application. Dr. Aragona's assessment of his patients for postural challenges included spinal biomechanical evaluation using motion endpoint x-rays for intersegmental motion analysis. Based on asymmetries discovered, a prescription of individualized asymmetric isometric exercises for optimizing potential abnormal biomechanical correction was given. His clinical research evolved into the program known as Applied Spinal Biomechanical Engineering (ASBE).

In essence, ASBE maneuvers apply specific asymmetric repetitions of isometric muscle contractions to primarily effect the transverse spinal muscle (deep posterior) groups with objective reproducible clinical success.

Regarding the muscular system, the axiom of, you lose what is damaged or that which you do not use and more specifically you lose what is not fully innervated because of neuronal compromise" i.e. a subluxated vertebrae, holds true. Functionally, muscle tissue is contractile in nature. Muscle requires frequent repetitious strength and stretching work throughout life owing to the rapid onset of non-use atrophy, prolific fascial and ligamentous adhesions after injury and natural shortening.

When there are so many options for muscular strengthening and stretching (like cross crawl and balance) why focus on isometric contractions for intrinsic spinal muscles for rehabilitation? For treatment considerations, "the intrinsic muscles of the back are defined by their embryological origin and innervation pattern." (Mekonen 2016) First, embryological considerations of the (posterior) epaxial spinal muscles in the clinical setting (transversospinalis muscles) give clues in prescribing efficient rehabilitative processes. "Movement and stability of the lumbosacral region is contingent on the balance of forces distributed through the myofascial planes associated with the thoracolumbar fascia (TLF). This structure is located at the common intersection of several extremity muscles (e.g. latissimus dorsi and gluteus maximus), as well as hypaxial (e.g. ventral trunk muscles) and epaxial (paraspinal) muscles. The mechanical properties of the fascial

constituents establish the parameters guiding the dynamic interaction of muscle groups that stabilize the lumbosacral spine. Understanding the construction of this complex myofascial junction is fundamental to biomechanical analysis and implementation of effective rehabilitation in individuals with low back and pelvic girdle pain.” (MD Schuenke 2012) These postural muscles also contain slow twitch muscle fibers and should be held isometrically (10 seconds or more) for nerve firing and muscle strengthening. Individually these muscles do not provide large movements, instead they function as refining postural movements in addition to providing structural support. (Hides 1976)

“Research shows that the superficial multifidus muscle contributes to the control of spinal orientation and the deep multifidus has a role in controlling intersegmental motion. Patients with first-time episodes of lower back pain respond to medications and reassurance, though later demonstrate atrophy and fatty degeneration of the local multifidi. The symptoms resolved, but there were neurophysiological residuals that led to morphological compromises. This is why the societal problem is not the acute back pain episode, but the recurrences and resulting disability and absenteeism.” (Morris, D.C. 2005) Earlier Hides noted, “Interestingly the multifidus muscle (expaxial) recovery is not automatic after resolution of acute, first-episode low back pain.” (Hides 1996)

Clinical Picture – Upon motion palpation the patient may present with a somatic nociceptive response (pain from muscles, capsules and joints) and hypokinetic intersegmental mobility in the cervical, thoracic or lumbar segments. If there are positive orthopedic and neurological findings this clinical presentation surpasses the threshold of clinical necessity for upright weight bearing static and bilateral lateral flexion motion x-rays of the areas of pain. (Council on Chiropractic Practice Clinical Practice Guideline 2013) Upon analyzing the x-rays, the pattern of intersegmental vertebral motion may not follow the established researched clinical spinal biomechanical of hypokenitic or hyperkinetic intersegmental motion. (White and Panjabai 1990), (Wietz 1981) Spinal movement can be abnormal in quality (abnormal coupling patterns) or in quantity (abnormal increased motion). This instability can be symptomatic or asymptomatic, depending on the demands made on the motion segment. (Dupruis 1985) One causation may be due to loss of strength and elasticity of the transversospinal muscle group. Symmetry in vertebral body lateral flexion and spinous process rotation is the visual template measurement.

Objective and researched measures of multifidus (transversospinal muscle group) size (strength) include MRI, CT scan, Ultrasound, and Myotonometer®.

Less objective though clinically significant are static palpation, motion palpation and muscle strength testing when used in conjunction with and compared to motion radiographic evaluation. Research supports evidence that transversospinal muscles can be strengthened. “*The size of the multifidus muscle has been shown to be modifiable with supervised motor-control training programs.*” (Hides 2017)

- Recommendations for increasing patient mobility through chiropractic adjustments and strengthening of muscle tissue:
- Formulate treatment plan with re-examination(s) at specified intervals.
- Informed consent.
- Initiate protocols with extremely light contraction and patient tolerance.
- Monitor pain and neurological findings modifying protocol as necessary.

- Increase intensity to patient tolerance over time and response to chiropractic adjustments.
- Re-examination for continuation of or creation of new treatment plan or discharge.

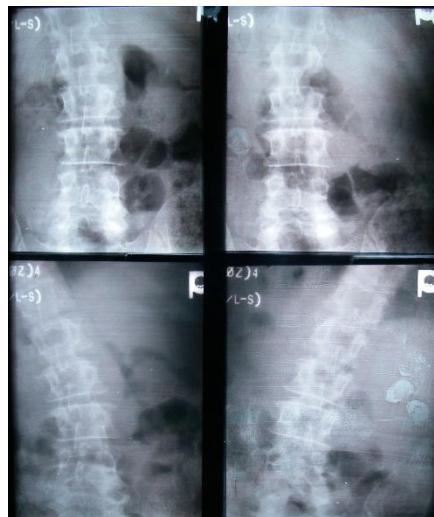
Additional activities

- Balance training, Stimulation for proprioception with the eyes open and eyes closed, Single leg standing, Balance ball.
- Buoyant exercise: swimming, aquatic exercise
- Stretching with strength: Yoga, Pilates, Barre ballet.
- Targeted exercises, Intersegmental/regional ASBE maneuvers., McKenzie Exercises
- Gross strength exercises., Roman Chair exercises, Isometric exercises, Planking on floor or labile surfaces, Isotonic exercises, back hyper-extension machine; weighted or non-weighted.
- Postural Programs: Alexander Technique, Egoscue Exercises., Tia Chi, Physical therapy, Dynamic Neuromuscular Stabilization, Go Posture-ElectronicPosture Feedback Trainer.

X-rays are initially used to rule out pathological processes and would rule out a contraindication for a chiropractic adjustment. Additionally, x-rays are beneficial to biomechanical evaluation. If bilateral lateral flexion x-ray are taken, evaluate the views for loss of coupling of spinous process rotation, vertebral body lateral flexion or both. If found, treatment recommendation is to strengthen the weakened side at the exercise ratio 3:1 where 3 repetitions are done on the weakened side. If segmental rotation or vertebral body lateral flexion is toward the opposite of the anticipated direction, then strengthen the weak side by a ratio 5:1.

In figure 1, the initial x-ray is the top and the post x-ray is the bottom. Lateral flexion with the right lateral flexion at a ratio of 3 right to 1 left. The post x-ray is two months later. The patient did the adjustments as recommended and the exercises as prescribed.

Figure 1



“Most recently we have found changes in contracted lumbar multifidus thickness were associated with improved Lower Back Pain - related disability one week after Spinal Manipulative Therapy” (Koppenhaver et al., 2011).

The best way to fill your practice is from referrals of people you fixed. Dr. Gonstead proved this over and over and shared much of what he did. Keep in mind of the seminal paper of Alex Cox, D.C. (Cox 1982) regarding the timing of the adjustment as critical for achievement the fixing goal and do your

best of keeping up to date with other treatment approaches that make sense to help hold the adjustment. Remember, if you are not experiencing treatment success it is not the Chiropractic principle of removing the primary subluxation that is the problem, it is the chiropractor's ability to find, fix and leave alone.

Conclusion: The primary goal of chiropractors is to give a specific chiropractic adjustment on a subluxated vertebrae. Subsequent to the adjustment are many clinical adjuncts for patients to support the healing of the subluxation. This article gives an overview of one therapeutic approach usable by patients for effective support the chiropractic adjustment.

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Cox, WA *Timing is as important as technique, The Gonstead System The American Chiropractor* July August 1982 "As a chiropractor begins to master his ability to deliver the right adjustment the right place, he finds the most difficult concept to deal with the "Right Time." Clinical experience has shown that thrusts in the human spine can be accepted or rejected. Naturally, it is our objective is to have a high percentage of acceptance daily (1) the adjustment did lot of good for the patient, (2) the adjustment did very little good for the patient, or (3) the adjustment did nothing for the patient . A thorough study of the patient must be mead with each visit and that instrumentation a great part in timing of the next adjustment."

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