Electromyographic Responses of Back and Limb Muscles Associated With Spinal Manipulative Therapy

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Walter Herzog, David Scheele and Philip J Conway

FROM ABSTRACT:

Ten young, asymptomatic male subjects underwent 11 clinically relevant spinal manipulative treatments on the cervical, thoracic, and lumbar levels and on the sacroiliac joint to test the magnitude and extent of reflex responses associated with spinal manipulative treatments. Reflex activities were measured using 16 pairs of bipolar surface electrodes placed on the back and proximal limb musculature.

Each treatment produced consistent reflex responses in a target-specific area. The reflex responses occurred within 50-200 msec after the onset of the treatment thrust. The responses were probably of multireceptor origin and were elicited asynchronously.

Conclusions. This is the first study in which results show a consistent reflex response associated with spinal manipulative treatments. Because reflex pathways are evoked systematically during spinal manipulative treatment, there is a distinct possibility that these responses may cause some of the clinically observed beneficial effects, such as a reduction in pain and a decrease in hypertonicity of muscles.

KEY POINTS FROM THIS ARTICLE:

1) Spinal manipulation produces reflexes that relieve pain and reduce hypertonicity in muscles within the treatment area.

2) "Spinal manipulative therapy (SMT) is a commonly used conservative treatment for neck, back, and pelvic pain."

3) "The effectiveness of SMT in the treatment of low back pain has been well established by outcome-based research."

4) All spinal manipulations in this study were standard in chiropractic and were performed by a full-time practicing chiropractor. All manipulations were analyzed for their electromyographic response using bipolar, surface electromyography.

5) The 11 manipulations elicited distinct electromyographic responses that were related to the manipulations.

6) These authors sought to answer these questions:
A) Is the electromyographic response to a manipulation a local phenomenon restricted to the treatment area or is there a systematic and repeatable electromyographic pattern across patients for a given SMT?

B) So the spinal manipulation electromyographic responses affect the upper and lower limbs?

“In contrast to manipulations applied with the activator instrument, the manual procedures listed here provided a repeatable and largely systematic electromyographic response for a given procedure that extended beyond the immediate area of force application in all treatments. Treatments in the upper and midthoracic areas elicited an electromyographic response in the upper limb musculature (deltoids) on the treatment side. Such an observation was also made for the sacroiliac treatments in the side-lying position. Electromyographic responses in the lower limb musculature (gluteus maximus) were systematically recorded for all treatments in the lower thoracic and lumbar levels and in the sacroiliac joint.”

7) The electromyographic responses associated with spinal manipulation “have a beneficial treatment effect by inhibiting hypertonic muscles, reducing pain, and increasing functional ability.”

8) Spinal manipulation inhibits hypertonic muscles in areas of back pain.

9) The electromyographic response in the muscles following spinal manipulation is initiated by “mechanoreceptors in the capsule of the spinal facet joints, pain and cutaneous receptors, and proprioceptors of skeletal muscles the muscle spindles and golgi tendon organs.”

10) “The results of this study allow for the conclusion that high-speed, low-amplitude SMTs elicit clear, measurable, and repeatable electromyographic responses in a distinct area that is specific to the treatment administered.”

11) The muscle reflex response generated by spinal manipulation depends on the rate of change in force and not on the magnitude of the force.

COMMENTS FROM DAN MURPHY:

This study shows that traditional joint adjusting fires mechanoreceptors from a number of local sources, causing two important things:

1) Inhibition of muscle tone.
2) The neurological influence of an adjustment on the muscles was primarily ipsilateral and systemic: mid-thoracic adjustments in particular were capable of influencing both the arm and the leg musculature.

The quickness of the adjustment was more important than the strength of the adjustment in causing the inhibitory muscle reflex responses.