Maigne et al. Highlighting of Intervertebral Movements and Variations of Intradiskal Pressure During Lumbar Spine Manipulation: A Feasability Study. JMPT Vol. 23, Number 8, October 2000.

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Spinal manipulation appears to have beneficial effects on patients with disc disorders, but the mechanism of this benefit is yet to be established. A recent study has helped to begin the process of understanding the mechanisms and effects of manipulation on the intervertebral disc. (1)

As little as perhaps a half decade ago, it was not unusual to hear expert opinion that manipulation commonly injures the disc and that manipulation is contraindicated in the presence of a known disc injury. The data, however, has not supported either of these subjective opinions and in fact has shown just the opposite. In the last issue of eSpine we reviewed a study by Burton et al (2) which found spinal manipulation to outperform chemonucleolysis in the short-term and to perform as well in the long-term in patients with symptomatic lumbar disc herniation. This study was consistent with a review by Bronfort and Haldeman (3) that summarized all of the trials of manipulation for lumbar disc herniation. This review found the procedure effective and that it had not produced a single complication in about 2600 cases.

Maigne and Guillon performed an interesting study to address some of the issues about the influence of spinal manipulation on the intervertebral disc. Two cadavers were used in this preliminary study to measure vertebral movements and changes in intradiscal pressure during two different side posture manipulation techniques. At first, it seems as if the use of cadavers would greatly compromise the data. However, the authors mention other study showing spinal manipulation performed in a relaxed patient causes no increased muscle response on EMG during the actual segmental motion. This would suggest that the data produced during manipulation under the circumstances would closely mimic an in vivo study.

The two different manipulations used differed only in the sagittal plane position of the lumbar spine. One incorporated slight flexion, while the other induced extension. The manipulation performed produced the audible joint cavitation sound that is typical of successful manipulation.

Manipulation produced a small initial increase in intradiscal pressure that was quickly followed by a decrease in this pressure from the pretreatment level. The flexion manipulation produced quicker onset of changes in the intradiscal pressure, although the patterns of an initial increase followed by a decrease below initial baseline levels was the same for both techniques.

The significance of the differences between the timing of the changes when a more flexed or extended position is used is unknown at this time. It would appear to be unimportant as both intradiscal pressure change curves precede muscle activation preventing this factor

from influencing the outcome.

During both procedures, pressure changes correlated with accelerations or movement of the vertebra suggesting that it is this movement that causes the pressure changes. The flexion manipulation caused a greater vertical movement, which was thought to be a "distractive" segmental motion. Vertical or distractive motion was also present with extension manipulation, although relatively more horizontal motion occurred with this style.

One of the most interesting findings was that the decrease in intradiscal pressure corresponded to the displacement of the segment. In other words, the change in position/motion in the segment caused the change in intradiscal pressure. The authors suggest that the decrease in intradiscal pressure seen in this study is an important mechanism by which manipulation produces its therapeutic benefit.

Two theories have developed concerning the intradiscal pressure changes seen with manipulation. The first is that of Cyriax who suggests that manipulation allows disc protrusion to be "sucked back" into the center of the joint. The data in this study is consistent with this mechanism. However, studies have not been able to demonstrate gross reductions in the size of the herniation short-term following manipulation, although small changes that could not be determined by study design could have occurred.

The second theory is that the release of the joint during manipulation could allow repositioning that re-establishes uniform pressure throughout the disc. Prior study has shown that diseased discs creep creating localized peaks of compressive stress within the disc. The authors seem to think that this latter mechanism has more merit.

Even though this study was a limited one on cadavers, it has important implications:

- Spinal manipulation is capable of lowering intradiscal pressure, a phenomenon thought to improve related symptoms.

- This pressure change theory is consistent with outcome studies that have examined manipulation in the treatment of symptomatic disc herniation.

- Vertebral movement can be demonstrated during manipulation.

- The effect of this movement is to redistribute or normalize intradiscal pressure, not to result in a different resting position of the vertebra.

- Future work on the motion/position aspect of manipulation should look at temporary positional changes during the manipulation, not before and after position.

Conclusion: Lumbar spinal manipulations have a biomechanical effect on the IVD, producing a brief but marked change in intradiskal pressure. This effect, which differs slightly with the different types of manipulation studied, is the consequence of movements of the adjacent vertebrae.

REFERENCES:

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