Etiology of Chronic Pain

A Review of the Literature

Mooney, MD. J. Musculoskeletal Medicine 1995; Oct:33-39.

Common acute back pain is due to chemical abnormalities created by soft tissue tear. The tear represents a mechanical disruption, which is usually microscopic. X-rays demonstrate no changes before and after an acute back injury.

Vert Mooney, MD: Spine, 1986 Dallas, TX.

*"In summary, what is the answer to the question of where is the pain coming from in the chronic low-back pain patient? I believe its source, ultimately, is in the **disc**. Basic studies and clinical experience suggest that mechanical therapy is the most rational approach to relief of this painful condition."*

Lee et al: Spine 1995

"*Anatomically the **disc** is richly innervated at the periphery and outer layers of the annulus by the branches of the sinu-vertebral nerves and sympathetic nerves.*"

"Pathological conditions confined within the disc property were the most probable sources of pain.

Derby MD, Spine 1996;21:1744,1745

"*Although muscle pain and tissue hyperalgesia may be an integral part of chronic cervical pain after whiplash injuries, such pain may be better explained as a secondary reflex reaction to injury of segmental supporting structures.*"

* ***Zygapophysial*** *Joint Pain*

Bogduk: 1999 Saal 1996 Spine 1997

"Neuropathic lesions such as nerve root compression causing radicular pain are extraordinarily uncommon in the spine…In most back pain, the mechanism involved is the **stimulation of nerve endings** in the affected structure. Nerve root compression is in no way involved."

Bogduk, MD: Newcastle Bone and Joint Institute, *Point of View*

"The study of Kaneoka et al now fills a critical gap in the story of cervical facet pain. It provides the missing biomechanical link. Theirs is the most significant advance in the biomechanics of whiplash since the pioneering studies of Severy et al in 1955."

* **Facet Joint pain**

Bogduk et al: Pain 1993

- Both a symptomatic **disc and a symptomatic zygapophysial joint** were identified in the same segment in 41% of the patients.

- The paper demonstrated that chronic pain is articular, not myofascial.

Bogduk: Spine 1992

Cervical **zygapophysial joint** pain is not rare, and is worthy of further consideration not just in research but in clinical practice.

Bogduk: Spine 1988

- Joint blocks in 24 pts
- The high yield of positive responders in this study probably reflects the propensity of patients with **ZJ** syndromes to gravitate to a pain clinic when this condition is not recognized in conventional clinical practice.

Holm, in *The Cervical Spine*, Lippincott, 1989

"Follow-up roentgenograms taken an average of 7 years after injury in one series of patients without prior roentgenographic evidence of disc disease indicated that **39% had developed degenerative disc disease at one or more disc levels since injury.**

….after an average of 7 years 39% had residual symptoms

Lord: Spine: Sept. 1993

Postmortem studies of victims of MVAs reveal that **zygapophyseal joint** injuries are common, being present in 86% of necks examined. The lesions include capsular tears, ruptures of meniscoids, intraarticual hemorrhage, and small fractures."

Khan, Cook, Gargan, and Bannister: *A Symptomatic Classification of Whiplash Injury and the Implications for Treatment*. The Journal of Orthopaedic Medicine 1999.

- Results: **Organic pain causes psychological stress, not the result of it**!

Halldor Jonsson et al: Spine

- Conclusions: *Follow-up surgery on the chronic patients showed a high incidence of* ***discoligamentous*** *injuries in whiplash-type distortions.*

- "Pain can originate both from the ganglion and the richly innervated annulus fibrosis and also from the **facet joints** causing both local and referred pain."

Nachmeson, MD: Spine 1976

"Although practically all anatomic structures in the region of the motion segment have their proponents in the etiology discussion, the **lower intervertebral disc** most likely causes the pain."

Bogduk: Spine 1988

The Innervation of the Cervical Intervetrebral Discs

…cervical **sinuvertebral nerves**…upward course in vertebral canal, supplying the **disc**…

"These anatomical findings provide the hitherto missing substrate for primary disc pain and the pain of provocation discography."

Bogduk: Spine 1983
The Innervation of the Lumbar Spine

- IVD innervated posteriorly by the sinuvertebral nerve but laterally by branches of the ventral rami and grey rami communicates.
- PLL…SVN
- Lumbar musculature

Bogduk: J Anat 1981

Anterior longitudinal ligament is innervated by the recurrent branches of the rami communicates.

Barnsley et al: Spine 1995

The prevalence of chronic cervical zygapophysial joint pain after whiplash.

Conclusion: In this population [chronic neck pain], cervical **zygapophysial joint** pain was the most common source of chronic neck pain after whiplash.

Barnsley et al: NEJM 1994
"…Corticosteriods for chronic pain.."

Results: Less than half the patients reported relief of pain for more than one week, and less than one in five pts reported relief for more than one month, irrespective of the treatment received.

Conclusion: Intraarticular injection of betamethasone is not effective….

Barnsley et al: NEJM 1994
"…Corticosteriods for chronic pain.."

"…the pts who derived a benefit from either treatment may have had a condition that was improved by the stretching of the joint capsule during the intraarticular injection, irrespective of what was injected."

Chronic disabling low back pain syndrome caused by internal disc derangements. The results of disc excision and posterior lumbar interbody fusion.

Lee, Vessa, Lee, Spine 1995 Feb. 1;20(3):356-61

- *"Anatomically the disc is richly innervated at the periphery and outer layers of the annulus by the branches of the sinu-vertebral nerves and sympathetic nerves."*

- *"Pathological conditions confined within the disc property were the most probable sources of pain. These pathologic conditions may include nuclear degeneration, annular tear, and biochemical ground substance degradation. The possible pain mechanism is stimulation of nociceptors within the disc by mechanical sources (abnormal local stress/strain), biochemical sources (various endogenous nonneurogenic or neurogenic chemical products), or both."*

1999 Paper by Bogduk, MD, PhD

Saal JA. 1996 North American Spine Society Presidential Address, Spine 1997;22(14):1545-1552

"Neuropathic lesions such as nerve root compression causing radicular pain are extraordinarily uncommon in the spine…In most back pain, the mechanism involved is the stimulation of nerve endings in the affected structure. Nerve root compression is in no way involved."

Literature Review by Haldeman, DC, MD, PhD\
Liebenson C. Rehabilitation of the Spine. Wms. & Wilkins, Baltimore 1996: 13-43.

"There has been no evidence that a change in the relation of adjacent vertebrae of the type commonly described in the chiropractic literature can result in nerve root or spinal cord compression."

Haldeman

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