

Immunohistochemical and Histological Study of Human Uncovertebral Joints

Spine

May 20, 2009; Volume 34, Number 12, pp 1257-1263

Brismée, Jean-Michel ScD; Sizer, Phillip S. Jr PhD; Dedrick, Gregory S. ScD; Sawyer, Barbara G. PhD; Smith, Michael P. PhD

The authors are from the School of Allied Health Sciences, Texas Tech University Health Sciences Center

KEY POINTS FROM THIS STUDY:

1) There is controversy with regard to the anatomic and histological makeup of the uncovertebral joints. Some authors claim it to be a synovial joint; others consider it to be disc tissue. In his original findings, Von Luschka suggested that the uncinete processes had a joint cavity that was lined with a synovial membrane that secreted synovial fluid.

[Hubert von Luschka was the first to describe the uncinete joints in 1858]

2) No research has investigated the presence of pain generating neurotransmitters within the uncovertebral cartilaginous and capsular tissue. This study investigated the anatomy and innervation of the uncovertebral joints to determine if it is synovial in nature and capable of generating pain.

3) This study used 2 unembalmed fresh male human cadavers of a mean age of 83 years. Tissue from uncovertebral capsule and cartilage was harvested for each uncovertebral surface from C2-C3 to C6-C7.

4) Chondrocytes and synoviocytes were identified at the capsular tissue of each uncovertebral joints. **[This indicates that the uncinete joints have articular hyaline cartilage and a synovial capsule]**. This suggests that the uncovertebral joint is "synovial in nature."

5) Immunoreactivity indicates the uncinete capsules also have the presence of both the somatic and autonomic nerve fibers. "These findings suggest that the uncovertebral joints are potential pain generators in the cervical spine."

[Free nerve endings (pain afferents) were found].

6) The uncinete capsules are also innervated with post-ganglionic sympathetic efferents. **[Important, as this helps establish the biological plausibility of somato-sympathetic reflexes]**

7) These capsular and synovial tissue nerve fibers lead to pain perception and reflexive responses associated with synovial pathology.

[Important: probably including somato-sympathetic reflexes].

- 8) Immunohistologic staining in this study found noradrenergic sympathetic postganglionic nerve fibers. The sympathetic nervous innervation can cause nonsegmental spinal pain patterns. **[And has potential visceral consequences].**
- 9) Biomechanically, the “uncovertebral joint is a major contributor to coupled motion at the lower cervical spinal segments and serves as a controlling factor of overall cervical segmental motion.”
[These joints are biomechanically important].
- 10) “A synovial or diarthrodial joint must exhibit a joint capsule, a synovial membrane, synovial fluid, and articular cartilage.” “Our present findings support the notion that the uncovertebral complex includes a synovial joint.”
- 11) Disc degeneration always influences the uncinat joints, their biomechanics and their degenerative potential.
- 12) Degenerative changes in the uncinat joints may translate into osteophytic projections that can compress adjacent cervical segmental nerves as they course through the intervertebral foramen or may cause cervical myelopathy.
- 13) “Due to the close proximity of the uncinat process to the vertebral artery degenerative changes in the uncovertebral joint have been clinically related to vertebral artery compression, ultimately lending to the onset and severity of clinical vertebrobasilar insufficiency.”

COMMENTS FROM DAN MURPHY

Many chiropractors, myself included, contend that the uncinat joint can become subluxated. The uncinat joint subluxation is distinct from the facet joint subluxation. The adjustment of the uncinat joint subluxation is quite distinct from the facet joint subluxation.

This study indicates that the uncinat joint is innervated with pain afferents and is thus a source of neck pain. Since pain perception is controlled by mechanical integrity (Melzack’s and Wall’s Gate theory), and a subluxated uncinat joint is a loss of mechanical integrity, one would need to adjust the subluxated uncinat joint to best manage some cases of neck pain.

Because the uncinat joints are innervated with post-ganglionic sympathetic efferents nerve fibers, it is easier to explain their involvement in cervical somato-sympathetic reflexes that may influence systemic health and wellbeing.