The Importance of Craniovertebral and Cervicomedullary Angles in Cervicogenic Headache

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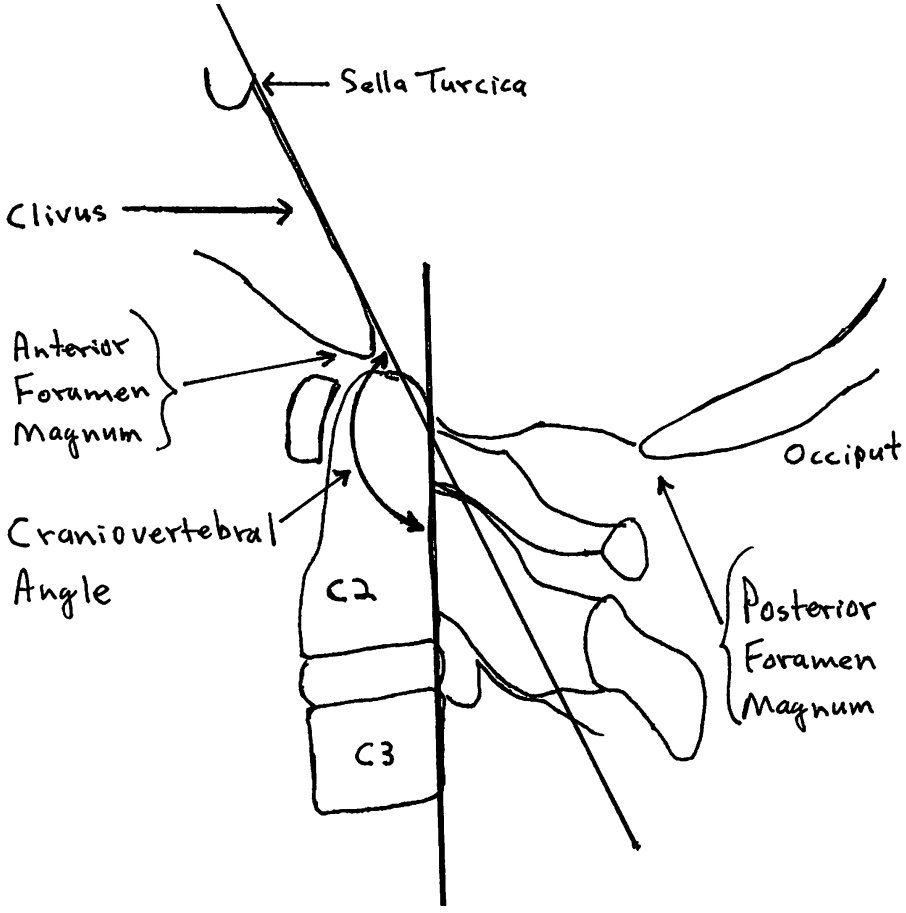
BACKGROUND FROM DAN MURPHY

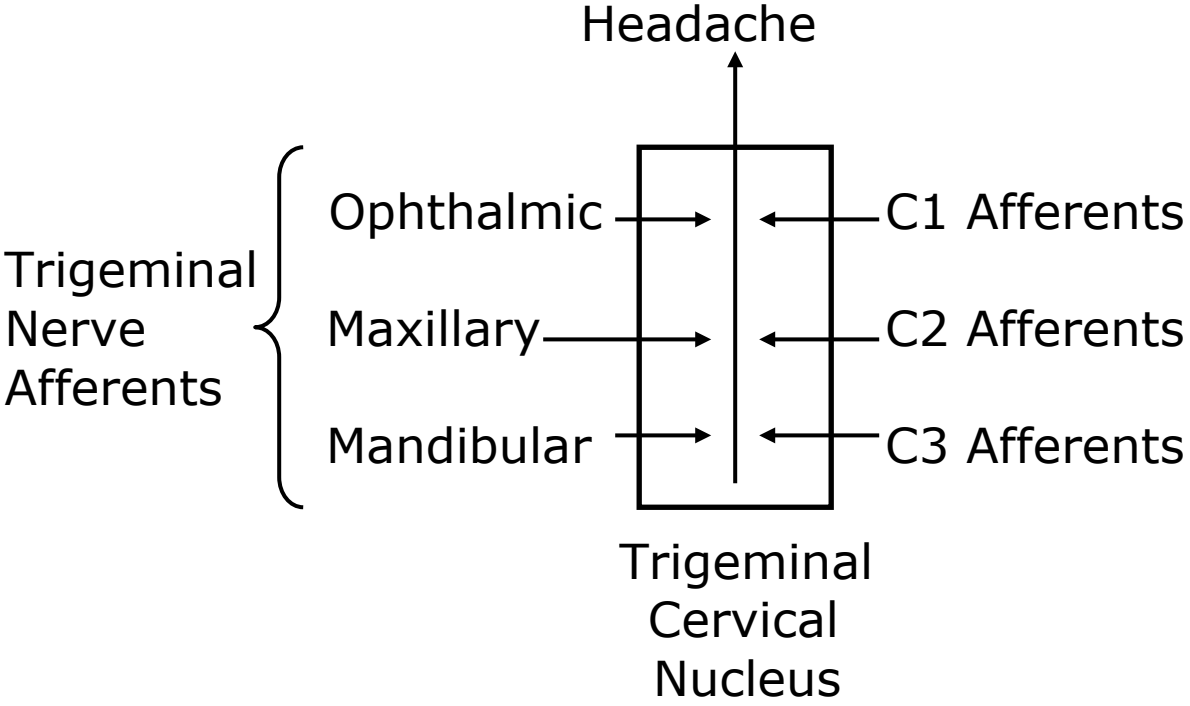
The ***craniovertebral angle*** is the angle produced by the junction between a line drawn from the sella turcica -- down the clivus -- to the anterior foramen magnum, and a line drawn on the back of the odontoid process and posterior body of the axis (C2). This angle should be between >150° and >180°. An angle <150° is abnormal and indicates anterior spinal cord compression. This line can be evaluated on any sagittal imaging: CT, MRI, lateral cervical x-ray.

The ***cervicomedullary angle*** is the angle produced by the junction between a line drawn from the base of the anterior brainstem and a line representing the anterior spinal cord. This line is drawn ***behind*** the cerebral spinal fluid, and has no hard bony landmarks for guidance. Consequently, this line cannot be measured on lateral cervical x-rays, and is best measured on a mid-sagittal MRI view. An angle <155° is abnormal.



KEY POINTS FROM THIS STUDY:

1) "Cervicogenic headache (CGH) is a referred pain from the cervical structures innervated by the three upper cervical spinal nerves." "The pain in cervicogenic headache radiates from the back to frontal regions and is also a referred pain from the cervical structures innervated by the three upper cervical spinal nerves."



2) Pain originating from the cervical structures innervated by the upper cervical spinal nerves is sensed in areas innervated by the trigeminal nerve branches. "Convergence between the cervical afferents and nervus trigeminus may result in cervicogenic headache."

3) "Many studies have indicated that cervicogenic headache may originate from the cervical structures innervated by the upper cervical spinal nerves." "Many studies have indicated that CGH may originate from the cervical structures innervated by the upper cervical spinal nerves and trigeminal nerve branches." Cervicogenic headache pain "may be due to a neck disorder," including:

- Atlanto-occipital joint
- Atlantoaxial joint
- Zygapophyseal joint
- Intervertebral disc
- Upper cervical spinal nerve pathologies

4) This is the first study to investigate "whether narrowing of the craniovertebral angle (CVA) or cervicomedullary angle (CMA) affects the three upper cervical spinal nerves." The study used 205 patients with cervicogenic headache and 40 non-headache controls.

5) The CVA and CMA values were measured on sagittal T2-weighted magnetic resonance imaging (MRI).

6) Headache pain scores significantly increased with decreasing CVA and CMA values. "CVA or CMA narrowing affects the occurrence of cervicogenic headache."

7) In this study:

49 patients had mild pain (group 1)

59 patients had moderate pain (group 2)

52 patients had severe pain (group 3)

45 patients had very severe pain (group 4)

8) "Pain scores increased with decreasing CVA values, and the difference was statistically significant." Pain scores also increased with decreasing CMA values, and the difference was statistically significant.

9) "The relationship between the CMA and CVA values and pain scores was statistically significant for each group." "There was an 83.4% correlation between CVA and CMA values."

10) "Ninety five patients showed a restricted range of motion on physical examination, and all were in the severe pain and very severe pain groups." There is a decrease of the range of motion in cervicogenic headache patients, and range of motion restriction is related to headache intensity.

Pain Severity and the *Craniovertebral* Angles

Pain Severity	**Angle** (rounded)
No Headache Pain	153°
Mild Headache Pain	151°
Moderate Headache Pain	147°
Severe Headache Pain	143°
Very Headache Severe	137°

Pain Severity and the *Cervicomedullary* Angles

Pain Severity	**Angle** (rounded)
No Headache Pain	160°
Mild Headache Pain	156°
Moderate Headache Pain	153°
Severe Headache Pain	150°
Very Headache Severe	146°

11) [Clearly, as the craniovertebral and cervicomedullary angles decreases, cervicogenic headache increases in severity]. "There is an inverse relationship between the angle values and pain scores."

12) "Our study showed that CVA and CMA narrowing affects the occurrence of cervicogenic headache."

13) "The average CMA and CVA values in cervicogenic headache patients were significantly narrower than those in controls, and there was an inverse relationship between the pain scores and CVA and CMA values."

14) Trauma is a predisposing factor for cervicogenic headache.

15) CMA and CVA values change with advancing age and degenerative changes.

16) In most cases cervicogenic headache is not caused by spondylosis. Spondylosis is not an important cause of headache.

17) Mechanical cervical spine pathologies and dysfunction in neck muscles may produce painful and limited neck motion.

18) "The most common cause of spinal dysfunction in the elderly is spondylotic myelopathy." Typical symptoms for these patients include (which do NOT include headache:

- Weakness of the arms and legs
- Upper motor neuron dysfunction
- Sensory symptoms;

19) There is a strong correlation between CMA values less than 135° and:

- Cervical myelopathy
- Brainstem compression
- C2 root pain.

20) "CMA and CVA values might change following physiotherapy, and medication might not be needed."

21) "In conclusion, our study showed that narrowing of the CVA and CMA affects the occurrence of cervicogenic headache. There was an inverse relationship between the angle values and the pain scores."

COMMENTS FROM DAN MURPHY

I found this article to be informative, interesting, important, but largely impractical. The measurements done in this study were on a MRI, imaging that we do not routinely have on our patients. Also, the MRIs in this study were recumbent, which almost certainly distort the true craniovertebral and cervicomedullary angles.

However, the ***craniovertebral angle*** is routinely and effectively done on lateral cervical x-rays. My recommendation is to assess this angle on all lateral cervical x-rays. Ideally the radiograph should include the sella trucica and clivus.