Occipital headaches stemming from the lateral atlanto-axial (C1-2) joint

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FROM ABSTRACT

Studies in normal volunteers have demonstrated that the lateral atlanto-axial joints (C1-2) are capable of causing pain in the occiput, but few clinical studies have validated this source of occipital headache.

The present study tested the null hypothesis that the lateral atlanto-axial joints are not a common source of occipital headache.

Patients presenting with occipital pain underwent diagnostic blocks of their lateral atlanto-axial joints if they demonstrated clinical features presumptively suggestive of a C1-2 origin for their pain.

Of 34 patients investigated, 21 obtained complete relief of their headache following diagnostic blocks, indicating that a C1-2 source of occipital pain is not rare. [21/34 = 62%]

The clinical features used to select patients for blocks, however, had a positive predictive value of only 60%.

Further study of headaches from C1-2 seems justified in order to establish more definitively the prevalence of this condition and how it might become better recognized in practice.

THESE AUTHORS ALSO NOTE:

It is difficult to make a definitive diagnosis of cervicogenic headache by using only history and clinical examination.

Clinicians often cannot distinguish cervicogenic headache from migraine or especially from muscle tension headache.

Since clinical evaluation agreement is only 76%, the standard is to corroborate the diagnosis with diagnostic blocks, which should abolish the patient's pain.

Possible sources of cervicogenic headache are:
(1) nerves
(2) nerve roots
(3) ganglia
(4) uncovertebral joints  
(5) intervertebral disks  
(6) facet joints  
(7) periosteum  
(8) muscles of the neck  
(9) ligaments of the neck or back of the head

Studies in normal volunteers show that distending the atlanto-occipital joints, the lateral atlanto-axial joints, or the C2-3 zygapophysial joints with fluid evokes pain in the occiput or suboccipital region.

Normal image on plain radiographs does not preclude the joint from being painful.

Osteoarthritic joints on plain radiographs does not mean the joints are painful.

“The only means of determining if a joint is painful is to abolish the patient’s pain by anaesthetizing the joint.”

These authors note that anaesthetizing the lateral atlanto-axial joints using periarticular blocks are inadequate, and the diagnostic block of choice should be an intra-articular block.

They note, however, that intra-articular lateral atlanto-axial joint blocks “are far from conventional” and “not universally available” and that headache specialists are “unlikely to have been accustomed to using them in the investigation of occipital headache.”

However, intra-articular lateral atlanto-axial joint blocks are standard for pain specialists and spinal pain radiologists.

The authors noted that the following criteria would be more likely to be associated with pain from the lateral atlanto-axial joints:

(1) pain in the occipital or suboccipital region  
(2) maximal or focal tenderness in the suboccipital region  
(3) maximal or focal tenderness over the tip of the left or right transverse process of C1 [sounds like the scanning palpation of Roy Sweat]  
(4) restricted rotation of C1 on C2 on manual examination of that segment  
(5) aggravation of their accustomed headache by passive rotation of the C1 vertebra to the left or right

“Focal tenderness means that the patient was tender to palpation only at the point in question; maximal tenderness means that although tender elsewhere the patient complained of greater pain when the site in question was palpated with the same finger pressure as applied to other tender regions; restricted rotation means that the segment exhibited less than 50% of the normal range of passive motion expected by the examiner.”
The intra-articular lateral atlanto-axial joint blocks are done with the patient prone on a fluoroscopy table, and the needle is inserted under fluoroscopic guidance.

RESULTS

34 patients underwent lateral atlanto-axial joint blocks.

21 patients obtained complete relief of their headache [62%].

No discernible patterns could be ascertained between those who experienced relief and those who did not.

“The only trend was that patients whose pain was exclusively cervical in distribution and did not encompass or extend into the occipital region were less unlikely to respond to lateral atlanto-axial joint blocks.”

DISCUSSION

The distribution of pain on pain drawings is not indicative of the pain source because there is significant overlap between the atlanto-occipital joints, the atlanto-axial joints, and the C2-3 zygapophysial joints.

[This could mean that the 38% who did not respond to blocks of the atlanto-axial joints could have been suffering pain arising from the atlanto-occipital joints or the C2-3 zygapophysial joints]

The atlanto-occipital joint is innervated by the C1 ventral ramus.

The lateral atlanto-axial joint by the C2 ventral ramus.

The C2-3 zygapophysial joint is innervated by the C3 dorsal ramus.

“Upon entering the spinal cord, however, all three upper cervical spinal nerves ramify at multiple segments and converge with trigeminal afferents on cells in the dorsal grey column of C1-3.”

“Because of this convergence, pain from any of the upper three cervical synovial joints is liable to be perceived in the same region and referred to the occiput and to regions innervated by the trigeminal nerve.” [IMPORTANT]

The physical clinical signs assessed in the present study, including C1-2 range of motion, did not distinguish those patients who responded to blocks of the lateral atlanto-axial joint from those who did not.

At best, physical clinical signs “had a positive predictive value of 60%.”
“The results of the present study provide prima facie evidence that the lateral atlanto-axial joints are not a rare cause of occipital pain.”

Recent studies report that lateral atlanto-axial joint pain can be successfully relieved by arthrodesis. **[Wow, I hope they try chiropractic first]**

**KEY POINTS FROM DAN MURPHY**

1. Three joints have been proven to cause suboccipital pain:
   - (A) atlanto-occipital
   - (B) atlanto-axial
   - (C) C2-3 zygapophysial

2. The best evaluation procedures to diagnose cervicogenic headache are:
   - (A) pain in the occipital or suboccipital region
   - (B) maximal focal tenderness in the suboccipital region
   - (C) maximal focal tenderness over the tip of the transverse process of C1
   - (D) restricted range of motion
   - (5) aggravation of headache by passive motion of the suspected joint

3. These criteria only identify 60% of those with atlanto-axial joint cervicogenic headache.

4. Plain radiographs are non-revealing as sources of cervicogenic headache.

5. The gold standard to identify atlanto-axial joint cervicogenic headache is by anaesthetizing the joint under fluoroscopy.

6. In this study, 62% of occipital headaches came from the atlanto-axial joints.

7. It is difficult to distinguish cervicogenic headache from migraine and especially from muscle tension headache.

8. The C1, C2, and C3 rami converge with trigeminal afferents in the spinal cord, and therefore pain from any of the upper three cervical synovial joints can be perceived in the occiput and to regions innervated by the trigeminal nerve.