The Neck and Headaches

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KEYWORDS

• Headache • Cervical • Cervicogenic • Diagnosis • Treatment

KEY POINTS

- The mechanism of cervicogenic headache is convergence between cervical afferents and trigeminal or cervical afferents in the dorsal horn of the C1-3 segments of the spinal cord.
- No clinical features have been validated for the diagnosis of cervicogenic headache.
- Definitive diagnosis requires evidence of a cervical source of pain, usually by the application of controlled, diagnostic blocks.
- The C2-3 zygapophysial joint is the most common source of cervicogenic headache to have been identified.
- Of conservative therapies, the best evidence supports exercise, with or without manual therapy.
- Headache stemming from the C2-3 or C3-4 zygapophysial joint can be successfully treated with thermal radiofrequency neurotomy.

CASE STUDY

Patient 001 was a 23-year-old female nurse, who attributed the onset of her headaches to prolonged periods of wearing heavy lead aprons in a radiology suite. Her headache was constant and centered on the right occipital region, spreading to the forehead and right orbit. The headaches had persisted for 3 years and were not relieved by physical therapy or analgesics. The patient could not work and was involved in a worker's compensation claim. Examination revealed tenderness maximal over the C2-3 region of the cervical spine; headache was aggravated by rotation of the head. The headache was completely relieved by anesthetizing the right third occipital nerve. Repeat blocks, on 3 occasions, consistently relieved the headache completely, in accordance with the duration of action of the agents used: lignocaine or bupivacaine. Intra-articular injection of steroids temporarily relieved her headache for a few weeks, whenever they were used as a palliative measure. Thermal radiofrequency third occipital neurotomy completely relieved her headaches, for 9 months in the first instance. On recurrence of the headache, repeat neurotomy relieved the headache for 12 months after the first repeat, and then 14 months after the second repeat.

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Having been relieved of her headache, the patient completed a university entrance examination, and then a university degree, before returning to full-time employment. Yearly repeat neurotomy has kept her free of headache.

DEFINITION

Pain arising from the upper cervical spine may be referred into regions of the head. The patient may be unaware of a cervical problem, and headache becomes the presenting feature. Technically, such headaches should be classified as referred pain from the cervical spine, but the term of reference that has largely been adopted in the literature, and in clinical practice, is cervicogenic headache.[1–4]

MECHANISM

The anatomic basis of cervicogenic headache is convergence, onto second-order neurons in the C1-C3 segments of the spinal cord, between nociceptive afferents of the first division of the trigeminal nerve and nociceptive afferents of the C1, C2, and C3 spinal nerves.[5] Convergence between trigeminal and cervical afferents explains referral of pain from cervical sources to the forehead, orbit, and temporal regions of the head. Convergence between other cervical afferents and those of C2 explains referral of pain to the occiput and parietal regions.

Physiologic convergence has been shown in laboratory animals, between trigeminal afferents from the dura mater of the skull and cervical afferents in the greater occipital nerve.[6–9] The convergence largely involves Aδ and C fibers, onto neurons in laminae I, II, V, and VI of the dorsal horn at C2. Stimulation of trigeminal afferents sensitizes the response to cervical input, and stimulation of cervical afferents sensitizes trigeminal input.

In human volunteers, pain in the head has been evoked experimentally by electrical stimulation of the dorsal rootlets of C1[10] and by noxious stimulation of the greater occipital nerve[11] or the suboccipital muscles of the neck.[12–15] Noxious stimulation of the C2-3 intervertebral disk, but not lower disks, produces pain in the occipital region.[16,17] Distending the C2-3 zygapophysial joint with injections of contrast medium produces pain in the occipital region,[18] as does distending the lateral atlantoaxial joint or the atlanto-occipital joint.[19] All segments from the occiput to C4-5 are capable of producing referred pain to the occiput, but referral to the forehead and orbital regions more commonly occurs from segments C1 and C2.[13]

In patients with suspected cervicogenic headache, headache can be relieved by anesthetizing the C2-3 zygapophysial joint[20–22] or the lateral atlantoaxial joint.[23–28] The C2-3 zygapophysial joint is the most common source,[22,27–29] followed by the lateral atlantoaxial joint,[27,28] and occasionally, the C3-4 zygapophysial joint.[27,29,30]

From a given joint, pain can be perceived in various regions of the head, but certain trends are evident (**Fig. 1**).[27] Pain from C2-3 tends to be perceived across the lateral occipital region and into the forehead and orbital region. Pain from C1-2 also tends to gravitate to the orbital region but otherwise more often occurs in the vertex or around the ear. Pain from C3-4 tends to focus in the suboccipital region and upper cervical spine; when it does spread to the head, it is largely restricted to the posterior regions, sparing the forehead and orbit.

CLINICAL FEATURES

The essential clinical feature of cervicogenic headache is dull, aching pain perceived in some combination of the occipital, temporal, parietal, frontal, or orbital regions of