The Caudalis Portion of the Spinal Trigeminal Nerve in the Headache Pathway — An Hypothesis

Davis and Goadsby have shown that afferents from the dural sinuses and middle meningeal artery travel to the caudalis portion of the spinal trigeminal nerve in the medulla, i.e. subnucleus caudalis (SNC).

Interestingly, Davis and Goadsby's experiments were carried out to demonstrate "migraine headache" pathways. Kerr, on the other hand, showed that cervicospinal impulses from the levels of C1, C2, and C3 converge with fibres travelling down the SNC. The spinal trigeminal nerve in humans has been shown to terminate at the level of approximately C3.

Pathology of the posterior neck structures such as muscles, joints, ligaments, and bone can send impulses via the cervicospinal nerves. This indicates that in posttraumatic cases or other cases where there is cervical pathology, there is nociception via the spinal nerves to the appropriate level in the cervicospinal cord.

Recently Olesen has indicated that tension-type headache is caused by muscle contraction of the posterior neck muscles which send nociceptive impulses to the cervicospinal cord.

One of Koch's postulates was that the removal of the causative agent should relieve the condition that is claimed to be caused by this agent. If we assume that nociception from the posterior neck structures is "causing" a headache via the SNC, then blockade of these impulses would "remove" the cause by blocking nociception. Gawel and Rothbart have shown that occipital blockade can relieve posttraumatic (and indeed migraine) headaches whilst the local anesthetic is in effect, and often longer.

Thus, we have strong evidence that many headaches are being mediated via the neck structures with impulses travelling into the subnucleus caudalis. In addition, we have evidence that headache can be mediated by stimulation of the intracranial vasculature with subsequent stimulation of the SNC.

We conclude that the caudalis portion of the spinal nucleus is an important relay station in the "headache" pathway. If we accept that the impulses travel from the subnucleus caudalis to the thalamus and thence to the cortex, then we have a model for the pathway of pain perception in headache. This then raises the question of where other theories of migraine headaches, such as stimulation of the periaqueductal grey and spreading depression of Leão, or central neuronal hyperexcitability, would fit.

REFERENCES

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REFERENCES