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A Case of Migraine Headaches with Hemifacial Spasm: Complete Resolution of Hemifacial Spasm Following Upper Cervical Intraarticular Facet Joint Injection

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Background: Headache is one of the leading neurological disorders both globally and nationally, responsible for significant morbidity and disability. Migraine headache disorder is a common headache disorder affecting at least 11% of world's population.

Case Report: We present a case of a patient who presented with migraine headaches associated with hemifacial spasm (only during acute migraine attacks) along with upper cervical pain. She was offered right-sided C2-C3 and C3-C4 intraarticular facet joint injections with steroid and local anesthetic under fluoroscopy. Significant relief in headaches along with a complete resolution of hemifacial spasms was noted.

Conclusion: This outcome raises the possibility of underlying pathophysiological processes that could have been interrupted by cervical facet joint steroid injection to stop the facial spasms. To the best of our knowledge, this is the first case report of migraine headaches associated with hemifacial spasm that responded to cervical intraarticular facet joint injection.

Key words: Facet joint injection, headache, hemifacial spasm, medial branch block, migraine, pathophysiology, spinal cord stimulation, trigeminocervical complex

BACKGROUND

Headache is one of the leading neurological disorders both globally and nationally, responsible for significant morbidity and disability. Migraine headache disorder is a common headache disorder affecting at least 11% of world's population (1). Headache is one of the common causes of emergency department visits, accounting for approximately 3% of all such visits found in a study by Burch et al (2). The American Migraine Prevalence and Prevention (AMPP) study indicated migraine prevalence to be 11.7% (3). Migraine is a common, disabling medical condition that affects almost one in every 6 Americans. One in 5 women between the ages of 15 and 64 have experienced migraine in the previous 3 months. Women and several other historically disadvantaged segments of the population are affected disproportionately. Higher burden of migraine was reported in part-time workers or those who are unemployed, those with low socioeconomic status, and those with government insurance (4). The economic burden is substantial, with an estimated direct cost (diagnosing and treating) of over $1 billion per year and indirect costs (costs to employers) close to $13 billion per year (5).

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Hemifacial spasm (HFS) is defined as involuntary, irregular clonic or tonic movement of muscles innervated by the ipsilateral seventh cranial nerve (6). In 1893, Edouard Brissaud, a French neuropsychiatrist, provided one of the first pictures and descriptions of unilateral facial spasms in a 35-year-old woman with apparent HFS (7). Facial nerve injury is an associated cause of hemifacial spasm. Yaltho and Jankovic (6) found that 6% (13 of 215) of patients presenting with hemifacial spasm had a history of facial nerve injury from trauma (dental procedure; assault; ear, nose, and throat (ENT) procedures; etc.), whereas a majority (62%) had unidentifiable etiology. Though uncommon, there are case reports of associated hemifacial spasm during episodes of migraine headaches (8).

Cervicogenic headache is classified under secondary headaches as per International Headache Society (IHS) classification (International Classification of Headache Disorders [ICHD]-3). It is described as a disorder of the cervical spine and its component - bony, disc and/or soft tissue elements, usually but not invariably accompanied by neck pain. Cervicogenic headache is referred pain from cervical structures innervated by the upper 3 cervical spinal nerves (9). Different sources of cervicogenic headache include the A-O (Atlanto-Occipital joint), C2-C3 intervertebral disc, C2-C3 zygapophyseal joint, upper posterior neck and paravertebral muscles, the trapezius and the sternocleidomastoid muscles, spinal and posterior cranial fossa dura mater, cervical spinal nerves and roots, and the vertebral artery (10).

We present a case of a patient who presented with migraine headaches associated with hemifacial spasm only during acute migraine attacks, along with upper cervical pain.

CASE

A 50-year-old woman was referred to the interventional pain clinic with diagnoses of cervicogenic headaches, complicated migraine associated with hemifacial spasm, and occipital neuralgia. She was referred after a motor vehicle accident (MVA) with worsening of headaches, neck pain, and hemifacial spasms. There was a history of MVA approximately 3 years prior to the onset of her episodic migraines and another (more recent) MVA prior to the onset of hemifacial spasm and worsening of migraine headaches in our patient.

Headache History

Headaches were described to be localized to the right frontotemporal region with spread down the right side of the head and into the shoulder on that side. Her description of headaches was consistent with occipital neuralgia followed by progression to episodes of migraine headaches. The exam was positive for greater and lesser occipital nerve tenderness primarily on the right side and right-sided upper cervical facet tenderness. She also reported having spasms of both sides of the face but significantly predominant on the right side, with a description: the left side of her mouth "pulls downward" and her left eyebrow "pulls upward." It felt like "a giant cramp" and she was unable to speak. Occasionally she had an aura of vertical diplopia before the onset of headaches. The onset of hemifacial spasms with migraine headaches was documented after the MVA in 2016. Triggers included trauma, stress, heat, and light. Headache frequency was documented at 18 of 30 in a month with intensity of 3-10 of 10 on the Numeric Rating Scale. The headache was sharp, stabbing and "exploding" in nature. The Headache Impact Test (HIT)-6 score was 61 (maximum score of 78). Of note, the patient did not have comorbid psychological disorders including depression or anxiety.

Conservative Treatments

Acute treatments available for migraine include simple analgesics such as acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs), over-the-counter combination analgesics (aspirin/acetaminophen/caffeine combination); and prescription analgesics like butalbital, serotonin receptor agonists (triptans), ergot derivatives (particularly dihydroergomatine), and antiemetics (11).

Preventive treatments are considered if acute treatments are not effective or only partially effective in managing headache frequency and intensity, causing a significant impact on activities of daily living (ADLs) and quality of life. Antidepressants, antihypertensives, antiepileptics, calcitonin gene-related peptide (CGRP) antagonist, and onabotulinum toxin A are different drug class categories that have been found to be helpful for headache prevention.

A multidisciplinary approach is recommended for chronic headache management which includes biofeedback, relaxation therapy, mindfulness, psychological input, physical therapy, and nutritional therapy along with other modalities mentioned above.

The patient had exhausted multiple conservative measures including baclofen, gabapentin, galcanezumab, ketorolac, meloxicam, and occipital nerve blocks with only a brief response in headaches and neck pain, but no impact on hemifacial spasms. She was referred for

cervical facet interventions given the brief but positive response to occipital nerve blocks, along with upper cervical facet tenderness on exam. This was further supported by magnetic resonance imaging (MRI) findings of facet arthropathy at the levels of interest.

Diagnostics (since the onset of hemifacial spasms)

- MRI of the brain (stroke protocol) was completed with no abnormality.
- MRI of the brain with and without contrast medium indicated no vascular impingement of the facial nerve or trauma.
- Magnetic resonance angiography of the head and neck were completed with no reported vascular anomaly, including vascular ectasia. No electromyography has been performed thus far.

Interventional Treatment

Cervical facet (zygapophyseal) joints below C2-3 are supplied by the medial branches of the dorsal ramus above and below the joints. Joints are targeted for intervention based on history (pain distribution), physical exam findings (paracervical tenderness), facet loading (provocative maneuver – pain on spine rotation and extension), and supportive diagnostic findings if available (but not absolutely necessary). Cervical facetogenic pain is addressed interventionally through intraarticular facet joint injection or medial branch blocks (MBB) leading to radio frequency ablation (RFA). MBBs are purely diagnostic in nature and are performed with local anesthetic only. If the patient responds significantly (preferably > 80%) to the initial MBB with respect to not just the pain scores but also ADLs, this is followed by a second trial of MBB. A decision to proceed with RFA is made only if both the MBBs offered significant pain relief to the patient. RFA of the medial branch nerves is expected to offer longer term (6-12 months) relief.

Interventional options are pursued only if an inadequate response from conservative treatments is observed. A risk-benefit analysis must be undertaken with a comprehensive discussion with the patient and their family. Like any other procedure, there are risks involved with cervical facet joint interventions, including, but not limited to, worsening of pain, infection, allergic reaction, and bleeding. Nerve or spinal cord damage is also mentioned in the literature, though rare.

We elected to proceed with intraarticular facet joint injections under fluoroscopy due to the patient's anxiety about having 2 trials of MBBs followed by the RFA procedure.

Our patient was offered right-sided (the predominant side) C2-C3, C3-C4 intraarticular facet joint injections with steroid and local anesthetic under fluoroscopy. The procedure was performed under local anesthesia. She was seen 5 weeks post injection in follow-up and reported significant relief in headaches (preprocedure 8-10 of 10, post procedure 1-2 of 10), significant improvement in ADLs, along with a complete resolution of hemifacial spasms (from 2-3 episodes a week for 2 years to 0 episodes since the facet joint injections). The plan is to offer MBB/RFA if her symptoms return.

DISCUSSION

Cervicogenic headache is one of the commonest forms of headaches referred to interventional pain clinics after having exhausted noninterventional options. The purpose of these interventional procedures is to add both diagnostic and therapeutic value. Our patient had a combination of cervicogenic headache, migraine headaches associated with hemifacial spasms, and occipital neuralgia. Our interventional aim was to provide the patient with relief from neck pain and headaches. However, her response was not just limited to neck pain and headaches, but she also reported resolution of her facial spasm. She continues to have low-intensity, dull headache, but has otherwise experienced significant improvement in her ADLs and quality of life. This outcome begs the question of what possible underlying pathophysiological processes could have been interrupted by cervical facet joint steroid injection, stopping the facial spasms.

Cuadrado et al (8) published a case report of migraine headaches linked to the onset of hemifacial spasm. Another case report also associated migraine headaches and hemifacial spasms (12). In both these case reports, migraine headache was considered to be a possible trigger for hemifacial spasm.

Nociceptive impulses transmitted to the trigeminal nucleus caudalis could lead to an increased activation of the trigeminofacial connections within the brain stem. A temporary increase in blink reflex has also been reported during acute migraine attacks (13). The spinal trigeminal nucleus integrates not only sensory input from the 3 branches of trigeminal nerve, but also consolidates sensory input from the facial, glossopharyngeal, and vagus nerves. The subnucleus pars caudalis is responsible for pain and temperature sensation from the ipsilateral face (14). The possibility of ephaptic transmission within the trigeminofacial connections could be one way to explain an association between migraine headaches and facial spasm.

In our case discussed here, it is possible that the reduction in nociceptive stimuli following the facet joint steroid injection may have dampened activation of trigeminofacial connections/ ephaptic transmission within the brain stem. This could have potentially resulted in resolution of facial spasm. There is a history of MVA prior to the onset of migraine and hemifacial spasm in our patient and another MVA prior to the onset of hemifacial spasm in our patient as mentioned above. We speculate that her MVAs may have resulted in injury to the right greater occipital nerve and cervical sensory afferents, and that increased nociceptive impulses to the trigeminal sensory nuclear complex may have resulted in excitation of the sensory trigeminal nucleus caudalis and coexcitation of the right facial motor nucleus, resulting in right-sided facial pain and hemifacial spasm (15). Trauma of the high cervical region has been associated with trigeminal neuralgia, as cited in our patient's MVA, and could be the source for subtle high cervical trauma not visualized on imaging, with referral to the trigeminal nerve/facial nerve (16). Given the hypothesis that high cervical nociceptive input may be causing this patient's facial pain and spasms, it would also be reasonable to consider a high cervical cord stimulator to block the excitatory input to the trigeminal nucleus caudalis and facial motor nucleus. Velasquez et al (17) reviewed the results of treating refractory trigeminal neuralgia (of various etiologies) with craniocervical junction stimulation. This resulted in a mean 57.1% pain reduction in these patients. Dorsal column stimulation is considered in refractory cases of migraine headaches and facial pain. Neurons projecting from the trigeminocervical complex to the trigeminal nucleus caudalis can be stimulated at C2-C3, covering both facial and occipital pain (18). Lambru et al (19) reported good response to paresthesia-free high-frequency-10 SCS for intractable headache disorder.

A systematic review by Chang Chien and Mekhail (20) of alternate intraspinal targets for SCS indicates that the cervicomedullary junction (CMJ) poses a unique anatomic target for SCS in the treatment of head and facial pain. Nociceptive fibers from the head and neck region project to the upper cervical spinal dorsal horns that are contiguous with the trigeminal nucleus caudalis, where nociceptive fibers of the trigeminal nerve synapse. The upper cervical dorsal horns of C1 to C3 and trigeminal nucleus caudalis form the trigeminocervical complex (TCC). They mention that neuromodulation of the CMJ is a growing indication for the treatment of recalcitrant head, facial pain, and chronic migraine. Their review included 5 studies on neuromodulation of the CMJ, out of which 3 were retrospective and 2 were prospective. Grade 2 C+ was given based on the evidence-based interventional pain management practice guidelines recommendation. They acknowledged the need for future well-designed studies to assess the suitability of individual treatment modalities for different clinical conditions.

To the best of our knowledge, this is the first case report of migraine headaches associated with hemifacial spasm that responded to cervical intraarticular facet joint injection.

Limitation

Single patient /case report.

CONCLUSION

This is a case report of a 50-year-old woman who was referred to the pain clinic with a chief complaint of worsening of headache/neck pain in the context of a MVA and resistance to conservative measures. The patient also had hemifacial spasms that were associated with severe episodes of migraine headaches with onset soon after the second MVA. Our expectations were primarily to address headaches and upper cervical pain through cervical facet interventions. However, our patient responded very well, reporting not only significant relief in the intensity and frequency of her headaches, but also a complete resolution of hemifacial spasms.

Trigeminal sensory nuclear complex has wide-ranging connections throughout the brainstem and upper brain centers, and merits further investigation into alternative etiologies that can ameliorate the over-excitability of this complex. We wish to share this experience as this information can be utilized in similar cases and perhaps ignite further interest in research on this subject for earlier intervention and better outcomes.

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