Published in final edited form as:

Headache. 2010 April ; 50(4): 669–671. doi:10.1111/j.1526-4610.2009.01436.x.

Pain Remapping in Migraine: A Novel Characteristic Following Trigeminal Nerve Injury

Aamir Hussain, MD,

Jefferson Headache Center, Department of Neurology, Thomas Jefferson University Hospital, Philadelphia, PA, USA

Marlind A. Stiles, DMD, and

Jefferson Oral and Maxillofacial Surgery, Thomas Jefferson University Hospital, Philadelphia, PA, USA

Michael L. Oshinsky, PhD

Jefferson Headache Center, Department of Neurology, Thomas Jefferson University Hospital, Philadelphia, PA, USA

Abstract

The location of pain during the headache phase of migraine varies between individuals as well as between attacks in some individuals. We have observed a “remapping” or a change in the location of migraine pain following injury to the trigeminal system that is a novel characteristic to migraine and has not been described in other trigeminal pain syndromes of the head, neck, and face.

Recognition of this clinical feature implies that the pathophysiology of migraine is impressionable and may be why diagnosis and treatment are often delayed.

Keywords

migraine; facial migraine; orofacial migraine; atypical facial pain; neurovascular orofacial pain; orofacial pain

The poor localization of migraine pain produces significant diagnostic challenges even for seasoned headache clinicians. The location of pain during the headache phase of migraine varies between individuals as well as between attacks in some individuals.^{1,2} The location of the pain is one of the first questions a patient should be asked during evaluation.³ Interestingly, the International Classification of Headache Disorders, 2nd edition (ICHD-II) criteria does not specify the location of the pain necessary for the diagnosis of migraine. Unilateral pain is part of the criteria but not necessary for the diagnosis. Migraine pain is unilateral in only ~60% of cases.¹ In other painful afflictions affecting the head, face, and neck the location of the pain is included in the diagnostic criteria and aids the physician and the patient in arriving at a diagnosis. For example, trigeminal neuralgia most commonly

affects a single branch of the trigeminal nerve and is unilateral, and trigeminal autonomic cephalalgias usually present as midface or periorbital pain.³ Cluster headaches are predominantly unilateral and periorbital in location.

Historically, facial pain has been attributed to migraine, cluster headache, and other trigeminal autonomic cephalalgias in many published case reports and series.^{4–8} Continued debate unfolds as to the exact pathophysiology whether neurovascular facial pains share the same etiology as migraine or if possibly they are a separate entity all together.^{9–12}

We report here, to our knowledge, the first 2 cases of “migraine remapping” a novel clinical observation where the pain of migraine changes location in response to injury and is relocated specifically to the region of the injury, thus misdirecting patients to consult a variety of physicians regarding the area affected.

CASE REPORTS

Case 1

A 38-year-old Caucasian woman was referred by her neurologist with a toothache in the left maxillary first premolar tooth following a routine dental filling replacement 2 years prior to the referral. The patient’s pain began as soon as anesthesia wore off from the dental procedure. The pain was severe in intensity and subsided within a few days only to recur once a month. Root canal therapy was done twice in order to alleviate the pain in this tooth. Finally, apicoectomy was performed but the episodic recurrence of the pain remained unchanged. She had been to numerous dentists, endodontists, oral surgeons, and neurologists. She was diagnosed as a case of “atypical neuralgia” by the referring neurologist. While evaluating her for tooth pain, she reported that it began each month as an ache and slowly worsened in intensity; the pain was throbbing, coincided with menses, and was associated with nausea, photophobia, and phonophobia. Each pain episode lasted for 24 to 48 hours. She denied having any sharp or shooting pain component and denied autonomic features. When questioned about her past headaches prior to the dental procedure, she described having severe bilateral, temporal, menstrual headaches although never formally diagnosed. Since the dental procedure, she reports she has not had any bilateral temporal headaches associated with menses. Her headache diary showed that “tooth pain” coincided with her menses and she was treated and responded well to triptans.

Case 2

A 48-year-old, right-handed, Caucasian woman was referred from neurosurgery where she was being considered for glycerol rhizotomy of the right second division of the trigeminal nerve. She presented with severe right-sided maxillary pain that began within days of a motor vehicle accident in which her right midface struck the steering wheel. She suffered multiple facial fractures, which were repaired surgically with rigid fixation. She reported that the pain in the right midface was episodic lasting hours to days and had escalated in frequency and severity following the accident. Upon evaluation, her episodic pain had transformed into continuous, severe, and throbbing pain. She had profound photophobia and phonophobia, was nauseated and reportedly vomited a few times when the pain became severe. She denied autonomic features and did not experience sharp shooting pain.

Her headache history is significant for right temporal headaches, which were previously diagnosed as migraine. She reports having these headaches since her teens and that they were intermittent 5–6 times per year. She had not had any right temporal headaches since her motor vehicle accident. She responded well to preventive therapy using a tricyclic antidepressant and triptans were used to abort breakthrough pain.

DISCUSSION

In the above mentioned cases, both individuals had a previous history of migraine headache, and following an injury to the head or the upper cervical region, their original migraine location remapped itself to the location of the injury. The pain completely changed locations. Both patients sought treatment because they believed the pain they experienced was directly related to their respective injuries. In the first case, much of the previous treatment was sought in dental offices. In case 2, it was assumed that this was purely a neuropathic pain as a result of nerve damage and pain management, and neurosurgical ablation procedures were being considered. In the second case, the patient actually said “it’s like my old migraines moved to my face.” In light of this brilliant observation, she was being scheduled for a glycerol injection at the same time she was consulting our office.

Physiologically, the peripheral afferent barrage from the second and third division of the trigeminal nerve onto second-order neurons in the trigeminal nucleus following an acute injury to the face or jaw may induce a central change in the processing of nociceptive signals from the head and neck that leads to a remapping of the pain associated with subsequent migraine events.^{13–15} This relocation or “remapping” of the migraine pain may also alter the expressed associated symptoms (such as nausea, vomiting, phonophobia, and photophobia) and further impede the diagnosis.

The actual severity of the injury to trigeminal or cervical region seems to be irrelevant to the phenomenon of “migraine remapping” in our experience. This clinical feature has implications at the trigeminal nucleus level as we work toward better understanding the central pain pathways involved in head and facial pain. This novel clinical feature of pain “remapping” in migraine has immediate impact on clinical evaluation of facial and cervical pain in neurology, dentistry, and otolaryngology. Injury to the trigeminal system may come in many forms: dental procedures, otolaryngology procedures, cosmetic procedures, as well as sinus infections, dental abscesses, etc. This clinical phenomenon could be used to better educate physicians in other disciplines so that the proper diagnosis is not delayed and further invasive procedures might be avoided, and may be applicable to other disorders affecting the trigeminal system.

References

1. Selby G, Lance JW. Observations on 500 cases of migraine and allied vascular headache. *J Neurol Neurosurg Psychiatry*. 1960; 23:23–32. [PubMed: 14444681]
2. Kelman L. Migraine pain location: A tertiary care study of 1283 migraineurs. *Headache*. 2005; 45:1038–1047. [PubMed: 16109118]
3. Benoliel R, Sharav Y. Paroxysmal hemicrania. Case studies and review of the literature. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 1998; 85:285–292. [PubMed: 9540085]

4. Bittar G, Graff-Radford SB. A retrospective study of patients with cluster headaches. *Oral Surg Oral Med Oral Pathol.* 1992; 73:519–525. [PubMed: 1518633]
5. Delcanho RE, Graff-Radford SB. Chronic paroxysmal hemicrania presenting as toothache. *J Orofac Pain.* 1993; 7:300–306. [PubMed: 9116630]
6. Gross SG. Dental presentations of cluster headaches. *Curr Pain Headache Rep.* 2006; 10:126–129. [PubMed: 16539865]
7. Moncada E, Graff-Radford SB. Benign indomethacin-responsive headaches presenting in the orofacial region: Eight case reports. *J Orofac Pain.* 1995; 9:276–284. [PubMed: 8995927]
8. Taub D, Stiles A, Tucke AG. Hemicrania continua presenting as temporomandibular joint pain. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2008; 105:e35–e37. [PubMed: 18230375]
9. Dodick DW. Migraine with isolated facial pain: A diagnostic challenge. *Cephalalgia.* 2007; 27:1199–1200. [PubMed: 17970983]
10. Gaul C, Sandor PS, Galli U, Palla S, Ettlin DA. Orofacial migraine. *Cephalalgia.* 2007; 27:950–952. [PubMed: 17645761]
11. Gaul C, Gantenbein AR, Buettner UW, Ettlin DA, Sandor PS. Orofacial cluster headache. *Cephalalgia.* 2008; 28:903–905. [PubMed: 18460008]
12. Gaul C, Sandor PS, Ettlin DA. Neurovascular orofacial pain: Authors' reply. *Cephalalgia.* 2008; 28:305. [PubMed: 18254900]
13. Burstein R, Yamamura H, Malick A, Strassman AM. Chemical stimulation of the intracranial dura induces enhanced responses to facial stimulation in brain stem trigeminal neurons. *J Neurophysiol.* 1998; 79:964–982. [PubMed: 9463456]
14. Schepelmann K, Ebersberger A, Pawlak M, Oppmann M, Messlinger K. Response properties of trigeminal brain stem neurons with input from dura mater encephali in the rat. *Neuroscience.* 1999; 90:543–554. [PubMed: 10215158]
15. Bolton S, O'Shaughnessy CT, Goadsby PJ. Properties of neurons in the trigeminal nucleus caudalis responding to noxious dural and facial stimulation. *Brain Res.* 2005; 1046:122–129. [PubMed: 15885666]