The Role of Occipital Nerve Block for Chronic Migraine Patients: Mechanisms and Management

Chronic migraine (CM) is a neurological disorder that impacts up to 2.2% of the population worldwide and imposes a significant socioeconomic burden. It is characterized by moderate-to-severe attacks of unilateral pulsating headache, associated with nausea and/or vomiting, photophobia, and phonophobia, typically lasting 4–72 hours for at least 15 days per month for at least three months.[1] With a prevalence toward women compared with men (1.7–4.0% vs. 0.6–0.7%),[1] CM incidence peaks during midlife, affecting the most productive years.[1] It typically evolves from episodic migraine (EM) with an annual progression rate of approximately 3%. Both entities are often considered disorders of the same pathophysiological spectrum, but some scientists suggest that CM develops into its own distinct clinical entity.[1] However, CM imparts a significantly greater burden in comparison with EM with disability scores reported to be nearly twice as high. Pronounced functional and structural brain changes, central sensitization, and neuroinflammation may be the possible pathophysiology mechanisms.[1]

The therapy of migraine represents a huge challenge due to modest treatment response with CM sufferers reporting the least satisfaction with primary care relating to treatment (38% vs. 66% of episodic migraineurs).[2] Established treatment options include risk factor modification, identification of internal or external triggers, comorbidity management, prophylactic pharmacotherapy (onabotulinumtoxinA, topiramate, and Gene-Related Peptide (CGRP)-targeted monoclonal antibodies such as fremanezumab, galcanezumab, eptinezumab, and erenumab), and acute pharmacotherapy (analgesics, nonsteroidal anti-inflammatory drugs, and migraine-specific agents that potentiate vasoconstrictive properties such as triptans and ergot derivatives).[3] Additional CM prophylactic agents shown to be effective in limited studies include valproate, gabapentin, pregabalin, tizanidine, zonisamide, and amitriptyline.[1] Opioids and barbiturates are not recommended due to their strong association with medication overuse and medication dependency.[1] Non-pharmacological emerging treatment for pharmacologically nonresponsive or intractable patients with CM is noninvasive neuromodulation, which includes supraorbital transcutaneous stimulation, transcranial magnetic stimulation, transcranial direct current stimulation, and noninvasive vagus nerve stimulation.[1] Invasive methods include implanted vagus nerve stimulation, occipital nerve stimulation, sphenopalatine ganglion stimulation, and deep brain stimulation.[1]

In addition to all the already mentioned methods of CM treatment, it is necessary to emphasize the well-established technique of the peripheral nerve block (PNB) that has been developed and successfully applied since the 1960s. Three occipital nerves arise from C2 and C3 spinal nerves and innervate the posterior scalp. They include the greater occipital nerve (GON), the lesser occipital nerve (LON), and the third occipital nerve (TON). The GON block can be a safe and effective pain treatment modality when performed by an experienced interprofessional team. It can be performed singularly or combined with other oral or intravenous pain regimens to increase desirable patient outcomes. In clinical practice, using various pharmacological substances such as anesthetics (lidocaine and bupivacaine are most often used) and corticosteroids, the block of the proximal and distal level of the GON is a widely used modality.[4,5] Based on scientific and clinical open-label studies, good evidence of the efficacy of GON block was found for CM, cluster headache, post-dural puncture headache, cervicogenic headache, and occipital neuralgia. The GON block can achieve significant analgesia as a primary treatment and be used as a second-line treatment when other methods have failed. When a GON block is successful, pain typically improves after 20–30 minutes and the pain-free period lasts several hours to several weeks or months.[4,5]

The GON block treatment adverse effects are generally mild and transient. The most commonly encountered include pain, redness, swelling, infection, and hematoma at the injection site, nerve trauma, arterial injury, dizziness, vertigo, numbness, lightheadedness, vasovagal syncope, presyncope, facial edema, worsening headache, and transient dysphagia. If corticosteroids are used, patients may also experience alopecia at the injection site. Absolute contraindications include anesthetic allergy, open skull defect, and infection and surgical procedures at the site of drug administration. Other relative contraindications include any type of coagulopathy and Arnold–Chiari malformation. Although a small amount of anesthetic is used, prevention and early identification of anesthetic toxicity must always be considered. Additional adverse reactions related to lidocaine or bupivacaine toxicity include arterial hypotension, cardiac dysrhythmias, seizures, and methemoglobinemia. The risk of complications can be reduced by aspirating before injecting an anesthetic and communicating with the patient after the procedure to identify possible clinical symptoms.[4,5] Although some studies discuss the synergistic effect of the distal-level GON block in patients treated with the proximal-level GON block, other studies refute these results.[6] Likewise, in their study of 78 patients with CM, Guner *et al*.[7] showed that Ultrasound (US)-guided GON block is an effective and safe treatment option, but the addition of a distal-level GON block to a proximal-level GON block did not provide extra benefit to patients with CM. Achieving GON block in patients with CM was found to be comparably effective using a proximal or distal technique for alleviating headache intensity and reducing the number of headache days in the short term, with the proximal GON block offering more sustained analgesic benefits. If more than three GON blocks are required in six

months, it is necessary to explore additional or alternative treatment modalities.[4]

Finally, the GON block is a useful modality of treatment in CM because of many attractive features such as its early effect in reducing the severity of pain, sustained effect following a single application, easy technique, minimum invasiveness, minimum adverse events, no drug-to-drug interactions, and minimal financial costs.[5,8] For patients impacted by severe or frequent headaches, the GON block treatment can substantially improve their quality of life.

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Conflicts of interest

There are no conflicts of interest.

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