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Bilateral Sphenopalatine Ganglion Block in the Management of Headache Associated With Subarachnoid Hemorrhage: Case Report

Bilena Molina Arteta, MD, Natalia Botero Jaramillo, MD, and Harold Acosta Gutierrez, MD

Background: The sphenopalatine ganglion (SPG) plays a pivotal role in the modulation of craniofacial pain. SPG blocks have been explored for various headache types; however, their efficacy in subarachnoid hemorrhage (SAH)-associated headaches remains underreported.

Case Report: A 26-year-old woman with a history of chronic migraine and B-cell acute lymphoblastic leukemia presented with severe holocranial headache and focal seizures following a central nervous system relapse and thrombocytopenia-induced bihemispheric SAH. Initial pharmacological management included hydromorphone, pregabalin, and amitriptyline. A bilateral transnasal SPG block was performed, followed by a fluoroscopy-guided SPG block, resulting in a significant reduction in pain intensity, from a numeric rating scale score of 10/10 to 3/10.

Conclusions: SPG blocks show promising potential in the management of persistent headaches following SAH. An initial noninvasive transnasal approach, followed by more invasive techniques when necessary, may provide substantial pain relief and improve patient quality of life. Further research is needed to validate these findings and optimize treatment protocols.

Key words: Sphenopalatine ganglion block, secondary headaches, subarachnoid hemorrhage, pain management

BACKGROUND

The sphenopalatine ganglion (SPG) is the primary extracranial parasympathetic ganglion involved in the modulation of craniofacial pain syndromes. It comprises parasympathetic and sensory nerve cells, but also contains sympathetic and motor fibers, although its parasympathetic function is the most clinically relevant (1). Irritation of the SPG can produce neuralgias in the face and neck due to its connections with the facial nerve, occipital nerves, and cervical cutaneous nerves. It may also generate ocular and mandibular pain through its connections with the ciliary and otic ganglia, as well as visceral symptoms, such as hiccups and digestive disturbances, via its connection with the vagus nerve. Additionally, it can cause referred otalgia due to its association with the sympathetic plexus (2).

The clinical significance of the SPG was first described by Sluder (3) in 1908, who identified its role in nasal headaches through clinical observations. He reported that patients experienced unilateral pain involving the root of the nose, the eyes, the upper jaw, the mastoid region, and the occiput. These symptoms were successfully relieved by the application of cocaine to the posterior end of the middle turbinate, suggesting that the SPG played a key role in the pathogenesis of these headaches.

From: Instituto Nacional de Cancerologia, Colombia

Corresponding Author: Harold Acosta Gutierrez, MD, E-mail: haacostag@unal.edu.co
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The SPG plays a fundamental role in autonomic balance and the regulation of cerebral vascular tone, supporting its involvement in headache disorders. Several techniques have been described for accessing the SPG: transnasal, infratemporal, and transoral. The transnasal approach involves the insertion of cotton applicators soaked in local anesthetic through the nasal floor until they reach the posterior wall, where additional anesthetic is applied and left in place for 15-30 minutes to allow mucosal absorption into the ganglion (4). Other methods and commercial devices for transnasal delivery—such as atomizers, sprays, and dedicated catheter systems—have been developed to improve anesthetic dispersion and enhance patient comfort. This technique is primarily used for headache management, although it has also been applied in cases of trigeminal neuralgia and other facial pain syndromes. However, drug absorption can be erratic and unpredictable, and side effects may include epistaxis, unpleasant taste, and motor or sensory disturbances in the palate and oropharynx (5).

The transoral technique is considered the most challenging due to the complexity of the approach. It requires the use of a curved needle inserted through the greater palatine foramen, traversing the maxillary nerve, which may induce paresthesia. Complications, such as hematomas and infraorbital nerve injury, may occur. The infratemporal approach is most commonly used for neurolytic and radiofrequency techniques and is performed under fluoroscopic guidance to insert a needle along the inferior lateral orbital wall to access the pterygopalatine fossa. Adverse events associated with this approach include accidental entry into the orbit or nasal cavity, severe hemorrhagic complications (2,5), and reflex bradycardia known as the "Konen reflex" (6).

According to the available evidence, the most strongly supported indication (Grade B), based on randomized clinical trials, is for reducing analgesic requirements following endoscopic sinus surgery. Other Grade B indications, supported by observational studies, include cluster headache, trigeminal neuralgia (second division), and migraine. Grade C recommendations, based on case series, suggest potential benefits in postdural puncture headache, sphenopalatine neuralgia, atypical facial pain secondary to trauma, hemifacial headache, nasal pain, cancer-related pain, and persistent hiccups, among others (4,7). In clinical practice, a study by Burkett et al (8) reported that its most common use among specialists was for chronic migraine. It has also been frequently employed in facial pain management, due to the SPG's connections with the maxillary nerve (a branch of the trigeminal nerve) and the otic ganglion, which are involved in the sensory innervation of the face (9).

Clinical Case

A 26-year-old patient with a history of chronic migraine and Philadelphia-like high-risk B-cell acute lymphoblastic leukemia under treatment was receiving inotuzumab-based therapy during hospitalization when she developed a severe holocranial headache, loss of consciousness, and focal seizures, in the context of bihemispheric subarachnoid hemorrhage (SAH) and thrombocytopenia. Cerebral angiography did not reveal any arteriovenous or aneurysmal malformations. The hemato-oncology team concluded that the bleeding was likely secondary to inotuzumab immunotherapy-induced thrombocytopenia. Following the initial seizure episode, the patient was admitted to the Intensive Care Unit.

The pain medicine and palliative care team initiated pharmacological management with hydromorphone, pregabalin, and amitriptyline. As part of the interventional approach, bilateral transnasal SPG blocks were initially performed for both therapeutic and diagnostic purposes. Concurrently, correction of thrombocytopenia was undertaken to allow for a safer subsequent intervention. Once platelet counts were stabilized, a fluoroscopy-guided bilateral SPG block was performed using bupivacaine and methylprednisolone (Fig. 2). The decision to proceed with a fluoroscopy-guided technique was based on the need for a deeper, more precise, and longer-lasting block, given the limited and short-duration relief obtained with the transnasal approach. Additionally, the unavailability of ultrasound-guided SPG techniques within the institution restricted the choice of image-guided methods.

The patient tolerated the intervention well. Following the fluoroscopy-guided procedure, she experienced a marked improvement in headache symptoms, with pain intensity decreasing from 10/10 to 3/10 on the numeric rating scale within the first hour postintervention. This significant reduction was maintained at the 7-day follow-up, without recurrence of seizures or neurological deterioration, and with notable improvement in sleep quality, as reported by the patient. Follow-up could not be extended beyond 7 days due to the patient's hospital discharge. During the postprocedural period, no adverse effects were reported, and the patient expressed satisfaction with the outcomes (Fig. 1).

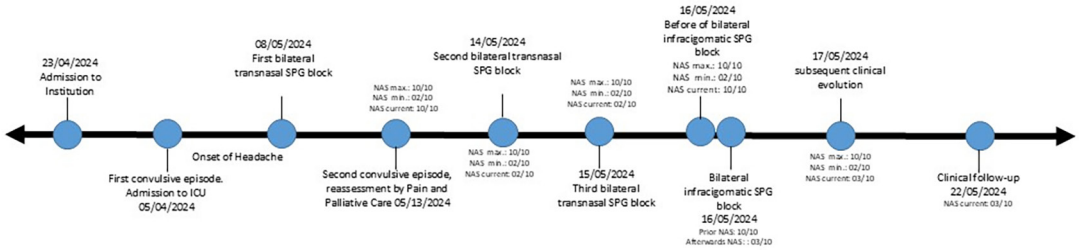

Fig. 1. Timeline with the main clinical events and pain interventions.

DISCUSSION

Approximately 80% of spontaneous SAHs result from aneurysmal rupture. These cases are commonly associated with intense and recurrent headaches, which are classified as persistent when they last for > 3 months. In the immediate post-SAH period, it is essential to evaluate potentially life-threatening complications, such as rebleeding, hydrocephalus, vasospasm, and delayed cerebral ischemia (10).

Post-SAH headaches typically present with a diffuse, diurnal pain pattern and have a slower onset than the initial ictal headache. These may manifest as sensations of pressure, throbbing, or pulling. Patients generally follow one of two trajectories: some experience rapid resolution of headaches within a few days, while others report persistent daily headaches of high intensity, which increases the risk of chronic pain and related sequelae (10).

The pathophysiological mechanisms underlying persistent headache after SAH are not well established. Proposed factors include direct meningeal stretching and chemical irritation by blood products, neuroinflammatory responses, and vascular hyperreactivity, such as vasospasm. Additionally, cortical spreading depression—associated with migraine aura—has also been observed post-SAH (11). Currently, there are no specific guidelines for the medical management of post-SAH headache. Furthermore, many therapies commonly used for other headache types present challenges in this setting. Opioids remain the most frequently used medications for this indication (10).

Given the patient's significant thrombocytopenia and recent intracranial hemorrhage, neuraxial, or more invasive cranial interventions were contraindicated. The SPG block presented a minimally invasive, low-risk alternative. After an initial favorable response and correction of platelet levels, a fluoroscopy-guided approach was chosen to improve both accuracy and duration of the therapeutic effect (Fig. 2).

The SPG block carries a Grade B recommendation for the treatment of cluster headache, second-division trigeminal neuralgia, migraine, reduction of pain associated with nasal packing removal postsurgery, and decreased analgesic requirements following endoscopic sinus surgery. Among these, the best evidence supports its use in reducing postoperative analgesic needs after endoscopic sinus surgery. For other pain syndromes, the level of recommendation is lower due to limited data from controlled studies. These include postdural puncture headache, sphenopalatine neuralgia, maxillary neuralgia, facial neuralgia, sympathetic neuralgia, atypical post-traumatic facial pain, atypical odontalgia, granuloma-related pain, herpes keratitis, hemifacial headache, paroxysmal hemicrania, nasal pain, continuous hemicrania, trigeminal neuropathy, oncologic pain, and seizures associated with nasal pathology (7).

Several case reports have described the use of SPG blocks in the management of post-SAH headache. Melinosky et al (12) reported 5 cases: 2 patients received a transnasal block and 3 received a transcutaneous block. All patients experienced complete pain relief within 30 minutes, except one who reported a 30% reduction. The transcutaneous approach yielded complete relief in all treated patients.

Smith et al (13) published a case series of 7 adult patients who received fluoroscopy-guided SPG blocks for spontaneous post-SAH headache. Each patient underwent a single bilateral suprazygomatic SPG block with ropivacaine and dexamethasone between 6 and 11 days posthemorrhage, resulting in significant headache relief.

Singh et al (14) described a patient treated with transnasal SPG block using a cotton swab soaked in 1-2 mL of 4% lidocaine combined with 5 µg of dexmedetomidine. The patient reported immediate relief; the block was repeated 4 times at 12-hour intervals on days 2 and 3 of treatment, after which the headache did not recur.

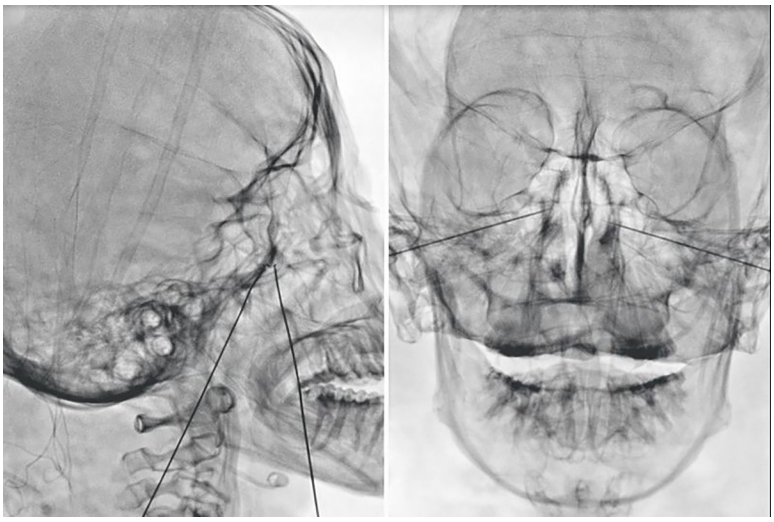

Fig. 2. Percutaneous SPG block technique guided by fluoroscopy.
SPG, sphenopalatine ganglion.

Although the transnasal SPG block provides effective relief, its duration typically does not exceed 6 hours, as demonstrated in postdural puncture headache (15). In a cohort study, Busman et al (1) showed a 48.85% total pain reduction in emergency settings, with a number needed to treat of 2 and a partial relief rate of 33.3%. It has been proposed that the use of a needle in percutaneous approaches may enhance the effectiveness of SPG blockade (16).

The proposed mechanism of action of SPG block involves modulation of autonomic input in the head, neck, and shoulder regions, which may account for its efficacy in headaches with an autonomic component. It is also suggested that SPG block reduces the local release of vasoactive substances in the pterygopalatine fossa, including calcitonin gene-related peptide (17). These mechanisms may alter the trajectory of post-SAH headache and reduce the risk of chronicity (13).

CONCLUSIONS

SPG blocks show promising potential as a therapeutic option for persistent headache following SAH. An initial diagnostic attempt using the transnasal technique may be appropriate, with subsequent use of more invasive techniques if necessary. Bilateral SPG block is recommended for holocranial headaches. The main limitation of this case is the lack of long-term follow-up to assess recurrence or the need for additional interventions. While current studies support the use of SPG block for secondary headaches, evidence in the context of SAH remains limited, and randomized controlled trials are required to validate its efficacy.

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