Sphenopalatine Ganglion Block

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Michael S. Leong, Mark P. Gjolaj, and Raymond R. Gaeta

Key Points

- The sphenopalatine ganglion is the most cephalad region of input for the superior cervical sympathetic ganglion.
- Sphenopalatine blockade is indicated to treat headache (cluster, migraine), atypical facial pain and neuralgias, and possibly other sympathetic maintained conditions.
- There are three main techniques for performing sphenopalatine ganglion blockade, the simplest using cotton pledgets to the middle turbinates of the nasal sinuses, the most advanced with fluoroscopic-guided technique.
- Further clinical studies are required to demonstrate efficacy in neuropathic pain conditions other than cluster headache and facial neuralgias.

M.S. Leong, M.D. (✉)
Stanford Pain Medicine Center,
450 Broadway Street, Redwood City CA 94063, USA

Department of Anesthesiology,
Stanford University School of Medicine, Stanford, CA, USA
e-mail: msleong@stanford.edu

M.P. Gjolaj, M.D., M.B.A.
Stanford Pain Management Center,
450 Broadway Street, Redwood City CA 94063, USA

Department of Anesthesiology, Stanford Hospital and Clinics,
450 Broadway Street, Redwood City, CA 94063, USA

Division of Pain Medicine,
Stanford University School of Medicine, Stanford, CA, USA
e-mail: markmd@gmail.com

R.R. Gaeta, M.D.
HELP Pain Medical Network,
1900 O'Farrell Street, Ste 250, San Mateo, CA 94403, USA
e-mail: rgaeta@helppain.net

Introduction

A certain mystique surrounds the sphenopalatine ganglion as it seemingly rests in the middle of the head but is readily accessible for neural blockade. The sphenopalatine ganglion block is an older and relatively simple pain management block for treatment of headache (cluster and migraine) and facial neuralgias. This block was first described by Greenfield Sluder in 1908 for the treatment of nasal headaches [1]. Since it is localized to the back of the nasopharynx, it can be approached externally through the nares by using cotton pledgets soaked with local anesthetic to anesthetize this region. This simple approach has even been taught to headache sufferers to manage their own pain control at home [2]. Despite the ease of blockade, only recently has interest in the block been resurrected.

Anatomically, the sphenopalatine ganglion, also called pterygopalatine ganglion, is the superior most constellation of sensory (maxillary nerve), parasympathetic (greater petrosal nerve), and sympathetic (superior cervical ganglion) nervous system. The sensory branches of the palatine nerves pass through the ganglion from their origin as the sphenopalatine branches of the maxillary nerve. The parasympathetic portions arise from the nervus intermedius contribution of the greater petrosal nerve. These parasympathetic fibers are responsible for the secretory and vasodilatory functions of the various glands of the nasopharynx and lacrimal glands. The sympathetic fibers originate in the superior cervical plexus through the carotid plexus. The deep petrosal nerve then enters the ganglion to provide the sympathetic vasoconstriction function of the ganglion.

Alternative approaches to the sphenopalatine ganglion, intraoral and fluoroscopic radiofrequency ablation, have increased utilization of this procedure. Hence, a diagnostic and temporary sphenopalatine ganglion block via a nasopharynx approach in the pain management clinic can be used to predict whether further interventional fluoroscopic

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radiofrequency procedures should be attempted. In one study of the treatment of episodic cluster headache, 46 % of the 15 patients treated had a change in headache frequency for 18 months [3].

Literature Review

The main indications for the sphenopalatine ganglion block have traditionally been multiple headache conditions and facial neuralgias. Michael Sanders reported a 70-month follow-up study on 66 patients with cluster headaches, with 60.7 % of episodic patients having benefit and 30 % with chronic patients gaining benefit [4]. A more recent example of treatment of episodic cluster headache is Narouze's study above. Most recently, electrical stimulation of the sphenopalatine ganglion under fluoroscopic guidance seems effective for episodic cluster headaches [5]. Migraine, one of the most common headache syndromes, has been recognized as having cranial parasympathetic input to the trigeminovascular pain pathway, with intranasal lidocaine providing significant pain relief [6]. Similar to the cluster headache study above, electrical stimulation of acute migraine seems to be effective as well [7]. A case report by Shah and Racz demonstrated long-term relief of posttraumatic headache by sphenopalatine ganglion pulsed radiofrequency lesioning [8]. With regard to facial neuralgias, a case report of stereotactic radiosurgery has been used to treat sphenopalatine neuralgia [9]. Another case report reported treatment of trigeminal neuralgia [10]. A more extensive series for atypical facial and head pain using pulsed radiofrequency of the sphenopalatine ganglion in 30 patients showed 61 % having mild to moderate pain relief [11].

The sphenopalatine ganglion block has also been studied in other chronic pain conditions. Two case series have looked at its application to myofascial pain and fibromyalgia, with no differences between 4 % lidocaine and placebo [12–14]. Cancer pain due to carcinoma of the tongue and floor of the mouth has responded to sphenopalatine block [15]. Two cases of acute herpetic infection and even sinus arrest from postherpetic neuralgia have been treated with this block [16, 17]. One of the more intriguing case series involves two complex regional pain syndrome patients with lower extremity affected limbs [18]. Even after sympathetic blockade of the lower extremities had failed, sphenopalatine ganglion blocks with 4 % tetracaine provided 50 % pain reduction. Further clinical studies are required to demonstrate efficacy in neuropathic pain conditions other than cluster headache and facial neuralgias. Moreover, studies on block technique, full radiofrequency ablation versus pulsed and electrical stimulation, are also indicated.

Evidence-Based Assessment of Available Studies

Using the Guyatt grading strength of recommendations [19], most of the strongest studies were graded as 1C observational studies or case series: Sanders, Narouze, Ansarinia, Tepper, and Yarnitsky. These studies targeted episodic cluster headaches or migraine and had subject samples of five or more. In addition, Bayer's study of pulsed radiofrequency for treatment of atypical facial and head pain was also robust for an observational series – 30 subjects. Hence, the strongest recommendations for treatment so far include episodic cluster headaches, migraine headaches, atypical facial pain, and head pain.

The sphenopalatine ganglion block is a useful technique in the management of pain syndromes in the head region. Its application in the use of migraine is of particular interest in the future. More specific trials related to its treatment should be undertaken to clarify the exact indications and patient characteristics in which it would be useful. It is a safe technique with multiple approaches for both provocative testing and even therapeutic intervention with radiofrequency lesioning.

Intraoral Sphenopalatine Ganglion Block

This intraoral technique of blocking the sphenopalatine ganglion is also called the greater palatine foramen approach. It involves positioning the patient in a supine position, with the neck slightly extended using a pillow or foam wedge. The patient must have an appropriate oral aperture so that the practitioner can palpate the medial gum line of the third molar on the ipsilateral side. The foramen may be identified by a dimple on the medial aspect of the posterior hard palate [20]. A dental needle with a 120° angle is inserted into the foramen approximately 2.5 cm superiorly and slightly posterior [21]. The maxillary nerve is superior or cephalad to the sphenopalatine ganglion, so a facial paresthesia may be elicited if the placement is too deep. After negative aspiration for heme or cerebrospinal fluid, 2 mL of local anesthetic may be injected cautiously.

Sphenopalatine Ganglion Block via Anterior Approach

Access to the sphenopalatine ganglion is readily achieved through the nasal passages utilizing anesthetic-soaked pledgets and bayonet forceps or more easily with the use of cotton tip swabs. In either case, patency of the nares should be ascertained by having patients breathe alternatively

through each of their nares, with the opposite side pressed closed. In addition, patients with nasal polyposis or a history of friable nasal mucosa should be approached with caution.

Classically, a nasal speculum to distend the nares allows the larger pledgets with a large surface area to be placed straight back into the nasal passages in the area of the sphenopalatine ganglion. Direct application of local anesthetic through the mucosa to the ganglion is thus achieved. The string attached to the pledget allows for easy recovery. Unfortunately, many patients may not tolerate the insertion of the pledgets, and thus, more significant sedation may be required.

An alternative which is well tolerated by many patients with very light or no sedation is the use of cotton tip swabs dipped in local anesthetic. Patience is required for the utilization of this technique with liberal amount of local anesthetics on the cotton tip swabs. After assuring patency, a liberal amount of lidocaine jelly can be applied to the nares prior to insertion of the cotton-tipped swabs. After a few minutes for the anesthetic to take effect, the cotton tip swabs should be advanced into the nares slowly in a twirling fashion. Generally, at the level of the turbinates, there may be slight resistance which can be overcome with gentle pressure, patience, and twirling of the cotton tip swab. As the nasal passages and the level of sphenopalatine ganglion are directly back from the midface, the angle of the cotton tip swab should almost be perpendicular to the face and advanced until the end of the nasopharynx is appreciated. With patience, 3–4 cotton tip swabs can be advanced into each nares. Additional local anesthetic can be dribbled onto the cotton tip swabs to provide more local anesthetic. Generally speaking, the cotton tip swabs may be left in place for 20–30 min after which they are removed.

Sphenopalatine Ganglion Block via Fluoroscopic Approach

Contraindications

- Absolute: local infection (skin or paranasal sinus); coagulopathy
- Relative: anatomic abnormalities of sinuses secondary to genetics, trauma, or surgery

Key Anatomic Landmarks

- Pterygopalatine fossa
- Zygomatic arch
- Maxillary nerve

Potential Side Effects

- Numbness at the root of the nose and potentially palate
- Lacrimation of the eye on ipsilateral side
- Reflex bradycardia for radiofrequency lesions
- Bleeding, infection, and epistaxis

Perioperative Medication and Conscious Sedation

Please refer to the current American Society of Anesthesiologist's (ASA) guidelines for conscious sedation [22] and/or Leong and Richeimer's "Conscious Sedation for Interventional Pain Procedures" in Lennard's Pain Procedures in Clinical Practice, 3 ed., Elsevier [23]. Standard monitors should also be applied during and post-procedure, including blood pressure monitoring, EKG, and pulse oximetry.

Procedure

Positioning

Most descriptions of the procedure advise the patient to be in a supine position with anterior-posterior view used initially to visualize the orbit and maxillary sinuses.

Imaging

The image intensifier should be placed in a lateral view and tilted cephalad until the pterygopalatine fossa is visualized. When the two pterygopalatine plates are superimposed, one will visualize an inverted flower "vase" just posterior to the posterior aspect of the maxillary sinus [24].

Needle Placement

The needle (typical – 22 gauge, 3.5 in spinal needle) is placed under the zygoma in the coronoid notch after local anesthetic skin infiltration. Using an AP view of the orbit and maxillary sinuses, the needle is advanced medial, cephalad, and slightly posterior into the pterygopalatine fossa. The needle should be positioned lateral to the lateral wall of the nose but medial to the maxillary sinus. When the needle enters the fossa, patients may experience a paresthesia from contact with the maxillary nerve [25]. One to two milliliters of local anesthetic (1–2 % lidocaine) is injected at this region prior to advancing the needle into the anterior superior corner of the fossa. If any resistance is encountered, needle positioning should be stopped and redirected to prevent advancing through the lateral wall of the nose.

It is important to place the needle into the sphenopalatine foramen, particularly when using radiofrequency ablation to prevent damage to the maxillary nerve. When

Table 28.1 Comparative costs of three nerve blocks

CPT code	Description	Medicare allowable – nonfacility	Medicare allowable – facility	Total
64505	Injection, anesthetic agent; sphenopalatine ganglion	$113.59	$92.39	$205.98
64510	Injection, anesthetic agent; stellate ganglion (cervical sympathetic)	$165.05	$75.59	$240.64
64400	Injection, anesthetic agent; trigeminal nerve, any division or branch	$129.45	$71.02	$200.47

positioned correctly, the patient will have a paresthesia at the root of the nose with nerve stimulation. If a paresthesia is felt in the upper teeth, the needle is placed too close to the maxillary nerve and needs to be redirected in a more caudal fashion [20].

Treatment

Local Anesthetic

One to two milliliters of lidocaine or bupivacaine with or without steroid may be placed at the sphenopalatine ganglion after negative aspiration for heme or CSF. A maximum of 5 mL of local anesthetic may be used for diagnostic block after negative aspiration. Numbness at the root of the nose as well as ipsilateral lacrimation may be a temporary result.

Radiofrequency

Lesioning can be performed using RFTC or pulsed EMF after a successful temporary block with local anesthetic. Typically a 20- or 20-ga, 10-cm, curved blunt-tipped RF needle is placed using a 5–10-mm active tip.

Confirmation of sensory paresthesia at the root of the nose should be elicited with approximately 0.5 V at 50 Hz. Again, if paresthesias are present in the upper teeth, the needle needs to be redirected caudally. Stimulation of the greater and less palatine nerves produces paresthesias of the hard palate. The needle is too lateral and anterior and needs to be redirected posteriorly and medially.

After best placement of the RF needle, RF lesioning is performed at 70–90 s at 80 °C. One to two lesions can be made after infiltration of 1–2 mL of local anesthetic. Pulsed RF does not require local anesthetic pretreatment since the lesioning is only at 42 °C for 120 s. Two to three lesions may be required for pulsed RF treatment.

As mentioned above, a reflex bradycardia may occur with RF and pulsed RF lesioning. A proposed mechanism suggests that a reflex similar to an oculocardiac reflex may be due to afferent transmission back to the dorsal vagal nucleus [26]. This reflex bradycardia stops with discontinuation of lesioning, but the patient may need atropine to complete the radiofrequency treatment.

Pharmacoeconomic Discussion of Sphenopalatine Blockade

Headache and facial pain produce both direct and indirect costs. Prescription drugs, physician office visits, emergency room visits, and inpatient hospitalizations represent the direct costs of an illness. For migraines alone, the national direct cost burden is estimated at $11 billion [Hawkins K. Value Health 2006;9:A85]. Indirect costs, due to missed workdays, short-term disability, and worker's compensation, make up over $13 billion annually, excluding presenteeism [27]. Presenteeism accounts for up to an additional $5 billion dollars annually of cost to employers in the United States [28].

In a large study of various pain disorders among the US workforce, headache was the most frequent cause of lost productive time over a 2-week period and caused the average affected individual to miss 3.5 h/week [29]. In the American Migraine Prevalence and Prevention (AMPP) study, the annual per person cost was $1,757 in episodic migraine and $7,750 in transformed migraine [30].

Approximately 15,000 new patients are diagnosed with trigeminal neuralgia each year in the United States alone [31]. An estimated 8,000 undergo surgery each year at an annual cost of greater than $100 million [32].

Sphenopalatine ganglion blockade represents a clinically and cost-effective intervention for facial pain and headaches. As shown in Table 28.1, the costs associated with sphenopalatine ganglion block match those of blocking one trigeminal nerve and are 20 % less than stellate ganglion block. When we consider the fact that patients can be instructed in performing the intranasal sphenopalatine ganglion block themselves, it becomes clear that it may be judged "the cheapest technique in the management of chronic pain" [33].

Summary

The sphenopalatine ganglion is located in the upper reaches of the nasopharynx and represents the most superior contribution of the superior sympathetic ganglion. Blockade of the sphenopalatine ganglion is easily achieved by a variety of techniques of increasing complexity, and it is deemed useful

in the management of various pain syndromes of the head particularly migraine headache. Case series and observational studies have demonstrated its utility for treatment of painful syndromes, with the based designed study reaching 1C level of utility. While future studies should indeed be conducted to determine the exact indications and patient characteristics specific utility of the block, current practice provides a relatively safe and putatively effective treatment strategy for headache and facial pain. Local anesthetic blockade of the ganglion via the anterior nares approach is readily accomplished and serves as a therapeutic trial to determine whether more invasive and perhaps longer lasting treatment such as radiofrequency lesioning should be considered. The magnitude of patient suffering from migraine and facial pain and its societal implications with regard to economics and overall productivity should be a strong impetus to utilize sphenopalatine blockade via the multiple approaches until the definitive studies demonstrate the best algorithm for treatment.

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