

# Sphenopalatine Ganglion Block Without Catheter

Unique technique allows self-administration of sphenopalatine ganglion block.  
By Morris Maizels, MD



The sphenopalatine ganglion (SPG) has long been implicated in headache disorders and other chronic pain conditions.<sup>1</sup> Invasive procedures to block SPG activity, followed by intranasal instillation of anesthetics, were first described for the treatment of cluster headache,

and later for migraine. More recently, intranasal catheters have been introduced to perform SPG blocks. The case series presented illustrates a unique technique for self-administration of SPG block without a catheter. Viscous lidocaine 2% is used—rather than topical lidocaine 4%—with positioning of the head to allow the lidocaine to reach the sphenopalatine fossa.

## ▶▶ Case Series: Self-Administered Sphenopalatine Ganglion (SPG) Blocks

### Case 1. Migraine With Aura in an Adolescent

MP is age 15 and had migraine episodes weekly, always preceded by a unilateral visual aura. His mother was taught to administer topical 4% lidocaine solution during MP's aura, on the side of anticipated headache. Over 18 months (~75 episodes), SPG block prevented the headache in all but 2 attacks. When administered ipsilateral to the aura (ie, contralateral to the anticipated side of headache) it did not prevent the headache. There was no effect of SPG block on the duration of the aura itself, and no reduction in frequency of attacks.

### Case 2. Chronic Migraine and Migraine With Brainstem Aura

SK had near-daily chronic migraine and episodes of migraine with brainstem aura (>1 day, including unilateral weakness, diplopia, and vertigo). Preventive treatment with verapamil reduced attack frequency. On follow-up, SK reported 8 of 11 migraine attacks without brainstem symptoms had rapid partial or full resolution with self-administered SPG block with intranasal viscous lidocaine 2%. Only partial relief was achieved for the 1 episode with brainstem symptoms treated with at-home SPG block, which was not fully terminated with 3 intramuscular injections of ketorolac but resolved after several days.

### Case 3. Daily Headache After Craniotomy

LS has a history of episodic migraine and had resection of an acoustic neuroma with later cyber-knife surgery for residual tumor. She used opiates for control of daily headaches that initially improved with onabotulinumtoxinA. Because LS' pain was primarily frontal, she was taught to self-administer SPG block with viscous

lidocaine 2%. On follow-up, she reported that daily use provided reduced headache severity to mild or eliminated her headache. LS experienced migraine flares approximately once per week that were usually relieved with a triptan. She has continued daily application of intranasal lidocaine for nearly 1 year.

### Case 4. Cluster Headache Series

Self-administration of SPG block with viscous lidocaine 2% was taught to 3 individuals with cluster headache (2 episodic, 1 chronic), none of whom had a headache at the time of the in-office procedure. One reported the procedure ended a cluster cycle early (30 days vs typical 6-12 weeks). The other 2 individuals did not have benefit treating acute attacks.

### Case 5. Chronic Posttraumatic Headache

JJ is age 67 with chronic posttraumatic headache after a motor vehicle accident with cervical hyperextension injury and reported constant headache despite prophylaxis with nortriptyline. His headache intensity was mild on a constant basis, but interfered with daily activity, and JJ experienced migraine-like flares weekly. Sumatriptan was not effective for daily headache or migraine flares. JJ had previously been opiate dependent. With home use of self-administered SPG block with viscous lidocaine 2% twice daily, he reported near-complete resolution of headache, and was able to enjoy projects he had previously had to give up. After approximately 3 months, the effect diminished, and JJ did not subsequently achieve benefit from other preventive measures, including onabotulinumtoxinA.

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▶▶ Case Series (Continued)

**Case 6. Thunderclap Headache With Orgasm**

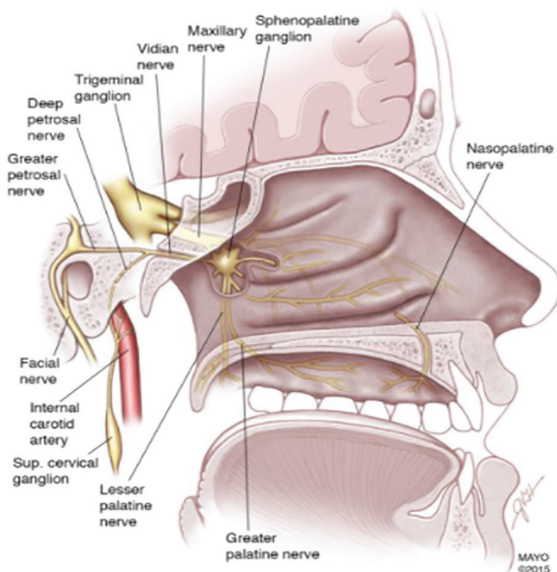
CC is age 45 and has migraine with aura that has been intermittently responsive to SPG block. She experienced a headache she describes as explosive, coinciding with orgasm. CC self-administered an SPG block with intranasally delivered lidocaine 2% and had near-immediate and near-complete relief of the headache. She had no recurrent attacks and declined imaging to evaluate the thunderclap headache.

**SPG Anatomy**

The SPG is a parasympathetic ganglion, situated in the pterygopalatine fossa, primarily derived from the greater petrosal nerve (Figure 1). The major afferent distribution of the SPG includes the entire nasopharynx and important connections with the trigeminal nerve, facial nerve, and internal carotid artery plexus of the sympathetic nervous system, as well as the lacrimal gland and nasal mucosa.<sup>2</sup>

**History of SPG and SPG Blocks**

In 1908, a long list of conditions that could be mediated by the SPG was suggested, including "...muscle spasm in the neck, shoulder, and low back; asthma; hypertension; intestinal spasm; diarrhea; angina pectoris; uterine spasm; intractable hiccup; and many others."<sup>3</sup> Notably, all are mediated by the autonomic nervous system. Although claims for SPG mediation for many of these conditions are still made, there is little scientific evidence for most. A recent single-blind randomized study, however, suggests SPG blocks may reduce hypertension.<sup>4</sup>



**Figure 1. Sphenopalatine ganglion anatomy. The SPG lies at a variable depth beneath the mucosal surface of the lateral wall of the nares. (Reproduced with permission from the Mayo Clinic.)**

Autonomic features associated with cluster headache suggest SPG involvement. An early technique used invasive supra-orbital infiltration of the SPG with alcohol and provided relief from pain and parasympathetic symptoms in 85% of 120 individuals with cluster headache.<sup>5</sup> Noninvasive intranasal topical cocaine to patients in the supine position with the head extended and rotated was also used to treat cluster headache.<sup>6</sup> To distinguish between sympathomimetic or anesthetic effect, topical lidocaine 4% was evaluated, and 4 of 5 individuals with nitroglycerin-induced cluster attacks had immediate relief.<sup>7</sup> Efficacy of 76.5% and 87% for episodic and chronic cluster headache, respectively, was reported with various invasive interventions targeting the SPG, including transnasal endoscopic injection of a mixture of steroids, anesthetics, and adrenalin; absolute alcohol; and onabotulinumtoxinA.<sup>8</sup>

**Intranasal Lidocaine for Migraine Treatment**

A 4% topical lidocaine block administered intranasally was also used for migraine,<sup>9</sup> and a randomized, double-blind placebo-controlled trial for the acute treatment of migraine was conducted.<sup>10</sup> Participants were individuals who presented to an urgent care clinic with migraine attacks. Of those treated with lidocaine, 55% had at least 50% reduction of headache pain compared with 21% who received placebo ( $P=.004$ ). Statistically significant relief occurred as early as 2 minutes, although relapse at 60 minutes was common.<sup>10</sup> In a separate population, 34 people who responded to in-office SPG block were taught to self-administer intranasal lidocaine 4% at home and relieved 141 (57.6%) of 245 episodes after 30 minutes. Headache symptoms recurred in 28 (19.9%) of 140 episodes. The response did not diminish over 6-month follow-up.

**Catheter-Delivered SPG Blocks**

Catheters designed to deliver topical anesthetic more accurately to the sphenopalatine fossa were introduced in 2014. Modest acute and preventive benefit for chronic migraine was reported with bupivacaine 0.25% delivered with catheter, in 12 treatments, given in office twice weekly for 6 weeks.<sup>11,12</sup> In a study of 12 people with chronic migraine and medication-overuse headache treated with the same protocol, MRI showed volume changes of cortical and subcortical structures known to be involved in migraine pathophysiology.<sup>13</sup> The authors of this study caution that the changes could not be attributed directly to the SPG blocks, noting headache improvement, reduction in medication usage, and other factors might be involved.

**Evidence and Mechanism of Action**

Reviews of SPG blocks for headache disorders show evidence of efficacy is strongest for cluster headache, and also support use for migraine, trigeminal neuralgia, and other trigeminal autonomic cephalgias.<sup>14,15</sup> Hemiplegic migraine<sup>16</sup> and postdural puncture headache<sup>17</sup> are also reported to respond,

although a randomized placebo-controlled clinical trial found bilateral catheter-delivered SBG block with anesthetic no different from placebo for postdural puncture headache.<sup>18</sup>

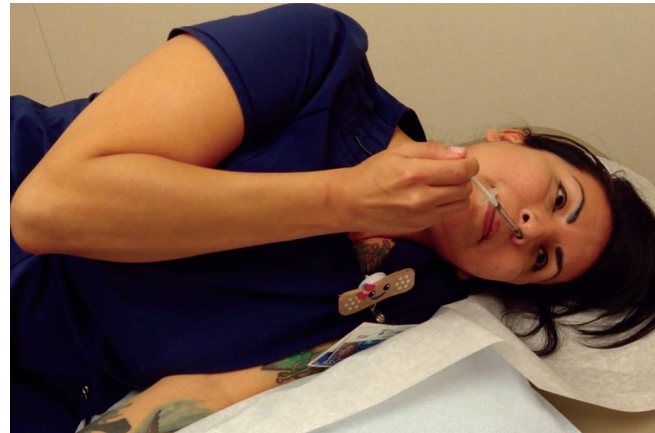
Further evidence of a role for the SPG is that SPG neurostimulation has been found effective for some with chronic cluster headache, providing an abortive effect and, for a minority of patients, a preventive effect.<sup>19,20</sup> Neurolysis of the SPG has been described as effective for idiopathic facial pain.<sup>21</sup>

The SPG lies a median 6.7 mm below the nasal mucosa surface, raising the question of whether local anesthetic could cross that distance,<sup>22</sup> and suggesting the clinical effect of topical local anesthetic might be via trigeminal rather than SPG block. This may also explain why SPG blockade is helpful in trigeminal neuralgia as well as its efficacy for migraine. Recent studies provide evidence for direct transport from nasal epithelium to the central nervous system, suggesting another potential mechanism of action.<sup>23</sup> For the purposes of this review, we will continue to refer to the procedure of delivering intranasal anesthetic as providing an SPG block.

### Self-administered Intranasal SPG Block Technique Using Viscous Lidocaine 2%

Self-administration technique is shown in Figure 2 and the Video (<https://bit.ly/3tmi0Xd>).

The patient lies in the lateral decubitus position with knees and hips flexed, the shoulder on a pillow, and the head off the pillow and laterally flexed and rotated about 30 degrees. For unilateral headache, the patient lies on the side ipsilateral to pain and treats only that nostril. The patient gently inserts the tip of a 1-mL syringe, filled with viscous lidocaine 2%, into the downside nares pointed towards the lateral nostril wall. Lidocaine is rapidly instilled and sniffed toward the back of the nostril. Afterward, the patient remains still and in this position for at least 2 minutes. For bilateral headache, the patient then rolls toward the other side, keeping the occiput in contact with the bed as much as possible, and repeats the procedure including being still for at least 2 minutes after instillation. Some find it helpful to remain in this position for up to 10 minutes.



**Figure 2.** Position for self-administered SPG block. In a decubitus position, headache side down with shoulder on and the head off of a pillow. The head is laterally flexed and rotated about 30 degrees. The tip of the syringe is pointing towards and gently touching the lateral wall of the nares. See video at <https://bit.ly/3tmi0Xd>.

### Results of In-clinic and At-home Use

In a recent open-label series of SPG block, 71% and 63% of people with episodic or chronic migraine, respectively, had pain relief in the office. Those who continued at home self-administration for acute attacks reported high response rates (Table). Participants were age 15 to 91 (mean 46.6) who had presented to an outpatient headache clinic with primarily frontal or temporal headache (n=88) or a diagnosis of cluster headache without an acute attack at administration (n=3).<sup>24</sup> Those categorized as having chronic migraine included those with comorbid cervicogenic headache (n=9) or possible medication-overuse headache (n=8).

### Clinical Considerations

Although there is limited high-quality data for any form of SPG block at this time, based on experience and expert discussion, it is the author's impression that

- in-office catheter delivery is often more effective than topical delivery and may occasionally be preventive, and

**TABLE. RESPONSE TO SPHENOPALATINE GANGLION BLOCK WITH VISCOUS LIDOCAINE 2%**

Diagnosis (n)	Sex (f/m)	Office responder	Home user	Home responder	Overall responder
Episodic migraine (14)	13/1	10 (71%)	5	5 (100%)	5/14 (36%)
Chronic migraine (56)	48/8	35 (63%)	27	19 (70%)	19/56 (34%)
New daily persistent headache (9)	5/4	4 (44%)	3	3 <sup>a</sup>	3/5 (60%) <sup>a</sup>
Cluster headache (3)	0/3	n/a	3	1 <sup>b</sup>	1/3
Chronic post-traumatic headache (9)	4/5	5 (56%)	3	3 <sup>c</sup>	3/9 (33%) <sup>c</sup>

Responders to SPG blocks in office and with home use. Home responder is shown as % of those who responded in-office. Overall responder is % of all patients offered the procedure in-office who had a positive response at home. Not all patients with a positive response in the office chose to use the procedure at home. Percentages not shown for samples of 3 or fewer.

<sup>a</sup>Responses are partial and typically less than 50%, but included for patients who report meaningful subjective relief, <sup>b</sup> Cluster cycle terminated after first use of SPG block, <sup>c</sup> 2/3 lost effect over weeks to months



- home SPG block should be offered to any individual who responds to an in-office SPG block.

Other clinical situations in which self-administered SPG block should be considered include:

- migraine with aura,
- contraindications or lack of response to triptans/gepants,
- children or adolescents if preferred to oral medication,
- pregnant women, and
- frontotemporal headache refractory to acute therapy.

## Discussion

The described technique for SPG block without catheter can be used successfully in the office, and when effective, may be offered for use at home. The most common use is for episodic or chronic migraine, although other frontal headaches may respond. Although only a minority of patients elect to continue home use, it is an important therapeutic adjunct for these individuals, and often their first-line therapy. The technique is safe and well-tolerated, although inconvenient compared with taking oral medication, as it requires lying down for 5 to 10 minutes. However, the rapid onset (minutes), dramatic resolution of headache, safety, and affordability, promote use.

People with nonmigraine diagnoses, often refractory to other therapies, may also respond to SPG block. Even partial response, or less than 50% response, is significant for many who have unremitting headache, and they continue use. Individuals who were opiate-dependent have found relief with SPG blocks.

The mechanism of action for intranasal lidocaine by any technique is not clearly SPG block and may be a more diffuse effect on the superficial afferents of V2 in the lateral nasal mucosa. Anecdotal reports of nasal lidocaine sprays, which are unlikely to achieve an SPG block, eliminating headache support the concept of a more diffuse block of afferent fibers.

SPG blocks may be used as preventive treatment, although data are lacking. A small number of persons who self-administer SPG block daily and report significant acute relief have not noted a reduction in headache frequency, but none of these individuals had migraine headaches. In a recent survey of the Southern Headache Society, a small number of users of SPG block with catheter reported a preventive effect in a minority of patients, sometimes with a single office treatment.

## Future Directions

It will be useful to identify predictive factors for response to SPG block, including whether unilateral vs bilateral headache, aura, age, frequency of headache, or responsiveness to usual acute and preventive migraine medications correlate with response to SPG block. Further studies of repetitive self-administered SPG blocks as preventive treatment would be of interest. A comparison of catheter based SPG block with the described method of patient self-administration would help define the relative role of the

2 procedures. Effectiveness of SPG blocks for acute relief of cluster headache is also important to determine.

## Conclusion

A variety of techniques for SPG block appears to offer acute, and at times preventive, effect for migraine, cluster headache, and other headache disorders. Although use of a catheter may achieve better results compared with patient self-administration, those who respond to office-administered SPG block should be considered for self administration of SPG blocks. All practitioners of headache medicine can consider incorporating some form of SPG blocks into their practice. ■

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**Disclosures**  
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