The Egyptian Journal of Hospital Medicine (January 2022) Vol. 86, Page 770-772

Sphenopalatine Ganglion Block for Treatment of Post Dural Puncture Headache: Review Article

Abdelrahem Agila Mohammad A. Najem, Abdelmohsen E.M. Aly, Farahat I. Ahmed, Shereen E. Abd Ellatif
Department of Anesthesia, Intensive care and pain management, Zagazig University, Egypt
***Corresponding author:** Abdelrahem Agila Mohammad A Najem, **Mobile:** (+20) 01095890124,
E-Mail: abdulrahimnajem@gmail.com

ABSTRACT
Background: Post-Dural puncture headache (PDPH) is a consequence of spinal and epidural anesthesia. The gold standard for its treatment is epidural blood patch. Sphenopalatine ganglion block (SPGB) has been proposed as a non-invasive intervention with minimal adverse effect.
Objective: The aim of this study was to assess the efficacy of sphenopalatine ganglion block for treatment of post-dural puncture headache.
Methods: The databases were searched for articles published in English in 3 data bases [PubMed – Google scholar and Egyptian bank of knowledge] and Boolean operators had been used such as [Sphenopalatine ganglion block and post dural puncture headache] and in reviewed articles.
Conclusion: SPGB is an effective initial modality for managing severe headache in patients with PDPH.
Keywords: Analgesia, Post-dural puncture headache, Sphenopalatine ganglion block.

INTRODUCTION
Sphenopalatine ganglion (SPG) block was first described in 1908 by Greenfield Sluder, MD, chairmen of Otolaryngology at Washington University in St. Louis **[1].**

The SPG contains postganglionic sympathetic fibers, synapses between pre- and postganglionic parasympathetic fibers, and somatosensory fibers of the head and neck region, making it a good target for pain intervention **[2].**

The methods of administration of SPG blocks have been greatly expanded since Sluder's time, as more anecdotal studies were published. SPG blocks are now used to treat pain of trigeminal neuralgia, persistent idiopathic facial pain, acute migraine, acute and chronic cluster headaches, Herpes Zoster neuralgia involving the ophthalmic nerve, and various facial neuralgias **[3].**

Physiology:
The transnasal sphenopalatine ganglion block (TSGB) was developed by Dr. Sluder in 1908 for treatment of headaches and it continued to be an effective methodology for various chronic headache scenarios, trigeminal neuralgia, and ENT surgeries **[4].** The sphenopalatine ganglion block inhibits the parasympathetic stimulation so meningeal and cerebral vessels can regulate without excess parasympathetic vasodilation and the headache dissipates **[5].**

It also blocks the activation of meningeal nociceptor fibers **[6].**

Transnasal Sphenopalatine Ganglion Block (TSBG) is a newly proposed alternative method for treatment of postdural puncture headaches (PDPH).

The role of SPG in headache:
While the mechanism of headache pain is still not completely understood, there are a few supported theories as to why SPG blocks may help relieve headache pain. The SPG is the main source of cranial and facial parasympathetics. A widely proposed theory is that SPG blocks interfere with the parasympathetic outflow from the SPG and that is the main mechanisms for the pain relief. Various headache pain triggers and activates brain areas that converge on the superior salvatory nucleus. When a trigger is encountered, the trigeminoautonomic reflex is stimulated. The afferent trigeminal sensory neurons from meningeal vessels project through the thalamus to the pons. The neurons in the pons reflexively stimulate the Superior Salvatory Nucleus (SSN), which increases parasympathetic output from the SP, otic, and carotid ganglia via the facial nerve **[7].**

The parasympathetic outflow from the SPG contributes to the vasodilation of cranial blood vessels that occurs during headache. This allows inflammatory mediators to be extravasated from blood vessels and activate meningeal nociceptors, causing headache pain **[3]. Wei *et al.* [8]** demonstrated that patients experiencing parasympathetic symptoms are more likely to have pain relief from an SPG block with lidocaine. Additionally, it is clear that the autonomic pathway is activated during headache because of the common symptoms experienced by migraineurs, including lacrimation, nausea, emesis, nasal congestion, rhinorrhea, forehead/facial sweating, conjunctival infection, salivation, diarrhea, and polyuria **[9].**

Another common feature of headache that has been proven is central sensitization to pain via

Received: 17/09/2021
Accepted: 14/11/2021

hypersensitivity of neurons. According to Levin, headache and migraine are a "centrally mediated primary neuropathic phenomena." SPG blocks, especially repetitive blocks, may provide a way to break the autonomic pain cycle. Modulating the trigeminal nucleus caudalis via the afferent sensory fibers through an SPG block could slowly change pain processing centers and lead to reduced pain **(10).**

SPG as a target for treating headache:

Due to the role of the SPG in the manifestation of cranial autonomic symptoms and in initiating and sustaining cluster headache pain, the SPG has been a target for preventive clinical treatment for headache pain. Local application of anesthetic agents has been attempted to control the pain of cluster attacks. In a study of alcohol injection via a percutaneous, supra-zygomatic approach, pain relief was observed in 86% of cases (N=120 patients), with follow-up ranging from 6 months to 4 years **(11).**

In a study of 15 cluster patients including both chronic and episodic patients, complete cessation of pain was achieved in all patients following intranasal application of cocaine (31 minutes) and lidocaine (37 minutes), compared to intranasal saline (59 minutes) **(12).**

In another study, anesthetics and steroids were applied locally over 2–4 weekly sessions in 20 chronic cluster patients, and 55% of patients achieved subsidence of symptoms or partial benefit **(13).**

Similarly, in 56 episodic and 10 chronic patients treated with SPG blocks, complete pain relief was achieved in 61% and 30% of patients, respectively, and partial relief was achieved in 25% and 30% of patients, respectively **(14).**

Recent advances in SPG block techniques:

There are many methods now available for blocking or modulating the SPG, with their respective advantages and disadvantages. The most common methods for SPG blocks using local anesthetic (2% to 4% lidocaine or 0.5% bupivacaine) are transnasal, transoral, and lateral infratemporal approaches **(15).**

Transnasal approach:

The traditional transnasal topical approach is introduced by John Bonica in 1952 where a cotton tipped applicator soaked in lidocaine is used. The anesthetic is applied posteriorly to the middle nasal turbinate on the nasopharyngeal mucosa **(16).** While the transnasal approach is simple and well tolerated, the variability in anatomy amongst patients makes it uncertain that the anesthetic will reach the SPG. Side effects may include epistaxis and infection **(17).**

An endoscopic transnasal approach was developed in 1993, and is also sometimes used. In this case, a physician directs a needle to deliver the anesthetic under direct vision via sinuscope, allowing the needle to directly penetrate the pterygopalatine fossa. This procedure, however, carries an increased risk for damage to the mucosa **(3).**

Three inexpensive and low-risk transnasal devices have recently been made available that allows the procedure to be completed in a few minutes and address the limitations of earlier techniques. The first device, called the Sphenocath (Dolor Technologies, Salt Lake City, UT) (Figure 1), is offered in 2 versions. Both versions have flexible sheaths, angled tips, and directional arrows **(7).**

Figure (1): Image of sphenocath transnasal device for SBG nerve blocks for treatment of headache **(7).**

The second device is the Allevio SPG Nerve Block Catheter (Jet Medical, Schwenksville, PA). Similar to the Sphenocath. This device has an angled tip, radiopaque ring, contrasted depth markings, flexible sheath, and directional arrow **(7).**

Figure (2): Image of Allevio SPG Nerve Block Catheter **(7).**

A third transnasal device is the Tx360 (Tian Medical, Lombard, Il, USA), which has a syringe in the barrel that is placed through the nares and then a flexible microcatheter is directed through the device posteriorly to the inferior nasal turbinate. The catheter tip then sprays 0.5% buvipicaine superiorly, laterally, and anteriorly to bathe the ganglion **(18).**

Procedure:

There are several ways to administer a TSGB with varied amounts of technical expertise required, "local application of the drug, administering it using a dropper, spraying, and injecting the drug under direct visualization". Direct drop administration usually requires less setting time (30-60 seconds per nares) **(4).**

Kent and Mehaffey (19) performed the TSGB on obstetric patients in the following manner: patient placed supine with neck extended, intranasal phenylephrine spray administered, hollow cue-tips saturated with 2% viscous lidocaine were placed into each nare until reaching the posterior nasopharynx and remain there for 10 minutes; the applicator was removed, re-saturated with lidocaine, and the procedure was repeated. The patient was then sat up and evaluated. Several applicators, i.e.Tx360, SphenoCath, and Allevio, have been developed to improve proper placement and can be combined with fluoroscopy to increase success of the block and decrease the amount of local anesthetic needed to saturate the sphenopalatine ganglion. After a rest period in the supine position, the patient is sat up and pain is evaluated, if at that time there was no relief in symptoms it would be appropriate to discuss other interventions and/or perform the gold standard epidural blood patch.

Various amounts and concentrations of local anesthetics have been utilized for TSGB. The diversity in medication administration is likely due to the differences in method of administration, the acuteness or chronicity of the headache, and how soon after onset the block was performed. Providers have used 1 puff of 10% lidocaine, 6% lidocaine drops, 10% cocaine drops, 4% lidocaine drops, 0.5 ml 0.4% lidocaine, 1 ml 4% lidocaine, 2% intranasal viscous lidocaine, 20% lidocaine dipped cotton applicators, 1-2 ml 2% lidocaine, 0.5 ml 0.5% ropivacaine, and 0.3 ml of 0.5% bupivacaine. The previously listed assortment encourages further research into the best medication and dose for TSGB [(4)].

Transoral:

The transoral approach, also known as the greater palatine foramen approach, is performed by dentists. The SPG is reached by passing a needle through the greater palatine foramen at the posterior end of the hard palate. However, this approach can be very painful and is technically difficult. It is more unpredictable in terms of making sure the anesthetic reaches the ganglion. The side effects include orbital hematoma or infection [(17)].

Lateral infratemporal approach:

Another administration technique is the lateral infratemporal approach, also called the infrazygomatic arch approach. The clinician uses fluoroscopy to direct a cannula percutaneously and laterally through the pterygo-maxillary fissure. The cannula is placed superiorly to the pterygopalatine fossa, and then anesthetic is delivered through the cannula. While this technique allows for the anesthetic to be delivered precisely, it is technically difficult and a rare side effect is infection [(3)].

CONCLUSION

Transnasal sphenopalatine ganglion block can be used as an effective, simple and safe modality of treatment for PDPH as first line treatment of this condition supported by conventional therapy without any major complications.

Financial support and sponsorship: Nil.
Conflict of interest: Nil.

REFERENCES

1. **Sluder G (1908):** The role of the sphenopalatine ganglion in nasal headaches. N Y State J Med., 27: 8-13.
2. **Tepper S, Caparso A (2017):** Sphenopalatine ganglion (SPG): Stimulation mechanism, safety, and efficacy. Headache: The Journal of Head and Face Pain, 57: 14-28.
3. **Piagkou M, Demesticha T, Troupis T *et al.* (2012):** The pterygopalatine ganglion and its role in various pain syndromes: from anatomy to clinical practice. Pain Practice, 12 (5): 399-412.
4. **Robbins M, Robertson C, Kaplan E *et al.* (2016):** The Sphenopalatine Ganglion: Anatomy, Pathophysiology, and Therapeutic Targeting in Headache. Headache: The Journal of Head & Face Pain, 56 (2): 240-258.
5. **Kent S, Maheaffey G (2015):** Transanasal sphenopalatine ganglion block for the treatment of postdural puncture headache in the ED. American Journal of Emergency Medicine, 33 (11): 1714.
6. **Channabasappa S, Manjunath S, Bommalingappa B *et al.* (2017):** Transnasal sphenopalatine ganglion block for the treatment of postdural puncture headache following spinal anesthesia. Saudi Journal of Anaesthesia, 11 (3): 362-363.
7. **Spector K, Srivastava S (2017):** A new look at sphenopalatine ganglion blocks for chronic migraine. Practical Pain Management, 16: 1-6.
8. **Wei J, Yan L, Liu T *et al.* (2011):** Cervical sympathectomy reduces neurogenic vasodilation in dura mater of rats. Auton Neurosci., 162(1-2):10-14.
9. **Láinez M, Puche M, Garcia A *et al.* (2014):** Sphenopalatine ganglion stimulation for the treatment of cluster headache. Ther Adv Neurol Disord., 7 (3): 162 168.
10. **Candido K, Massey S, Sauer R *et al.* (2013):** A novel revision to the classical transnasal topical sphenopalatine ganglion block for the treatment of headache and facial pain. Pain Physician, 16 (6): E769-E768.
11. **Devoghel J (1981):** Cluster headache and sphenopalatine block. Acta Anaesthesiol Belg., 32:101-107.
12. **Costa A, Pucci E, Antonaci F *et al.* (2000):** The effect of intranasal cocaine and lidocaine on nitroglycerin-induced attacks in cluster headache. Cephalalgia, 20: 85- 91.
13. **Felisati F, Arnone F, Lozza P (2006):** Sphenopalatine endoscopic ganglion block: A revision of a traditional technique for cluster headache. Laryngoscope, 116: 1447- 1450.
14. **Sanders M, Zuurmond W (1997):** Efficacy of sphenopalatine ganglion blockade in 66 patients suffering from cluster headache: A 12- to 70-month follow-up evaluation. J Neurosurg., 87: 876- 880.
15. **Kim D, Kang H, Hwang S (2019):** The effect of sphenopalatine block on the postoperative pain of endoscopic sinus surgery: a meta-analysis. Otolaryngology–Head and Neck Surgery, 160 (2): 223-231.
16. **Bonica J (1953):** The Management of pain, with special emphasis on the use of analgesic block in diagnosis, prognosis, and therapy. The Journal of Bone & Joint Surgery, 36: 1303-1304.
17. **Cady R, Saper J, Dexter K *et al.* (2015):** A double-blind, placebo-controlled study of repetitive transnasal sphenopalatine ganglion blockade with Tx360® as acute treatment for chronic migraine. Headache, 55 (1): 101-116.
18. **Schaffer J, Hunter B, Ball K *et al.* (2015):** Noninvasive sphenopalatine ganglion block for acute headache in the emergency department: a randomized placebo-controlled trial. Ann Emerg Med., 65 (5): 503-510.
19. **Kent S, Mehaffey G (2016):** Transnasal sphenopalatine ganglion block for the treatment of postdural puncture headache in obstetric patients. J Clin Anesth., 34: 194-6.