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Review Article **Surgery**

Sphenopalatine Ganglion Block 'Miracle Block'- A Review Article

Dr. Faisal Taiyebali Zardi[1], Dr. Nagalaxmi Velpula[1], Dr. Brajesh Gupta[2], Dr. Srishitha Rao Enaganti[3*], Dr. Sunayana Abbagalla[3]

[1]Professor, Sri Sai College of Dental Surgery, Vikarabad, Telangana, India
[2]Reader, Sri Sai College of Dental Surgery, Vikarabad, Telangana, India
[3]Post Graduate Student, Sri Sai College of Dental Surgery, Vikarabad, Telangana, India

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***Corresponding author:** Dr. Srishitha Rao Enaganti
Post Graduate Student, Sri Sai College of Dental Surgery, Vikarabad, Telangana, India

Abstract

The sphenopalatine ganglion has maximum number of neurons in the calvarium that are not situated within the brain. In the sympathetic, parasympathetic and sensory nervous system it's the largest and most superior ganglion. SPG block in conjunction with topical anaesthetic and radiofrequency ablation is currently advised for the treatment of trigeminal neuralgia, cluster headaches, migraines, and persistent idiopathic facial discomfort. The block of SPG is also known as "the miracle block". The sphenopalatine ganglion block is a simple and safe procedure which can be used for eliminating acute or chronic pain and reduces the episodic recurrence of the pain.

Keywords: Sphenopalatine ganglion, cluster headache, migraine, trigeminal neuralgia, persistent idiopathic facial pain.
Abbreviations: SPG, GPN, CH, SPF.

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INTRODUCTION

The sphenopalatine ganglion is also known as Meckel's ganglion or the sphenomaxillary ganglion, it is located posterior and lateral to the middle turbinate in the pterygopalatine fossa and it is covered by a 1.0 mm – 2.0 mm thick layer of connective tissue and mucous membrane [1]. The sphenopalatine ganglion is a parasympathetic ganglion. It is located in the course of greater petrosal nerve and has multiple relations with trigeminal, facial and sympathetic, parasympathetic. It is a ganglion which is triangular, conical, or heart shaped [2]. The borders of the pterygopalatine fossa are as follows: anterior border - posterior wall of the maxillary sinus, posterior border - medial pterygoid plate, superior border - sphenoid sinus, medial border - a perpendicular plate of the palatine bone, and lateral border - communicates with the infratemporal fossa. It forms several neuronal connections for autonomic, sensory and motor functions and is located posterior to the maxillary sinus and middle nasal turbinate.

Sensory Innervation

The maxillary branch of the trigeminal nerve passes through the foramen rotundum, which is located along the superolateral part of the pterygopalatine fossa. The pterygopalatine nerve allows the SPG to be "suspended" from maxillary nerve. Sensory fibres arising from the maxillary nerve travel through the SPG, providing sensory innervation to the nasal membranes, soft palate, and parts of the pharynx [2].

Autonomic Innervation

The sympathetic chain is formed by preganglionic sympathetic fibers in the upper thoracic spine, which synapse with postganglionic fibers in the superior cervical sympathetic ganglion to provide sympathetic innervation through the SPG. The vidian and deep petrosal nerves are traversed by postganglionic fibers after they join the carotid nerves. These postganglionic fibres travel through the SPG to the lacrimal gland, nasal mucosa, and palatine mucosa. The superior salivatory nucleus in the pons is the starting point for parasympathetic innervation via the SPG. Parasympathetic Fibers run along the nervus intermedius, which is a branch of the facial nerve, through the geniculate ganglion to form the greater petrosal nerve (GPN). Parasympathetic fibres synapse in the SPG. Second-order neurons then provide a secretomotor function to the nasal, oral, and pharyngeal mucous membranes, the lacrimal glands, and branches to the meningeal and cerebral blood vessels [3].

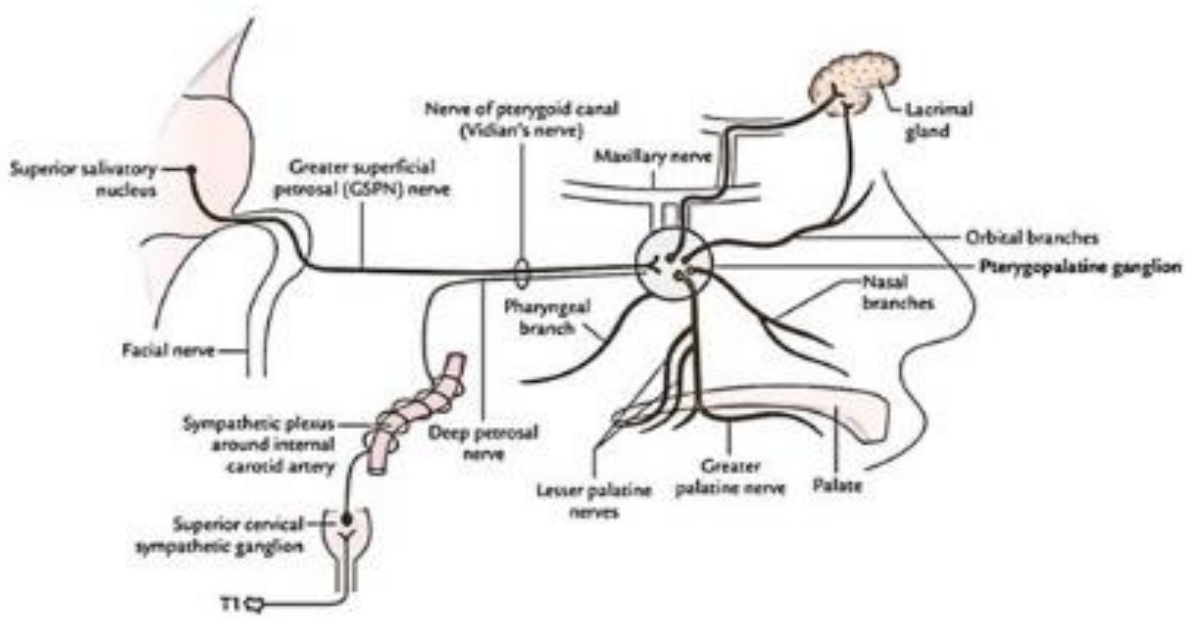

Fig 1: Course of sphenopalatine ganglion – parasympathetic, sympathetic and sensory supply of the ganglion [4]

REVIEW OF LITERATURE

Sphenopalatine ganglion block's anatomy, pathophysiology and the procedure of administration of the block to relieve the chronic type of orofacial pain, cluster headache and migraines had been proposed by various authors in the past.

Sahni D *et al*., (2015), conducted a study discussing the trans-nasal and infrazygomatic approaches for localising the sphenopalatine ganglion. They concluded that morphometric measurements will aid the clinician in accurately placing electrodes or needles and thereby preventing any complications. Additionally, Robbins MS *et al*., (2016) examined the anatomical relationships and their role in the pathophysiology of headache disorders and the trigemino-autonomic reflex.

Candido KD *et al*., (2013) conducted a study in which he concluded that the sphenopalatine ganglion block is a quick, safe, simple, and reliable technique to effectively deliver topical trans nasal analgesic agent to the mucosa associated with the SPG. Binfalah M *et al*., (2018) discussed the sphenocath device and concluded that the procedure was well tolerated with few adverse effects. Machado FC *et al*., (2019) published a case study in which he used sphenopalatine ganglion block to treat post-dural puncture headache and he concluded that this could be a non-invasive treatment modality in management of post-dural puncture headache.

Peterson JN *et al*., in (1995) and M, Demesticha T *et al*., in 2019 described the sphenopalatine ganglion block as a safe and simple procedure for managing acute or chronic type of pain in any pain management clinic. Patients who do not respond to conservative therapy for their persistent head and neck pain are frequently treated with interventional therapies, according to a study conducted in 2019 by Kaye AD *et al*., The occipital nerve subcutaneous stimulation and occipital nerve pulsed radiofrequency (PRF) are two of the conservative interventional therapeutic options available. Other procedures include injections, sphenopalatine ganglion block, local occipital nerve anaesthetic and corticosteroid infiltration, and radiofrequency procedures. Following a thorough analysis, Ho KW *et al*., (2017) came to the conclusion that using blocks, radiofrequency ablation, and neurostimulation, the sphenopalatine ganglion is a assessable region for the treatment of cluster headache.

DISCUSSION

SPHENOPALATINE GANGLION BLOCK

It is believed that the SPG blockage relieves headaches by obstructing the para sympathetic flow to the cerebral vasculature. This allows the cerebral vasculature. This allows the cerebral vessels to revert back to their normal diameter. Theoretically, anesthesia of SPG functions as a gate control mechanism similar to the theory proposed for trans cutaneous nervous stimulations analgesis effects, except at the higher level of CNS. Thus may indicate the cause of SPG block's efficiency in treating cases of trigeminal neuralgia [1].

Different approaches to block sphenopalatine ganglion includes:

- Trans nasal approach
  1) Trans nasal topical approach
  2) Trans nasal injection approach
- Infra zygomatic approach
- Trans oral approach

The trans nasal route is the most often employed safe method.

TRANS NASAL APPROACH

- **POSITION OF SPF IN THE NASAL CAIVITY**: The SPF was situated 55 mm on average from the anterior nasal spine. The foramen is situated at or slightly superior to the midpoint of distance between the hard palate and the base of the skull [5].
- **POSITION OF SPG IN RELATION TO SPF:** The distance from the centre of the foramen to the nearest point of the SPG is 6.3 mm [5].

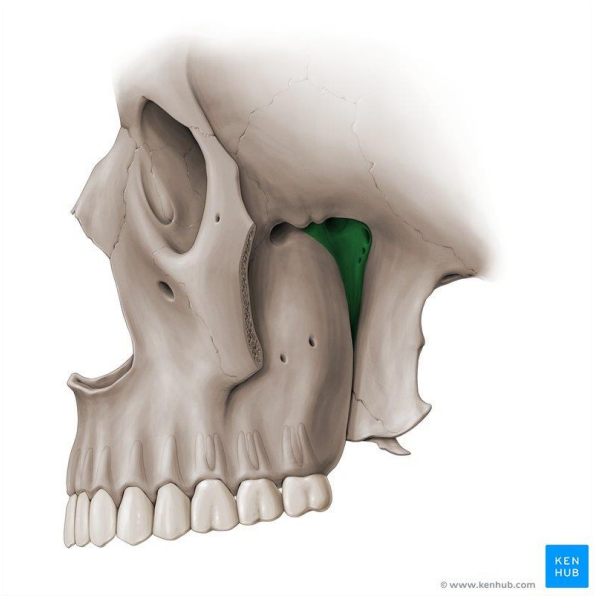

Fig 2: Location of sphenopalatine fossa [6]

PROCEDURE

The patient is made to sit in supine position, that causes stretching of cervical spine. Subsequently, the distance between nasal nares opening and the mandibular notch directly below the zygoma is used to determine the depth of advancement which is required for the placement of cotton-tipped applicator. Once the cotton tip is placed into the nares parallel to the zygoma, with its top slanted laterally, after which the cotton-tipped applicator rests on the nasopharyngeal mucosa posterior to the middle nasal turbinate [7]. In most of the instances, it takes about five to ten minutes to get a response. The applicator must be left in place for a period of half an hour.

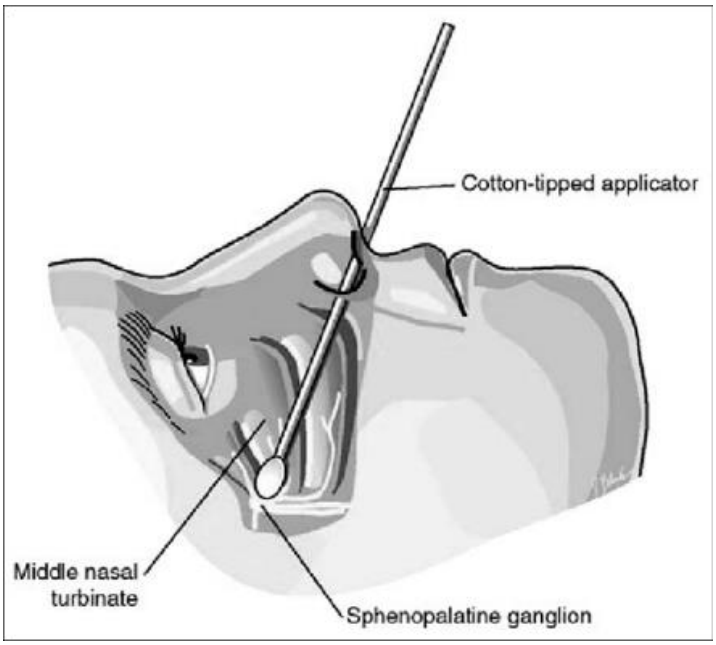

Fig 3: Trans nasal topical approach of sphenopalatine ganglion block [8]

The most prevalent indicator of SPG obstruction is that it has long been used to alleviate headaches which would be cluster type of headache (CH). Since, SPG has a direct role in the out flow of cranial parasympathetic nervous system which relates to the pathophysiology of CH [2]. This SPG blockage is also an indicator of second – division trigeminal neuralgia, migraine and other types of headaches effectively [9].

This procedure is contraindicated in patients with known allergy or hypersensitivity to the anaesthetic agent that is being used or to the preservative agents present in the anaesthetic solution. Also in patients who are known cocaine users, or with a history of chronic nose bleeding, cardiac history and pregnant women. Patients with deviated septum may present greater difficulty in application. Patients should be advised not to eat or drink if the anesthetic agent has caused transient numbness in the throat [1].

The associated advantages of this block is simplicity of the technique, short procedure time, low risk with associated complications limited to epistaxis and infection [10]. It is cost effective, painless procedure, atraumatic in nature and also because of the no bony boundary between the nasal cavity and the ganglion; via foramen it is easily performed.

The disadvantages of this SPG blockage is that it requires diffusion of local anesthetic agent across mucous membranes [10] and does not provide permanent pain relief and may lead to mild irritation in the nose while performing the procedure.

The complications is that the patients may feel sensation of mild discomfort during the application. Patients may also experience burning sensation due to medication and an unpleasant taste. Presence of numbness in the back of the oropharynx after the procedure as some of the medication may take longer duration to be dissipated in the body. Other potential side effects are lowered blood pressure, nausea, and epistaxis [2]. If appropriate aseptic practice is not followed, infection may occur. When using cotton-tipped applicators in the nasal route, carelessness on the part of the practitioner or excessive pressure from the needle on the lateral nasal wall might result in nasal epistaxis. During the winter, when forced air heating may cause the nasal mucosa to dry up, epistaxis is more common [11].

CLINICAL SIGNIFICANCE

A sphenopalatine ganglion block is used to treat many forms of orofacial pain and headaches. When a substantial decrease in pain is accompanied with an improvement in functional ability and/or a decrease in the usage of opioids, this is significant. To extend the length of pain reduction if the SPGB is effective only temporarily, radiofrequency neurotomy or SPG stimulation may be used afterward. It can therefore function as a diagnostic block [12].

As a result, sphenopalatine ganglion block is the most commonly used approach for many forms of headaches and orofacial pain; nevertheless, it is not a permanent treatment modality as it provides relief of pain for a period of 6-8 hours.

CONCLUSION

SPG stimulation is a novel, effective, and secure treatment modality. The SPG has been a therapeutic target for different types of headache and orofacial pain disorders. The patient can be trained for self-administration of SPG block, which will aid them in reducing number of episodes of pain which they experienced at the comfort of their home. Thereby, making the procedure more patient friendly and economical.

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