CRIMSONpublishers
http://www.crimsonpublishers.com

Editorial

Dev Anesthetics Pain Manag

ISSN: 2640-9399

Sphenopalatine Ganglion Block: An Underutilized Tool in Pain Management

Barry J Kraynack*

President of White Bear Associates, LLC, USA

***Corresponding author:** Barry J. Kraynack, MD, President of White Bear Associates, LLC. USA

Submission: November 01, 2017; **Published:** November 13, 2017

Abstract

The sphenopalatine ganglion (SPG) block has been utilized to treat a wide variety of pain disorders. Postganglionic parasympathetic, sympathetic neurons, and the somatic sensory afferents can all be blocked by an SPG block. We examine the SPG anatomy, the techniques of blockade and the vast spectrum of conditions and indications for SPG block for pain relief.

SPG block is an easy, safe and cost-effective method of management of acute, chronic and breakthrough pain which provides immediate relief and minimal side effects. It can be performed in a hospital or surgery center, clinic, office, ER department or at home. It is presently an underutilized and overlooked tool in pain therapy that should be more widely used.

Keywords: Sphenopalatine ganglion; SPG block; Indications; Techniques; Anatomy; Pain

Introduction

Anatomy

Because the sphenopalatine ganglion (SPG) has diffuse and extensive anatomical connections within the trigemino-autonomic (parasympathetic) reflex, it is of great interest to clinicians who treat pain conditions [1]. The SPG is a large extra cranial parasympathetic ganglion with multiple neural roots, including autonomic, sensory, and motor [2,3]. The SPG is a five-mm triangular shaped parasympathetic ganglion, located superficially and anterior to the pterygoid canal in the pterygopalatine fossa at the level of the middle nasal turbinate bilaterally. It is also known as the pterygopalatine, nasal or Meckel's ganglion [4]. It is enclosed in mucous membrane and a thin layer (1 to 1.5mm) of connective tissue. It is denoted as parasympathetic because preganglionic parasympathetic fibers synapse within the SPG. It is the largest peripheral parasympathetic ganglion with manifold connections to general sensory fibers and the internal carotid plexus [5-7]. The preganglionic fibers of the parasympathetic system are in the superior salivatory nucleus of the pons and pass through the nervous intermedius of the facial nerve and enter the SPG as a branch of the greater petrosal nerve. The preganglionic sympathetic neurons leave the spinal gray matter at the level of the first and second thoracic vertebrae (T1-T2). They then traverse the cervical sympathetic nerves and enter the superior cervical ganglion and synapse. The superior cervical ganglion relates to upper cervical nerve roots (C1, C2, and C3) and thus connects with SPG (7). Postganglionic neurons then enter the cranium after following the internal carotid artery as the deep petrosal nerve.

Sympathetic fibers synapse in the superior cervical ganglion. Post-ganglionic sympathetic fibers, after traversing with the parasympathetic nerves in the vidian nerve (formed by the greater and deep petrosal nerves), pass through the SPG without synapsing [2]. The SPG has an extensive distribution with links to the trigeminal nerve, facial nerve and internal carotid artery plexus via the sphenopalatine nerves, the greater superior petrosal nerve and the great deep petrosal nerve, respectively. Thus, it is connected directly to the superior cervical sympathetic ganglion. Postganglionic parasympathetic postsynaptic projections supply the lacrimal and nasal glands as well as paranasal sinuses, palate, and upper pharynx areas via the ophthalmic and maxillary divisions of the trigeminal nerve [8,9]. Orbital projections from the SPG provide postganglionic parasympathetic and sympathetic innervation of the major cerebral and meningeal vasculature [2,8,10]. The pterygopalatine nerves or ganglionic nerves are afferent neural projections of the maxillary division of the trigeminal nerve that pass through the SPG, and these nerves form the sensory component of the SPG [8]. The sensory fibers connect the maxillary nerve to the SPG by way of five branches that extend from the nasopharynx, nasal cavity, palate, and orbit [9,11,12]. The SPG is a crossroads for the trigeminal, facial, and autonomic nerves and with possible distant autonomic actions [13].

Techniques

The SPG block can be performed with topical anesthetic or by injection because of its superficial location in the nasal cavity [14,15].

Waldman cites three approaches for SPG block:

i. Trans nasal application of topical anesthetic with a cotton-tipped applicator to the nasopharyngeal mucosa posterior to the middle turbinate;

ii. Trans oral approach via the sphenopalatine foramen through the posterior palatine canal and;

iii. The lateral approach via the pterygopalatine fossa through the infra-temporal fossa [16].

The trans nasal approach is effective, very safe and very easy [17]. The trans oral and lateral approach are invasive and require time, training, sedation for some patients, use of fluoroscopy, and an operating room to facilitate, whereas the trans nasal approach is simple, minimally invasive and can be done at bedside [18]. Yang and Oraee summarize the development of various techniques of SPG block [19]. Sluder first used cocaine to trans nasally block the SPG in 1908 for headache and facial pain [20] and first used the term sphenopalatine neuralgia. He observed mucosal congestion, rhinorrhea, and lacrimation indicative of parasympathetic hyperactivity [21]. In 1911, he used a trans nasal needle for the injection of phenol [22]. The transoral and the lateral injection approaches were introduced by Ruskin [23,24] and treated tic doloreaux [25]. Transnasal endoscopic technique was developed for direct vision injection using rigid sinuscope [26]. For safety, image guidance is required for the transoral and lateral approaches [27-30].

The transnasal topical technique remains the most popular approach for the block because of its simplicity, minimal side effects, safety and general effectiveness [7,31-34]. It can be easily done [2,7]. Cotton-tipped applicators with local anesthetics can be placed near the SPG [35]. Although even with a properly placed applicator, the SPG block may be less than adequate because local anesthetic distribution and penetration is not a certainty [36]. In addition, some patients do not tolerate cotton tip applicators very well. Thus, various modifications have been introduced [37]. These include new modifications of the trans nasal technique with new applicators such as SphenoCath®, Allevio™ SPG Nerve Block Catheter, Tx360 Nasal Applicator® [34,38,39] or the modification of an intravenous administration set by Windsor and Jahnke [6] or by Mingi's modification [40].

Indications

The sphenopalatine ganglion block has been used to treat a wide variety of painful disorders. With Sluder [21] and Ruskin [25], Byrd [41] also used SPG block to treat a vast spectrum of muscular, vascular and neuro-genic pain syndromes. SPG block via the trans-nasal route is a simple, safe, effective and valuable technique that been overlooked. Home based application of SPG block is an easy, safe and cost-effective method of management of acute, chronic and breakthrough pain which provides immediate relief and minimal side effects. It can be taught to care givers, so it can be performed safely and effectively at home or can be used in the ER department, hospital or surgery center, office or clinic [6,7,18,19,22,35,42]. Health care extenders can perform the SPG block as well. As such, it is cost-effective therapy. We believe that this technique should be more widely applied in practice of pain therapy [22,42]. Indications for the SPG block include musculoskeletal, vascular and neuro-genic pain. Head and neck cancer pain and low back pain, visceral pain as well as angina, sciatica, and arthritis have been treated [7,15,17,42-44]. It has been used effectively for oro-facial pain in the management of temporomandibular joint (TMJ) pain, chronic and episodic headache due to migraine, tension or cluster, tic douloureux, dysmenorrhea, trigeminal neuralgia, broncho-spasm and chronic hiccup, postoperative pain relief for ear, nose and throat surgeries [14,18,32,35,42,45].

Oluigbo et al. [42] found SPG blocks indicated for facial and head pain of acute and chronic duration. Disorders treated included cluster headaches, trigeminal neuralgia, temporomandibular joint pain, post-herpetic neuralgia, Sluder's neuralgia, paroxysmal hemicranias, atypical facial pain, pain due to head and neck cancer, complex regional pain syndrome I and II, and vasomotor rhinitis. Surgical anesthesia and post-operative analgesia can be obtained for oro-facial surgery [43,44]. Others have reported its use in diverse ailments such as convulsive disorders; blindness; glaucoma; metallic taste in the mouth; earache; ophthalmoplegic migraine; sciatica; pain in the abdomen, neck, shoulder, upper extremity, and low back; asthma; angina; intractable hiccup; diarrhea; dysmenorrhea; and hyperthyroidism [45-50]. Saberski et al. [32] treated sinus arrest in post herpetic neuralgia with SPG block.

Sphenopalatine ganglion blockade has been successfully used in the treatment of trigeminal neuralgia unresponsive to medical therapy [51]. It has also been used to treat tension headache in labor and postpartum period and low back and neck pain as well in the postpartum period [21,52].

Of interest to anesthesiologists, SPG has recently been used to treat post dural puncture headache (PDPH) (post-spinal headache) in parturient as well as other patients. The SPG block appears to be a simple, minimally invasive block which can be done bedside to treat PDPH [18]. It has been shown to be as effective as epidural blood patch in relieving headache with no risk of spinal infection or neurologic complication and requires no needle or blood injection. It can be done at bedside without imaging and may have immediate onset of pain relief allowing discharge home. However, larger, prospective studies need yet to be performed to determine efficacy and safety when compared to the gold standard of PDPH care: the epidural blood patch [53-55].

Conclusion

In summary, the SPG block is an easy , safe and effective method but is currently underutilized in the treatment of painful conditions of the head and face and other indications where it has proven effective.

With new applications for trans nasal SPG block available, pain therapists should consider using it for the management of pain.

References

1. Robbins MS, Robertson CE, Kaplan E (2016) The Sphenopalatine Ganglion: Anatomy, Pathophysiology, and Therapeutic Targeting in Headache. Headache 56(2): 240-258.
2. Tepper SJ, Caparso A (2017) Sphenopalatine Ganglion (SPG): Stimulation Mechanism, Safety, and Efficacy. Headache 57 Suppl 1: 14-28.
3. Lang J (1995) Clinical Anatomy of the Masticatory Apparatus and Peri-pharyngeal Spaces. Thieme Medical Publishers Inc., New York, USA.
4. Khonsary SA, Ma Q, Villablanca P, Emerson J, Malkasian D (2013) Clinical functional anatomy of the pterygopalatine ganglion, cephalgia and related dysautonomias: a review. Surg Neurol Int 4(Suppl 6): S422-428.
5. Berkovitz BKB (2005) Nose, nasal cavity, paranasal sinuses and pterygopalatine fossa. In Standring S (Eds.), Gray's Anatomy: The Anatomical Basis of Clinical Practice. (39th edn), Elsevier Churchill Livingstone, Edinburgh, UK, pp. 578.
6. Windsor RE, Jahnke S (2004) Sphenopalatine ganglion blockade: A review and proposed modification of the trans nasal technique. Pain Physician 7:283-286.
7. Sanghavi PR, Shah, BC, Joshi GM (2017) Home based application of sphenopalatine block for head and neck cancer pain management. Indian J Palliat Care 23(3): 282-286.
8. Norton NS (2006) Netter's Head and Neck Anatomy for Dentistry. PA: Saunders, Philadelphia, USA.
9. Waxman S (1996) Correlative Neuro anatomy, (23rd edn), Stamford, Appleton & Lange, pp. 265-266.
10. Hardebo J, Arbab M, Suzuki N (1991) Pathways of parasympathetic and sensory cerebrovascular nerves in monkeys. Stroke 22(3): 331-342.
11. Eagle W (1942) Sphenopalatine neuralgia. Acta Otolaryngol 35: 66-84.
12. Gardner G, Gray A, Rahilly OS (1906) Anatomy: A Regional Study of Human Structure, (5th edn), WB Sanders, Philadelphia, USA, pp. 676-677.
13. Ruskin A (1979) Sphenopalatine (nasal) ganglion: remote effects including 'psychosomatic" symptoms, rage reaction, pain, and spasm. Arch Phys Med Rehabil 60(8): 353-359.
14. Waldman S (1993) Sphenopalatine ganglion block- 80 years later. Reg Anesth 18(5): 274-276.
15. Salar G, Ori C, Iob I (1987) Percutaneous thermo-coagulation for sphenopalatine ganglion neuralgia. Acta Neurochir (Wien) 84(1-2): 24-28.
16. Waldman SD (2004) Sphenopalatine ganglion block. In Waldman SD (Eds.), Atlas of interventional pain management. (2nd edn), WB Saunders, Philadelphia, USA, pp. 11-22.
17. Schaffer JT, Hunter BR, Ball KM, Weaver CS (2015) Noninvasive sphenopalatine ganglion block for acute headache in the emergency department: A randomized placebo-controlled trial. Ann Emerg Med 65(5): 503-510.
18. Nair AS, Rayani BK (2017) Sphenopalatine ganglion block for relieving postdural puncture headache: technique and mechanism of action of block with a narrative review of efficacy. Korean J Pain 30(2): 93-97.
19. Yang IY, Oraee S (2006) A Novel approach to trans nasal sphenopalatine ganglion injection. Pain Physician 9(2): 131-134.
20. Sluder G (1908) The role of the sphenopalatine ganglion in nasal headache. NY State J Med 27: 8-13.
21. Cohen S, Trnovsk S, Zada Y (2001) A new interest in an old remedy for headache and backache for our obstetric patients: a sphenopalatine ganglion block. Anaesthesia 56: 585-610.
22. Sluder G (1911) A phenol (carbolic acid) injection treatment for sphenopalatine ganglion neuralgia. JAMA 62(27): 2137.
23. Sluder G (1927) Injection of the nasal ganglion and comparison of methods. Ann Otol Rhinol Laryngol 36(3): 648-655.
24. Ruskin SL (1951) Techniques of sphenopalatine therapy. Eye Ear Nose Throat Mon 30: 28-31.
25. Ruskin SL (1925) Tic doloreaux and trigeminal neuralgia. Arch Otolaryngol 2: 584-586.
26. Prasanna A, Murthy PS (1993) Sphenopalatine ganglion block under vision using rigid nasal sinuscope. Reg Anesth 18: 139-140.
27. Sluder G (1927) Injection of the nasal ganglion and comparison of methods. Ann Otol Rhinol Laryngol 86: 648-655.
28. Cambareri JJ (1997) Sphenopalatine ganglion. In Thomas PS (Eds.), Image Guided Pain Management. Lippincott Raven Publishers, Philadelphia, USA, pp. 27-33.
29. Day M (1999) Sphenopalatine ganglion analgesia. Curr Rev Pain 3(5): 342-347.
30. Raj PP, Lou L, Erdine S, Staats PS (2003) Sphenopalatine ganglion block and neurolysis. In: Raj PP, Lou L, Erdine S, Staats PS (Eds.), Radiographic Imaging for Regional Anesthesia and Pain Management. Churchill Livingstone, New York, USA, pp. 66-71.
31. Peterson JN, Schames J, Schames M, King E (1995) Sphenopalatine ganglion block: a safe and easy method for the management of orofacial pain. Cranio 13(3): 177-181.
32. Saberski L, Ahmad M, Wiske P (1999) Sphenopalatine ganglion block for treatment of sinus arrest in postherpetic neuralgia. Headache 39(1): 42-44.
33. Shah RV, Racz GB (2004) Long-term relief of posttraumatic headache by sphenopalatine ganglion pulsed radiofrequency lesioning: a case report. Arch Phys Med Rehabil 85(6): 1013-1016.
34. Cady R, Saper J, Dexter K, Manley H (2015) A double blind, placebo controlled study of repetitive transnasal sphenopalatine ganglion blockade with Tx360® as acute treatment for chronic migraine - Research submission. Headache 55(1): 101-116.
35. Russell AL (1991) Sphenopalatine block-the cheapest technique in the management of chronic pain. Clin J Pain 7(3): 256-257.
36. Janzen VD, Scudds R (1997) Sphenopalatine block in the treatment of pain in fibromyalgia and myofascial pain syndrome. Laryngoscope 107(10): 1420-1422.
37. Piagkou M, Demesticha T, Troupis T, Vlasis K, Skandalakis P, et al. (2012) The pterygopalatine ganglion and its role in various pain syndromes: From anatomy to clinical practice. Pain Pract 12(5): 399-412.
38. (2017) Sphenocath.
39. (2017) SPG Nerve Block Catheter, Alleviospg.
40. Mingi C, Seng J, Wang Y, Martin S (1996) Sphenopalatine ganglion block-A simple but underutilized therapy for pain control. J Pain 6: 97-104.
41. Byrd H, Byrd W (1930) Sphenopalatine phenomena: present status of knowledge. Archives of Internal Medicine 46(6): 1026-1038.
42. Oluigbo CO, Makonnen G, Narouze S, Rezai AR (2011) Sphenopalatine ganglion interventions: technical aspects and application. Prog Neurol Surg 24: 171-179.
43. Prasanna A, Murthy PSN (1997) Vasomotor rhinitis and sphenopalatine ganglion block. J Pain Symptom Manage 13(6): 332-338.
44. Hogan QH (1993) The sympathetic nervous system in post- herpetic neuralgia. Reg Anesth 18: 271-273.
45. Berger J, Pyles ST, Saga-Rumly S (1986) Does topical anesthesia of the sphenopalatine ganglion with cocaine or lidocaine relieve low back pain. Anesth Analg 65(6): 700-702.

46. Reder M, Hymanson A, Reder M (1982) Sphenopalatine ganglion block in treatment of acute and chronic pain. In Hendler N, Lond D, Wise T (Eds.), Diagnosis and Treatment of Chronic Pain. Boston, John Wright pp. 97-109.

47. Candido KD, Massey ST, Sauer R, Darabad RR, Knezevic NN (2013) A novel revision to the classical trans nasal topical sphenopalatine ganglion block for the treatment of headache and facial pain. Pain Physician 16(6): E769-E778.

48. Cady RK, Saper J, Dexter K (2015) Long term efficacy of a double blind, placebo-controlled, randomized study for repetitive sphenopalatine blockade with bupivacaine vs. saline with the TX360 Device for treatment of Chronic migraine. Headache 55(4): 529-542.

49. Manahan AP, Malesker MA, Malone PM (1996) Sphenopalatine ganglion block relieves symptoms of trigeminal neuralgia: a case report. Nebr Med J 81(9): 306-309.

50. Grant GJ, Schecter D, Redai I, Lax J (2014) Transnasal topical sphenopalatine ganglion block to treat tension headache in a pregnant patient. Int J Obstetrical Anesthesia 23(3): 292-293.

51. Cohen S, Sakr A, Katyal S, Chopra D (2009) Sphenopalatine ganglion block for postdural puncture headache. Anaesthesia 64(5): 574-575.

52. Patel P, Zhao R, Cohen S, Mellender S, Shah S, et al. (2016) Sphenopalatine ganglion block (SPGB) versus epidural blood patch (EBP) for accidental postdural puncture headache (PDPH) in obstetric patients: a retrospective observation. Poster presentation at: 32nd Annual Meeting of the American Academy of Pain Medicine pp. 18-21.

53. Kent S, Mehaffey G (2015) Trans nasal sphenopalatine ganglion block for the treatment of postdural puncture headache in the ED. Am J Emerg Med 33(11): 1714.e1-2.

54. Kent S, Mehaffey G (2016) Trans nasal sphenopalatine ganglion block for the treatment of postdural puncture headache in obstetric patients. J Clin Anesth 34: 194-206.

55. Channabasappa SM, Manjunath S, Bommalingappa B (2017) Transnasal sphenopalatine ganglion block for the treatment of postdural puncture headache following spinal anesthesia. Saudi J Anaesth 11(3): 362-363.