

Glossopharyngeal Nerve Block versus Lidocaine Spray to Improve Tolerance in Patients with Exaggerated Gag Reflex

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Abstract

The gag reflex is a normal physiological mechanism to protect the throat and airway from foreign objects. An exaggerated gag reflex in some patients makes it difficult to perform oral procedures and also increases the risk of aspiration of dental instruments. In this study we have tried to compare the effectiveness of glossopharyngeal nerve block and that of lidocaine spray in improving the tolerance of patients with exaggerated gag reflex. Within the limits of the study we have concluded that the glossopharyngeal nerve block showed superior results when compared to lidocaine spray in terms of duration, depth and onset of regional analgesia. Hence, the technique of GNB should be studied to administer the nerve block safely and effectively by the dental surgeon when the need arises.

Keywords: Glossopharyngeal nerve block, Local anesthesia, Gag reflex, Oral surgery, Lidocaine spray

INTRODUCTION

Gagging is one of the common clinical problems that dentists face while performing dental procedures.^[1] The gag reflex is a normal physiological mechanism to protect the throat and airway from foreign objects. Exaggerated gag reflex is common in many people that cause great anguish and sometimes embarrassment during various dental procedures, making it challenging or even impossible for dentists to accomplish the treatment in the best possible way.^[2] The parasympathetic division of the autonomic nervous system mainly controls the gag reflex which guards the upper respiratory tract and digestive tract against from foreign body that might choke them.^[3] The vagus nerve (X CN) and glossopharyngeal nerve (IX CN) serve as afferent and efferent pathways for the gag reflex. Any stimulus in the region of posterior pharyngeal walls, base and posterior 1/3rd of the tongue, tonsillar pillars, or the soft palate is carried out to the CNS by CN IX which acts as an afferent pathway. The nucleus of CN IX is situated in the superior ganglion which is called as nucleus solitaries (gustatory nucleus). These nuclei, thereafter, send fibers to nucleus ambiguous which is present in the medulla. Now, the efferent fibers from the nucleus ambiguous are carried out through X CN (vagus nerve) to the constrictors of muscles of pharynx which causes gag reflexes.^[4] Many interventions have been suggested to reduce the severity of gagging which

includes anti-nausea medicines, sedatives, local and general anesthetics, herbal remedies, behavior therapy and cognitive behavior therapy, acupressure, acupuncture, prosthetic devices, relaxation, hypnosis, and drugs.^[2]

Many clinicians use anesthetic sprays although it is difficult to control and may cause toxicity. The glossopharyngeal nerve block technique to control gag reflex is popular among anesthetist and otolaryngologist, but it is used rarely in the field of dentistry to tide over the difficulty of exaggerated gagging during dental procedures.^[3]

We wanted to know how effective and safe the glossopharyngeal nerve block is compared to anesthetic spray that is a commonly used intervention in helping people undergo dental procedures successfully and in reducing the severity of gagging.

Hence, the purpose of this study is to compare the two methods of controlling gag by giving glossopharyngeal nerve block

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and using lidocaine spray to overcome the shortcomings of phenomenon of gagging in daily practices of dentistry.

Aims and objective

The aim and objective of the study are to compare and evaluate the effects of local anesthetic solutions containing 2% lignocaine epinephrine 1:2,00,000 and that of LOX 10% lignocaine spray (10 mg/puff) in terms of duration, depth, and onset of regional analgesia and management of gag reflex in patients undergoing elective dental procedures.

This study was undertaken using a parallel group study design in the outpatient clinic of the Department of People's Dental Academy, Bhopal. All necessary permissions and clearance were obtained from the institutional and ethical committee. In our study period, a total of 532 patients were examined, out of which 50 patients were found to have various grades of gagging on attempting various treatments. Patients were screened and evaluated through a comprehensive case history and physical examination to identify the grade of gagging that the patient has.

Assessment of gagging was done before Glossopharyngeal Nerve Block using gagging severity index

- Grade I -Very mild, occasional, and controlled by patient
- Grade II -Mild, control is required by the patient with reassurance from the dental team
- Grade III -Moderate, consistent, and limit treatment options.
- Grade IV -Severe and treatment are impossible
- Grade V -Very severe, affecting patient behavior, and making treatment impossible.

The selected patients were randomly assigned using a toss of coin to either of the following 2 groups: 25 patients were assigned to each study group.

- Group A: consisted of patients who received LA solution by glossopharyngeal nerve block containing 1:200,000 epinephrine (Figure 1).
- Group B: patients who received LA spray (LOX 10%) 10 mg lignocaine/puff (Figure 2).

For patients in group A, 25 gauge needle was inserted into the membrane near the base of the anterior tonsillar pillar and inserted about 0.25–0.50 cm and after careful aspiration, 3 ml of 2% lignocaine solution with 1:200000 epinephrine was injected slowly and the injection was repeated on the opposite side if needed.

For Group B Surface anesthesia of the mouth and oropharynx was achieved by spraying of local anesthetic solution on posterior pharynx. LOX 10% carrying 10 mg of lignocaine/puff was used for this method. Three puffs were given on the site.

A comparative study of the following clinical findings was done

- a. Gagging severity Index
- b. For anesthetic efficacy, we noticed time taken for injection/



Figure 1: Glossopharyngeal nerve block technique



Figure 2: Local anesthetic spray

spray and time taken for action of local anesthesia (in minutes). Anesthesia was considered to be successful if results were obtained within 5 min, adequate at 10 min, slow onset at 15 min, and failure if no anesthesia was obtained beyond 20 min.

- c. Comparison of complications involved in both the methods in terms of patient has discomfort on the administration of LA block/spray, the extent of difficulty in swallowing post-administration of LA block/spray, or patient had upper airway obstruction or foreign body sensation.

RESULTS AND DISCUSSION

Gagging is very commonly encountered in dentistry while performing different procedures^[1] such as impression making, taking of X-rays, restorative treatment, disimpaction procedures, application of rubber dam, and other procedures in the posterior region of oral cavity.

There are different ways to manage gagging such as distraction of patient's attention from dental procedure, relaxation, desensitization techniques, acupuncture, acupressure, transcutaneous electrical nerve stimulation, hypnosis, and use of pharmacological agents such as the use of local anesthetics,

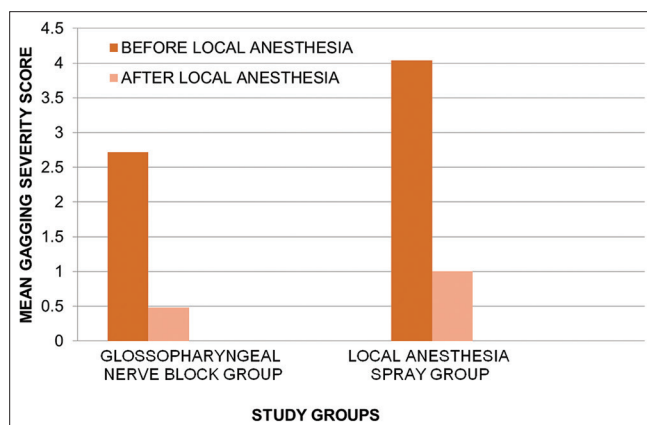
sedation, and general anesthesia.^[1] The drugs and medications which we use for the management of gagging in ENT, maxillofacial, and dental procedures are broadly classified as centrally acting and peripherally acting drugs. Peripheral acting drugs such as topical and injectable local anesthetic which eliminates the reflex of gag and help the surgeons to carry on the procedures safely.^[3]

In our study, we have included all the fields of dentistry where any stimulation in the posterior part of oral cavity stimulating gagging has to be managed. We have selected patients who had gagging while performing procedures such as extraction of impacted third molars and grossly decayed tooth, root canal treatment, impression taking of edentulous jaws, and crown preparation. Out of 50 patients in our study, who had various grades of gagging, we found 22 patients to be male and 28 patients were found to be female. The mean time taken for the action of local anesthesia (in minutes) (Table 1) in our study, which is an important parameter to decide the effectiveness and efficiency of the two approaches studied, was more in the glossopharyngeal nerve block group, i.e., 6.41 mins as compared to time taken in local anesthetic spray group which was 2.12 mins. It clearly indicates that the onset of anesthesia is shorter in local anesthetic spray group.

The Table 1 shows comparison of time required for the GNB injection, than that of lignocaine spray (in seconds). The mean time taken for GNB was found to be 40.08 s as compared to lignocaine spray (18 s). This ratio indicates that GNB has higher time for administration as compared to lignocaine spray.

Table 1: Mean time taken for injection and local anesthesia (in seconds)

Groups	Mean time taken	Standard deviation	P-value
Glossopharyngeal nerve block group	6.41	3.34	0.000*(HS)
Local anesthetic spray group	2.12	0.52	



Graph 1: Comparison of mean gagging severity index before and after local anesthesia

Graph 1 shows comparison of mean gagging severity index before and after local anesthesia. When we compare the mean gagging severity index before and after the administration of two ways of LA studied, we observed that gagging severity index has been severely reduced in patients who had been given GNB. The p value has been observed highly significant in GNB.

When the mean gagging index was compared before and after the administration of LA in both the groups, it was observed that the gagging severity index was significantly less in patients who were given GNB.

If we compare the complications involved in both the techniques in our study, 11 patients in GNB group had suffered moderate discomfort on the administration of local anesthesia (Table 2) whereas 13 patients in lidocaine spray group had suffered moderate discomfort due to bitterness of the solution.

However, the number of subjects who faced no difficulty in swallowing was higher in GNB group, i.e., 8 as compared to 1 in lidocaine spray group. It clearly suggests that patient acceptance is better in glossopharyngeal nerve block group as compared to lidocaine spray group.

32% of the patients in group A complained/ experienced upper airway obstruction following GNB whereas 16% of patients in group B experienced/complained of upper airway discomfort following LA spray application (Table 3).

In a study on the effects of GNB on post-operative pain relief after tonsillectomy by Park *et al.* in 2007,^[5] twelve patients with severe gag reflex after GNB had unsatisfactory pain relief. There was mild dyspnea observed in 7 patients undergoing GNB and the patients were managed conservatively. When we compared foreign body sensation post-administration of local anesthesia (Table 4), it was observed that 36% of the subjects had experienced foreign body sensation after administration of LA spray as compared to that of GNB (28%).

It was observed that 36% of the patients from the GNB group experienced foreign body sensation following administration of LA, whereas 28% patients of Group B felt foreign body sensation following LA spray application (Table 4).

Glossopharyngeal nerve block usually carries the risk of intravascular administration of anesthetic agent because this region is densely vascular, followed with the risk of toxicity.^[6] However, in our study, the depth of penetration was kept very superficial, only till 3 mm, so, during our study, we did not encounter any such problem in our patients and also before administration, aspiration was done to confirm.

If an excessive volume of local anesthetic solution is injected while giving glossopharyngeal nerve block, it causes blockade of the vagus nerve proximal to the origin of the recurrent laryngeal nerves which subsequently causes a serious complication that is upper airway obstruction as concluded by Bean-lijewski (1997).^[7] However, in our study, we injected only 1.5 mL of 2% lignocaine solution (1:2,00,000) while

Table 2: Distribution of discomfort level on administration of local anesthesia

Discomfort on administration of local anesthesia	Study Groups		Total n (%)	P-value
	Glossopharyngeal Nerve Block Group n (%)	Local Anesthetic Spray Group n (%)		
Mild	12 (24)	11 (22)	23 (46)	0.000*
Moderate	2 (4)	13 (26)	15 (30)	
None	11 (22)	1 (2)	12 (24)	
Total	25 (50)	25 (50)	50 (100)	

Table 3: Comparison of upper airway obstruction post-administration in both the groups

Upper airway obstruction	Study groups		Total n (%)	P-value
	Glossopharyngeal nerve block group n (%)	Local anesthetic spray group n (%)		
Absent	16 (32)	8 (16)	24 (48)	0.024*
Mild	9 (18)	17 (34)	26 (52)	
Total	25 (50)	25 (50)	50 (100)	

Table 4: Comparison of foreign body sensation post-administration of local anesthesia

Foreign Body Sensation	Study groups		Total n (%)	P-value
	Glossopharyngeal nerve block group n (%)	Local anesthetic spray group n (%)		
Absent	11 (22)	7 (14)	18 (36)	0.239
Present	14 (28)	18 (36)	32 (64)	
Total	25 (50)	25 (50)	50 (100)	

administering GNB to prevent systemic toxicity. Therefore, no such complication was encountered during our study.

In a study done by Hayashi *et al.* (2017)^[8] to examine if lidocaine spray alone is similar to spray plus viscous solution for pharyngeal observation during transoral endoscopy, they gave 5 puffs of spray (40 mg lidocaine/puff) which is usually sufficient for pharyngeal anesthesia. However, in our study, we only gave 3 puffs of lidocaine spray (LOX 10%: 10 mg lignocaine/puff) which was sufficient and made it even more quicker technique to administer.

Hence, we can conclude that the use of glossopharyngeal nerve block provides greater comfort and tolerance in patients undergoing various procedures in dentistry as compared to the conventional method used, i.e., lidocaine spray. The results show that it can be a promising and effective anesthetic technique when it comes to controlling gag reflex in patients with exaggerated gag problems. It also cuts off the potential complications and risks involved in lidocaine spray.

CONCLUSION

The present study was carried out to compare the clinical outcomes associated with the administration of various routes of local anesthesia through 2 different approaches: Glossopharyngeal nerve block of local anesthesia and lignocaine spray.

Within limits of the present study, glossopharyngeal nerve block technique showed superior results than lignocaine spray in terms of duration, depth, and onset of regional analgesia for the management of gag reflex in patients undergoing elective dental procedures.

Hence, we can conclude that the use of glossopharyngeal nerve block provides greater comfort and tolerance in patients undergoing various procedures in dentistry as compared to the conventional method used, i.e., lidocaine spray. The results show that it can be a promising and effective anesthetic technique when it comes to controlling gag reflex in patients with exaggerated gag problem. It also cuts off the potential complications and risks involved in lidocaine spray.

SOURCE OF SUPPORT

None.

CONFLICT OF INTEREST

None.

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