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**Original Research Article**

# New easy improved and safe methods of posterior superior alveolar nerve block

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## Abstract

Posterior superior alveolar nerve block is used to anaesthetize maxillary molars following different dental procedures, extraction of teeth and minor oral surgeries but due to ill defined anatomical landmarks and common complications like hematoma, dentists tend to avoid the direct posterior superior alveolar block. The aim of this study is to suggest technically ease, effective and safe PSA nerve block to prevent possible complications and alleviate fear among the dentists.

**Keywords:** Hematomas, PSA block methods.

## 1. Introduction

Local anaesthetics have been used in dentistry for a century for avoiding pain during the surgical and non-surgical procedures. The first local anesthetic agent to be widely used in dentistry was cocaine by William Halsted.[1] In 1905 Alfred Einhorn and his associates discovered procaine, an ester-based synthetic, which can be used instead of cocaine and Nils Lofgren in 1943 reported the discovery of lignocaine which is commonly used local anaesthetic even today.[2]

Several injections techniques have been used by dentists for delivery of local anaesthesia in maxilla and mandible for minor oral surgical procedures.

The posterior superior alveolar nerve (PSAN) block is a technique for achieving anesthesia for the maxillary molars. The PSAN is a major sensory branch of the maxillary division of the trigeminal nerve. A PSAN block injection is a procedure employed for effective pain control for the posterior maxillary teeth and surrounding structures supplied by this nerve.[1]

The posterior superior alveolar (PSA) nerve block targets the posterior superior nerve in the infratemporal fossa. It is accomplished by depositing the anesthetic agent along the posterior surface of the maxilla. The needle must be advanced medially, superiorly and posteriorly at a 45 degree angle to the maxillary occlusal plane to reach the infratemporal fossa. The improperly placed posterior superior alveolar nerve block can result in various complications. The hematoma formation due to trauma to the pterygoid plexus of veins is one of the most common complications. A very uncommon and rare complication of Bell's palsy can result due to improper placement of the needle into the inferior part of the parotid gland resulting to the trauma of the cervicofacial division of the facial nerve. This along with trauma of the lateral and medial pterygoid muscles could result in trismus. The injury of the blood vessel due to penetration of needle to far distally during Posterior superior alveolar nerve block may leads to temporary unaesthetic hematoma [1] Regardless of the care used in administration of Posterior superior anesthetic technique, unusual reactions can occur. Complications arising from the PSAN block include hematoma formation, transient diplopia, blurred vision, and temporary blindness.[2]

Due to reported complications and technical difficulties It's always a matter of debate among dentists to find an easy effective way of PSAN block for administration of local anaesthesia in posterior maxillary teeth.

**1.1 Aims and objectives**

The aim of this study was to find

1) Technically easy effective and simple methods of the PSAN block.
2) Any complications

## 2. Materials and methods

The study was conducted in department of oral and maxillofacial surgery of MGS dental college and research center Rajasthan after getting approval by the Hospital Ethics Committee and informed consent from the patient. The PSA nerve block was performed in 150 adult patients of age between 20 and 60 years, categorized into 3 groups of 50 patients. Out of 150 patients, 100 were males and 50 were females. The PSA nerve block was administered to remove upper second and third molars. The efficacy of anesthesia was tested by identification of the subjective and objective symptoms after a latency period of 5 to 10 min. A probe was used to find the efficacy of the anesthetic technique. Buccal tissues in front of the upper second molar root and above the distal buccal root of the first molar were pricked with probe to test the anesthesia. No reaction of pain from the patient was taken as complete anesthesia of the PSA nerve. The materials used were 2% lignocaine with 1:80000 adrenaline anesthetic solutions.

**2.1 Technique 1:**

Following the standard procedure and under all aseptic conditions patient is made to lie in semi spine position A 24 mm length needle is precurved as shown in Figure 3. The precurved needle is inserted initially in the depth of vestibule, distal and superior to the second molar region (junction of the posterio lateral surface of maxilla and posterior surface of maxilla) as shown in Figure 1. With few drops of the anesthetic solution deposited to anesthetize the path of insertion.

**Figure 1: The precurved needle is inserted initially in the depth of vestibule, distal and superior to the second molar region**

The precurved needle is inserted further superiorly along posterior wall of maxilla to a distance of approximately 5 mm and further 1 mL of solution is injected.

The precurved needle is advanced further superiorly to a distance of another 5 mm (totally 10 to 12 mm from the initial puncture point). Now the needle tip is in the middle third of posterior surface of maxilla, where the PSA nerve descends downward to reach its foramen; here 1 mL of solution is injected. This is the final position of needle in this technique that is shown on skull Figure 2.

**Figure 2: Final position of needle in this technique**

**Figure 3: Precurved 24 mm length needle**

**2.2 Technique 2:**

In this technique 26 mm length needle (Figure 4) is used to deposit local anesthesia directly in the depth of vestibule, distally and superior to third molar as shown in figure the needle is inserted further superiorly to its full length from its initial puncture area till it reaches to the middle third of posterior surface of maxilla, where the PSA nerve descends downward to reach its foramen and local anesthesia is deposited in this area. Figure 5 shows final position of needle on skull.


**Figure 4: 26 mm length needle**

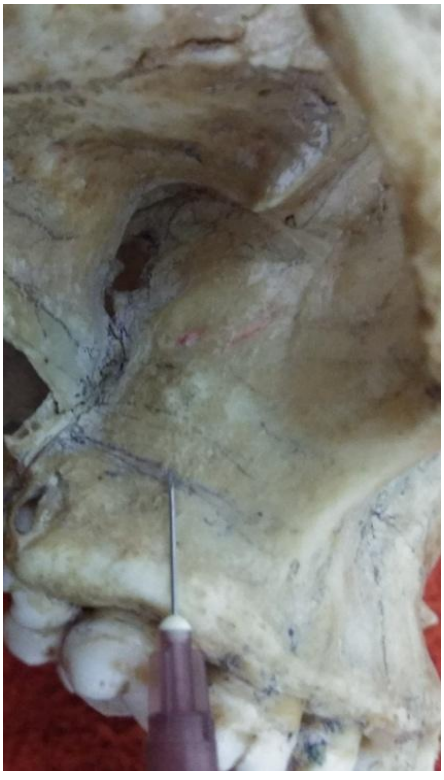


**Figure 5: Shows final position of needle on skull**

**2.3 Technique 3:**

In this technique patient is asked to shift his mandible to ipsilateral side while deposting local anesthesia as show in figure 6.

A normal 24 mm needle can be used with initial pucture site of needle being distal and superior to third molar.

The insertion is made to a distance of about ½ or ¾ in, going upward, inward, and backward direction from the initial path of insertion. This should place the needle in the vicinity of foramen through which the nerves enter the maxilla.

The distance between the lateral most bulging point of the alveolar part of the maxilla and ipsilateral anterior border of the ramus of the mandible is increased in this technique and there is less interference to the course of needle as compared to the conventional technique.

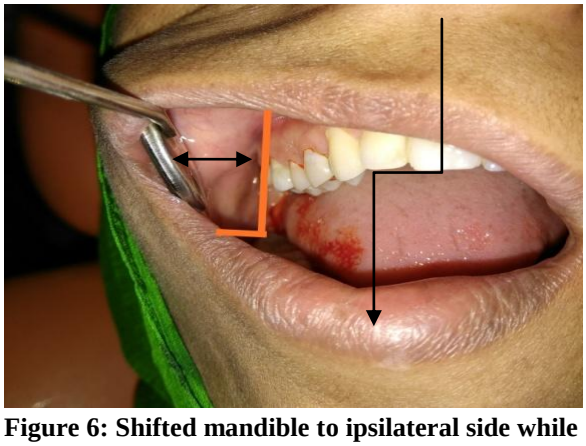


**Figure 6: Shifted mandible to ipsilateral side while deposting local anesthesia**

## 3. Results

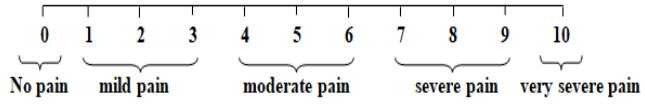
In all the 150 patients', grouped in three different categories based on techniques employed during administering local anesthesia, we obtained positive anesthesia with onset of 5 to 8 min for a duration of 60 to 90 min till the procedure was completed.

The results were consistent with the techniques employed as there was No positive aspiration in any of the techniques.

There were no extra oral hematoma or other complication reported in any of the patients of all the three groups.

There was no pain during and after extraction. The pain was assessed by Visual Analog Scale VAS, that was explained to all the patients and on scale of 10, patients response to pain after administration of local anaesthesia and after complete extraction of tooth was recorded.

**Visual analog scale**




**No pain - 0**
**Mild pain - 1-3**
**Moderate pain - 4-6**
**Severe pain - 7-9**
**Very severe pain - 10**

There was no pain recorded after administration of local anesthesia and after extraction of teeth in the areas anaesthetized during the PSA block in all the three techniques applied during the procedure.

## 4. Discussion

Dental practitioners have the challenge of providing dental care with a minimum amount of discomfort and anxiety for their patients. The science of pain control has continued to evolve since the introduction of local anesthesia into dentistry. Pain is a complex psychologic phenomenon. Pain perception levels are not constant. Pain thresholds, as well as reactions to pain, change significantly under various circumstances. The pain reaction threshold is significantly altered by past experiences and present anxiety levels. The dental profession continually explores new methods to help meet the challenges faced by dental care providers. Traditional methods of anesthetizing maxillary teeth include supraperiosteal infiltration over a specific targeted tooth or a nerve block. Numerous studies have demonstrated that infiltration injection of anesthetics results in 90%-95% successful pulpal anesthesia in maxillary teeth.1-3 Descriptions of conventional techniques for maxillary anesthesia are available for review in numerous articles and textbooks. Clinically, maxillary anesthesia is more successful than mandibular anesthesia, and the infiltration is

by far the dominant approach.4 PSA block is associated with many complications. One of the complications noted by Prakasm *et al*, in a case of patient receiving posterior superior alveolar (PSA) block was temporary pupillary dilatation and ptosis.[5]

Literatures insists that posterior superior alveolar nerve block should be administered with a short needle of 20mm in order to avoid injuring the blood vessels to prevent complications.[4] One of the most common complication encountered after posterior superior alveolar nerve block is hematoma arising from venous plexus or from the maxillary artery itself,3 along with other neurological complications like peripheral nerve palsy, abducent nerve palsy resulting in diplopia and also temporary blindness due to involvement of optic nerve.[5] Malamed SF [3] had stated that even after following strict injection protocol, complications may arise

A short needle is usually recommended for a PSAN block injection as a long needle will harm the pterygoid plexus. A cadaver study proved that the improper size and placement of needle could damage the pterygoid plexus.[7] A patient whose abducent nerve is involved may complain of double vision and may exhibit limitation of abduction of the ipsilateral eye as well as paresthesia of the lateral side of the upper and lower eyelids in limited cases.[8]

Standard operating protocol was followed while admistering The PSA nerve block technique as described in the Monheim's text, with slight modifications as described above

i. The operator stands on the right side of patient. The patient is positioned so that the maxillary occlusal plane is at 45° angle to floor. The operator moves the left forefinger over the mucobuccal fold in a posterior direction from the bicuspid area until the zygomatic process of maxilla is reached. At its posterior surface, the fingertip will rest in a concavity in the mucobuccal fold.
ii. At this point the left forefinger is rotated so that the finger nail is adjacent to mucosa and its bulbous portion is still in contact with the posterior surface of the zygomatic process.
iii. Now the hand is lowered with the finger keeping the bulbous portion in contact with the zygomatic process so that the finger is in a plane at right angles to the occlusal surface of maxillary teeth and at the 45° angle to the patient's saggital plane.
iv. The index finger should be pointing in the exact direction the needle is to follow.
v. Now we followed our technique 1, techinque 2 and technique 3 in three different patient groups for administering local anesthesia as described above.

## 5. Conclusion

In our study, the techiniques we have applied and suggested in depositing local anesthesia as part of modifications to posterior superior alveolar nerve block will successfully help in preventing common complications like hematoma and instill a positive attitude among the dentists and alleviate fear while administering posterior superior alveolar block.

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