Palatal approach of anterior superior alveolar injection technique may not be potentially useful in periodontal procedures

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Abstract:
Background: The palatal approach of anterior superior alveolar (P-ASA) using WAND injection was reported to effectively provide a profound bilateral maxillary anesthesia of the soft tissue of anterior one-third of the palate and facial gingivae extending from canine to canine which lasted for more than an hour thus making it ideal for scaling root planing and minor periodontal procedures in the anterior maxilla. Our study suggests that the conventional P-ASA injection is of very short duration and the extent of anesthesia was not profound and consistent. This has not been reported earlier in the literature.

Materials and Methods: Thirty-five cases (20 males and 15 females), who underwent scaling, root planing and minor periodontal surgical procedures such as abscess drainage, gingivectomy, and frenectomy in the maxillary anterior region in the age range of 19–45 years was assessed for the efficacy of the P-ASA injection. After the administration of the P-ASA injection, the subjective and the objective symptoms were used to evaluate the extent and duration of the anesthesia at 10, 15, and 20 min.

Results: This study suggests that the conventional P-ASA injection technique does not provide anesthesia for more than 20 min. Wilcoxon matched pairs test was used to compare the effect of anesthesia at the different time intervals and the results were found to be statistically significant (P < 0.05).

Conclusions: The conventional P-ASA injection technique is of very short duration and does not demonstrate effectiveness in periodontal surgery of the anterior maxilla.

Key words: Local anesthesia, pain, periodontal surgery

INTRODUCTION

Periodontal surgery of the anterior maxilla involving the right and left central and lateral incisors and the canines usually require anterior superior alveolar (ASA), and the nasopalatine (NP) blocks along with the supplemental infiltrations if required. Traditionally, dentists have anesthetized the maxillary anterior teeth by administering an infiltration injection near the apex of the target tooth.[1] However, in the recent past, a site-specific injection for anesthetizing the maxillary anterior teeth has been introduced – The palatal-ASA (P-ASA) injection using the WAND™ system, i.e., a computer-controlled local anesthetic delivery (CCLAD).[2]

As described by Malamed[3] the P-ASA injection involves a palatal injection into the incisive canal, and it derives its name from the ability of the injection to anesthetize both the right and left ASA nerves. The right and left ASA nerves branch from their respective infraorbital nerves for approximately 6–10 mm before they exit from the infraorbital foramina.

The ASA nerves provide pulpal innervations to the central incisors, lateral incisors, and canines, as well as sensory innervations to the periodontal tissues, labial bone and mucous membrane adjacent to these teeth.[4] The ASA nerve communicates with the middle superior alveolar (MSA) nerve and gives off a small nasal branch that innervates the anterior part of the nasal cavity, along with the branches of the pterygopalatine nerves. In persons without MSA, ASA frequently innervates the premolars and mesiobuccal root of the first molar.[5]
The NP nerve, a nasal branch of pterygopalatine nerve, passes across the roof of the nasal cavity downward and forward. It enters the incisive canal and passes into the oral cavity via the incisive foramen innervating the region of the premaxilla. The NP nerve block can be used to anesthetize the anterior portion of the hard palate (hard and soft tissues) from the mesial of the right premolar to left first premolar. Friedman and Hochman reported in their study that the P-ASA injection technique provided a profound bilateral maxillary anesthesia extending from canine to canine which lasted for 60 min or more. In addition, they stated that soft tissue anesthesia of anterior one-third of the palate and facial gingivae was also achieved without numbness to the lips and face or interferences with the muscles of facial expression thus providing an attractive alternative for pain control during scaling and root planing along with minor periodontal surgical procedures such as gingivectomy, frenectomy, curettage, and periodontal abscess drainage. They also mentioned that although the WAND™ system has the advantage of a precise flow rate during the administration of the anesthetic solution, further clinical investigations are required to test the traditional/conventional technique.

The objective of our study, therefore, was to confirm the efficacy of the P-ASA injection with the conventional anesthetic technique.

**MATERIALS AND METHODS**

This study was conducted at the Department of Periodontics, S.D.M. College of Dental Sciences and Hospital, Dharwad, India in April 2010 to February 2011. Thirty-five cases (20 males and 15 females), who underwent scaling, root planing, and minor periodontal surgical procedures such as abscess drainage, gingivectomy, frenectomy, and curettage in the maxillary anterior region in the age range of 19–45 years were assessed for the efficacy of the P-ASA injection. Informed written consent was obtained from all the subjects. Ethical clearance was obtained from the Institution’s Ethical Committee (Internal Review Board) governing good clinical practice.

All the subjects were nonsmokers and in good general health with no systemic diseases, thus obviating any alteration in pain perception and the time interval of anesthesia. None of the female subjects were pregnant. No tooth was carious. Mobility of teeth was absent.

A conventional syringe with a 27-gauge needle containing 2 ml of lignocaine with 1:100,000 epinephrine was used for the conventional P-ASA injection in all the subjects. Anesthetic solution used by Friedman and Hochman in the present study is similar. The anesthetic solution was deposited in the designated location as follows.

In the initial needle-insertion-phase of injection, the beveled surface of the needle was placed at a groove just lateral to the incisive papilla at the palatal aspect of the two central incisors (11 and 21) as shown in Figures 1 and 2 and then the needle was reoriented at an angle of 45° parallel to the facial aspect of the maxilla so that it would gain entrance into the incisive canal. The needle was advanced slowly into the canal and was placed to a depth of 6–8 mm from the initiation of needle placement.

Once the bony resistance was felt, approximately 1.5–2.0 ml of the anesthetic solution was delivered over an approximate 4 min (at the rate of 0.5 ml/min) during the solution deposition phase as compared to 0.9–1.4 ml in the reported study. None of the cases was administered more than 2 ml of solution in the P-ASA injection. Although CCLAD systems have been recommended for slow deposition; this is not an absolute requirement. CCLAD was not used in this study.

The study was carried out to evaluate the extent and profundity of the P-ASA injection. All 35 subjects were provided the conventional P-ASA injection. Subjective and objective symptoms of anesthesia in the associated soft tissue extended bilaterally on both buccal and palatal aspects were evaluated. Based on Malamed, subjective evaluation included a sensation of firmness and numbness of buccal and palatal tissues, and numbness of teeth and soft tissues involving the maxillary anterior. The objective evaluation included blanching of the buccal soft tissues involving central and lateral incisors and the area involving midbuccal portion of the canine in a few subjects, pressure testing the soft tissues with a blunt end of a manual dental instrument and evaluation of pain during the procedure.

The subjective and objective symptoms for extent and profundity of anesthesia were evaluated at 10, 15, and 20 min for each subject. Within 1 min after P-ASA injection, there was blanching on labial and palatal aspect in the maxillary anterior region. Anesthesia was noted in the associated soft tissue affecting bilateral central and lateral incisors and canines both on the labial side and the palatal side as shown in Figure 3. On the buccal aspect in all the 35 subjects, anesthesia involved the marginal and the attached gingiva of the central and lateral incisors. It was noted that when the needle was inserted from the right side of the groove on the incisive papilla, the mesial portion of the canine was involved and vice versa. However, canines on the palatal aspect were involved bilaterally. During scaling and root planing and minor periodontal surgical procedures, any subject reporting ineffectiveness of the anesthesia due to prolonged surgical procedure (which was further confirmed by the objective symptoms) was provided with an appropriate supplemental anesthesia. The effect of anesthesia was evaluated at 10, 15, and 20 min [Tables 1 and 2].

**RESULTS**

The onset of anesthesia in all the 35 patients occurred within the first 4–5 min but the anesthetic effect lasted for around only 15–20 min.

After the completion of scaling and root planing and the indicated periodontal surgical procedures, 10 subjects (5 males and 5 females) required a buccal infiltration in the anterior region supplementing P-ASA injection after 10 min, 13 subjects (7 males and 6 females) required buccal infiltration after 15 min, and in 12 subjects (7 males and 5 females) a supplementing buccal infiltration was administered after 20 min.

The data were subjected to Wilcoxon matched pairs test to compare the effect of anesthesia at different time intervals. A statistical significance set at 5% level of significance ($P < 0.05$). In
DISCUSSION AND CONCLUSION

Differing from Malamed[3], this study indicates that the P-ASA injection technique provided a profound bilateral anterior maxillary anesthesia involving the marginal and the attached gingivae of the central and lateral incisors on the buccal side, and the canines on the palatal side. According to Friedman and Hochman[2,5,8,9] the use of P-ASA injection using WAND™ for the anesthesia of the six anterior teeth would be advantageous because only one injection would anesthetize all the anterior teeth bilaterally for more than an hour, thus making it ideal for scaling and root planing; and minor periodontal surgical procedures such as abscess drainage, curettage, frenectomy, and gingivectomy. However, our study using the conventional P-ASA technique was not comparable with Friedman and Hochman’s[2] clinical impression of PASA injection using the WAND™, especially with regard to the duration of time. However, though the onset of anesthesia occurred within first 4–5 min in the conventional P-ASA technique used in this study, the duration of anesthesia was not more than 60 min as documented by Friedman and Hochman.[3]

This study suggests that the conventional P-ASA injection technique provides anesthesia involving the marginal and attached gingivae of the central and lateral incisors on the buccal side and mesial portion of canine in some subjects and on the palatal side the anesthesia extending bilaterally from canine to canine, which lasts for a duration not more than 20 min. This has not been reported earlier in the literature. Although the P-ASA technique using the WAND™ has been reported to be beneficial,[10-15] the same using a conventional technique may not be as efficacious. The WAND™ system may not be economically feasible for every clinician. This study was an attempt, as suggested by Friedman and Hochman cited earlier to explore the conventional P-ASA technique, and we agree with them that more clinical investigations are needed to assess its efficacy for routine clinical use.
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Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Burns Y, Reader A, Nusstein J, Beck M, Weaver J. Anesthetic efficacy of the palatal-anterior superior alveolar injection. J Am Dent Assoc 2004;135:1269-76.
2. Friedman MJ, Hochman MN. P-ASA block injection: A new palatal technique to anesthetize maxillary anterior teeth. J Esthet Dent 1999;11:63-71.
3. Malamed SF. Handbook of Local Anesthesia. 5th ed. St. Louis: Mosby; 2004. p. 171-225.
4. Jastak JT, Yagiela JA, Donaldson D. Local Anesthesia of the Oral Cavity. Philadelphia: WB Saunders; 1995.
5. Friedman MJ, Hochman MN. The AMSA injection: A new concept for local anesthesia of maxillary teeth using a computer-controlled injection system. Quintessence Int 1998;29:297-303.
6. DuBrul EL. Sicher’s Oral Anatomy. 7th ed. St. Louis: Mosby; 1980.
7. Hawkins JM, Isen D. Maxillary nerve block: The pterygopalatine canal approach. J Calif Dent Assoc 1998;26:658-64.
8. Friedman MJ, Hochman MN. Using AMSA and P-ASA nerve blocks for esthetic restorative dentistry. Gen Dent 2001;49:506-11.
9. Friedman MJ, Hochman MN. A 21st century computerized injection system for local pain control. Compendium 1997;18:995-1003.
10. Loomer PM, Perry DA. Computer-controlled delivery versus syringe delivery of local anesthetic injections for therapeutic scaling and root planing. J Am Dent Assoc 2004;135:358-65.
11. Sculean A, Kasaj A, Berakdar M, Willershausen B. A comparison of the traditional injection and a new anesthesia technique (The Wand) for non-surgical periodontal therapy. J Indian Soc Periodontol 2004;1:363-8.
12. Saloum FS, Baumgartner JC, Marshall G, Tinkle J. A clinical comparison of pain perception to the Wand and a traditional syringe. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2000;89:691-5.
13. Saxena P, Gupta SK, Newaskar V, Chandra A. Advances in dental local anesthesia techniques and devices: An update. Natl J Maxillofac Surg 2013;4:19-24.
14. Kumar S. Newer delivery systems for local anesthesia in dentistry. J Pharm Sci Res 2015;7:252-5.
15. Mittal M, Kumar A, Srivastava D, Sharma P, Sharma S. Pain perception: Computerized versus traditional local anesthesia in pediatric patients. J Clin Pediatr Dent 2015;39:470-4.