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EVALUATION OF EFFICIENCY AND EFFICACY OF ANTERIOR MIDDLE SUPERIOR ALVEOLAR INJECTION TECHNIQUE IN MAXILLARY PERIODONTAL OPEN FLAP DEBRIDEMENT PROCEDURE- A PROSPECTIVE FEASIBILITY STUDY

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ABSTRACT

Background: The five nerves must be anaesthetized before performing open flap debridement on the maxillary quadrants. We intended to investigate the efficacy of a single injection as the Anterior Middle Superior Alveolar (AMSA) nerve block technique rather than multiple injections. Methods: For this study, 35 male and female subjects aged 18 to 50 years were recruited. For the maxillary periodontal surgeries, all participants received an AMSA block. Anaesthesia efficacy and effectiveness were evaluated and presented as means averages. The subjective and objective signs of anaesthesia efficacy were satisfactory. During the entire procedure, 86.7% experienced no pain and 13.33% experienced pain near the end of surgery that too minimal scoring 2 on the VAS.. Pain was reported in 13.3% of the cases in the anterior teeth buccally. Repeat LA (Buccal infiltration) was given in all these cases. Conclusions: AMSA technique in single injection anaesthetizes larger area in maxilla, both buccal and palatal without collateral involvement of the adjacent lip, nose & eyelids. The AMSA injection can be used as an

effective technique to anaesthetize teeth distal to the first molar up to the last standing molar in maxillary periodontal open flap debridement procedures.

Keywords: AMSA, Maxilla, Local anaesthesia, Periodontal surgery, Open flap debridement

INTRODUCTION:

Local anaesthesia is an essential component of periodontal flap surgeries. Anaesthesia is required for the following nerves during open flap debridement for maxillary quadrants: anterior superior alveolar nerve, middle superior alveolar nerve, posterior superior alveolar nerve, greater palatine nerve, and nasopalatine nerve. Traditionally, five injections at the mucoperiosteal folds near the nerves are required to achieve complete anaesthesia of all five branches. In addition, this technique anaesthetizes not only the buccal and lingual soft tissues, but also the lips, lower eyelid, and lateral aspect of the nose, reducing patient discomfort **[1, 2]**.

To address this, Friedman and Hochman proposed an alternative single injection anaesthetic technique, the Anterior Middle Superior alveolar nerve injection technique, to anaesthetize the entire maxilla (AMSA) **[3]**. The name derives from the block's ability to anaesthetize all three constituent nerves. This AMSA technique has been used successfully in oral surgery for maxillary tooth extraction **[4, 5]** and minor surgical procedures **[6, 7]**, restorative dentistry to achieve pulpal anaesthesia **[8]**, and paediatric dentistry **[9, 10]**. A search of the literature for AMSA techniques in maxillary periodontal procedures revealed only a few reports on the effectiveness of AMSA in scaling and root planning **[11, 12]**. There were very few reports on the open flap debridement procedure **[13, 14, 15]**. In lieu of the above, the present study was undertaken to find out the effectiveness and effectiveness of the AMSA technique for maxillary periodontal open flap debridement procedures. The technique as described by Malamed: The plexus where anterior and middle superior alveolar nerves meet is the target site for AMSA. The injection site is identified at the intersection of a vertical line bisecting the premolars and a horizontal line halfway between the mid-palatine raphe and the crest of the free gingival margin in the hard palate **(Figure 1)**. Anaesthetic solution is deposited at the site at the rate of 0.5ml per minute. On the deposition of the solution, blanching will be observed on the palatal tissue unilaterally till the midline **[16, 17] (Figure 1)**.

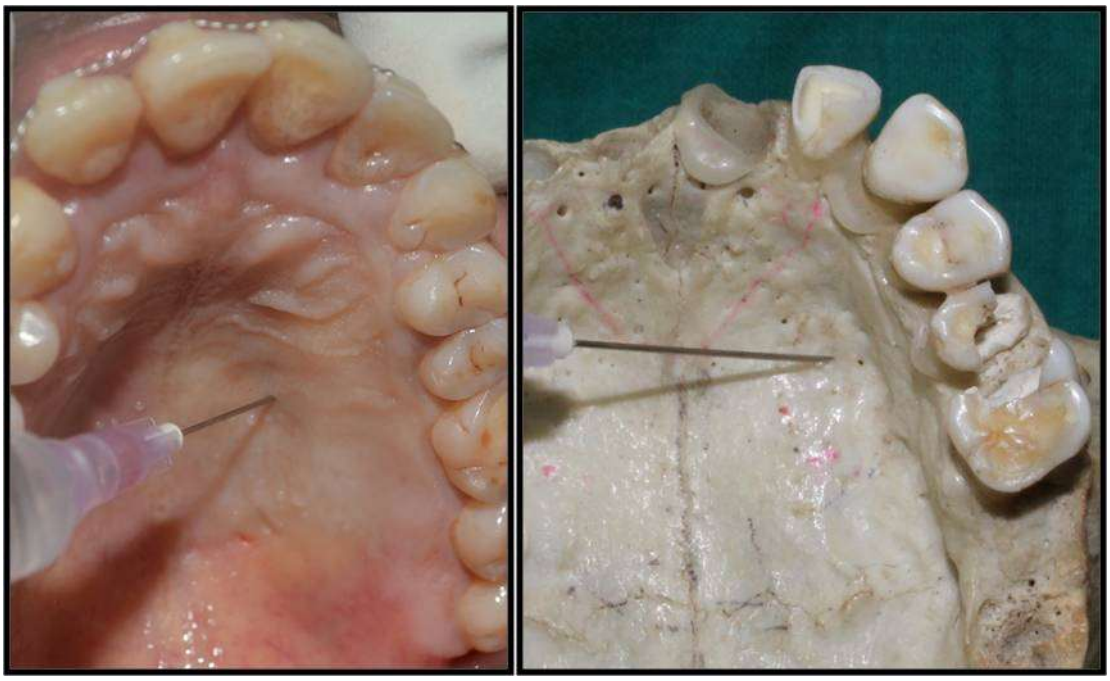

Figure 1: Site of injection for AMSA

This technique anesthetizes structures innervated by the greater palatine nerve, nasopalatine nerve, anterior superior alveolar nerve, and middle superior alveolar nerve **[1, 18]**. Such extent of diffuse anaesthesia is obtained as a result of solution diffusing through nutrient canals in the porous cortical plate **[19, 20]**.

SUBJECTS AND METHODS:

The subjects for this study were recruited from the patient pool of the Department of Periodontology, in a tertiary institute in South India. *Inclusion criteria:* Patients with chronic periodontitis, indicated for periodontal flap surgery who consented to the study were included in the study. The study was approved by the research committee of department of periodontology. *Exclusion criteria:* Patients with a known allergy, patients under medications that would alter their pain perception including narcotics, pregnant and lactating women, and any use of central nervous system depressants within the previous 48 hours were excluded from the study. A total of 35 male and female subjects aged between 18 – 50 years were recruited for this study. The nature of this investigation was explained to the participants in detail and signed informed consent was obtained. All 35 participants received AMSA block for the maxillary periodontal surgeries. For AMSA block conventional disposable plastic syringes with 22mm needle & 25 gauge loaded with

lignocaine 2% with 1:100,000 epinephrine was used. All the injections were administered by the same investigator. To establish the injection site on the palate, the parameters described in the original technique by Friedman and Hochman were followed. 1 ml of anesthetic solution was deposited in 2 – 3 min. The investigator left the operation room and all assessments were done by a second blinded observer. There is no patient blinding as the injections were made. The study is assessing the feasibility of the block and not a randomized controlled one. The trial was in accordance with the declaration of Helsinki. The following parameters were assessed: pain, discomfort during administration, bleeding or swelling immediately following administration, Time of onset of anesthetic effect, duration of action of LA, duration of the procedure, pain during the procedure, and whether repeat LA was needed. The pain, swelling & discomfort at the site of administration was assessed after 12 hours and 24 hours. For assessing the efficacy of LA, subjective symptoms like a sensation of firmness and numbness of palatal and buccal tissues & numbness of teeth and soft tissues extending from the central incisor to the last molar were assessed.. Objective signs of LA efficacy like blanching of the palatal and buccal soft tissues from the central incisor to the last molar & presence or absence of sensation on pressure testing of the soft tissues with a manual dental instrument were also done and recorded. The achievement of such symptoms meant efficacy is achieved the onset and duration of the block were defined as efficiency. If the onset of the block was within ten minutes, it was found to be efficient with two parameters under the primary outcome measure, with a possible 90 % confidence interval, 5 % error chance and a target population of 300 with a 3 % target patients, a sample of 29 is enough. We recruited 35 patients to overcome dropouts. A simple descriptive analyses with mean and SD is all needed for the study.

RESULTS

The average time duration for the administration of anaesthetic solution was 2.8 min. the mean time taken for onset of action of anaesthesia was 5.59 minutes. The duration of all the periodontal flap surgeries done was 55 min and the time duration of anesthetic action was 95.5 min **(Table 1)**.

Considering the subjective and objective signs of efficacy of anaesthesia, 100% of the patients experienced sensation of firmness and numbness of palatal and buccal tissues numbness of teeth and soft tissues extending from the central incisor to the last molar.

Again 100% of the subjects had no sensation on pressure testing the soft tissues with a manual dental instrument, but blanching of the soft tissues till the last molar was observed in only 80% of the cases. In rest 20% blanching was observed only till the mesial aspect of 1st molar **(Table 1)**.

During administration of anaesthesia, no bleeding at the site was observed in 76.6% and no swelling at the site as evident in any of the cases. Pain during administration of anaesthesia was recorded as VAS scoring by the patient. 3% of the subjects scored 1, 66.7% scored 2, 16.7% scored 3 and 3.33% scored 4 **(Table 2)**. During the entire procedure, 86.7% experienced no pain & 13.33% experienced pain towards the end of surgery, and all the 13.3% scored 2 according to VAS. In all the 13.3% cases pain was experienced in the anterior teeth bucally. Repeat LA (Buccal infiltration) was given in all these cases **(Table 2)**.

Table 1: Comparison of various objective & subjective signs of anaesthesia

		Minimum (Minutes)	Maximum (Minutes)	Average
Duration for administration		1.0	3.5	2.8 min
Time taken for onset of action of anaesthesia		4.0	10.0	5.59 min
Duration of all the periodontal flap surgeries		40.0	90.0	55 min
Time duration of anaesthetic action		45.0	80	95.5 min
		During administration		After administration	
		Yes	No	Yes	No
Bleeding at the site of injection		-	100%	-	100%
Swelling at the site of injection		-	100%	-	100%
				Yes	No
Subjective signs	Sensation of firmness and numbness (Buccal & Lingual)			100%	-
	Numbness of teeth and soft tissues extending from the central incisor to the last molar			100%	-
Objective signs	Blanching till the last molar			80%	20%
	No sensation on pressure testing the soft tissues with a manual dental instrument			100%	-

Table 2: Pain during administration (VAS)

VAS scores	0	1	2	3	4	5	6	7	8	9	10
During administration (n =)	0	4	25	5	1	-	-	-	-	-	-
During procedure (n =)	29	4	-	2	-	-	-	-	-	-	-

DISCUSSION:

Local anaesthetic administration is a critical step in any surgical procedure and is generally regarded as painful. The postero-superior alveolar nerve block, anterior superior alveolar nerve block, middle superior alveolar nerve block, greater palatine, and nasopalatine nerve blocks are required to achieve adequate anaesthesia of the maxillary quadrants for periodontal surgical procedures. This implies multiple pricks, which may be extremely painful for

the patient **[21]**. Infraorbital nerve block and maxillary block are alternative techniques. However, these are extremely technique dependent. Furthermore, these techniques cause collateral numbness of the upper lip, lower eyelid, and lateral aspect of the nose **[22]**.

Friedman and Hochman proposed the AMSA technique to overcome the limitations of traditional maxillary anaesthesia techniques. The injection site is at the junction of the anterior superior alveolar nerve, the middle superior alveolar nerve, and the subneural dental plexus, near the premolar root apices **[13]**. As a result of depositing large volumes of anaesthetic solution in this region, anaesthetic solution can diffuse through pores in the palatal bone and reach the neural plexus, anaesthetizing all five aforementioned nerves with a single injection **[23]**.

The results of the present study show that the average time duration for administration of anaesthetic solution was 2.8 min. the time taken for onset of action of anaesthesia was 5.59 minutes on an average the time duration of anaesthetic action was 90.5 min. this in accordance with study conducted by JJ patel *et al* **[13]**, 2012, Sangle A *et al* **[8]**, 2012, Goyan *et al*, 2014 **[24]**. But Valesco *et al* reported that the duration of pulpal anaesthesia ranged only between 23-40 min **[25]**. Acharya AB *et al*, reported profound anaesthesia especially the palatal anaesthesia as long as 180 minutes.

Considering the subjective & objective signs of efficacy of anaesthesia, in the present study, 100% of the patients experienced sensation of firmness and numbness of palatal and buccal tissues & numbness of teeth and soft tissues extending from the central incisor to the last molar.

Again 100% of the subjects had no sensation on pressure testing the soft tissues with a manual dental instrument, but blanching of the soft tissues till the last molar was observed in 80% of the cases. In rest 20% blanching was observed only till the mesial aspect of 1st molar. This was in accordance with study by Acharya AB **[14]** *et al* which reported effect of anaesthesia beyond the first molar and extending to the last standing molar. Contrarily many reports suggest blanching and anaesthesia only till the mesial aspect of first molar **[13, 24]**. Fukayama *et al* **[6]** described blanching and anaesthesia extending from lateral incisor to the second premolar, and found it to be less effective in the area of the central incisor and first molar.

During the entire procedure, 86.7% experienced no pain & 13.33% experienced pain towards the end of surgery, and all the

13.3% scored 2 according to VAS. In all the 13.3% cases pain was experienced in the anterior teeth bucally. Repeat LA (Buccal infiltration) was given in all these cases. Similarly in report by Acharya AB **[14]** *et al*, buccal infiltration was required in few cases. The reason could be poor diffusion of the anaesthetic solution into the bone.

The advantages of the AMSA technique include single injection that covers large maxillary surgical fields, reduced amount of local anaesthetic and vasoconstrictor deposited. Because normal lip function is not affected, gingival contours can be monitored during aesthetic procedures. Large volumes of LA deposited in the palate provide excellent hemostasis in periodontal mucogingival procedures, particularly during graft procurement from the palate. Because the LA has a palatally acting vasoconstrictor effect, no vasoconstrictor affects buccal gingiva. As a result, adequate blood supply is maintained at the recipient site in the case of free gingival or connective tissue grafting **[26]**.

The main limitation of this work is that it is only a feasibility study with no controls. The AMSA technique, too, has some limitations. Long administration times, for example, may be uncomfortable for the patient. Since no vasoconstrictor affects the buccal gingiva, it may lead to less than desirable hemostatic control **[26]**.

CONCLUSIONS:

AMSA technique in single injection anesthetizes larger area in maxilla, both buccally & palatally without collateral involvement of the adjacent lip, nose & eyelids. From our study, it is evident that in the AMSA technique, the anaesthetic effect extended till the last present molar. The profoundness of the anaesthesia in the anterior region varied in a few cases. From this study, it is evident that the AMSA technique can be effectively used for maxillary periodontal open flap debridement procedures. Hence The AMSA injection is a valuable anaesthetic technique for periodontal surgery of the maxilla.

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