Anaesthetic Efficacy of the Anterior Middle Superior Nerve Block for Extraction of Maxillary Anterior Teeth

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Abstract:

Aim: The aim of the present clinical trial was to evaluate the efficacy of a relatively newer anterior middle superior alveolar (AMSA) local anaesthetic technique for the extraction of anterior maxillary teeth. **Method :** Forty subjects with an age range of 18 to 45 years were selected for the present study. AMSA technique was used for obtaining local anaesthesia of maxillary anterior teeth. 2% ligocaine containing 1:200,000 epinephrine was used for anaesthesia. For each patient, the operator obtained the time of onset of anaesthesia, visual analogue scales for pain after the injection and immediately after extraction. VAS scores of acceptance of the procedure were also recorded postoperatively. Patients Data was analyzed using descriptive statistical methods (frequency, means and standard deviations) using SPSS ver. 16.0 (SPSS Inc.). **Results:** The average time of onset in seconds was M=291.46, SD=50.26 and SEM=8.04 in seconds. The pain of injection in VAS score was M=4.02, SD=1.06 and SEM=0.17. The pain of extraction in VAS score was M=0.56, SD=0.64, SEM=0.10. The patients' acceptance of the procedure in VAS score was M=2.74, SD=0.91 and SEM=0.14). All the patients accepted the procedure well and did not have any post extraction complications. All were evaluated seven days after the procedure and showed satisfactory healing of the extraction sockets. **Conclusions:** The AMSA technique is a useful alternative technique for maxillary anterior teeth extractions. It is a preferable technique for periodontal surgeries and restorative procedures, because it does not anaesthetize the buccal and facial tissues.

Keywords: Maxilla, Local Anesthesia, Teeth, Extraction.

Introduction

Over a long time period, anaesthesia of the maxillary teeth by has been obtained by administering an infiltration injection on the buccal or labial aspect of the tooth to be treated.[1] The infraorbital, or intraosseous and intraligamentary injection have also been traditionally used for anaesthesia of the maxillary teeth and soft tissues.[2,3] Maxillary dentoalveolar procedures almost always require more than one injections. They may also affect the smile line by inadvertently anesthetizing the facial structures.[3] This may be a source of embarrassment to the patients and can adversely affect their social life.

The anterior middle superior alveolar (AMSA) injection is a relatively recent technique, which has been used for the

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anaesthesia of the anterior maxillary teeth.[4] This technique was introduced by Friedman and Hochman.[4] They stated that for an expected duration of 45 to 60 minutes, the AMSA achieves pulpal anaesthesia of the maxillary central and lateral incisors, canines, and first and second premolars, after an injection of 0.6 to 1.4 mL of anaesthetic solution. They also stated that no numbness of the lips and face, or interference with the muscles of facial expression is noted, and palatal soft tissue anaesthesia is obtained.[4]

This nerve supposedly anaesthetises the anterior and middle superior alveolar nerves because of diffusion of the anaesthetic solution via numerous nutrient channels on the palatal process of the maxillary bone.[4,5] The AMSA derives the name because of this reason. Ten maxillary teeth extending from the second premolar on one side to the second premolar on the opposite side are anesthetised by a bilateral AMSA. The site for the AMSA injection is located palatally at a point that bisects the premolars and is approximately halfway between the midpalatine raphe and the crest of the free gingival margin.[6] Since its discovery, this local anaesthetic technique has been successfully used in various maxillary dentoalveolar procedures.

The purpose of this prospective study was to determine the anaesthetic efficacy of the AMSA injection delivered by the conventional syringe for extraction of maxillary anterior teeth, using 2% Lignocaine hydrochloride and 1:200000 adrenalin as a local anaesthetic agent.

Materials and Method

A total of 40 adult patients who required extractions of any single maxillary anterior tooth for various reasons were included in the study. The inclusion criteria was healthy adult patients, free from systemic disease, patients who gave consent for participation in the study, and requiring extraction of only one maxillary anterior tooth. The exclusion criteria were use of medications that alter pain perception, presence of systemic pathologies or allergies that contraindicate local anaesthetics with vasoconstrictors, patients allergic to local anaesthetics and pregnancy. This study was approved by the ethics committee of our institution. A written signed informed consent was obtained from all the patients.

To establish the injection site on the palate, the parameters described in the original technique by Friedman and Hochman were followed.[4] The AMSA injection site was centred halfway between the mid palatine raphe and the gingival margin of the first and second premolars (Fig.1). A topical aerosol local anaesthetic (15% lignocaine w/w) was used at the site before injection for duration of 60 seconds. About 1.4 ml of 2% lignocaine with 1:200000 adrenalin was used as the local anaesthetic agent. Subjects were placed in a semi-supine position with the head tilted up and back. It was delivered using a 2ml conventional Luer lock syringe with needle specifications 0.45 X 38 mm, 26 X 1 ½. 1.4 ml of the solution was deposited in the palate over a period of 3 minutes as described by Velaso et. al. (2012).[3]

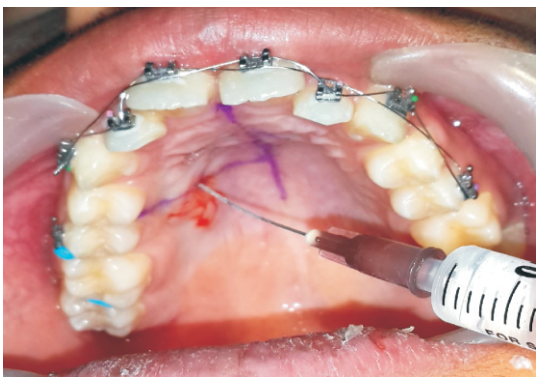

Fig. 1: The site of injection for AMSA block

The adequacy of anaesthesia was checked by objective signs, determined by no pain at the buccal and palatal gingiva on probing 6 minutes after the injection completion. Thereafter the extraction procedure was carried out. Time of onset (seconds), pain on injection (visual analogue scale=VAS), pain of extraction (VAS), and acceptance of the procedure (VAS) was recorded. The patient was given standard postoperative instructions and analgesic tablet 400mg ibuprofen T.I.D for two days. The patient was instructed to contact the operator in case of any problem. The data so obtained was subject to simple statistical analysis using the SPSS software version 16.0. Since it was not a comparative study, no particular statistical tests were employed.

Results

The sample comprised of 25 (62.5%) females and 15 (37.5%) males. Their age groups ranged from 18 years to 45 years. The average age in years was mean (M)=25.79, Standard deviation (SD)=6.53 and standard error of mean (SEM)=1.04 (Fig. 2, Table-1). All were healthy and free from systemic disease. The out of the total teeth extracted, 28 (70%) were maxillary first premolars, 16 (40%) of right side and 12 (30%) of left side. 8 (20%) were maxillary second premolars, 4 (10%) left and 4 (10%) right, 2 (5%) were central incisors (both right), 1 (2.5%) was right side canine and one (2.5%) was left side lateral incisor (Fig. 3).

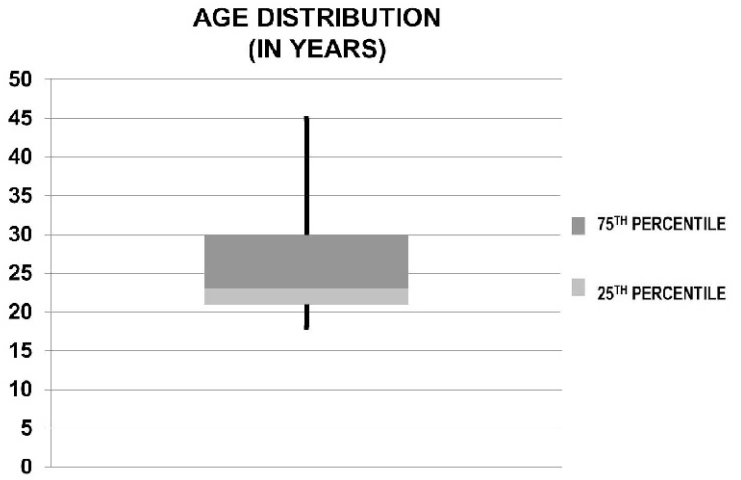

Fig. 2: Age distribution of patients (in years)

Table – 1: Table showing patient age and the parameters measured

Parameter	Mean	Standard deviation	Standard error of mean
Age (Years)	25.79487	6.538065	1.046928
Onset of anaesthesia (Seconds)	291.4615	50.26972	8.049597
Pain of injection (VAS)	4.025641	1.06344	0.170287
Pain of extraction (VAS)	0.564103	0.640513	0.102564
Patient acceptance (VAS)	2.74359	0.909539	0.145643

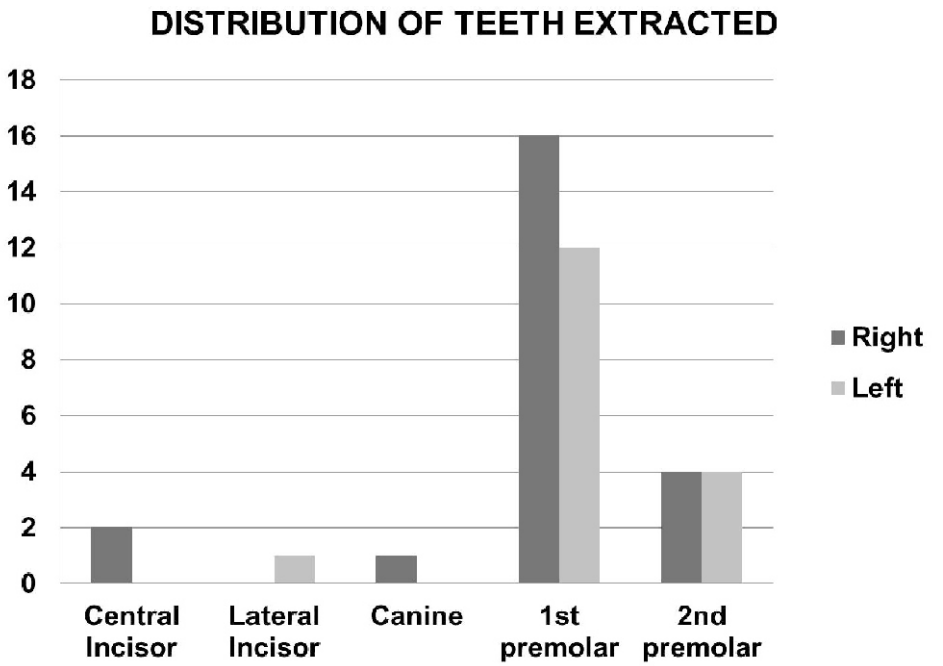

Fig. 3: Distribution of teeth extracted

The average time of onset in seconds was M=291.46, SD=50.26 and SEM=8.04 in seconds (Fig.4, Table-1). The pain of injection in VAS score was M=4.02, SD=1.06 and SEM=0.17 (Fig. 5, table-1). The pain of extraction in VAS score was M=0.56, SD=0.64, SEM=0.10 (Fig. 5, table-1). The patients' acceptance of the procedure in VAS score was M=2.74, SD=0.91 and SEM=0.14 (Fig.4, Table-1). All the patients accepted the procedure well and did not have any post extraction complications. All were evaluated seven days after the procedure and showed satisfactory healing of the extraction sockets.

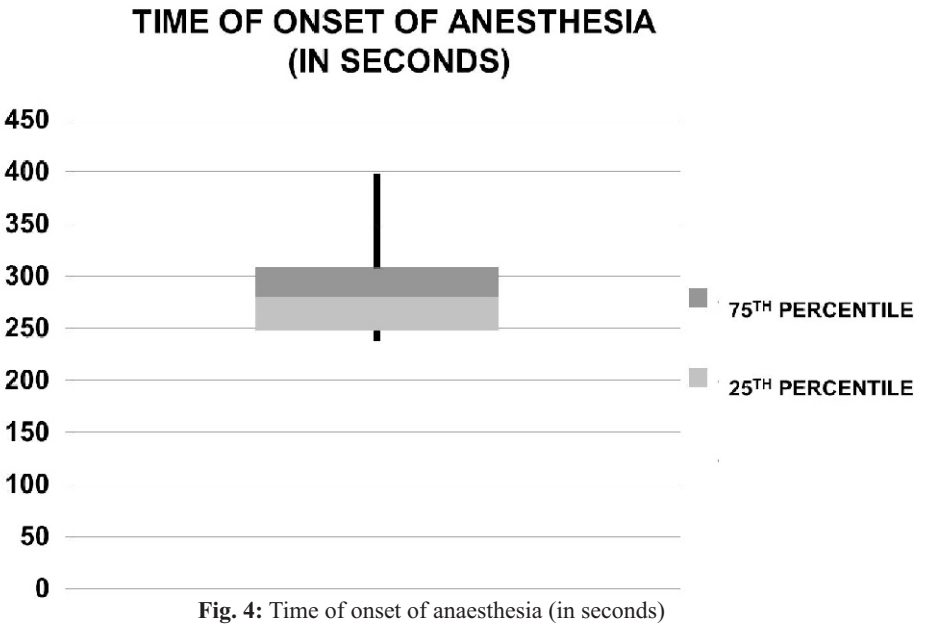

Fig. 4: Time of onset of anaesthesia (in seconds)

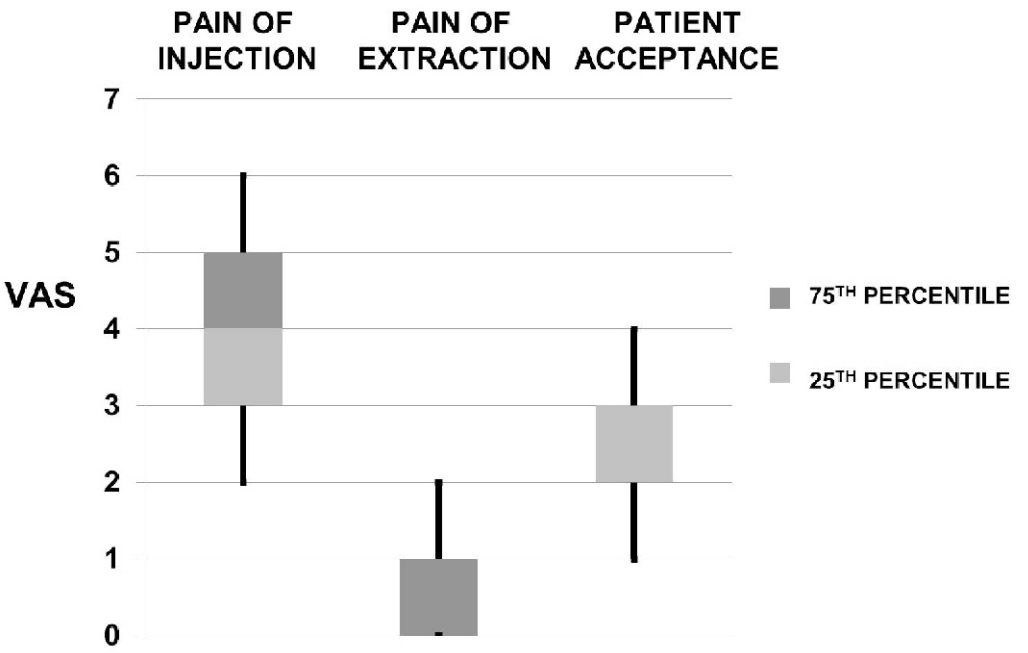

Fig. 5: Graphical representation of parameters measured

Discussion

Multiple injections are required to obtain anaesthesia of the hard and soft tissues for Maxillary dentoalveolar surgery. Whereas greater palatine and nasopalatine blocks are used for palatal anaesthesia, posterior and superior alveolar nerves (PSA), middle superior alveolar (MSA), and anterior superior alveolar (ASA) block injections are used to anesthetize buccal tissues. The pain of these transmucosal punctures is unpleasant for the patient.[7] Although these injections effectively anesthetize maxillary tissues, it may also affect facial structures, such as the upper lip, lateral aspect of the nose and lower eyelid.[8]

The use of a single maxillary injection would unilaterally anesthetize all the maxillary anterior teeth from incisors to second premolar for approximately 60 minutes. This is achieved with no collateral facial or buccal anaesthesia. The conventional supraperiosteal infiltrative anaesthesia is applied in multiple injections for each maxillary tooth. The main theoretical advantage of this AMSA nerve block is that it reduces the number of injections and the quantity of anaesthetic solution administered. It does not cause numbness of the lip and face, so is well suited for use in cosmetic dentistry.[3] The middle superior alveolar (MSA) and anterior superior alveolar (ASA) nerves branch from the infraorbital nerve, before they exit from the infraorbital foramen. The MSA nerve is thought to innervate the maxillary premolars and plays some role in pulpal innervation of the mesiobuccal root of the first molar. The ASA nerve provides pulpal innervation to the central and lateral incisors and canines. The plexus where the 2 nerves join is the target site for the AMSA injection.[6]

The anaesthetic agent should be injected into the site at a moderate rate of 0.5 mL per minute.[9] This slow rate is warranted to avoid

patient discomfort due to the tightly bound nature of palatal tissues. Regardless of technique, Anaesthesia in the present study had a gradual onset. The authors observed palatal blanching extending anteriorly to the incisive papilla and posteriorly to include the soft palate in all the patients of the study.[10] The palatal blanching did not cross the midpalatine raphe. Therefore, it seems likely that some portion of the anaesthetic solution remains in the palatal soft tissue and the remainder passes through the palatine process to anesthetize the maxillary teeth.[6]

The sense of tightness and numbness of palatal tissues and periodontium from central incisors through second molar confirms the onset of anaesthesia. In our study, the mean time of onset of anaesthesia was 4 minutes and 51 seconds. This is in accordance with other studies by Friedman and Hochman (1998)[9] and Patel (2012),[10] which reported times ranging from 2 minutes to 8 minutes. However, this is in contrast with other studies by Lee et. al. (2004)[6] and Velasco (2012)[3], which reported onset time ranging from 6 minutes to 26 minutes. This wide variation and gradual onset of pulpal anaesthesia is most likely due to the time it takes for the anaesthetic solution to pass through the palatine process.[6]

In the present study, the authors were able carry out simple intra-alveolar extraction procedures using this anaesthesia technique. The patients' injection pain perception of the injection was 4.02 in VAS score. This is in accordance with studies by Hochman et. al. (1997),[11] Fukayama et.al. (2003)[12] and Nusstein et. al. (2004)[1]. However, one of the main disadvantages of the AMSA nerve block is that palatal injections are generally considered the most painful injections.[13] In our study, severe pain during the technique was not reported, possibly due to the prior application of topical anaesthetic and the slow and controlled injection of the anaesthetic solution. Pain of extraction in VAS score was 0.56. Recent studies have successfully used this anaesthesia technique for periodontal surgical procedures as well.[10.14]

Patients tolerated the procedure of injection and extraction well in the present study. The mean patient acceptance score in VAS was 2.74. This is in accordance with numerous other studies of Saloum et al (2000),[15] Goodell et al (2000),[16] Gibson et al (2000),[17] Allen et al (2002), [18] and many more. In fact, it has been shown to be tolerated well by preschool of age 2 to 5 years, especially when delivered by a computer controlled delivery system.[18]

One of the greatest advantages of the AMSA injection is that it is able to cover large maxillary surgical fields by a single injection. It provides multiple benefits as it eliminates repetitive trans mucosal punctures, reduces the cumulative number of necessary injections, reduces the total amount of delivered vasoconstrictor and may prove useful for cardiovascular-compromised patients requiring maxillary anaesthesia. The AMSA's maintenance of upper lip function allows for continuous evaluation of gingival contours unimpeded by the "lip drooping" that typically occurs with traditional anaesthetic techniques. The disadvantage is that AMSA also has a long administration time of approximately 4 to 5 minutes. Some patients may find it disconcerting to have an injection last 4 minutes, and attempts to speed up the AMSA injection may lead to increased patient discomfort at the injection site.

One drawback of the present study was that the shape of the palate was not recorded. But the

authors believe that there was a homogeneous distribution between the deep and shallow palate in this study. Because this anaesthetic technique was applied to a fairly young population, the results may not be applied to children or the elderly.

Conclusion

AMSA is a new technique that has been introduced for anesthetizing maxillary anterior teeth. The AMSA technique has been shown to be a useful alternative to the conventional technique for extraction of maxillary anterior teeth in the present study. AMSA may be clinically useful in restorative dentistry as it does not anesthetize the facial muscles and does not affect the smile line. It may also be of particular importance in periodontal surgery due to the excellent haemostatic control in palatal soft tissues. Further studies in this direction with a larger sample size involving various procedures on maxillary anterior teeth are warranted.

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