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Comparative Analysis of Efficacy of Inferior Alveolar Nerve Block and Infiltration Techniques for Anesthetizing Mandibular Primary Molar

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ABSTRACT

Background: The mandibular block is the local anesthesia technique of choice when treating mandibular primary or permanent molars. One of the most common complaints following I.A nerve block is soft-tissue injury due to biting lips, tongue, and buccal mucosa. Therefore, the necessity of an alternative method is felt. The aim of present study was to comparatively analyze the efficacy of Inferior alveolar nerve block and infiltration techniques for anesthetizing mandibular primary molar.

Material and Methods: For the sample of study group, we selected 35 children, belonging to age group 3 to 9 years. The subjects were administered intraosseous infiltration on one side of the mandible and inferior alveolar nerve block on the other. The treatment was completed in two appointments, one appointment for each side. The subjects were randomly placed into the group 1 and group 2. On the first appointment, subjects in the group 1 received infiltration for mandibular right first molar and in group 2 received I.A. nerve block for the left side.

Results: While comparing SEM scores of injections and extractions of two groups with infiltration technique, no significant difference was observed. The efficacy of block induced anesthesia between two groups did not show significant differences. The SEM score of infiltration injection was significantly lower than a block in both groups regardless the order of injections but was not significant on extraction. The scores of SEM in infiltration technique were significantly lower than block. Therefore, infiltration technique is more acceptable for children. No significant difference was seen between block and infiltration induced anesthesia on extraction.

Conclusion: It was concluded by the authors that infiltration anesthesia can be effectively used as an alternative to block anesthesia as this technique is easier and soft tissue trauma is also comparatively less.

Keywords: Inferior alveolar nerve block, infiltration, primary molars, anesthesia.

INTRODUCTION

The mandibular block is the local anesthesia technique of choice when treating mandibular primary or permanent molars. Simultaneous lingual and occasional long buccal nerve block when a mandibular block is administered result in anesthetizing the respective half of the tongue and lower lip. The technique of block injection for adults and children is almost

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similar. The only difference is that the injection must be a little lower, and more posteriorly for children because the mandibular foramen is lower to occlusal surface of deciduous teeth.[1] Intra-osseous anesthesia (IO) is a supplementary technique that achieves higher success than IANB alone for patients. The anesthetic solution is delivered to cancellous bone through the 27-gauge ultra short injector needle placed in the hole made by the perforator. One of the most common complaints following I.A nerve block is soft-tissue injury due to biting lips, tongue, and buccal mucosa. Therefore, the necessity of an alternative method is felt.[2, 3]Today I.A. nerve block is commonly used to treat the pulp of mandibular primary molar teeth. Block injection for hemophilic patients who have not received recombinant factor may lead to cervical hematoma or even death. In these patients, infiltration may be used.[4] Infiltration technique because of direct vision of practitioner on it, less depth penetration of needle, less technical errors, less amounts of anesthetic solution, easier application, limited anesthesia of soft-tissues outside the operation field and shorter duration of being anesthetized might be used as an alternative to block.[5] So, the aim of present study was to comparatively analyze the efficacy of Inferior alveolar nerve block and infiltration techniques for anesthetizing mandibular primary molar.

MATERIAL AND METHODS

The study was conducted in the Department of Pediatrics and Preventive dentistry in the institution. For the sample of study group, we selected 35 children, belonging to age group 3 to 9 years. Following inclusion criteria was followed for the study:

1. Generally healthy and lack of painful illness;
2. Absence of allergies to any medication or local anesthetic;
3. Had carious lesions in primary molars on both sides of the mandible;
4. Cooperative behavior on first visit

An informed written consent was obtained from the parents/guardians of the children after informing them about the procedure of the study. Ethical approval for conducting the study was obtained from the ethical committee of the institute.

The subjects were administered intraosseous infiltration on one side of the mandible and inferior alveolar nerve block on the other. The treatment was completed in two appointments, one appointment for each side. The subjects were randomly placed into the group 1 and group 2. On the first appointment, subjects in the group 1 received infilteration for mandibular right first molar and in group 2 received I.A. nerve block for the left side. Firstly, a topical anesthetic was applied for atleast 1-min on dry mucosa (injection site). The procedure for the infiltration visit was as follows. After topical anesthetic application, 1.7 ml of lidocaine hydrochloride 2% containing epinephrine 1:100,000 was infiltrated in the mucobuccal fold between the roots of the first and second primary molars and in the mesial and distal papillae of the teeth to be treated. For the anesthetic to complete its action, a waiting period of 5 min was scheduled in every patient, before probing buccally and lingually to determine anesthesia. The procedure for I.A. nerve block was as follows. I.A nerve block injection was performed using conventional technique with the volume of 1.7 ml of lidocaine 2% along with long buccal nerve injection as an adjunct. Dental procedures performed on subjects included class I and II amalgam restorations, crown preparation for stainless steel crowns (SSC), form cresol pulpotomies, and extractions. Same operator performed various procedures on the subjects.

Assessment of the anesthesia was done by evaluating presence or absence of pain while probing the gingivae. Any sign of discomfort indicating pain upon assessment of each evaluation interval was recorded as presence of pain, the procedure was discontinued, and the anesthesia technique evaluated as inadequate. Signs of discomfort included hand and body tension, eye movements indicating pain, verbal complaints, tears, and hand and body movements. Frenkel's behavior rating scale was used at the various stages to assess the child's behavior.[6]

Statistical analysis:

The statistical analysis of the data was done using SPSS software for windows. Behavior of the subject was assessed using chi-square test. Statistical significance was predetermined at $P<0.005$.

RESULTS

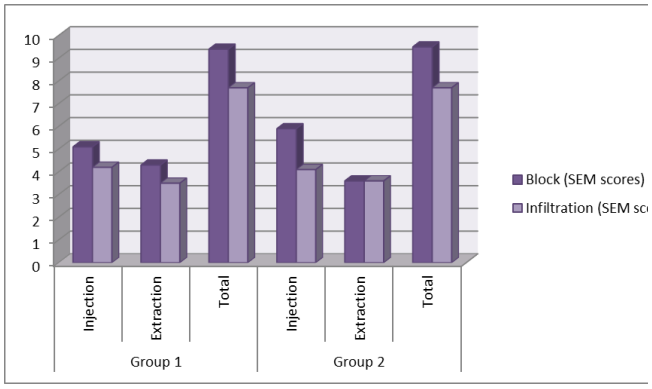
The range of age of patients was 3-9 years with mean age of 5.8 years. There were total 35 patients included in the study out of which 20 patients earned ++ for cooperation. The summarized SEM scores in comparative analysis of injection and extraction for different techniques is given in Table 1. It was observed by the authors that when comparison of SEM scores of injections and extractions of two groups with infiltration technique is done, there is no significant difference with $p > 0.05$. Nevertheless, the efficacy of block induced anesthesia between two groups did not show significant differences. The SEM score of infiltration injection was significantly lower than a block in both groups regardless the order of injections but was not significant on extraction. The scores of SEM in infiltration technique were significantly lower than block. Therefore, infiltration technique is more acceptable for children. No significant difference was seen between block and infiltration induced anesthesia on extraction.(figure 1).

Table 1: Comparative analysis of SEM scores of I.A. nerve block and Infiltration technique in Group 1 and Group 2

Groups	Determinants	Block (SEM scores)	Infiltration (SEM scores)	P- value
Group 1	Injection	5.1 ± 1.76	4.2 ± 0.88	<0.001
	Extraction	4.3 ± 2.46	3.5 ± 0.47	0.212
	Total	9.4 ± 2.66	7.7 ± 0.92	<0.001
Group 2	Injection	5.9 ± 1.85	4.1 ± 1.22	<0.001
	Extraction	3.6 ± 0.66	3.6 ± 0.66	1.00
	Total	9.5 ± 1.55	7.7 ± 1.54	<0.001

*SEM- sound-eye-motor

Figure 1: Comparative analysis of SEM scores of I.A. nerve block and Infiltration technique in Group 1 and Group 2



DISCUSSION

In this study, the efficacy of infiltration and I.A nerve block induced anesthesia to perform mandibular primary first molars extractions were compared. Since injection is known as a stressful phase in pediatric dentistry, well controlled pain during injection is an important effective factor in getting the cooperation of the child. Thus, the dentist who can perform an injection with minimum pain, stress, and anxiety is more successful. The most common technique for mandibular anesthetic injection in children is I.A nerve block. Considering that block injection induces relatively sustained anesthesia and may also cause soft-tissue traumatic injuries, the necessity of an alternative technique is felt.

The present study showed no significant difference between the efficacy of block and infiltration induced anesthesia during injection and on extraction procedure. Gallatin J et al.[7] undertook a study to compare the two systems' anesthetic outcomes in primary intraosseous injections in mandibular posterior teeth. The authors, using a crossover design, randomly administered a primary Stabident intraosseous injection and a primary X-tip intraosseous injection, at two separate appointments, to 41 subjects. Subjects were asked if they perceived an increase in heart rate with the intraosseous injections. The research team blind-tested each subject's first molar, second molar and second premolar with a pulp tester at two minute cycles for 60 minutes after the injection. Anesthesia was considered successful when two consecutive pulp tester readings of 80 were obtained. Anesthetic success rates for the Stabident technique and the X-tip technique, respectively, were 93 percent and 93 percent for the first molar; 95 percent and95

percent for the second molar; and 81 percent and 83 percent for the second premolar, with no significant differences (P > .05) between the two techniques. For both intraosseous techniques, onset of pulpal anesthesia occurred within the first two minutes, but the duration of anesthesia declined steadily over the 60 minutes. Eighty-five percent of the subjects had a perceived increase in heart rate with the Stabident injection and 93 percent with the X-tip injection, with no significant differences (P > .05) between the techniques. The two primary intraosseous injection techniques were similar regarding anesthetic success, onset, duration and perceived heart rate increases.

Poorni S et al.[8] conducted a study to evaluate the anesthetic efficacy of 4% articaine with 1:100,000 epinephrine in inferior alveolar nerve block (IANB) and infiltration anesthetic technique to anesthetize mandibular molars with irreversible pulpitis. The study was composed of 2 test arms and 1 control arm. Subjects in the test arms received either a standard IANB or a buccal infiltration (B Infil) of 4% articaine with 1:100,000 epinephrine, whereas the subjects in the control arm received a standard IANB of 2% lidocaine with 1:100,000 epinephrine. Subject's self-reported pain response was recorded on Heft Parker Visual Analogue Scale after local anesthetic administration during access preparation and pulp extirpation. For statistical analysis Pearson c2, Student's paired t test, 1-way analysis of variance, and Friedman tests showed no significant difference in success rates among the 3 arms of the trial. Although Infiltration and IANB of 4% articaine were equally effective, B Infiltration can be considered a viable alternative in IANB for pulpal anesthesia in mandibular molars with irreversible pulpitis.

Kanaa M.D. et al.[9] compared the efficacy of supplementary repeat inferior alveolar nerve block with 2% lidocaine and epinephrine, buccal infiltration with 4% articaine with epinephrine, intraligamentary injection, or intraosseous injection (both with 2% lidocaine with epinephrine) after failed inferior alveolar nerve block (IANB) for securing pain-free treatment in patients experiencing irreversible pulpitis in mandibular permanent teeth. This randomized clinical trial included 182 patients diagnosed with irreversible pulpitis in mandibular teeth. Patients received 2.0 mL of 2% lidocaine with 1:80,000 epinephrine as an IANB injection. Patients who did not experience pain-free treatment received randomly 1 of 4 supplementary techniques, namely repeat lidocaine IANB (rIANB), articaine buccal infiltration (ABI), lidocaine intraligamentary injection (PDL), or lidocaine intraosseous injection (IO). Successful pulp anesthesia was considered to have occurred when no response was obtained to the maximum stimulation (80 reading) of the pulp tester, at which time treatment commenced. Treatment was regarded as being successfully completed when it was associated with no pain. Data were analyzed by c2 and Fisher exact tests. Of the 182 patients, 122 achieved successful pulpal anesthesia within 10 minutes after initial IANB injection; 82 experienced pain-free treatment. ABI and IO allowed more successful (pain-free) treatment (84% and 68%, respectively) than rIANB or PDL supplementary techniques (32% and 48%, respectively); this was statistically significant (P = .001). IANB injection alone does not always allow pain-free treatment for mandibular teeth with irreversible pulpitis. Supplementary buccal infiltration with 4% articaine with epinephrine and intraosseous injection with 2% lidocaine with epinephrine are more likely to allow pain-free treatment.

Oulis CJ et al. [10] conducted a study to determine the effectiveness of mandibular infiltration compared with mandibular block in treating primary molars in children, and to relate the effectiveness to age and type of treatment performed. The study population consisted of 89 cooperative children, 3 to 9 years old, requiring the same type of treatment on contra lateral mandibular molars. The half mouth study design was used. Dental procedures included class I and II amalgam restorations, stainless steel crowns, formocresol pulpotomies, and extractions. Evaluations of pain and behavior for each anesthesia technique and type of treatment were made using sounds, motor, and ocular changes indicating pain and the Frankl Behavior Rating Scale. Evaluations were made upon probing, rubber dam placement, and during tooth preparation and extraction. No statistically significant difference was found between the two anesthetic techniques for either behavior or pain when performing amalgam or stainless steel crown restorations (P = 0.05). Mandibular infiltration was less effective than

mandibular block for pulpotomy and extraction (P = 0.05). No significant relationship to age as determined by primary or mixed dentition, for effectiveness was noticed.

CONCLUSION

It was concluded by the authors that infiltration anesthesia can be effectively used as an alternative to block anesthesia as this technique is easier and soft tissue trauma is also comparatively less.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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