Original Article

Efficacy Of Inferior Alveolar Nerve Block Plus Buccal Infiltration Versus Inferior Alveolar Nerve Block Plus Buccal And Lingual Infiltration In Patients With Irreversible Pulpitis

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Abstract

Introduction: - Dental practitioners are always seeking materials and techniques to manage pain during and after root canal treatment. It is desirable to achieve maximum local anesthesia during endodontic treatment so the practitioner can focus on the procedure without being worried about the patient having pain or discomfort. This study is design to investigate the anesthetic efficacy of supplemental LI of the mandibular molars following IANB plus BI. The anesthetic efficacy of an additional LI of the mandibular molars, following IANB plus LI especially in patients with irreversible pulpitis, has not been investigated adequately. The necessity of supplemental LI depends on its ability of enhancing the anesthetic efficacy. More evidence is required to provide helpful suggestions for clinical situations.

Objective: - To compare the efficacy of Inferior Alveolar Nerve Block plus buccal infiltration versus Inferior Alveolar Nerve Block plus buccal and lingual infiltration in patients with irreversible pulpitis.

Setting: Institute of dentistry LUMHS, Jamshoro

Duration: Six months from 1-7-2015 to 31-12-2015

Design: Randomized clinical trial.

Subject and Methods: A total of 60 patients with mandibular molars teeth and showed positive lip numbness after IANB were included in this study. Patients were randomly allocated into two groups. Thirty patients were received buccal infiltration and 30 patients were received buccal plus lingual infiltration. If the patients complained of moderate or severe pain during access, the initial instrumentation was omitted at the first visit. Success of the pulpal anesthesia was defined as no pain (VAS score = 0) or mild pain (VAS score 54 mm) at any stage of endodontic treatment.
Results: The average age of the patients was 43.17±9.71 years in lidocaine group and 41.10±11.88 in articane group. There were 28(46.7%) male and 32(53.3%) female. Efficacy was significantly high in lidocaine group as compared to articane group (83.3% vs. 56.7%; p=0.024).

Conclusion: In conclusion, IANB (lidocaine) plus buccal infiltration (articaine) plus lingual increases the success rate of inferior alveolar nerve block in patients with irreversible pulpitis, although none of the techniques provided an acceptable success rate. The necessity of supplemental LI depends on its ability of enhancing the anesthetic efficacy. More evidence is required to provide helpful suggestions for clinical situations.

Key Words: Alveolar Nerve Block, Buccal infiltration, Lingual infiltration

INTRODUCTION

Dental practitioners are always seeking materials and techniques to manage pain during and after root canal treatment. [(1)] It is desirable to achieve maximum local anesthesia during endodontic treatment so the practitioner can focus on the procedure without being worried about the patient having pain or discomfort. [(2)] Profound anesthesia is required during all steps of the treatment from access cavity preparation to root canal instrumentation and root filling. Numerous investigations have been performed to evaluate various anesthetic techniques, anesthetic solutions, and premedication. [(3-10)]

The most common technique to anaesthetize the mandibular molars is inferior alveolar nerve block. The success rate of the inferior alveolar nerve block IANB decreases in patients with irreversible pulpitis. [(11-12)] It is widely accepted that achieving anesthesia in mandibular molars with irreversible pulpitis is much more difficult in comparison with teeth with normal healthy pulps. [(13)] The failure rate of the IANB was reported to be in the range of 44-81% in patients with irreversible pulpitis. [(14)] When the traditional inferior alveolar nerve block fails to achieve pulpal anesthesia, the use of supplemental injection techniques is a strategy to help dentists. [(15)] Mandibular buccal plus lingual BLI injections with articaine was recommended to help achieve adequate pulpal anesthesia in mandibular anterior teeth. [(16)] The results of another study showed that combining supplemental BI plus LI with IANB for mandibular teeth with irreversible pulpitis resulted in a higher efficacy rate 67% than IANB alone 33%. All the studies mentioned above have demonstrated the effectiveness of supplemental mandibular infiltration, either supplemental BI alone or BI plus LI. [(17)]

However, the role of supplemental lingual infiltration LI with mandibular molars remains controversial. It was reported that LI for the first mandibular molars was less effective than BI in obtaining anesthesia of mandibular first molar in healthy volunteers.[18] Meechan found that buccal and BLIs do not differ in their efficacy in producing anesthesia of healthy mandibular molars. [(19)]

The purpose of this prospective, randomized, single blind trial is to investigate the anesthetic efficacy of supplemental LI of the mandibular molars following IANB plus BI. The anesthetic efficacy of an additional LI of the mandibular molars, following IANB plus LI especially in patients with irreversible pulpitis, has not been investigated adequately. The necessity of supplemental LI depends on its ability of enhancing the anesthetic efficacy. More evidence is required to provide helpful suggestions for clinical situations.

METHODOLOGY

Study design: Randomized clinical trial.
Setting: Institute of dentistry LUMHS, Jamshoro

Duration: Six months from 1-7-2015 to 31-12-2015

Sample size: The sample size was determined by taking the percentage of efficacy in group I i.e. 67% and in group II i.e. 33%, level of significance 5%, power of study 80%, than at least sample of 30 was required in each group.

Sampling technique: Nonprobability consecutive sampling

Inclusion criteria:

- Age 18 years to 60 years
- Either gender
- Symptomatic irreversible pulpitis
- Mandibular molar teeth
- Patient showed positive lip numbness after IANB

Exclusion criteria:

- Patients having no response to cold or electric pulp testing.
- IANB failure
- Pregnancy
- Uncontrolled diabetes
- Uncontrolled hypertension
- Allergies to local anesthesia
- Non-restorable teeth.

Data Collection Procedure

After the approval of synopsis by CPSP, the patients meeting the inclusion criteria were enrolled in this study. Eighty patients diagnosed with irreversible pulpits was included in this study divided into two groups each of 40 patients. Before local anesthesia, the patients were asked to rate their pain using a Heft–Parker visual analogue pain scale (HP-VAS) after the cold test using ethyl chloride spray. The HP-VAS score is divided into four categories, no pain corresponded to0 mm, mild pain was defined as >0 and _54 mm, moderate pain was defined as >54 and <114 mm, and severe pain was defined as being _114 mm.

All patients will receive a standard IANB injection of 1.8 ml 2% lidocaine containing 1:100 000 epinephrine (2% xylocaine dental with epinephrine by Dentsply) using a 27-gauge needle (H DENT). The conventional IANB was administered over a 1-min time period, If profound lip numbness will not be achieved at 10 minutes after the IANB, the patient would be excluded from this study. Only those 80 patients were selected and divided into two groups who had profound lip numbness and they feel pain on initial access opening.40 patients were received buccal infiltration and 40 patients was received buccal plus lingual infiltration.

In buccal infiltration group access cavity was opened if during access cavity opening patient feels pain ,pain was recorded by HP-VAS and supplemental buccal infiltration was given using 0.9 ml of 4% articaine containing 1:100 000 epinephrine (DENTSPLY) using cartridge ampule syringe (Aspirating Syringes) with a 27-gauge dental needle(H DENT) BI injections was delivered at the buccal apex of the selected teeth, and procedure was resumed if patient does not feels pain access cavity is opened and all instrumentation is done.

In buccal plus lingual infiltration group supplemental buccal infiltration injection plus a lingual infiltration of the same anesthetic solution and dose was given supplemental lingual infiltration is given into lingual alveolar mucosa just below the lingual attached gingiva with same anesthetic solution 4% articaine and pain is recorded if patient feels no pain, then access cavity is opened, and instrumentation is done.

The patients were asked to rate their pain using a Heft–Parker VAS at 5 min after the supplemental injections, during access cavity preparation, and during the initial root canal instrumentation, including detection of the orifices of root canals, pulp extirpation and full-working length determination. If the patients complained of moderate or severe pain during access, the initial instrumentation was omitted at the first visit. Success of the pulpal anaesthesia was defined as no pain (VAS score = 0) or mild pain (VAS score _ 54 mm) at any stage of endodontic treatment.

Data Analysis

Data was entered and analyzed through SPSS version 20. Mean and standard deviation was calculated for age and VAS scale, frequency and percentage were calculated for gender, and efficacy. Chi square test was applied to compare

the efficacy in both groups. Stratification with respect to age and gender was done. Post stratification chi square test was applied. P-value less than equal to 0.05 was taken as significant.

RESULTS

A total of 60 patients with mandibular molars teeth and showed positive lip numbness after IANB were included in this study. Patients were randomly allocated into two groups. Thirty patients were received inferior alveolar nerve block IANB (lidocaine) plus buccal infiltration (articaine) and 30 patients were received inferior alveolar nerve block IANB (lidocaine) plus buccal infiltration (articaine) plus lingual infiltration. Age distribution of the patients with respect to groups is shown in figure 1. The average age of the patients was 43.17±9.71 years in IANB (lidocaine) plus buccal infiltration (articaine) and 41.10±11.88 in IANB (lidocaine) plus buccal infiltration (articaine) plus lingual infiltration as shown in table 1. There were 28(46.7%) male and 32(53.3%) female. Gender distribution of the patients with respect to groups is shown in figure 14. Similarly mean pain score was 4.27±9.94 in IANB (lidocaine) plus buccal infiltration (articaine) plus lingual infiltration. and 15.70±19.69 in IANB (lidocaine) plus buccal infiltration (articaine) as shown in figure 15. Severity of pain with respect to groups is also shown in figure 2.

Efficacy was significantly high in IANB (lidocaine) plus buccal infiltration (articaine) plus lingual as compared to IANB (lidocaine) plus buccal infiltration (articaine) (83.3% vs. 56.7%; p=0.024) as shown in table 2. Stratification analysis with respect to age and gender was performed and observed efficacy was high in IANB (lidocaine) plus buccal infiltration (articaine) plus lingual as compared to IANB (lidocaine) plus buccal infiltration (articaine)but there was no statistical significant for all age groups and for male and female as shown in table 3.

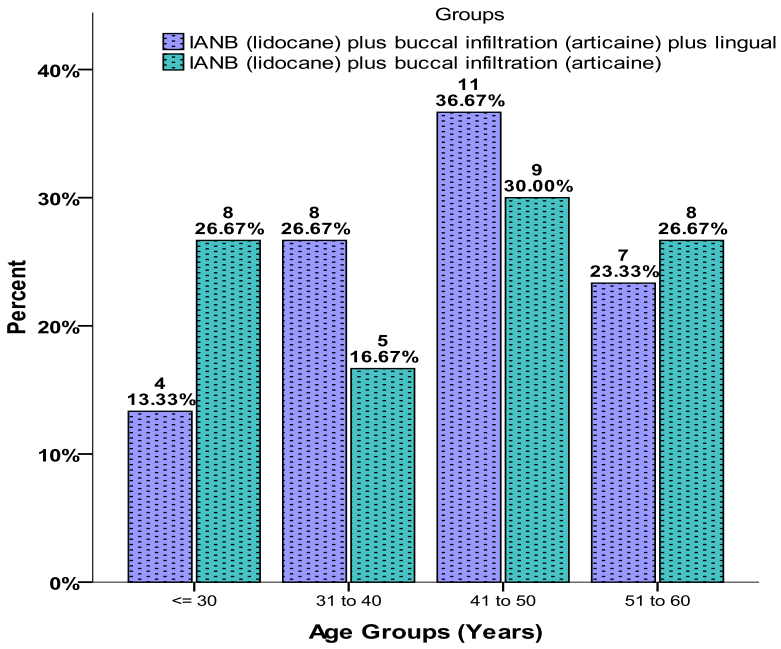

Figure 1: Age Distribution of Patients (n=60)

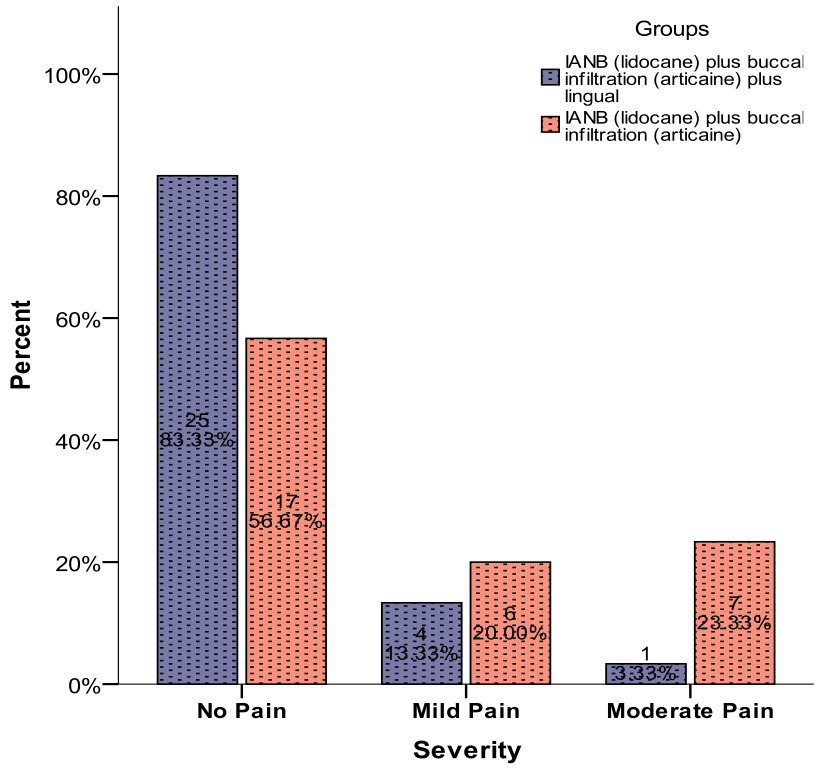

Figure 2: Severity of Pain in Relation to Groups (n=60)

Table 1: Comparison of Efficacy Between Groups in Patients with Irreversible Pulpitis (n=60)

Outcome	IANB (lidocane) plus buccal (articaine) plus lingual infiltration **n=30**	IANB (lidocane) + buccal infiltration (articaine) **n=30**	**Total**	**P-Value**
Effective	25(83.3%)	17(56.7%)	42(70%)	0.024
Not Effective	5(16.7%)	13(43.3%)	18(30%)	

Table 2: Comparison of Efficacy among Groups in Terms of Age Groups (n=60)

Effectiveness	Age Groups	IANB (lidocane) plus buccal (articaine) plus lingual infiltration **n=16**	IANB (lidocane) + buccal infiltration (articaine) **n=17**	**P-Value**
Effective	≤45 years	14(87.5%)	10(58.8%)	0.65
Not effective		2(12.5%)	7(41.2%)	
Effective	> 45 years	11(78.6%)	7(53.8%)	0.23
Not effective		3(21.4%)	6(46.2%)	

Table 3: Comparison of Efficacy in Patients in Terms of Gender Groups (n=60)

Effectiveness	Gender	IANB (lidocane) plus buccal (articaine) plus lingual infiltration **n=16**	IANB (lidocane) + buccal infiltration (articaine) **n=17**	**P-Value**
Effective	Male	13(81.3%)	7(58.3%)	0.18
Not effective		3(18.8%)	5(41.7%)	
Effective	Female	12(85.7%)	10(55.6%)	0.06
Not effective		2(14.3%)	8(44.4%)	

DISCUSSION

IANB is the most frequently used injection technique to anaesthetize mandibular teeth. Other techniques, such as interosseous, periodontal ligament anesthesia and buccal infiltration anesthesia, may be used to supplement or replace IANB.[20] Unfortunately, IANB to be the most frustrating, with highest percentage of clinical failures (approximately 15% to 20%) even when properly administered.[20] When IANB wide area is anaesthetized, it is not necessary in endodontics. Complications related to IANB injection include transient facial paralysis, trismus, local anesthetic injected into blood vessel, self-inflicted trauma, damage to sphenomandibular ligament and pterygomandibular space infection. Buccal infiltration is a simpler technique than IANB and other alternatives, such as intraosseous and intraligamental. Infiltration anesthesia does not require specialized equipment, which is needed for intraosseous delivery. It is less destructive to periodontal ligament and avoids bacteremia that follows intraligamental injection.

Lidocaine hydrochloride became first marketed amide local anesthetic and soon became the gold standard to which all new local anesthetics are compared.[20] Articaine hydrochloride was synthesized as the first amide type local anesthetic with lipophilic thiophene ring and an additional ester group.[21] The average age of the patients was 43.17±9.71 years in lidocaine plus articaine and 41.10±11.88 in lidocaine plus articaine and lingual infiltration. There were 28(46.7%) male and 32(53.3%) female. In Zain et al [22] study average age of subjects was 31.46 ±10.994 years and 58.97%were males.

In this study mean pain score was 4.27±9.94 in lidocaine plus articaine plus lingual infiltration and 15.70±19.69 in lidocaine plus articaine. Efficacy was significantly high in lidocaine plus articaine plus lingual infiltration as compared to without infiltration group (83.3% vs. 56.7%; p=0.024). This is similar to that reported by Aggarwal et al.[17] who reported combining supplemental BI plus LI with IANB for mandibular teeth with irreversible pulpitis resulted in a higher efficacy rate 67% than IANB alone 33%. All the studies mentioned above have demonstrated the effectiveness of supplemental mandibular infiltration, either supplemental BI alone or BI plus LI.[17] Currie et al.[23] who reported 72.7% success rate of articaine in buccal infiltration. The success rate of buccal

infiltration of articaine in this study is similar to the work of Ashraf et al. [24], although they had administered buccal infiltration after the failure of IANB with articaine in mandibular 1st and 2nd molars. Success rate of 87% has been reported by Robertson et al. [25] which is on a higher side as compared to this study. Higher success may be due to lower sample size and inclusion of only asymptomatic.

Supplemental mandibular infiltrations were one strategy to enhance pulpal anesthesia when IANB failed. Kanaa et al. [26] reported that the IANB with supplemental articaine infiltration was more successful than IANB alone in mandibular molars with irreversible pulpitis. Fan et al. [27] (2009) reported that IANB injection supplemented with articaine BI resulted in a higher success rate than IANB alone in first molars with irreversible pulpitis. The results of another study [28] showed that combining supplemental BI plus LI with IANB for mandibular teeth with irreversible pulpitis resulted in a higher success rate (67%) than IANB alone (33%). Mandibular buccal plus lingual infiltration (BLI) injection with articaine was recommended to help achieve adequate pulpal anesthesia in mandibular anterior teeth. [28] The BLI significantly improves anesthetic success in mandibular incisors with healthy pulps, when compared with labial infiltration alone. [28] However, the role of supplemental lingual infiltration (LI) with mandibular molars remains controversial. It was reported that LI for first mandibular molars was less effective than BI in obtaining anesthesia of the mandibular first molar in healthy volunteers. [29] Bangerter et al. [30] reported that the supplemental PDL injection was one of the most widely taught and used supplemental techniques. The success rate of supplemental PDL injections in helping achieve anesthesia for endodontic procedures has been reported to be 83–86%. [31-32] Research on supplemental IO injection for patients diagnosed with irreversible pulpitis has also been shown to achieve good results. It was reported that a supplemental mandibular IO injection had a success rate of 86–91% in attaining complete pulpal anesthesia when the IANB injection failed. [33]

CONCLUSION

In conclusion, IANB (lidocaine) plus buccal infiltration (articaine) plus lingual increases the success rate of inferior alveolar nerve block in patients with irreversible pulpitis, although none of the techniques provided an acceptable success rate. The necessity of supplemental LI depends on its ability of enhancing the anesthetic efficacy. More evidence is required to provide helpful suggestions for clinical situations.

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