

COMPARE THE ANAESTHETIC EFFECTIVENESS OF BUCCAL INFILTRATION ALONE WITH COMBINED BUCCAL AND PALATAL INFILTRATION ON SYMPTOMATIC MAXILLARY FIRST MOLARS

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Abstract

Objective: To compare the efficacy of two different local anaesthetic technique. Buccal filtration alone was compared with a combination of buccal and palatal infiltration on pulpal anaesthesia of symptomatic maxillary molars.

Materials & Methods: A randomised control trial was conducted at the Department of Operative Dentistry, Sardar Begum Dental College, Peshawar, from June 2014 to December 2014. One hundred and eighty emergency patients who had maxillary 1st molar diagnosed with irreversible pulpitis participated in the study. Subjects were divided into two groups (random allocation). One group received buccal infiltration alone, and the other group received buccal infiltration along with palatal infiltration. Subjects reported pain on Heft Parker Visual Analogue Scale (VAS) after local anaesthetic administration during access cavity preparation and pulp extirpation.

Results: Mean age of subjects was 30.5 years \pm 8.4 SD. The success rate of buccal infiltration was 80% whereas the success rate of buccal infiltration along with palatal infiltration was 78.8%. There was no statistically significant difference between the two groups (*p*-value 0.845).

Conclusion: It can be concluded from the results that the addition of palatal infiltration to a conventional buccal infiltration does not increase the success of pulpal anaesthesia for symptomatic maxillary first molars.

Key Words: Buccal infiltration, maxillary first molar, palatal infiltration and pulpal anaesthesia.

Introduction

With increasing demand for endodontic treatment, the success of local anaesthesia will always be an important factor that would concern clinicians. Records are showing that the incidence of teeth requiring endodontics has increased significantly¹. Therefore it has been important to increase the success of maxillary infiltration anaesthesia for endodontics.

Previous studies have evaluated the success of maxillary infiltrations using the electric pulp tester, ranged from 62% to 100%²⁻⁴. Evans et al⁵. Mason et al⁶. and Katz et al⁷. administered buccal infiltrations of the maxillary first molar using 1.8 ml of 2% lidocaine with 1:100,000 epinephrine in asymptomatic teeth with vital pulp. They reported 72%, 97%, and 83% success rates, respectively.

The exact role of pulpal anaesthesia from a palatal injection for the first molar is not known, and a very few studies have been conducted to assess the impact of adding a palatal infiltration to buccal infiltration for endodontics. Guglielmo et al⁸. administered 2% lidocaine with 1:100,000 epinephrine in

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buccal infiltration only and the combination with palatal. The reported success rate in this study was 88% for the buccal infiltration and 95% for the buccal plus palatal infiltration. However, the authors did not perform endodontic access to confirm anaesthetic effectiveness nor were the teeth selected symptomatic with irreversible pulpitis. The significance of this study is that studies did not fully portray a clinical scenario.

This study aimed to evaluate if adding palatal anaesthesia along with buccal infiltration would increase the success of pulpal anaesthesia for a symptomatic maxillary first molar. The reason for providing endodontic treatment is to provide a patient with a pain free tooth, during treatment and later. With the increase of success of maxillary infiltration, patients comfort during treatment will increase. Also, the confidence of the clinician during the procedure is directly related to anaesthesia success. Ultimately this increases the success of the endodontic treatment. Considering pain as a major factor playing a part in the success of endodontic treatment the significance of this study is evident.

Materials and Methods

A randomised, control trial was conducted at the department of operative dentistry, Sardar Begum Dental College, Peshawar conducted from June 2014 to December 2014. A total of 180 subjects were included with 90 in each group through consecutive, non-probability sampling. The inclusion criterion was patients needing endodontic treatment in maxillary first molars and diagnosed with symptomatic irreversible pulpitis. While the teeth showing periapical pathosis in pre-operative radiograph were excluded from the study. Approval from the hospital ethical review committee (Sardar Begum Dental College) was taken. All the objectives and protocols of the study were briefed to the subjects and selection was done only after complete willingness through written informed consent. The participants were referred from the outpatient department to the department of operative dentistry because of spontaneous pain. After proper history taking and investigations (periapical radiographs and pulp vitality tests) patient was considered in one of our two groups by random allocation (lottery method). Visual analogue scale (VAS) was used to rate the patient's pain experienced during the study, so it was explained before treatment

commenced. The VAS was divided into four categories to interpret the data. No pain corresponded to 0 cm (centimetres) on the VAS. Mild pains defined as greater than 0 cm and less than 4 cm. Moderate pains defined as greater than 4 cm and less than 7 cm. Severe pains were defined as equal to or greater than 7 cm. A standard buccal infiltration anaesthesia was administered using 1.3 mL (75% of cartridge) of 2% lidocaine with 1:100,000 epinephrine (MEDICAIN-ER[®] Inj, Huon Co., Ltd, Korea) and a palatal infiltration using 0.5 mL (25% of cartridge) 2% lidocaine with 1:100,000 epinephrine in the case of combination. For the second group buccal infiltration using 1.8 mL 2% lidocaine with 1:100,000 epinephrine and a mock palatal infiltration (needle insertion only) were carried out. After infiltration, approximately 7-10 minutes were given for induction. This was confirmed with inter-dental probing and electric pulp tester (EPT). Once a rubber dam was placed, endodontics was initiated. If the patient felt pain, the treatment would be immediately stopped, and the patient rated their discomfort by using the VAS. The stages have patients recorded pain was before treatment as a baseline and during the procedure (entering the pulp chamber and file placement). The success of the anaesthesia was considered when the operator was able to access the pulp chamber and place initial file without pain (VAS score of 0) or mild pain (VAS rating < 4 cm).

Data collected were analysed using SPSS version 20. The mean \pm SD was calculated and presented for the age of the patient. Frequency and percentage were calculated for categorical variables like gender. Chi-square test was used to compare the two study groups on the bases of pain perceived rated with VAS. A p-value of less than 0.05 were considered significant.

Results

A total of 180 participants were included in the study. Most of the participants were males $N=95(53\%)$ having a mean age of 30.5 ± 8.4 . Ages were further distributed into three age groups, i.e. 18-30, 31-50 and 51-60 years. The greatest numbers of participants were in the age group 18-30 years. This was 58.88% (106/180).

Average pain score before starting the treatment for the buccal was 7.4 ± 1.4 SD. But the mean of pain perceived during treatment for the buccal group was

Table 1: Shows the success of achieving pulpal anesthesia with respect to technique used.

Effectiveness of Technique (Based On Vas Score)	Infiltration technique		Total
	Buccal	Buccal and palatal	
NO (VAS score \geq 4cm)	18(20%)	19(21.12%)	37(20.6%)
YES (VAS score 0-3cm)	72(80%)	71(78.88%)	143(79.4%)
Total	90	90	180

P value was 0.845

Table 2: Shows the effectiveness of maxillary infiltration irrespective of technique used

EFFECTIVE	FREQUENCY	Per cent %
NO	37	20.6
YES	143	74.4
TOTAL	180	100

2.3 ± 2.6 SD. For the group with palatal infiltration added to buccal infiltration, the pain scores were 7.1 ± 1.3 SD and 2.0 ± 2.7 SD respectively. Out of the 90 subjects in each group, 72 attained anaesthetic successes (80%) after buccal infiltration while combining both Buccal and palatal the success rate was 71(78.88%) The chi-square test was used to compare both groups. Statistically, this difference was not significant, a P value of 0.854 (Table 1). The 79.4% of subjects (143/180) secured successful pulpal anaesthesia because they had no pain (VAS score 0cm) or mild pain (VAS score 4cm or less) during access cavity preparation and pulp extirpation. While 20.6% of subjects (37/180) experienced moderate (VAS score 4-7 cm) to severe pain (VAS score $>$ 7cm) during the procedure so were considered unsuccessful. This was irrespective of the technique used (Table 2).

Discussion

Studies have reported that local anaesthesia is not always effective in dentistry^{1,5}. It would be expected that a higher degree of success is achieved with infiltration anaesthesia because it is an easier technique to perform, and it should not be affected by collateral nerve supply². Nevertheless, infiltration injection is not always 100% successful. Success is reported to range from 50 to 100% in maxillary teeth⁹. This variation can be explained by differences in the density, porosity and thickness of the bone surrounding the maxillary teeth, as well as by individual variation in response to the drug administered. Another important factor was the preoperative condi-

tion of the tooth. In this study design, all participants had symptomatic teeth with irreversible pulpitis. The literature clearly states that inflammatory mediators and their effects, i.e. TTX (tetrodotoxin) affect the success of local anaesthesia. This was recently explored by Nusstien et al., where they assessed the effect of conventional local anaesthetic techniques for symptomatic teeth and concluded that success was decreased significantly¹⁰.

In this randomised control, clinical trial the subjects were divided into two groups. Both groups were compared on the bases of their anaesthetic success. Results showed that there was 72% success in the buccal infiltration group and 71% in the combined (buccal and palatal). Statistically when both groups were compared the value was insignificant (p-value of 0.845). This concluded that infiltration techniques are irrelevant to the anaesthetic success of symptomatic maxillary first molars.

Comparing the results, Guglielmo et al⁸. conducted a clinical trial of crossover design to compare the same two maxillary anaesthesia techniques. Their findings were 88% success for buccal infiltration alone and 95% for combined and also concluding that the finding was insignificant. It should be mentioned that in the study by Guglielmo et al., the teeth were healthy without any symptoms. And success was determined via electric pulp tester. Another trial was conducted by Aggrawal et al., where they compared three techniques, i.e. buccal infiltration, buccal and palatal and posterior superior alveolar nerve block (PSA) for symptomatic maxillary molars. They

concluded that none of the tested methods gave 100% anaesthetic success rates in maxillary first molars with irreversible pulpitis¹¹. Hence concurring with this study, that by adding a palatal infiltration to a conventional buccal infiltration for endodontics in symptomatic maxillary first molars, does not significantly increases the success of anaesthesia.

Literature reviews have related many variables with the effectiveness of anaesthesia. Considering the maxillary infiltration, the most important being the volume of the anaesthetic agent. In our study, this was kept constant (1.8ml) for both groups. Sreekumar et al¹². used three different volumes of anaesthetic solutions and found that increasing the volume positively affected the onset, duration, and success of pulpal anaesthesia for maxillary molars¹³⁻¹⁶. The use of vasoconstrictor is another factor to consider especially, the concentrations in the anaesthetic agent¹⁷⁻²⁰. But this factor was found insignificant by Atasoy et al²¹ in 2014 when they concluded from the study, that a single buccal infiltration did not achieve adequate pulpal anaesthesia in the palatal root canal of the maxillary first molars associated with irreversible pulpitis. Irrespective of the anaesthetic solution used.

The drawback of this study was that this was not a double-blinded clinical trial. Hence some bias from the operator can be considered. Another such study design related drawback is that this was not a crossover study. Hence factors like bone density and anatomical variations could not be controlled. So, person to person variations affected the data recorded. The visual analogue scale was used to record the intensity of pain perceived by the subjects. This method records a subjective finding objectively. This variable could not be controlled in this study design either. There was deficiency regarding local literature on this topic and comparisons could not be made elaborately. So, it must be emphasised that regional studies are conducted on such related topics shortly.

Conclusion

Within the limitations of the study conducted. It can be concluded that there is no significant difference when buccal infiltration is used alone or combined with palatal anaesthesia for pulpal anaesthesia for symptomatic maxillary first molars.

It can be stated that if buccal infiltration is

unsuccessful in a clinical scenario. It would be wise that the operator opts for other strategies like increasing the volume of the anaesthetic agent or apply supplemental anaesthetic techniques. Because both techniques have been tested in clinical trials and found successful.

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