

Comparison of Efficacy of Buccal Infiltration Versus Buccal and Palatal Infiltration for Maxillary First Molar Extraction

Efficacy of
Buccal
Infiltration VS
Palatal
Infiltration for
Molar Extraction

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ABSTRACT

Objective: To evaluate the effectiveness of palatal and buccal infiltration against buccal infiltration only while extracting the maxillary first molar.

Study Design: quasi experimental study

Place and Duration of Study: This study was conducted at the Oral and Maxillofacial Surgery Department, Azra Naheed Dental College/Chaudhry Muhammad Akram Dental Hospital, Lahore from August 2022 to May 2023.

Methods: After meeting inclusion and exclusion criteria, a total of 100 patients (50 in each of the group) were enrolled for the study. In Group A (experimental) only buccal infiltration was given for extraction of maxillary first molar while in Group B (control) buccal plus palatal infiltration was used for the extraction of maxillary first molar. Efficacy was noted in both groups. The data was entered and analyzed using SPSS version 25.

Results: In our study from only buccal infiltration group the mean visual analogue score (VAS) of the patients was 2.90 ± 1.61 and in buccal and palatal infiltration group the mean VAS of the patients was 2.64 ± 1.67 (p-value=0.432). In only buccal infiltration group efficacy was achieved in 27(54%) patients and in buccal and palatal infiltration group it was achieved in 28(56%) patients (p-value=0.841)

Conclusion: Both buccal infiltrations versus buccal and palatal infiltration are equally efficacious during extraction of maxillary first molar

Key Words: Buccal Infiltrations, Palatal Infiltration, Extraction of Maxillary First Molar

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INTRODUCTION

Anxiety has played a key role in acting as a barrier to dental treatment. The main factor why some patients feel reluctant to undergo dental treatment is fear of pain. There are number of factors which play a crucial role why a patient experiences pain during administration of local anesthetic^[1,2]. The most important one is the site in the oral cavity where injection is being given, among these sites palatal infiltration/ anesthesia is the most painful^[3,4].

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Palatal injections is not well tolerated because of the rich nerve supply of palatal tissues. Secondly palatal mucosa is more keratinized as compared to buccal mucosa which means it is more resistant to local anesthetic. Due to the firm attachment of the palatal mucosa with the underlying periosteum, diffusion under pressure of local anesthetic can cause extreme discomfort. The pain associated with the palatal injection can be lessened using a variety of techniques, such as topical or pressure surface anesthesia, freezing treatments, injection pressure management, computer-controlled anesthesia delivery systems, transcutaneous electric nerve stimulation (TENS) and eutectic mixtures of local anesthetic. The local anesthetics currently in use can diffuse across the buccal-palatal cortical bone distance and this distance tend to increase when we are moving from anterior to posterior direction is case of maxilla^[5-7].

Allergic reactions to local anesthesia can occur. Immediate reaction includes urticaria and anaphylaxis. Mild toxicity to LA can present as slurred speech and confusion, moderate toxicity will be present as headache and blurred vision and severe toxicity will present as cardiac dysrhythmia and cardiac arrest. Patients may have maxillary teeth extracted without

palatal invasion. Badcock et al. used 2% lignocaine and 1:80,000 epinephrine to remove maxillary third molars without palatal injection. A comparative study at a private dental college in Lahore found 51 adult patients, 25 in each group, with 18 (72%) success rates in the control group (buccal and palatal infiltration) and 7 (28%) in the experimental group (single buccal infiltration only). The experimental group had a 40% success rate. Successful cases were defined as extraction without LA repetition. Palatal anesthesia denial is rising among researchers. Due to the maxilla's thin and porous nature, problems are rare and anesthesia is excellent^[4,7-9].

In a comprehensive analysis of maxillary extraction pain with buccal infiltration alone, Band Enoch Jones E and colleagues emphasized additional clinic trials with higher sample sizes and identical techniques^[10,11]. Aim of this study was that to date most of the dental practitioners rely on buccal as well as palatal infiltration for extraction of maxillary first molar, the local data only shows 28% success rate with buccal infiltration, indicating further studies required in this regard. Therefore, the aim of this was evaluate the effectiveness of palatal and buccal infiltration against buccal infiltration while extracting the maxillary first molar, so as to provide benefit to the population by evaluation pain control without palatal injection and to compare adequate anesthesia in the posterior maxillary region.

METHODS

The study was presented to the ethical review board of Azra Naheed Dental College, Lahore and commenced after approval vide letter no. (ANDC/RAC/2022/34). This study was carried out at Department of Oral and Maxillofacial surgery, Azra Naheed Dental College/Chaudhry Muhammad Akram Dental Hospital, Lahore from August 2022 to May 2023. A sample size of 100 (50 in each group) individuals using the Non-Probability consecutive sampling technique were selected using 5% level of significance efficacy of 72% in palatal group and 28% in buccal alone group.⁷

Inclusion Criteria: Patients ages between 20 to 40 years, both genders, visiting the OPD for extraction of maxillary first molar were enrolled in the study,

Exclusion Criteria: Immunocompromised individuals, having active infection e.g. abscess, coagulopathies, pregnant or lactating females, allergic to local anesthetics and ASA III or IV were not considered for this study.

Data Collection: 100 patients fulfilling the inclusion criteria were included in this study from OPD. Demographic data was collected regarding age, sex. Patients were explained regarding the protocol of study and an informed written consent was obtained in accordance with the guidelines of Helsinki declaration. Patients were allocated into groups A and B using a

random balloting technique. In Group A (experimental) only buccal infiltration was given for extraction of upper maxillary first molar while in Group B (control) buccal with palatal infiltration was used for maxillary first molar extraction. The participants were not informed in which group they were allocated to overcome bias. In all patients, extractions were done by the same surgeon with a standard technique. Local anesthesia (2%) Lidocaine hydrochloride with epinephrine 1: 100000 for buccal infiltration alone and for buccal and palatal infiltration technique were used. Dose of LA which was used for experimental group was (0.9ml for buccal infiltration alone) and for control group (0.6ml for buccal infiltration and 0.3ml for palatal infiltration). Effectiveness of local anesthesia perceived by patient as pain during extraction by applying forcep on maxillary first molar after 5 minutes of giving infiltration. This was recorded as degree of pain felt by patient using visual analog scale (VAS) <3 was considered effective after 5 minutes, VAS \geq 3 was considered ineffective after 5 minutes. Patients were asked about effectiveness of local anesthesia after five minutes of infiltration when the upper molar forcep was applied and patients was asked to rate the pain, and appropriate entries were made in the predesigned proforma. Other variables i.e. palatal infiltration needed in group A was also recorded.

Data Analysis: The data was entered and analyzed using SPSS version 25. The qualitative data like efficacy and gender was presented as frequency and percentage. The quantitative variables like VAS and age were shown as means and standard deviations. The chi square test was applied to see significant difference, statistically if any, between efficacy of two groups. A p value of ≤ 0.05 was considered as statistically significant.

RESULTS

After meeting inclusion and exclusion criteria, a total of 100 patients (50 in each of the group) were included in current study. Table 1 shows that in group A, the average age of patients was 30.26 ± 7.73 years, while it was 30.70 ± 6.13 years in group B. The observed change was not statistically significant. The p-value was equal to 0.753. Among the patients in group A, 21 individuals, accounting for 42% of the total, were male. Similarly, in group B, 18 patients, making up 36% of the total, were male. A ratio of 0.6:1 (male to female) was observed. The observed change was not significant as the p-value was equal to 0.539. The average Visual Analogue Scale (VAS) score was 2.90 ± 1.61 for patients in group A, whereas it was 2.64 ± 1.67 in group B. The observed change was not statistically significant. The p-value was equal to 0.432.

Table No. 1: Demographical Data of Patients in Both Groups (n = 100)

	Study Groups		p-value
	Group A	Group B	
n	50	50	
Age (Years)	30.26 ± 7.73	30.70 ± 6.13	0.753
Gender			
Male	21 (42.0%)	18 (36.0%)	0.539
Female	29 (58.0%)	32 (64.0%)	
Pain score using VAS	2.90 ± 1.61	2.64 ± 1.67	0.432

Table 2 showed that in group A, efficacy was attained in 27 patients, accounting for 54% of the total, whereas in group B, efficacy was reached in 28 patients, accounting for 56% of the total. The observed change was not statistically significant. The p-value is equal to 0.841.

Table No. 2: Comparison of Efficacy in Both Groups (n=100)

		Study Groups		Total	p-value
		Group A (n = 50)	Group B (n = 50)		
Efficacy	Yes	27	28	55	0.841
		54.0%	56.0%	55.0%	
	No	23	22	45	
		46.0%	44.0%	45.0%	

While Table 3 demonstrated that Out of total 50 patients of group A, the additional palatal infiltration needed in 23(46%) patients.

Table No. 3: Frequency Distribution of Palatal Infiltration Needed in Group A (n = 50)

Palatal infiltration needed in group A	Frequency (%)	
	Yes	23 (46%)
No	27 (54%)	
Total	50 (100%)	

DISCUSSION

Fear and anxiety are prevalent and acknowledged as obstacles to seeing the dentist. A patient's reluctance to attend the dentist may stem from a bad experience in the past or a generalized belief that dental care is harmful. Local anesthetic administration is a necessary component of any painful dental operation. The use of needles and injections may cause discomfort and may trigger anxiety. For every dental procedure, perioperative pain and discomfort reduction is essential. In recent years, there have been several changes made to the agents and procedures used in dentistry research^[12-13].

The mean VAS of the patients in the present research was 2.90±1.61 in the buccal infiltration group and 2.64±1.67 in buccal with palatal infiltration group (p-value=0.432). Efficiency was attained in 27 (54%) patients in buccal infiltration group alone, while in 28(56%) patients in buccal plus palatal infiltration group (p-value=0.841). According to the results of the present investigation, Vikas Sandilya et al.¹⁵ showed that, for all three measures, there was no statistically significant difference between the two groups (P >0.05). This demonstrates that, in the majority of instances, a single buccal infiltration of articaine may be utilized in place of lignocaine for the extraction of maxillary premolar teeth. This demonstrates that, in the majority of instances, a single buccal infiltration of articaine may be utilized in place of lignocaine for maxillary premolar teeth extractions^[14].

According to some research, the longer time it takes for articaine to start working is because it takes longer for a single buccal infusion to produce sufficient palatal anesthesia^[15,16]. Fan et al, conducted a review and found that the therapeutic effectiveness of articaine formulations containing 4% vs 2% concentrations with concentrations of 1:100,000 or 1:200,000 adrenaline was comparable.^[17]

Abhirup Chatterjee et al. found that, in most situations, a prolonged waiting time was sufficient for extracting the posterior maxillary teeth with a single buccal infiltration without any palatal injection. Dentists may successfully try extractions without using palatal injections. However, if rescue palatal anesthesia is required, the alternative method may be used^[18]. According to Majid and Ahmed,³ the anesthetic effects of lidocaine (2%) and articaine (4%) buccal injections were similar. However, lignocaine's anesthetic effectiveness was noticeably insufficient compared to the 4% articaine anesthesia provided by the conventional method^[3].

According to the results of the present research, A.N. Iyengar et al. observed that, in comparison to pain experienced just during the administration of buccal injection, pain experienced during both buccal and palatal injection was clearly on the higher side. None of the patients seemed to be in excruciating agony^[19]. The identical results as our research were also reported in another study by D Prasanna Kumar. The effectiveness of a single injection of articaine buccally, according to the author, is equivalent to that of a buccal plus palatal injection of lignocaine^[20].

Sekhar et al. performed a study concluding that there was no significant difference in terms of pain experienced during palatal instrumentation when using either 2 ml of 2% buccal injection of lignocaine with 1:80,000 or 1.7 ml buccal plus 0.25 ml palatally, with a latency duration of 8 minutes^[22]. In a prior investigation conducted by Fan et al.^[17], the process of removing upper teeth was described, both with and without the

administration of a local anesthetic called 4% articaine and 1:100,000 epinephrine, which was injected into the roof of the mouth. The pain evaluation conducted using a Visual Analogue Scale (VAS) did not reveal any notable difference between the injection techniques used, without the need for an additional palatal injection. Hence, the use of articaine as a local anesthetic agent helps prevent the pain and suffering associated with receiving a palatal injection^[17].

However, a research done by Somuri et al. showed that using just articaine as a single infiltration buccally is more effective in providing anesthesia for extracting the maxillary premolars compared to using both buccal and palatal injections of lidocaine^[22].

From the findings of this study, it was suggested and recommended that

- The choice between buccal infiltration alone and buccal and palatal infiltration should be based on individual patient factors. Consider the patient's anatomy, pain threshold, anxiety level, and any specific considerations that may affect anesthesia efficacy.
- The complexity of the maxillary upper first molar extraction should be considered. For straightforward extractions with minimal anatomical variations, buccal infiltration alone may be sufficient. However, for more challenging cases, such as impacted or multi-rooted molars, the addition of palatal infiltration may enhance anesthesia efficacy.
- The operator's level of experience and skill with each infiltration technique can influence efficacy. Familiarity with both buccal infiltrations alone and buccal and palatal infiltration techniques is essential for accurate administration and optimal results.
- Dental professionals should rely on their clinical judgment and experience when making decisions regarding the choice of infiltration technique.

Considering the above mentioned limitations, suggestions and the variations between the results of this study along with few others, it is recommended that additional research be conducted with a bigger sample size and improved methodology. It is also recommended that in order to reduce bias, data be collected in a multicenter context. In the end, a trained dental practitioner should decide which kind of infiltration to use based on their clinical judgement and assessment of the particular situation. To choose the best anesthetic method, they will take into account the patient's comfort level, the intricacy of the extraction, and the anatomy of the patient.

CONCLUSION

The results of this investigation allow us to draw the conclusion that, when it comes to the extraction of the

maxillary first molar, both buccal alone and buccal plus palatal infiltrations are equally effective.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Haseeb Khalid Khan, Muhammad Asif Shahzad
Drafting or Revising Critically:	Shahzada Faiz Ahmad Khan, Wedad Sohail, Syeda Azka Aamer, Rushda Khalid
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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