

ORIGINAL ARTICLE

Anesthetic Efficacy of Single Buccal Infiltration of 4% Articaine and 2% Lignocaine in Extraction of Maxillary 1st Molar

MUHAMMAD JUNAID HASHMI¹, ATIQ UR RAHMAN², MUHAMMAD ATHAR KHAN³, MUHAMMAD AZEEM KHAN⁴, SHAMIMA ABDULLAH⁵, HAFIZ MUHAMMAD SHAHZAD⁶

¹Lecturer Department: Community Dentistry Bakhtawar Amin Medical and Dental College, Multan

²Assistant Professor Department of Maxillofacial Surgery Mufti Mehmood Teaching Hospital Dera Ismail Khan

³Assistant Professor of Oral Maxillofacial Surgery Bakhtawar Amin Medical and Dental College, Multan

⁴Assistant Professor of Oral Medicine Bakhtawar Amin Medical and Dental College, Multan

⁵Assistant professor of Department of Community Dentistry Bakhtawar Amin Medical and Dental College, Multan

⁶Assistant professor Department of oral pathology Bakhtawar Amin Medical and Dental College, Multan

Correspondence to: Muhammad Junaid Hashmi, Email: drjunaidhashmi57@gmail.com, Cell: +923228015926

ABSTRACT

Objective: To determine anesthetic efficacy of single buccal infiltration of 4% articaine and 2% lignocaine in extraction of maxillary 1st molar.

Study Settings: This study was carried out at The Department of Oral & Maxillofacial Surgery, Bakhtawar Amin Medical and Dental College, Multan from March 2021 to August 2021.

Material and Methods: Patients were divided in two groups randomly Articaine HCl. 4% with Epinephrine 1:100,000 injection and Lignocaine HCl. 2% and Epinephrine 1:100,000 injection. Buccal infiltration was given in the area between the two molar buccal roots, along the long axis. One person carried out all injections by using slow injection method (roughly 1ml/min) and deposited full cartridge (1.8ml of solution). 4% articaine or 2% lignocaine was used on each patient when extraction was performed however in cartridges labeled 1 to 100 with the use of suitable blinding technique.

Results of the Study: VAS scores after injection of lignocaine were: mild for 5 patients (10%), moderate for 34 patients (68%), and severe for 11 patients (22%), while none of the patients reported with no pain after lignocaine injection. The mean pain experienced by patients on VAS, after extraction using articaine was 2.70 ± 1.91 and VAS after extraction using lignocaine was 2.58 ± 1.94 .

Conclusion: It was concluded that during articaine single buccal injection observed pain is significantly less in contrast to combined buccal and palatal lignocaine injection.

Keywords: Single buccal infiltration, articaine, lignocaine, maxillary 1st molar

INTRODUCTION

Maxillary first molar teeth is normally extracted because of different indications that includes tooth fracture, hypomineralization, or hypoplasia, teeth affected by intractable caries and periodontitis, and various periodontal and endodontic problems.¹ Besides, reducing the incidence of their impaction, maxillary first molars extraction improves the location of 2nd and 3rd molars significantly.^{2,3} Extracting first molars becomes a challenge for both the dentist and the patient, mostly because of problems in achieving adequate anesthesia.⁴

The control of the patient's pain and anxiety by using efficient anxiolytics and local anaesthesia is essential in oral surgery. Local anesthetic agents are skin soothing agents that unpredictably decrease repolarization and depolarization rate of impulsive tissues. This produces local analgesia which induces pain sensation absence, although other senses are frequently influenced in this area as well.^{5,6} The most commonly employed anesthetic agent is lignocaine which has been the dentist's first choice owing to its incomparable benefits.⁷ Articaine is introduced in 1976 in world 1st time as it is similar to lignocaine local amide anesthetic drug, so a lot of authors reported that its efficacy is higher as compare to other local anesthetics of short duration.^{8,9} To the best of researcher knowledge very rare literature in local population is available about this topic. So this study was undertaken to check efficacy of articaine 4% in extraction of maxillary first molar.

MATERIAL AND METHODS

This research was conducted at Department of Oral & Maxillofacial Surgery, Bakhtawar Amin Medical and Dental College, Multan from March 2021 to August 2021. Total fifty patients having age from 18 to 60 years who involve maxillary 1st molar removal because of proper reasons, no severe periapical infection in patients in relation to maxillary 1st molar were included in this study. Patients having a history of local unaesthetic related problems, swelling or acute infection and patients presenting teeth movement, pregnant women and lactating women were excluded from the study. Intra

oral periapical radiograph (to rule out any periapical pathology) was obtained from each patient were enrolled in the study. Patients were divided in two groups randomly Articaine HCl. 4% with Epinephrine 1:100,000 injection and Lignocaine HCl. 2% and Epinephrine 1:100,000 injection.

Buccal infiltration was given in the area between the two molar buccal roots, along the long axis. One person carried out all injections by using slow injection method (roughly 1ml/min) and deposited full cartridge (1.8ml of solution). 4% articaine or 2% lignocaine was used on each patient when extraction was performed however in cartridges labeled 1 to 100 with the use of suitable blinding technique. In buccal and palatal gingiva, the symptoms were evaluated objectively and proper rescue injections (posterior superior alveolar block and palatal infiltration) were given in case if the patient complains about pain and in the case history proforma, it was recorded.

By asking patients, pain was evaluated to record the number most accurately using Visual Analogue Score (VAS)¹¹ that describes the amount of pain which was experienced throughout the procedure of extraction on a 10 cm scale, along with markings at every 1cm anchored by the end points of "no pain" on the right and "worst pain" on the left. The data was analyzed using SPSS version 16. For descriptive analysis mean and standard deviation was reported for age, VAS score and gender, where percentages and frequency were calculated for categorical variables.

RESULTS

A total of 50 patients having age 12-30 years were included in the research. The study group included 23 male (46%) and 27 female patients (54%) (27) (Table 1). VAS scores after injection of lignocaine were: mild for 5 patients (10%), moderate for 34 patients (68%), and severe for 11 patients (22%), while none of the patients reported with no pain after lignocaine injection. The pain experienced with lignocaine injection with p-value less than 0.001 (Table 2) was statistically highly significant. The mean pain experienced by patients on VAS, after extraction using articaine was 2.70 ± 1.91 and VAS after extraction using lignocaine was 2.58 ± 1.94 .

Table 1: Age and gender of enrolled patients

Parameter		Frequency	Percentage
Gender	Male	23	46.00
	Female	27	54.00
Age	≤15	10	20.0
	16 - 20	21	42.0
	21 - 25	17	34.0
	>25	2	4.0

Table 2: VAS pain score after extraction

VAS	Articaine	Lignocaine	Z value	P value
None	6 (12%)	3 (6%)	0.878	0.380 ^{NS}
Mild	33 (66%)	35 (70%)		
Moderate	9 (18%)	9 (18%)		
Severe	2 (4%)	3 (6%)		
Total	50	50		

NS: p>0.05; Not significant

Table3: Comparison of mean pain scores of articaine and lignocaine after extraction

Scale	Articaine		Lignocaine		Z value	P value
	Median	Mean±SD	Median	Mean±SD		
VAS	3	2.70±1.91	2	2.58±1.94	0.649	0.516 ^{NS}

NS: p > 0.05; Not significant;

DISCUSSION

The most important factor during any surgical or operative technique for successful treatment is pain control. In dental practice, numerous techniques are used to control the pain among which the most frequently applied method is the use of local anaesthetic agents. For a local anaesthetic agent it is necessary to have rapid onset of action, easily metabolized, satisfactory action duration and the injection has to be least painful.¹² The available literature shows that when statistically compared to other local anesthetics, articaine is equally effective.¹³ Uckan S et al.¹⁴ in his study evaluated pain scores after articaine and lignocaine injection using only VAS scale. Somuri AV et al.¹⁵ evaluated pain scores after articaine and lignocaine injection using VAS.

Somuri AV et al.¹⁵ revealed that in comparison with buccal and palatal injection of lidocaine, articaine, provided as individual buccal infiltration offers favorable anesthesia. In the researches done by Sina et al.¹⁶, Oertelet al.¹⁷, and Song et al.¹⁸, they concluded that in the buccal vestibule articaine is deposited to achieve palatal anesthesia which was as effective as palatal infiltration of lignocaine. According to Potocnik et al.¹⁹ & Costa et al.²⁰ maxillary infiltration with articaine may provide anesthesia of the palatal hard and soft tissues, and because of its high capacity for diffusion eliminates the need for palatal infiltration or nerve blocks.²⁰ In our study we found that the patients experienced significantly more pain after injection using lignocaine. This could be due to the effect of two needle punctures, one on the buccal and the other on the palatal aspect. This could also be due to the fact that we have used needles of different calibre for the two techniques.

The statistical analyses in our research presented no significant pain difference during extraction in the experimental and control groups. This is because of the diffusion of articaine from the buccal onto the palatal aspect. Malamed et al. carried out a research and discovered that 4%Articaine combined with 1:100000epinephrine is an effective and safe local anesthetic for use in pediatric dentistry. For clinical use, duration of anesthesia and time to onset are suitable and are similar to those found with other commercially available local anesthetics.²¹ another study by Malamed et al. states that the articaine usage in children younger than age of four years is not suggested, since no data exist to support such usage. Further controlled clinical trials can be undertaken to evaluate the effectiveness of articaine for the extraction of mandibular teeth by using infiltration technique rather than using nerve block

CONCLUSION

It was concluded that during articaine single buccal injection observed pain is significantly less in contrast to combined buccal and palatal lignocaine injection.

REFERENCES

- Ryalat ST, Al-Shayyab MH, Amin W, AIRyalat SA, Al-Ryalat N, Sawair F. Efficacy of intraligamentary anesthesia in maxillary first molar extraction. *J Pain Res.* 2018;6(11): 2096–2098.
- Tarazona B, Paredes V, Llamas JM, Cibrián R, Gandia JL. Influence of first and second premolar extraction or non-extraction treatments on mandibular third molar angulation and position: a comparative study. *Med Oral Patol Oral Cir Bucal.* 2010;15(5):e760–e766.
- Livas C, Halazonetis DJ, Booij JW, Katsaros C. Extraction of maxillary first molars improves second and third molar inclinations in class II division 1 malocclusion. *Am J Orthod Dentofacial Orthop.* 2011;140(3):377–382.
- Jälevik B, Möller M. Evaluation of spontaneous space closure and development of permanent dentition after extraction of hypomineralized permanent first molars. *Int J Paediatr Dent.* 2007;17(5):328–335.
- Minu MO, Ajay RH, Bhat SS, Sargod S, Riyas AK, Suvarna RM, Shabbir A, Hegde N. Comparison of the Local Anaesthetic Effect of 4% Articaine and 2% Lidocaine Administered Using Inferior Alveolar Nerve Block Technique in Primary Mandibular Molar Extractions. *J Evol Med Dent Sci.* 2021;10(1):13-9.
- Arali V, Mytri P. Anaesthetic efficacy of 4% articaine mandibular buccal infiltration compared to 2% lignocaine inferior alveolar nerve block in children with irreversible pulpitis. *J Clin Diagn Res.* 2015;9(4):ZC65-7.
- Monteiro MRFP, Groppo FC, Haiter-Neto F, et al. 4% articaine buccal infiltration versus 2% lidocaine inferior alveolar nerve block for emergency root canal treatment in mandibular molars with irreversible pulpitis: a randomized clinical study. *Int Endod J.* 2015;48(2):145-52.
- Hosseini HR, Parirokh M, Nakhaee N, et al. Efficacy of articaine and lidocaine for buccal infiltration of first maxillary molars with symptomatic irreversible pulpitis: a randomized double-blinded clinical trial. *Iran Endod J.* 2016;11(2):79-84.
- Katyal V. The efficacy and safety of articaine versus lignocaine in dental treatments: a meta-analysis. *J Dent.* 2010;38(4):307-17.
- Tortamano IP, Siviero M, Lee S, et al. Onset and duration period of pulpal anaesthesia of articaine and lidocaine in inferior alveolar nerve block. *Braz Dent J.* 2013;24(4):371-4.
- Hicks CL, von Baeyer CL, Spafford P, van Korlaar I, Goodenough B. The faces pain scale - revised: toward a common metric in pediatric pain measurement. *Pain* 2001;93:173-83.
- Malamed SF, Gagnon S, Leblanc D. Articaine hydrochloride: the study of safety of a new amide local anesthetic. *J Am Dent Assoc.* 2001 ; 132: 177-185.
- Claffey E, Reader A, Nusstein J, Beck M, Weaver J. Anesthetic efficacy of articaine for inferior alveolar nerve blocks in patients with irreversible pulpitis. *J Endod.* 2004; 30(8): 568-71.
- Uckan S, Dayangac E, Araz K. Is permanent maxillary tooth removal without palatal injection possible? *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2005 Dec; 1(8).
- Soumri AV, Rai AV, Pillai M.:Extraction of Permanent Maxillary Teeth by Only Buccal Infiltration of Articaine *J. Maxillofac. Oral Surg.* (Apr-June 2013) 12(2):130-132
- Sina U, Dayangac E, Araz K et al (2006) Is permanent maxillary tooth removal without palatal injection possible? *Oral Surg OralMed Oral Pathol Oral Radiol Endod* 102:733–735
- Oertel R,Rahn R,Kirch W.Clinical Pharmacokinetics of Articaine. *Clin Pharmacokinet* 1997; 33(6) :417-25.
- Song F, Weiliang C, Zhao Y et al (2009) Comparison of the efficiencies of permanent maxillary tooth removal performed with single buccal infiltration versus routine buccal and palatal injection. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 107:359–363.
- Potocnik I, Tomsic M, Sketelj J, Bajrovic FF (2006) Articaine is more effective than lidocaine or mepivacaine in rat sensory nerve conduction block in vitro. *J Dent Res* 85(2):162–166
- Costa CG, Tortamano IP, Rocha RG, Francischone CE. Onset and duration periods of articaine and lidocaine on maxillary infiltration. *Quintessence Int* 2005; 36:197-201
- Malamed SF, Gagnon S, Leblanc D.A comparison between articaine HCL and lidocaine HCL in pediatric dental patients. *Pediatric dentistry* 2000;22(4):307- 11
- Malamed SF, Gagnon S, Leblanc D. Efficacy of Articaine: A new Amide Local Anesthetic. *J Am Dent Assoc* 2000 ; 131(5):635-642.