

Original Article

Comparative Evaluation of Anaesthetic Efficacy of Lidocaine and Articaine in Third Molar Surgery

Aakanksha¹, Mamit Kumar², Sambhav Jain³, Megha Gupta⁴, Geetinderpreet Kaur⁵

^{1,2,4}Senior Lecturer, Department of Oral and Maxillofacial Surgery, MM College of Dental Sciences and Research, Mullana, MM University, ³Senior Lecturer, Department of Conservative Dentistry & Endodontics, Yamuna Institute of Dental Sciences & Research, Yamunanagar, Haryana, ⁵Senior Lecturer, Department of Oral and Maxillofacial Surgery, MNDV Dental College Tatool, Solan, Himachal Pradesh, India

ABSTRACT:

Background: Transalveolar extraction of the impacted molars is the most frequently performed oral surgical procedure. The mainstay for intraoperative pain control for any outpatient procedures are local anaesthetics. The present study was conducted with the aim to determine and compare the anaesthetic efficacy of articaine and lidocaine in third molar surgery. **Materials and methods:** The present prospective study was done enrolling 50 subjects reporting to the dental department. All the subjects with impacted mandibular third molar between 18-30 years were included in the study. The local anaesthesia was not known to the doctor and patient. The surgical technique of extraction was similar amongst all the subjects and the post operative medications were also same. SPSS software was used for the analysis of data and chi square test was used for descriptive analysis. Probability value of less than 0.05 was considered significant. **Results:** The study included 50 subjects, out of which 35 were males and 15 females. The mean age of the subjects was 31.34 +/- 4.28 years. The mean pain in Group A was 0.95 +/- 0.80. The mean pain in Group B was 1.20 +/- 1.10. The mean duration in Group A was 230 +/- 57.12 minutes. The mean duration in Group B was 190 +/- 34.21. **Conclusion:** In our study, articaine provided a better and faster pain relief and can be regarded as a safe alternative to lidocaine for performing dental treatment.

Key words: Anaesthesia, Articaine, Lidocaine, Pain.

Received: 20 November 2017

Revised: 30 December 2017

Accepted: 2 January 2018

Corresponding Author: Dr. Aakanksha, Senior Lecturer, Department of Oral and Maxillofacial Surgery, MM College of Dental Sciences and Research, Mullana, MM University

This article may be cited as: Aakanksha, Kumar M, Jain S, Gupta M, Kaur G. Comparative Evaluation of Anaesthetic Efficacy of Lidocaine and Articaine in Third Molar Surgery. J Adv Med Dent Sci Res 2018;6(2):19-21.

INTRODUCTION

Local anesthetics are safe and effective drugs that are used to prevent and manage pain. There is no other drug that truly be used for prevention of pain or that can prevent propagation of nociceptive nerve impulse from reaching the CNS (central nervous system).¹Transalveolar extraction of the impacted molars is the most frequently performed oral surgical procedure. The mainstay for intraoperative pain control for any outpatient procedures are local anaesthetics. Alfred Einhorn in the year 1904 synthesised the first local anaesthetic procaine and was widely used in dentistry and medicine. Nils Lofgren in the year 1943 synthesised the first amide anaesthetic as lidocaine.² Widespread popularity was gained by lidocaine and it became the gold standard for comparison and usage.² Rusching and colleagues in the year 1969 developed articaine and in the year 1976 in Germany its name was changed to articaine. Later by 1983 and 1998 it was used in North America and United Kingdom

respectively. Articaine is also an intermediate acting local anaesthetic like lidocaine.³ Articaine Hydrochloride (HCl) chemically known as 4-methyl-3-[1-oxo-2-(propylamino)-propionamido]-thiophene-carboxylic acid methyl ester hydrochloride is used in the concentration of 4%.^{4,5} The duration of action of articaine is longer than lidocaine because of the presence of thiopentone ring and it has better diffusion into the bony tissues that makes it slightly longer acting. It is safer to be used amongst Children as reported by Malamed.¹ The present study was conducted with the aim to determine and compare the anaesthetic efficacy of articaine and lidocaine in third molar surgery.

MATERIALS AND METHODS

The present prospective study was done enrolling 50 subjects reporting to the department of institute. All the subjects with impacted mandibular third molar between 18-30 years were included in the study. The ethical

committee clearance was obtained from the institute’s ethical board and a written consent was obtained from the subjects in their vernacular language. Pregnant or lactating mothers, subjects with uncontrolled blood pressure, diabetes were excluded from the study. Patients with allergies to amide or any other component of local anaesthetics were excluded from the study. Subjects taking aspirin or NSAIDS 24 hours before the procedure were also not included. Under complete aseptic conditions 1.8 ml of local anaesthetic was given to the subjects. The local anaesthesia was not known to the doctor and patient. The surgical technique of extraction was similar amongst all the subjects and the post operative medications were also same. All the subjects were explained about visual analogue scale and were told to inform about numbness of tongue and lips. The onset and duration of anaesthesia, duration of surgery and postoperative pain were recorded in a predesigned proforma. All the subjects were followed up the next day. SPSS software was used for the analysis of data and chi square test was used for descriptive analysis. Probability value of less than 0.05 was considered significant.

RESULTS

The study included 50 subjects, out of which 35 were males and 15 females. The mean age of the subjects was 31.34 +/- 4.28 years.

Table 1 illustrates the mean onset of anaesthesia in both the groups. The mean onset in Group A was 57.18+/- 9.87 secs. The mean onset in Group B was 82.50+/- 10.66 secs. On applying chi square test the p value was less than 0.05 indicating a significant difference between the two groups.

Table 2 illustrates the mean pain during administration of anaesthesia in both the groups. The mean pain in Group A was 0.95 +/-0.80. The mean pain in Group B was 1.20 +/-1.10. On applying chi square test the p value was more than 0.05 indicating no significant difference between the two groups.

Table 3 illustrates the mean pain during the procedure in both the groups. The mean pain in Group A was 1.30 +/-0.85. The mean pain in Group B was 2.60 +/-1.25. On applying chi square test the p value was less than 0.05 indicating a significant difference between the two groups.

Table 4 illustrates the mean duration of in both the groups. The mean duration in Group A was 230 +/-57.12 minutes. The mean duration in Group B was 190 +/-34.21. On applying chi square test the p value was less than 0.05 indicating a significant difference between the two groups.

Table 1: Showing onset of anaesthesia

GROUP	PATIENTS	MEAN	STANDARD DEVIATION	P VALUE
Group A (Articaine)	25	57.18	9.87	<0.05
Group B (Lidocaine)	25	82.50	10.66	

Table 2: Showing pain during administration of anaesthesia

GROUP	PATIENTS	MEAN	STANDARD DEVIATION	P VALUE
Group A	25	0.95	0.80	>0.05
Group B	25	1.20	1.10	

Table 3: Showing pain during the procedure

GROUP	PATIENTS	MEAN	STANDARD DEVIATION	P VALUE
Group A	25	1.30	0.85	<0.05
Group B	25	2.60	1.25	

Table 4: Showing duration of anaesthesia

GROUP	PATIENTS	MEAN (mins)	STANDARD DEVIATION	P VALUE
Group A	25	230	57.12	<0.05
Group B	25	190	34.21	

DISCUSSION

Articaine has a amide linkage that undergoes biotransformation in liver, that is actually a slow process but it is also metabolised by the estrases present in serum that is quick and occurs immediately after injection.⁶ The visual analogue scales (VAS) for scoring of pain has been considered as a reliable and generalizable scale for evaluating pain.⁷ Hence, it was used as a scoring measure in our study. In the present study, the mean pain on LA administration in Group A was 0.95 +/-0.80. The mean pain in Group B was 1.20 +/-1.10. On applying chi square test the p value was more than 0.05 indicating no significant difference between the two groups. The ph of local anaesthetic solution is 5.5, on addition of vasoconstrictor it reduces to 4.5. The alkaline nature of the solution provides it higher potency and quick onset of action. In a study conducted by Malamed, articaine was regarded as a safer, effective and well tolerated method of pain

relief.⁸ Vahatalo et al in the year 1993 conducted a study and found no significant difference in the onset and duration of anaesthesia between articaine and lignocaine.⁹ In our present study, the mean onset in Group A was 57.18± 9.87 secs. The mean onset in Group B was 82.50± 10.66 secs. On applying chi square test the p value was less than 0.05 indicating a significant difference between the two groups.

According to Miyoshi et al in the year 2000 on comparing the potency of four local anaesthetics, found that articaine has a quicker onset of action than lidocaine.¹⁰ In a similar study conducted by Costa et al concluded that articaine has a shorter and quicker onset of action.¹¹ A study by Kalia et al found that articaine has a longer duration of anaesthesia as well as longer onset of anaesthesia when compared to 2% lidocaine.¹² According to our study, the mean duration in Group A was 230 ± 57.12 minutes. The mean duration in Group B was 190 ± 34.21. On applying chi square test the p value was less than 0.05 indicating a significant difference between the two groups. Another study done to evaluate the anesthetic efficacy of 4% articaine and 2% lignocaine for the surgical removal of the impacted molar teeth by Sree kumar and Bhagat et al found that, 4% articaine had better anesthetic efficacy.¹³ The protein binding capacity of lidocaine and articaine are 65% and 95% respectively.[20]

Articaine concentration in the alveolus after extraction of tooth was approximately 100 times more than in systemic circulation. This metabolism of articaine has been regarded as the contributing factor for duration of the local anesthetic action, inspite of articaine's short systemic half-life.¹⁴ In literature, the duration of soft tissue

anesthesia by 4% articaine at a dose of 1.8ml was 4.3 to 5.3 hours for nerve blocks.¹⁵

CONCLUSION

Articaine has better pharmacokinetic and pharmacodynamic properties compared to lidocaine. In our study, articaine provided a better and faster pain relief and can be regarded as a safe alternative to lidocaine for performing dental treatment.

REFERENCES

1. Malamed SF. Handbook of local anesthesia fifth edition, St Louis, Mosby 2004: P 5
2. Kanaa MD, Whitworth JM, Corbett IP, Meechan JG. Articaine and lidocaine mandibular buccal infiltration anesthesia: a prospective randomized double-blind crossover study. J Endod. 2006;32:296–8
3. Snoeck M. Articaine: a review of its use for local and regional anesthesia. Local Reg Anesth. 2012;5:23-33.
4. Rebollo A S, Molina E D, Aytés L B, Escoda C G. Comparative study of the anesthetic efficacy of 4% articaine versus 2% lidocaine in inferior alveolar nerve block during surgical extraction of impacted lower third molars. Med Oral Patol Oral Cir Bucal., 2007; 12: e139-44.
5. Kalia V, Supreet, Kaur R. Comparative evaluation of onset and duration of anesthesia of 4% articaine versus 2% lidocaine with epinephrine 1: 1,00,000 during exodontia. Indian Journal of Comprehensive Dental Care., 2011; 1(1): 19-24.
6. Yapp K E, Hopcraft M S, Parashos P. Articaine: A review of the literature. Br Dent J., 2011; 210(7): 323-9.
7. Price D D, Bush F M, Long S, Harkins S W. A comparison of pain measurement characteristics of mechanical visual analogue and simple numerical rating scales. Pain., 1994; 56: 217-26.
8. Malamed SF, Gagnon S, Leblanc D. Efficacy of articaine: a new amide local anesthetic. J Am Dent Assoc. 2000;131:635–42.
9. Vähätalo K, Antila H, Lehtinen R. Articaine and lidocaine for maxillary infiltration anesthesia. Anesth Prog. 1993;40:114–6.
10. Miyoshi T, Aida H, Kaneko Y. Comparative study on anesthetic potency of dental local anesthetics assessed by the jaw-opening reflex in rabbits. Anesth Prog. 2000;47:35–41.
11. Costa CG, Tortamano IP, Rocha RG, Francischone CE, Tortamano N. Onset and duration periods of articaine and lidocaine on maxillary infiltration. Quintessence Int. 2005;36:197–201.
12. Kalia V, Supreet, Kaur R. Comparative evaluation of onset and duration of anesthesia of 4% articaine versus 2% lidocaine with epinephrine 1:1,00,000 during exodontia. Indian J Compr Dent Care. 2011;1:19–24.
13. Bhagat MJ, Narayan V, Muthusekhar MR, Jain AR. Comparative study of the anesthetic efficacy of 4% articaine versus 2% Lignocaine in the inferior alveolar nerve block during the surgical extraction of impacted mandibular third molars. Univ Res J Dent. 2014;4:108– 14.
14. Gregorio L V L, Giglio F P M, Sakai V T, Modena K C S, Colombini B L, Calvo A M, Sipert C R, Dionísio T J, Lauris J R P, Faria F A C, Trindade Junior A S, Carlos F. A comparison of the clinical anesthetic efficacy of 4% articaine and 0.5% bupivacaine (both with 1:200,000 epinephrine) for lower third molar removal. Oral Surg Oral Med Oral Pathol Oral Radiol Endod., 2008; 106(1): 19-28.
15. Malamed S F, Gagnon S, Leblanc D. A comparison between articaine HCl and lidocaine HCl in pediatric dental patients. Pediatr Dent., 2000; 22(4): 307-11.

Source of support: Nil

Conflict of interest: None declared

This work is licensed under CC BY: *Creative Commons Attribution 3.0 License*.