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Original Research Article

Comparison of Efficacy of 2% Lignocaine to 4% Articaine in Mandibular Third Molar Impaction

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Introduction: The discovery of anaesthesia has been a great boom to the field of dentistry and surgery in general. Local anaesthesia is an important part of the daily routine for dentist. Local anaesthesia as a therapeutic modality defined as a transient regional loss of sensation to a painful or a potentially painful stimulus, resulting from a reversible interruption of peripheral conduction along a specific neural pathway to its central integration and perception in brain.

Aim and Objective: To evaluate the efficacy of articaine in third molar impactions and VAS scores preoperative, intra-operative and post operative for pain and swelling.

Material and Methods: A prospective study was conducted 123 patients who had undergone surgical removal of impacted Mandibular third molar between one year time period.

Results: We randomized 123 patients and treated 71 with articaine and 72 with lignocaine. 35 male and 36 female patients with mean age group of 30.18 years in articaine group and 35 male and 37 female patients with mean age group of 27.72 years in lignocaine group were included in the study. VAS evaluation for efficacy analysis. No statistically difference was found in preoperative and post-operative pain parameters. But intraoperative pain parameters were 3.17 and 2.51 for lignocaine and articaine respectively, which were statistically significant.

Conclusion: The efficacy of 4 % articaine is slightly better to 2% lignocaine. 4% articaine has longer duration of action than Lignocaine. The efficacy of 4% articaine based on VAS scores for pain, the intraoperative pain parametres are much less for articaine when compared to Lignocaine. No significant difference in preoperative, intraoperative and postoperative vital parametres.

Keywords: Lignocaine, Articaine, Impaction, Third Molar etc.

Introduction

Pain is defined as an unpleasant emotional or sensory experience associated with actual or potential tissue damage or described in terms of such damage [1]. Effective control of pain during dental treatment has been one of the most

important prerequisite for practice of painless dentistry. The discovery of anaesthesia has been a great boom to the field of dentistry and surgery in general. Local anaesthesia is an important part of the daily routine for dentist. Local anaesthesia as a therapeutic modality defined as a transient regional loss of sensation to a painful or a potentially painful stimulus, resulting from a reversible interruption of peripheral conduction along a specific neural pathway to its central integration and perception in brain [2]. Local anesthesia forms the back bone of pain control techniques in dentistry. Their advantage to block the perception of pain only in limited portion of body and no need of circulation as an intermediate carrier made it more popular as compared to general anesthetics for local procedures.

Aim of the study to evaluatethe efficacy of articaine in third molar impactions and VAS scores preoperative, intraoperative and post operative for pain and swelling.

Material and Methods

A prospective study was conducted 123 patients who had undergone surgical removal of impacted Mandibular third molar between one year time period.

All subjected were evaluated preoperatively.

1. Fifty-one of them received 4% articaine with 1:100000 epinephrine.
2. Fifty-two received 2% lignocaine with 1:200000 epinephrine with unilateral mandibular third molar impactions
3. Twenty bilateral cases we used articaine on one side and lignocaine on the other side.

The time of onset of anesthesia, volume of local anesthetic used, need of reinjection, duration of action, VAS scores for pain and swelling, vital parameters for 30 patients, number of pain killer used post operatively and intra and postoperative complications were recorded.

Ethical clearance: Ethical clearance was obtained from the Ethical Committee.

Results

The study group consisted of 123 patients who had undergone surgical removal of impacted mandibular third molar. All subjected were evaluated preoperatively. Fifty one of them received 4% articaine with 1:100000 epinephrine and next fifty two received 2% lignocaine with 1:200000 epinephrine with unilateral mandibular third molar impactions and in twenty bilateral cases we used articaine on one side and lignocaine on the other side. We randomized 123 patients and treated 71 with articaine and 72 with lignocaine. 35 male and 36 female patients with mean age group of 30.18 years in articaine group and 35 male and 37 female patients with mean age group of 27.72 years in lignocaine group were included in the study.

Table no. 01 showed impaction was classified and difficulty index was noted according to winter's classification and was tabulated. Most of the impactions were mesioangular, which was 44 for articaine and 43 for lignocaine. The mean difficulty index was 5.58 for articaine and 5.18 for lignocaine. The study showed the mean time for onset of anesthesia for articaine is 2.75 min and for lignocaine is 4.22min. Table no. 02 showed the mean duration of action for articaine is 3.30±0.27hrs and for lignocaine is 2.46±0.38hrs. The results are statistically significant.

We included VAS evaluation for efficacy analysis. No statistically difference was found in preoperative and post-operative pain parameters. But intraoperative pain parameters were 3.17 and 2.51 for lignocaine and articaine respectively, which were statistically significant. In further postoperative days the pain parameters were slightly higher for lignocaine as compared to articaine.

We included VAS evaluation for efficacy analysis. In first postoperative day the

mean swelling with articaine was 4.61 as compared to lignocaine which was 3.64. Similarly on postoperative day 2 the mean swelling parametres for articaine was slightly higher than lignocaine.

Table 1: Classification and difficulty index of impaction.

Classification of Impaction	LA used				Total	
	Articaine		Lignocaine			
	N	%	N	%	N	%
Distoangular	11	15.5	10	13.9	21	14.7
Horizontal	10	14.1	7	9.7	17	11.9
Vertical	6	8.5	12	16.7	18	12.6
Mesioangular	44	62.0	43	59.7	87	60.8
Total	71	100.0	72	100.0	143	100.0

χ^2 =2.582 df =1 p=0.461

Table 2: Duration of action of Anesthesia.

Duration of Anesthesia	Articaine	Lignocaine
N	71	72
Mean	3.30	2.46
SD	0.27	0.38
Minimum	3	2
Lower Quartile	3	2
Median	3.3	2.5
Upper Quartile	3.5	2.625
Maximum	4	3.5
t		15.206
p		<0.001

Table 3: Pain Rating with Local Anesthesia.

	LA used	N	Mean	SD	t	P
Preoperative pain	Articaine	71	2.10	1.10	0.137	0.891
	Lignocaine	72	2.07	1.42		
Intra operative pain	Articaine	71	2.51	1.01	-3.853	0.000
	Lignocaine	72	3.17	1.03		
Post operative pain	Articaine	71	2.42	0.86	-0.428	0.669
	Lignocaine	72	2.49	0.92		

Table 4: Swelling Rating with Local Anesthesia

Swelling score	LA used	N	mean	sd	t	P
Baseline	Articaine	71	3.96	0.64	-0.369	0.713
	Lignocaine	72	3.99	0.12		
Day 1	Articaine	71	4.61	1.19	3.913	0.000
	Lignocaine	72	3.74	1.45		
Day 2	Articaine	71	5.34	1.25	1.776	0.078
	Lignocaine	72	4.94	1.39		
Day 3	Articaine	71	4.11	0.75	-0.913	0.363
	Lignocaine	72	4.24	0.86		
Day 4	Articaine	71	1.48	0.50	-1.241	0.217
	Lignocaine	70	1.61	0.77		
Day 5	Articaine	71	1.10	0.30	-1.484	0.140
	Lignocaine	70	1.19	0.39		

Table 5: Comparison of articaine with other anesthetic agent

Location of comparison	Number of studies	
	Articaine is significantly more successful	No significant differences between anaesthetics
Maxillary infiltration	Evans G et al., 2008 [13]	Oliveira et al., 2004 [14] Donaldson et al., 1987 [15]
Mandibular infiltration	Abdulwahab et al., 2009 [16]; Robertson et al., 2007 [17]	
Incisive/mental nerve block	Batista da Silva et al., 2010 [18]	
Periodontal ligament infiltration		Berlin et al., 2005 [19]

Discussion

Articaine was originally synthesised as carticaine in 1969 and entered clinical practice in Germany in 1976. [3] The name was changed in 1984, the year it was released in Canada. [4] It then entered the United Kingdom in 1998, then United States in 2003 and Australia in 2005 [3]. Currently, articaine is available as a 4% solution containing 1:100, 000 or 1:200,00 adrenaline. [5]

Articaine (4-methyl-3-[2-(propylamino)-opionamido]-2-thiophene-carboxylic acid, methyl ester hydrochloride) is a unique amide LA in that it contains a thiophene, instead of a benzene, ring. The thiophene ring allows greater lipid solubility and potency as a greater portion of an administered dose can enter neurons. [6] It is the only amide anaesthetic containing an ester group, allowing hydrolysation in unspecific blood esterases. [7] When we compared the demographic data, we found that atricaine is not age dependent. The mean age of the patients with lignocaine and articaine was 30.18 and 27.72 respectively. In our study there was no statistically significant difference between male to female ratio between the two anesthetic agents. Study done by Oertal et al (1999) [8] to evaluate the effect of age on pharmacokinetics of the local anestheticagent (articaine).Submucosal infiltration anesthesia from two different dosages of 4% articaine without epinephrine was compared in healthy elderly and young volunteers. High performance liquid chromatography has been used to determine concentrations of articaine in serum. Basic pharmacokinetic parameters were calculated according to standard procedures. The area under the serum concentration time curve and maximum drug concentration (Cmax) values did not differ significantly with age; however, both parameters tended to be higher in elderly volunteers. No changes in terminal half-life and time to reach maximum serum concentration (tmax) were observed and concluded that the metabolism of articaine is age independent. No change of dosage of articaine in elderly patients should be necessary. Jakobs W et al in 19959 has recommended that there is no need to fix a lower mg/kg articaine dose limit for children because of age-related differences in the pharmacokinetics and the use of 2% articaine in pediatric dentistry is particularly advantageous because of the lower C max and the shorter half-life. [9] Onset and duration periods must be considered when comparing two or more local anesthetics. An ideal agent should have a rapid onset and should last long enough to allow the completion of the procedure. [10]Stanley F. Malamed (2001) [11] in their study on this amide local anestheticstated that onset of anesthesia with articaine 4% with epinephrine 1:200,000 is 1.5–1.8 min for maxillary infiltration and 1.4–3.6 min for inferior alveolar nerve block. The duration of soft tissue anesthesia is 2.25 h for maxillary infiltration and approximately 4 h for nerve

block. [11] Costa CG in 2005 [12] compared onset and duration periods of articaine and lidocaine on maxillary infiltration. Both articaine solutions produced shorter onset and longer duration of pulpal anesthesia by maxillary infiltration than the lidocaine solution did. Statistical analysis did not confirm better clinical results of 4% articaine with 1:100,000 epinephrine than with 4% articaine with 1:200,000 epinephrine. [12]Literature comparing articaine properties in healthy volunteers:

When we compared VAS scores for swelling of two anesthetic agents. We concluded that swelling parametres for articaine were slightly higher than lignocaine.According to a study, the most frequently reported adverse events in the articaine group, excluding post procedural dental pain, were headache (4 percent), facial edema, infection, gingivitis and paresthesia (1 percent each), some studies have shown articaine to cause opthalmological complications. [20,21] Many studies correlate with our study saying that there are more chances of lingual nerve damage than inferior alveolar nerve and one suggested reason for this may be the fascicular pattern in the region where the injection is given.

Conclusion

The efficacy of 4 % articaine is slightly better to 2% lignocaine. Demographic shows that efficacy of articaine is not age dependent Onset of anesthesia is much faster and amount of local anesthetic solution required is less when compared to Lignocaine. 4% articaine has longer duration of action than Lignocaine. The efficacy of 4% articaine based on VAS scores for pain, the intraoperative pain parametres are much less for articaine when compared to Lignocaine. No significant difference in preoperative, intraoperative and postoperative vital parametres.

Conflict of Interest: None

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