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RESEARCH ARTICLE

COMPARATIVE EVALUATION OF LOCAL ANESTHETIC ACTION OF ARTICAINE WITH LIGNOCAINE IN LOWER THIRD MOLAR SURGICAL REMOVAL USING INFERIOR ALVEOLAR NERVE BLOCK

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ABSTRACT

Aims and Objectives: To compare and evaluate the time of onset, profoundness, duration of anesthesia and postoperative complications of Articaine and Lignocaine.
Materials and Methods: The study group consists total of 90 patients divided into two groups of 45 each undergone double blind study conducted with Articaine and Lignocaine with surgical removal of impacted mandibular 3rd molars. Clinical parameters like onset of anesthesia, duration of anesthesia, Pain experience and post operative complications were analysed.
Results: Onset of anesthesia was (3 to 6 minutes) with mean 4.64 minutes for Articaine and 4.3 minutes for lignocaine. Mean duration of Anesthesia is 390.67 minutes for Articaine and 368 minutes for Lignocaine. Pain (evaluated withVAS scale) during anesthesia is not much significant statistically (Mean value - 2.00). There is also no statistical difference between the two groups (mean value 2.00) for pain during procedure. Paraesthesia was reported in Lignocaine group which resolves itself in due course of time.
Conclusion: From the result of our study we can conclude that the onset of action Articaine solution is similar to Lignocaine. 4% Articaine has longer duration of action than 2% Lignocaine. The efficacy of 4% Articaine based on VAS (Visual analog scale) is similar to 2% Lignocaine indicating that Articaine has provided adequate analgesia. Articaine can be used in minor oral surgical procedures like impaction and dentoalveolar surgery.

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INTRODUCTION

Primary local anesthetics used in the Dentistry are classified as amide and ester. Amide local anesthetic agents are more often used than ester because amides act more rapidly and reliably to produce profound surgical anesthesia. New amide ester local anesthetic were synthesized between 1891 and 1930 such as Tropocaine, Holocaine, Benzocaine, and Tetracaine (Cavino, 1986). Lidocaine prepared by Nils Lofgrean in 1943 and introduced to market in 1948, became the most common local anesthetic used because of safety and effectiveness. **A**rticaine is an amide local anesthetic, that differ from other agents of its groups due to the presence of thiophene ring instead of a benzene ring and is one of the commonly used local anesthetic for daycare surgeries. Some researches claim that Articaine is superior to Lignocaine in its biologic profile (Malamed *et al*., 2000). Lidocaine also becomes the Gold standard of comparison among newer local anesthetics.

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Carticaine, first prepared by Rusching and colleagues in 1969, had its generic name changed to Articaine, entered in clinical practice in Germany in 1976. Third molar surgeries are the most common of surgical procedures done under local anesthesia. Various local anesthetic agents have been used like Lidocaine, Bupivacaine, Prilocaine and others (Hawkins, 2001; Nusstein *et al*., 2005). In this study it is intended to compare the safety and efficacy of new amino local anesthetic. Articaine with most commonly used Lignocaine in surgical removal of mandibular 3rd molars.

MATERIALS AND METHODS

The study group consists of 45 patients who had undergone surgical removal of impacted mandibular 3rd molars. All patients were evaluated pre-operatively by double blind study conducted with Articaine and Lignocaine. Onset of duration of anesthesia and post operative complication in each group were recorded. Pain experience analyzsed with visual analogue scale (VAS). The values were compared and statistically analyzed. The results are tabulated in the tables.

Patients with bilateral lower third molar impaction of identical nature which requires removal were included in the study. Exclusion Criteria includes patients with history of Allergic diseases like Asthma, hay fever. Patients allergic to drugs like Sulpha and ingredients of local anesthetic solution. Patients on sedatives, monoamine oxidase inhibitors, Tricyclic anti-depressants. Medically compromised patients, acute infection in the oral cavity and Patients not willing to participate in the study. Impacted tooth on one side was removed, under LA using 4% Articaine Hydrochloride. The other side was removed under LA using 2% Lignocaine Hydrochloride (Figure 1). Both impactions were done by the same operator and by using the same surgical approach (Wards approach). The bone removal and tooth sectioning were done using micromotor and burs under copious irrigation with normal saline. All patients were treated in an identical fashion and using the inferior alveolar nerve block technique (direct).

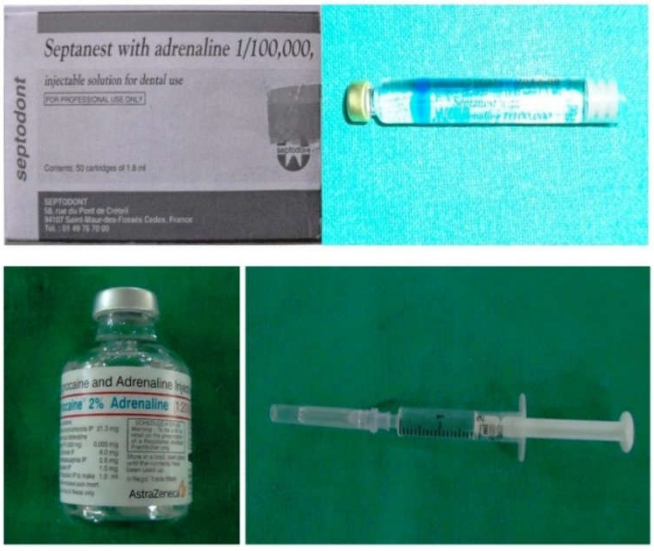
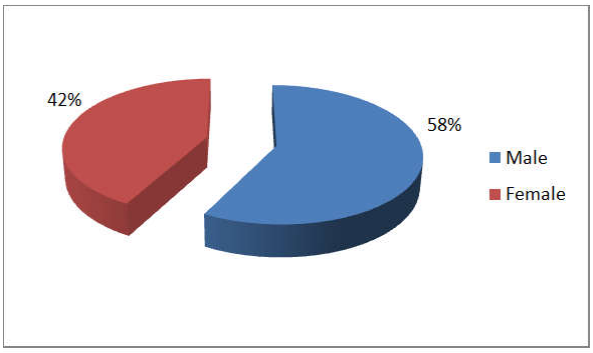


Figure 1. 4% Articaine Hydrochloride and 2% Lignocaine Hydrochloride

Figure 2. Inferior alveolar nerve block with lignocaine and with articaine

RESULTS

We randomized 45 patients - of these 42.2% were females and 57.8% males. Sex distribution show Female: Male 1:12 (Graph 1). Surgical removal of third molars done using articaine in 45 patients and using lignocaine in 45 patients. Values obtained during the bilateral surgical removal of third molars done at different appointments. The study showed the onset of anesthesia ranging from 3 to 6 minutes with mean 4.64 minutes and standard deviation + 0.64 minutes for Articaine. For Lignicaine, onset of anesthesia 4.3 minutes and standard deviation + 0.484 minutes.



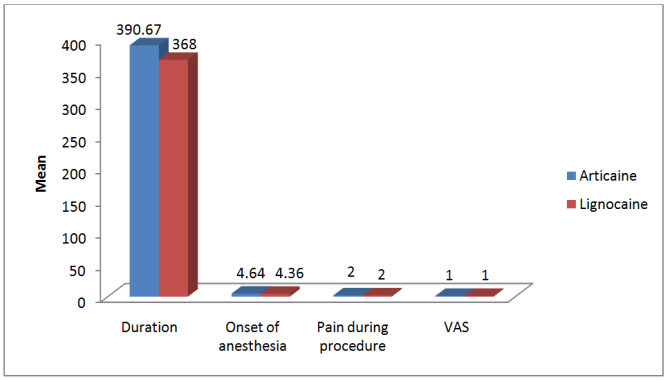
Graph 1. Age distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	45	50.0	100.0	100.0
Missing	System	45	50.0		
Total		90	100.0		

A mean duration of Anesthesia is 390.67 minutes for Articaine and 368 minutes for Lignocaine. Difference is statistically significant. Giving an inference that the articaine has longer duration of anesthesia, compared to lignocaine (Z value 2.403 DF 88 P value 0.18). Pain ratings included VAS evaluation for analysis. There is no statistical difference between the two groups (mean value 2.00). Pain during anesthesia is not much significant. Mean value is 2.00 and standard deviation of articaine and lignocaine groups are zero. (Table 1, Graph 2)

Table 1. Group Statistics of the study

	Art-1	N	Mean	Std. Deviation	Std. Error Mean
Age	1	45	24.73	6.545	.976
	2	45	24.73	6.545	.976
Duration	1	45	390.67	161.617	24.092
	2	45	368.00	96.238	14.346
Onset of anesthesia	1	45	4.64	.645	.096
	2	45	4.36	.484	.072
Pain during procedure	1	45	2.00	.000[a]	.000
	2	45	2.00	.000[a]	.000
VAS	1	45	1.00	.000[a]	.000
	2	45	1.00	.000[a]	.000



Graph 2. Comparison of duration, onset of anesthesia, pain during procedure and VAS Statistics between the two groups

In one patient paraesthesia was noted. Paraesthesia may be due to the drugs or some other causes. Paraesthesia subsided by itself and no medicines were given.

DISCUSSION

One of the most important factors in dentoalveolar treatment is the control of pain in patients using local anesthetics. To have an effective pain control in the minor surgical procedures in dentistry, a number of local anesthetics are present and are studied for their efficacy in pain control. Articaine is not exactly a new drug. Articaine is mostly identified in German literature as carticaine. Articaine is unique among available amide local anesthetics because it is based on a thiophene ring rather than the typical benzene group (Nusstein, 2005). Articaine unlike other amide local anesthetics undergoes bio-transformation in both liver and plasma, thus cleared more quickly from the body (Vree, 2005). The emergence of articaine is generating considerable interest because of its considerable faster onset of action and longer duration of action and its comparable safety and potency. We found VAS score between 0 to 2 and No significant differences were observed between the tested anesthetic solutions for postoperative pain control in third molar surgery, with the use of the Visual Analogue Scale. Pain measurement is difficult to establish, because its perception and intensity are multifactorial encompassing sensorial and effective factors. Although VAS may show deficiencies regarding understanding and perception, it provides a validated and meaningful measure of anesthetic efficiency. However SierraRebolledo *et al*. observed that postoperative pain control with articaine was more satisfactory (Sierra Rebolledo *et al*., 2007). Our study shows duration of action of articaine was longer and the difference is statistically significant. This result of our is in inverse relation with study of Costa CG in 2005 (Costa *et al*., 2005) and in co-relation with study of Kalia V in 2011. Rusching *et al*. synthesized articaine in the form of articaine hydrochloride and is commercially available as a 4% solution with epinephrine 1:100,000. It has a longer duration of action due to its thiopentene ring and has superior diffusion through bony tissue makes it a longer acting local anesthetic. It was reported to be a safe anesthetic and could be used safely in children was reported by Malamed. Kanaa *et al* concluded that articaine was a more effective local anesthetic thsn lidocaine. We found in our study that 4% articaine was better than 2% lignocaine, effective in comfortable having less pain during the procedure and after the procedure (Kanaa *et al*., 2009).

Summery and Conclusion

The study included Ninety patients who underwent surgical removal of mandibular bilateral impacted third molar with the aim to evaluate the onset, duration of anesthesia and complications of Articane in comparison with Lignocaine.

From the data obtained from our study we can conclude that the onset of action Articaine solution is similar to Lignocaine. 4% Articaine has longer duration of action than 2% Lignocaine. The efficacy of 4% Articaine based on VAS (Visual analog scale) is similar to 2% Lignocaine indicating that Articaine has provided adequate analgesia. Only few post-operative complications were noted with both of these agents. Hence Articaine can be used in minor oral surgical procedures like impaction and dentoalveolar surgery.

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