

## Anaesthetic Efficacy of Two Local Anaesthetics Viz Lidocaine and Articaine In Third Molar Surgery

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### ABSTRACT

**Background:** Local anesthetics are efficient and safe medicaments that are used prevention and management of pain. The duration action of articaine is longer than lidocaine as it has the presence of thiopentone ring and it has better diffusion into the tissues that leads to its longer duration of action. The aim of the present study was to determine and compare the anaesthetic efficacy of articaine and lidocaine in third molar surgery.

**Materials and Methods:** The present prospective randomised study was performed amongst 60 subjects who reported to the dental department of the college. Under complete aseptic condition 1.8 ml of local anaesthesia was administered as inferior alveolar and lingual nerve block. Buccal nerve block was also administered. The performing surgeon and the patient was blinded about the type of anaesthesia. Similar surgical technique and post-operative medications and instructions were provided to all the subjects. All the data was arranged in a tabulated form and analysed using SPSS software.

**Results:** The study included 60 subjects, out of which 45 were males and 25 females. The mean age of the subjects was 32.35 +/- 5.31 years. The mean onset in Group A was 56.20 +/-

9.86 secs. The mean onset in Group B was 83.51 +/- 11.65 secs. The mean pain in Group A was 0.96 +/- 0.81. The mean pain in Group B was 1.21 +/- 1.15.

**Conclusion:** Articaine provided better and quick pain relief and may be considered as a safe alternative to lidocaine for doing dental treatment.

**Keywords:** Anaesthesia, Articaine, Lidocaine, Pain.

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### INTRODUCTION

Local anesthetics are efficient and safe medicaments that are used prevention and management of pain. There is no other medicament that truly can be used to prevent pain or that can be used for prevention of propagation of the nociceptive impulses reaching the central nervous system.<sup>1</sup> Surgical removal of the impacted molars is one of the most commonly performed oral surgical treatment. The mainstay for pain control during the intraoperative period for different outpatient procedures is local anaesthetics. A. Einhorn by the year 1904 first synthesised local anaesthetic procaine and is widely used in dentistry and medicine. Nils Lofgren (1943) synthesised the first amide anaesthetic as lidocaine.<sup>2</sup> Lignocaine gained widespread popularity and became the gold standard for comparing and usage. It was Rusching and his colleagues who developed articaine in the year

1969 developed and in the year 1976 in Germany its name was changed to articaine. Later in the years 1983 and 1998 it became widely popular in North America and United Kingdom respectively. Articaine is basically an intermediate acting local anaesthetic like lidocaine.<sup>3</sup>

Articaine Hydrochloride chemically regarded as 4-methyl-3-[1-oxo-2-(propylamino)-propionamido]-thiophene-carboxylic acid methyl ester hydrochloride is commonly used in the concentration of 4%.<sup>4,5</sup> The duration action of articaine is longer than lidocaine as it has the presence of thiopentone ring and it has better diffusion into the tissues that leads to its longer duration of action. It is safe to be used amongst Children as stated by Malamed.<sup>1</sup> The aim of the present study was to determine and compare the anaesthetic efficacy of articaine and lidocaine in third molar surgery.

## MATERIALS AND METHODS

The present prospective randomised study was performed amongst 60 subjects who reported to the dental department of the college. The study was approved by the institutional ethical board and all the subjects were informed about the study and a written consent was obtained from all in their vernacular language. Subjects more than 18 years of age were enrolled in the study. Subjects elder than 55 years of age were excluded from the study. Subjects with uncontrolled hypertension, diabetes, pregnant or lactating mothers and subjects with allergies to local anaesthesia were also excluded from the study. Subjects with impacted mandibular third molars were included in the study. All the subjects were told not to take any pain killer or NSAID 24 hours before the procedure. Under complete aseptic condition 1.8 ml of

local anaesthesia was administered as inferior alveolar and lingual nerve block. Buccal nerve block was also administered. The performing surgeon and the patient was blinded about the type of anaesthesia. Similar surgical technique and post-operative medications and instructions were provided to all the subjects. The level of pain amongst all the subjects was noted using the visual analogue scale. The onset and duration of anaesthesia, duration of surgery and postoperative pain were recorded in a predesigned format. Follow up of all the subjects was performed till 3 post-operative days. All the data was arranged in a tabulated form and analysed using SPSS software. Chi square test was used for analysis. Probability value of less than 0.05 was regarded as significant.

**Table 1: Showing onset of anaesthesia**

Group	Patients	Mean	Standard Deviation	P Value
Group A (Articaine)	30	56.20	9.86	<0.05
Group B (Lidocaine)	30	83.51	11.65	

**Table 2: Showing pain during administration of anaesthesia**

Group	Patients	Mean	Standard Deviation	P Value
Group A	30	0.96	0.81	>0.05
Group B	30	1.21	1.15	

**Table 3: Showing pain during the procedure**

Group	Patients	Mean	Standard Deviation	P Value
Group A	30	1.29	0.75	<0.05
Group B	30	2.65	1.28	

**Table 4: Showing duration of anaesthesia**

Group	Patients	Mean (Mins)	Standard Deviation	P Value
Group A	30	231	56.12	<0.05
Group B	30	189	35.25	

## RESULTS

The study included 60 subjects, out of which 45 were males and 25 females. The mean age of the subjects was 32.35 +/- 5.31 years.

Table 1 illustrates the mean onset of anaesthesia in both the groups. The mean onset in Group A was 56.20 +/- 9.86 secs. The mean onset in Group B was 83.51 +/- 11.65 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 0.96 +/- 0.81. The mean pain in Group B was 1.21 +/- 1.15. 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 1.29 +/- 0.75. The mean pain in Group B was 2.65 +/- 1.28. 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 231 +/- 56.12 minutes. The mean duration in Group B was 189 +/- 35.25. On applying chi square test the p value was less than 0.05 indicating a significant difference between the two groups.

## DISCUSSION

Articaine chemically has a amide bond that undergoes biotransformation in the liver and it is actually a sluggish process but its metabolism also occurs by the estrases in serum that is quick and occurs immediately after injection.<sup>6</sup> The visual analogue scales for pain scoring of is a reliable and generalised scale for pain evaluation.<sup>7</sup> Hence, it was used for measurement of scoring in our study. In the present study the mean onset in Group A was 56.20 +/- 9.86 secs. The mean onset in Group B was 83.51 +/- 11.65 secs. On applying chi square test the p value was less than 0.05 indicating a significant difference between the two groups. The mean pain in Group A was 0.96 +/- 0.81. The mean pain in

Group B was 1.21 +/-1.15. On applying chi square test the p value was more than 0.05 indicating no significant difference between the two groups. The pH of anaesthetic solution is 5.5, on adding vasoconstrictor it decreases to 4.5. The alkaline nature of the anaesthetic provides a higher potency and quick onset of action. As per the study by Malamed, articaine was considered as a safer, effective and well tolerated technique of pain relief.<sup>6</sup> Vahatalo et al conducted a study in the year 1993 and found no significant difference in the onset and duration of anaesthesia between articaine and lignocaine.<sup>9</sup> In our present study, the mean duration in Group A was 231 +/-56.12 minutes. The mean duration in Group B was 189 +/-35.25. On applying chi square test the p value was less than 0.05 indicating a significant difference between the two groups. As per Miyoshi et al on comparing the potency of four local anaesthetics, they found that articaine has a faster onset of action than lidocaine.<sup>10</sup> According to a study conducted by Costa et al they came to the conclusion that articaine has a shorter and faster onset of action.<sup>11</sup> As per Kalia et al found that articaine has a longer duration of anaesthesia as well as longer onset of anaesthesia when compared to 2% lidocaine.<sup>12</sup> As per the study by Sree kumar and Bhagat et al, to evaluate the anesthetic efficacy of articaine and lignocaine for the transalveolar extraction of the impacted molar teeth, they found that, articaine had better anesthetic efficacy.<sup>13</sup> The concentration of articaine in the alveolus after extraction of tooth was 100 times more than that in systemic circulation. The chief action contributing to its duration of action is metabolism of articaine of its short systemic half-life.<sup>14</sup> In studies, the duration of soft tissue anesthesia by articaine at a dose of 1.8ml is 4.3 to 5.3 hours for nerve blocks.<sup>15</sup>

## CONCLUSION

According to our study it can be concluded that articaine has better pharmacokinetic and pharmacodynamic actions when compared to lidocaine. Articaine provided better and quick pain relief and may be considered as a safe alternative to lidocaine for doing dental treatment.

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