

# Articaine vs Lidocaine in Removal of Third Molar Surgery: A Clinical Study

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## ABSTRACT

**Introduction:** The choice of local anesthetic solution in extraction of teeth is based on three main clinical considerations: anesthetic potency, latency and duration of the anesthetic affect. The study was carried out to evaluate the efficacy articaine vs lidocaine in the surgical removal of impacted mandibular third molars. The parameters studied were the onset of anesthesia ,pain during injection ,pain during procedure and after the procedure and duration of anesthesia between the two anesthetics

**Material and methods:** A prospective study was conducted on 30 patients planned for surgical removal of mandibular third molars. The patient was administered one of the anesthetics and the parameters were noted.

**Results:** The differences in latency, pain during procedure and after procedure was statistically significant between articaine and lignocaine.

**Conclusion:** We concluded that articaine had a significant faster onset of action and longer duration of action when compared to lignocaine.

**Keywords:** Mandibular Third Molar, Articaine, Lignocaine, Local Anesthesia

We aimed to study the clinical efficacy of lidocaine vs articaine in removal of third molar surgery

## MATERIAL AND METHODS

The present study was done in 30 patients reporting to the Department of Dentistry, Punjab Institute of Medical Sciences, Jalandhar with impacted mandibular third molars. The approval to undertake this study was obtained from The Institutional Ethics Committee.

### Inclusion criteria

- Patients who were in the age group of 18 to 30 years
- Acute pericoronitis in relation to lower third molar region
- Dental decay in relation to third molars and were not restorable.

### Exclusion criteria

- Patients who were allergic to any local anesthetics were excluded from the study. Pregnancy and lactation
- Single isolated impacted tooth
- Patients who had history of diabetes, hypertension, cardiac, or neurological disorder
- The patients in which mouth opening was reduced making surgery not possible

### Methodology

Surgery was carried out under strict asepsis. The local anesthetic used was random not known to both the patient and the doctor. A total of 1.8 ml of local anesthesia was used. The surgical technique followed was similar for all the patients and the post operative medication was also standard for all the patients.

The parameters studied were:

1. The onset of anesthesia was determined by loss of sensation on lower lip and corresponding half of the tongue
2. Duration of surgery after anesthetic administration
3. Postoperative anesthetic duration on soft tissues was determined
4. The amount of pain experienced by the patient ,the

## INTRODUCTION

Surgical removal of third molars is the most commonly performed procedure by oral and maxillofacial surgeons . Local anesthetic agents are the mainstay of intra operative pain control for most office based oral surgical procedures. Procaine was the first synthesized local anesthetic agent by Alfred Einhorn in 1904 and it became the main local anesthetic in medicine and dentistry. The first amide anesthetic to be synthesized was lidocaine by Nils Lofgren in 1943<sup>1</sup> The amide anesthetic gained popularity and was started being widely used and was considered the gold standard for usage and comparison<sup>2</sup> The onset of action of lidocaine varies from 2 to 3 min and the duration of its anesthesia is 85 minutes at the pulpal level, with addition of epinephrine as vasoconstrictor<sup>3</sup> Lidocaine is the most safely used local anesthetic agent for pain control in dentistry because of its pharmacokinetic characteristics and it has quite low toxicity compared with other anesthetics<sup>4</sup> Rusching *et al.* synthesized articaine in the form of articaine hydrochloride and it was 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<sup>5</sup>

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**How to cite this article:** Harveen Kaur, Ramneet Kataria. Articaine vs lidocaine in removal of third molar surgery: a clinical study. International Journal of Contemporary Medical Research 2017;4(9):1889-1891.

scale from 0 to 10, with 0 anchored by no pain and 10 anchored by worst pain imaginable was determined by visual analog scale.

## STATISTICAL ANALYSIS

Microsoft office 2007 was used for the analysis. Descriptive statistics like mean and percentages were used for the interpretation of data. Chi square test was used to calculate the p value.

## RESULTS

The results of this study are tabulated with the various parameters which were recorded in the study. The mean onset of anesthesia was 58.68 sec for Articaine and 86.48 sec for lidocaine (table-1). The mean duration of surgery was 36 min for Articaine and 34 min for Lignocaine VAS score for recording pain during administration of anesthesia for Articaine was  $0.94 \pm 0.88$ , whereas for Lignocaine it was  $1.18 \pm 1.68$ , ( $P > 0.01$ ), which was not significant (table-2). VAS score for pain during procedure using Articaine was  $1.28 \pm 0.78$  and  $2.58 \pm 1.10$  for Lignocaine with  $P < 0.01$ , which was highly significant (table-3). The mean duration of anesthetic effect for Articaine was  $228 \pm 56.15$  min and  $180 \pm 36.02$  min for Lignocaine with  $P < 0.01$ , which was highly significant (table-4).

## DISCUSSION

Surgical removal of third molars is the most commonly performed procedure by oral and maxillofacial surgeons and the dentists trained to do this procedure. To have an effective pain control in the majority of procedures in dentistry, a number of local anesthetics are present and are studied upon for their efficacy in pain control and hence supremacy over the existing local anesthetics. 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. The pH of most of the anesthetic agents is acidic which causes the discomfort during administration. To control the pH of anesthetics, a number of additives are added to make it alkaline such as bicarbonates or carbon dioxide which makes the drug administration comfortable. The pH of plain local anesthetic solution is approximately 5.5; vasoconstrictor containing solution is about 4.5. The alkalized solution has a faster onset of action and relatively higher potency. Malamed compared both the anesthetics in a study and concluded that articaine was safe, tolerated well and was effective in pain relief.<sup>5</sup> In another study done by Vahatalo et al in 1993 articaine and lidocaine were compared and he found no difference in the duration of action and onset of anesthesia between the two.<sup>6</sup> Miyoshi et al in 2000<sup>7</sup> compared the potency of four local anesthetics on dental pulp and concluded that articaine had quicker onset than lidocaine. Costa et al compared the onset and duration of action and concluded that articaine had shorter onset of anesthesia.<sup>8</sup> A similar study was conducted by Kalia et al in 2011 to compare the onset of action and duration of anesthesia of articaine and lidocaine and concluded that 4% articaine had longer duration and onset of anesthesia

| Group     | No of patients | Mean (sec) | SD    | p    |
|-----------|----------------|------------|-------|------|
| Articaine | 15             | 58.68      | 9.76  | 0.00 |
| Lidocaine | 15             | 86.48      | 10.86 |      |

**Table-1: Onset of anaesthesia**

| Group      | No of patients | Mean | SD   | P     |
|------------|----------------|------|------|-------|
| Articaine  | 15             | 0.94 | 0.88 | 0.393 |
| Lignocaine | 15             | 1.18 | 1.68 |       |

**Table-2: Pain during administration of anesthesia**

| Group      | No of patients | Mean | SD   | P     |
|------------|----------------|------|------|-------|
| Articaine  | 15             | 1.28 | 0.78 | <0.01 |
| Lignocaine | 15             | 2.58 | 1.10 |       |

**Table-3: Pain during procedure**

| Group      | No of patients | Mean (min) | SD    | P     |
|------------|----------------|------------|-------|-------|
| Articaine  | 15             | 228        | 56.15 | <0.01 |
| Lignocaine | 15             | 180        | 36.02 |       |

**Table-4: Duration of anestheisa**

as compared to 2% lidocaine.<sup>9</sup> Another study was done to compare the anesthetic efficacy of both 4% articaine and 2% lignocaine with epinephrine during surgical removal of the impacted mandibular third molars by Sree kumar and Bhagat et al and they concluded that 4% articaine has better anesthetic efficacy.<sup>10</sup> The duration of the effect of the local anesthetic is dependent on the injection site or concentration of vasoconstrictor present in the anesthetic solution, among other factors. Another prospective study to compare the anesthetic efficacy of 4% articaine and 2% lidocaine both with 1:100,000 epinephrine concentration was done by Batista da silva and he revealed that the duration of anesthesia was longer for articaine than lignocaine.<sup>11</sup> In a comparative study on the postoperative pain after surgical removal of lower third molars Garcia and Gomes et al and concluded that the articaine with epinephrine is useful where longer duration of procedure was expected.<sup>12</sup> In a study, Moore et al compared 4% articaine HCl with different epinephrine concentrations and concluded it was very effective in periodontal surgeries in pain control.<sup>13</sup> A study conducted to compare the pain on injection with articaine and lidocaine by Sumer et al and they concluded that there were mild or no injection pain for all the anesthetics.<sup>14</sup> Kanaa et al concluded that articaine was a more effective local anesthetic than lidocaine.<sup>15</sup> 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.

## CONCLUSION

In our comparative study, results showed that 4% articaine due to its better pharmacokinetic properties had a better pain control, faster onset and long duration. From our study, we concluded that 4% articaine is a safe alternative to 2%

lignocaine, which is potent and effective in minor surgical procedures such as removal of mandibular third molars.

## REFERENCES

1. Kanaa MD, Whitworth JM, Corbett IP, Meechan JG. Articaine and lidocaine mandibular buccal infiltration anesthesia: a prospective randomized double-blind cross-over study. *J Endod.* 2006;32:296–8
2. Trullenque-Eriksson A, Guisado-Moya B. Comparative study of two local anesthetics in the surgical extraction of mandibular third molars: bupivacaine and articaine. *Med Oral Patol Oral Cir Bucal.* 2011;16:e390–6.
3. Sierra-Rebolledo A, Delgado-Molina E, Berini-Aytés L, Gay-Escoda C. 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.
4. Malamed SF. *Handbook of Local Anesthesia.* 5th ed. St. Louis: Mosby; 2004.
5. Malamed SF, Gagnon S, Leblanc D. Efficacy of articaine: a new amide local anesthetic. *J Am Dent Assoc.* 2000;131:635–42.
6. Vähätalo K, Antila H, Lehtinen R. Articaine and lidocaine for maxillary infiltration anesthesia. *Anesth Prog.* 1993;40:114–6.
7. 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.
8. 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.
9. 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.
10. 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.
11. Batista da Silva C, Berto LA, Volpato MC, Ramacciato JC, Motta RH, Ranali J, et al. Anesthetic efficacy of articaine and lidocaine for incisive/mental nerve block. *J Endod.* 2010;36:438–41.
12. García-Gómez FA, Martín JF. Effects of local anaesthetics in postsurgical pain in third molar surgery. *Dentum.* 2006;6:67–9.
13. Moore PA, Doll B, Delie RA, Hersh EV, Korostoff J, Johnson S, et al. Hemostatic and anesthetic efficacy of 4% articaine HCl with 1:200,000 epinephrine and 4% articaine HCl with 1:100,000 epinephrine when administered intraorally for periodontal surgery. *J Periodontol.* 2007;78:247–53.
14. Sumer M, Misir F, Celebi N, Muglali M. A comparison of injection pain with articaine with adrenaline, prilocaine with phenylpressin and lidocaine with adrenaline. *Med Oral Patol Oral Cir Bucal.* 2008;13:E427–30.

15. Kanaa MD, Whitworth JM, Corbett IP, Meechan JG. Articaine buccal infiltration enhances the effectiveness of lidocaine inferior alveolar nerve block. *Int Endod J.* 2009;42:238–46.

**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 19-08-2017; **Accepted:** 21-09-2017; **Published:** 30-09-2017