



Clinical Assessment of Using Local Anesthetic Articaine 4% with 1:100,000 Epinephrine for Inferior Alveolar Nerve Block Comparing It with Lidocaine 2% with 1:100,000 Epinephrine

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Abstract: Objectives: This study was carried out to study the efficacy and the anesthetic characters of using Articaine 4 % with 1:100,000 Epinephrine as a local anesthetic drug in surgical practice through inferior alveolar nerve block and comparing it with Lidocaine 2% with 1:100,000 Epinephrine. Materials and methods: Thirty patients in two groups, fifteen patients each, undergo extraction of impacted mandibular third molar, Inferior Alveolar Nerve block had been carried out using either Articaine 4% or Lidocaine 2% Local anesthetic drugs. Results: Articaine was well-tolerated and it provided clinically effective pain relief during surgical procedures and it was as potent as Lidocaine and provided similar clinical effect to Lidocaine (Gold standard). Conclusions: On the basis of our findings, we recommend using Articaine 4% as local anesthetic drug in minor oral surgery.

Keywords: Articaine, Lidocaine, Inferior Alveolar Nerve Block

1. Introduction

Pain is a protective mechanism of the body to a tissue injury by different stimulations, which transmit a signal to the Central Nervous System. Dental pain is usually originated from acute inflammatory nature and it compels the patient for seeking professional help. On the other hand, surgical interventions in dentist office may also induce pain in the post operative period of previously asymptomatic patients⁽¹⁾.

The increased availability of local anesthetics has improved interest in research about dental pain control. Nowadays the professional can select from a broad variety of local anesthetic drugs that have the specific properties demanded by the specific case of the patient and the kind of surgical procedure. The concept of local anesthetic action is based on hindering the generation and conduction of nerve impulses. Thus, the impulse is aborted, hindered from reaching the brain and is not interpreted as pain by the patient⁽²⁾.

Articaine is a recent amide local anesthetic agent, similar to all other local anesthetics currently used in dentistry.

Instead of benzene ring it contains a thiophene ring that increases its lipid solubility. Unlike other local anesthetics, articaine is an exceptional in that it contains an additional ester group that is rapidly metabolized by plasma esterase to articainic acid (3).

2. Material and Methods

The study was conducted on thirty patients subjected to perform extraction of impacted lower third molar. Patients were selected from the outpatient clinic of Oral and maxillofacial Surgery Department, Faculty of Dentistry, Suez Canal University who presented for surgical extraction of mandibular 3rd molar under local anesthesia.

Patients were divided into two equal groups, 15 patients each.

Group (I):

The local anesthesia was conducted by using Articaine 4% (Ubistesin Forte).

Group(II):

The local anesthesia was conducted by using Lidocaine 2% (Octocaine 100).

All patients of both groups were subjected to the following assessment:

2.1. Onset of Anesthesia

Onset of mandibular paresthesia was measured after completion of injection till feeling of altered sensation in lower lip.

2.2. Total Volume of Anesthesia

Total volume of the anesthetic drug required to complete the surgery was calculated for each patient in the study regarding that each carpule is 1.8 ml

2.3. Duration of Analgesic Effect of the Local Anesthetic Drug

The duration of the analgesia was calculated according to the time at which the patient felt pain, discomfort and need for analgesia after surgery and withdrawal of the anesthetic effect.

3. Results

In general, Articaine was superior to Lidocaine in all items of evaluation of the study clinically and statistically but with no statistical significance.

Total volume of anesthesia (ml) chart (1) :

1st group recorded total volume ranged from 2 to 5.6 ml, with mean of 3.7 ± 1.3 ml

2nd group recorded total volume ranged from 2 to 7.4 ml with mean of 4 ± 1.8 ml.

Onset of anesthesia (minutes) chart (2):

1st group recorded onset of anesthesia ranged from 1 to 4 minutes, with mean onset time 2 ± 1 minutes.

2nd, group recorded onset of anesthesia ranged from 2 to 4 minutes, with mean onset time 2.4 ± 0.7 minutes.

Time to first analgesia “mins”(Analgesic effect) chart (3):

Time was measured from onset of anesthesia till taking the first analgesic drug as an equivalent for the analgesic effect of the anesthesia.

1st group: recorded time taken to first analgesia with mean of 296.1 ± 104.5 minutes.

2nd group recorded time taken to first analgesia with mean of 263.6 ± 140.5 minutes.

4. Discussion

The present study was designed to assess efficacy and the anesthetic characters of using Articaine 4 % with 1:100,000 Epinephrine as a local anesthetic drug in dental practice through inferior alveolar nerve block and comparing it with Lidocaine 2% with 1:100,000 Epinephrine . Lidocaine hydrochloride has maintained its status as the most widely used local anesthetic in dentistry since its introduction. Proven efficacy, low allergenicity, and minimal toxicity through clinical use and research have confirmed the value and safety of this drug. Thus, it became labeled the gold

standard to which all new local anesthetics are compared. Despite the gold standard status of lidocaine hydrochloride, numerous reports have advocated the use of articaine hydrochloride as a superior anesthetic agent, primarily on the basis of its enhanced anesthetic potency, which is 1.5 times greater than that of lidocaine, with faster onset and increased success rate ⁽⁴⁾.

The average time of onset for subjective symptoms for Articaine in the present study was 2 min (1–2 min) and objective symptoms 2.12 min (1.08–4 min). On comparison to Lidocaine it was subjective symptoms 2.40 min (1–3 min) and objective symptoms 3.15 min (1–4 min). Latency is directly influenced by the corresponding pKa value—smaller pKa values being associated to shorter latency. Accordingly, 4 % Articaine (pKa = 7.8) would at least in theory present a shorter latency than 2 % Lidocaine (pKa = 7.9). Our results coincide with this assumption, since the latency was shorter for Articaine versus Lidocaine. The mean time taken by 4 % Articaine was 2–3 min as compared to 3 min for 2 % Lidocaine ⁽⁵⁾.

The results of the present study are in accordance with many other previous studies. Dugal *et al.* ⁽⁶⁾ concluded onset of action of Lidocaine was 1.15 min. Moore *et al.* ⁽⁷⁾ reported 4 % Articaine HCl with 1:100,000(A100) as 4.2 ± 2.8 min and for 4 % Articaine HCl with 1:200,000(A200) as 4.7 ± 2.6 min. Colombini *et al.* ⁽⁸⁾ stated 149.50 ± 14.29 s for Articaine. Rebolledo *et al.* ⁽⁹⁾ reported 53.03 s (0.93 min) for Articaine versus 75.04 s (1.25 min) for Lidocaine. The long period of analgesia for Articaine explained by Gregorio *et al.* ⁽¹⁰⁾ stated that onset of action of Articaine was 1.66 ± 0.13 min. Statistically significant difference was not present in action of onset of the two drugs.

Regarding total volume of anesthetic drug and no. of carpules, no statistical significance was recorded but articaine showed clinical superiority. Mean of articaine volume was 3.7ml comparing with lidocaine which was 4 ml. this is in agreement with ⁽⁵⁾ in his 1325 adult patients study, which was 2.5 ± 0.07 in simple impaction and 4.2 ± 0.15 in complex impaction for articaine 4% and 2.6 ± 0.09 in simple impaction and 4.5 ± 0.21 in complex impaction for lidocaine 2%. ⁽¹¹⁾ Reported mean volume of Articaine to be 2.22 ± 0.49 ml.

Regarding the analgesic effect of articaine, articaine showed superior clinical parameters than lidocaine. 2 patients out of 15 did not take any analgesics and 7 out of 15 took analgesics 1 hour after the withdrawal of anesthetic effect, one patient out of 15 took analgesics 30 min. After withdrawal of anesthesia, one patient took analgesics before withdrawal of anesthesia, and the remaining 4 patients took analgesics at the same time of fade of anesthesia, while all the 15 patients in lidocaine group took analgesics at the same time of fade of anesthesia.

Colombini *et al.* ⁽¹²⁾ stated Articaine provides a longer period of analgesic effect and a tendency for a longer period of anesthesia in study with mepivacaine. . It was stated that the pre-emptive nerve block with long acting local anesthetic results in reduction of postoperative pain and can prevent the central hypersensitivity that occurs as a result of surgical

trauma.

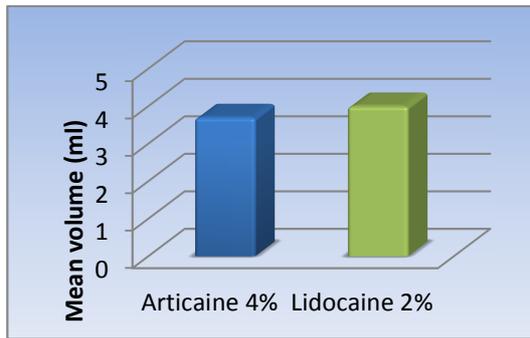


Fig. (1). Bar chart representing mean volume of anesthesia in the two groups.

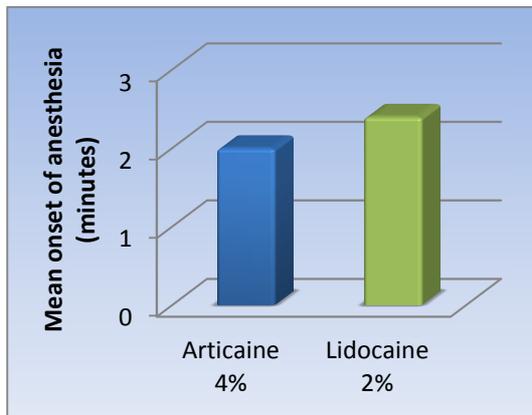


Fig. (2). Bar chart representing mean onset of anesthesia in the two groups.

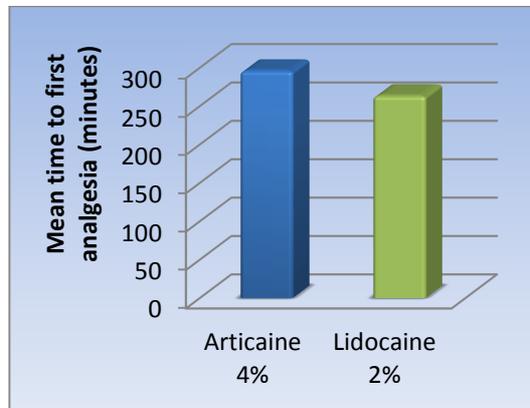


Fig. (3). Bar chart representing mean times to first analgesia in the two groups.

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