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Assessment of efficacy of Local Anesthesia with 2 Different Concentrations of Adrenaline in patients undergoing mandibular third molar extraction

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Abstract

Background: Local anesthesia laid the fundamental foundation for pain regulation in dentistry. Hence; the present study was conducted for assessing the efficacy of Local Anesthesia with 2 Different Concentrations of Adrenaline in patients undergoing mandibular third molar extraction.

Materials & Methods: 50 patients who were scheduled to undergo mandibular third molar extraction were enrolled and were uniformly divided into two study groups as follows: Group A: 2% lignocaine with concentrations of adrenaline being 1:80000; and Group B: 2% lignocaine with concentrations of adrenaline being 1:200000. Complete demographic details of all the patients were obtained. Pre-extraction examination of all the patients was done. Local anesthesia was delivered as per respective group and dental extractions were carried out under adequate aseptic environment. Postoperative results were recorded and compared.

Results: Mean time of onset among patients of group A and group B was 3.52 minutes and 3.28 minutes respectively. Mean duration among patients of group A and group B was 158.5 minutes and 121.8 minutes respectively. Significant alteration in the pulse rate among the patients of group A was recorded.

Conclusion: 1:80000 adrenaline concentrations showed significant rise in pulse rate. For the cardiac and elderly patients, 1:200000 adrenaline concentrations are recommended.

Keywords: Local anaesthesia, Adrenaline, Third molar

1. Introduction

Local anesthesia laid the fundamental foundation for pain regulation in dentistry. The backbone of pain management was founded by William Halsted in 1885 by introducing injectable dental local anesthesia, which reformed dental surgery. Since the beginning of this revolution, a perceptible advancement in dental anesthesiology has been apparent in the anesthetic solutions used. Despite multitudinous developments in medical and dental sciences, there are still many local and systemic complications encountered in a clinical setting; pain at the injection site, reduced efficacy, ulceration and induced infection at site of injection are the few local complications. At the same time, toxicity is a major systemic complication encountered^[1-3]. A practitioner preferably needs to have a requisite understanding concerning composition, pH, efficacy, antibacterial activity and cytotoxicity of different anesthetic solutions available to avoid these postoperative complications. In recent years, different techniques have been proposed to mollify the intensity of pain during the process of injecting an anesthetic. One of these is to use buffered solutions of local anesthesia as recommended in a Cochrane study. Adding a buffer-like bicarbonate with lidocaine increases the pH of the anesthetic solution, thus reducing the pain during the injection. Pain is ascribed with local anesthetic's acidity; hence, practitioners should know about the pH and presence of bicarbonate ions in the anesthetic solutions used in clinical practice^[4-7]. Hence; the present study was conducted for assessing the efficacy of Local Anesthesia with 2 Different Concentrations of Adrenaline in patients undergoing mandibular third molar extraction.

Materials & methods

The present study was conducted for assessing the efficacy of Local Anesthesia with

2 Different Concentrations of Adrenaline in patients undergoing mandibular third molar extraction. 50 patients who were scheduled to undergo mandibular third molar extraction were enrolled and were uniformly divided into two study groups as follows:

Group A: 2% lignocaine with concentrations of adrenaline being 1:80000.

Group B: 2% lignocaine with concentrations of adrenaline being 1:200000.

Complete demographic details of all the patients were obtained. Pre-extraction examination of all the patients was done. Local anesthesia was delivered as per respective group and dental extractions were carried out under adequate aseptic environment. Postoperative results were recorded and compared. All the results were recorded and analysed by SPSS software. Chi-square test was used for evaluation of level of significance.

Results

Mean age of the patients of group A and group B was 43.8 years and 41.8 years respectively. There were 14 males and 11 females in group A while there were 15 males and 10 females in group B. Mean time of onset among patients of group A and group B was 3.52 minutes and 3.28 minutes respectively. Mean duration among patients of group A and group B was 158.5 minutes and 121.8 minutes respectively. Significant alteration in the pulse rate among the patients of group A was recorded.

Table 1: Demographic data

Variable	Group A	Group B
Mean age (years)	43.8	41.8
Males (n)	14	15
Females (n)	11	10

Table 2: Outcome

Variable	Group A	Group B	p- value
Mean time of onset (minutes)	3.52	3.28	0.25
Mean duration (minutes)	158.5	121.8	0.00*

*: Significant

Table 3: 3ulse rate

Pulse rate	Group A	Group B	p- value
Baseline	72.5	73.2	0.25
Intraoperative 10 mins	75.8	74.6	0.00*
Intraoperative 20 mins	82.2	75.7	0.01*
Intraoperative 30 mins	86.1	77.7	0.02*
Intraoperative 60 mins	75.3	76.9	0.82

Discussion

Local anesthetics interrupt neural conduction by inhibiting the influx of sodium ions through channels or ionophores within neuronal membranes. Normally these channels exist in a resting state, during which sodium ions are denied entry. When the neuron is stimulated, the channel assumes an activated or open state, in which sodium ions diffuse into the cell, initiating depolarization. Following this sudden change in membrane voltage, the sodium channel assumes an inactivated state, during which further influx is denied while active transport mechanisms return sodium ions to the exterior. Following this repolarization, the channel assumes its normal resting state. An appreciation of these sodium channel states helps to explain the preferential sensitivity of local anesthetics for various classes of neuronal fibers [6-10].

Mean age of the patients of group A and group B was 43.8

years and 41.8 years respectively. There were 14 males and 11 females in group A while there were 15 males and 10 females in group B. Mean time of onset among patients of group A and group B was 3.52 minutes and 3.28 minutes respectively. Managutti A et al compared the efficacy and cardiovascular effects with the use of 2% lignocaine with two different concentrations. Forty patients underwent extractions of mandibular bilateral teeth using 2% lignocaine with two different concentrations - one with 1:80000 and the other with 1:200000. There was no significant difference in the efficacy and duration with the 2% lignocaine with 2 different concentrations. 2% lignocaine with 1:80000 adrenaline concentration has significantly increased the heart rate and blood pressure especially systolic compared with the lignocaine with 1:200000. Though 2% lignocaine with 1:80000 is widely used in India, 1:200000 adrenaline concentrations do not much affect the cardiovascular parameters [10].

In the present study, mean duration among patients of group A and group B was 158.5 minutes and 121.8 minutes respectively. Significant alteration in the pulse rate among the patients of group A was recorded. Kakade AN et al compared the effectiveness of 0.75% ropivacaine alone and 2% lignocaine with adrenaline (1:80,000) in the removal of bilateral maxillary wisdom teeth using the posterior superior alveolar nerve block technique. They randomly allocated the sides and sequences of ropivacaine and lignocaine with adrenaline administration. They evaluated the efficacy of both anesthetics with regard to the onset of anesthesia, intensity of pain, variation in heart rate, and blood pressure. The onset of anesthesia was faster with lignocaine (138 s) than with ropivacaine (168 s), with insignificant differences ($p = 0.001$). There was no need for additional local anesthetics in the ropivacaine group, while in the lignocaine with adrenaline group, 2 (13.3%) patients required additional anesthesia. Adequate intraoperative anesthesia was provided by ropivacaine and lignocaine solutions. No significant difference was observed in the perioperative variation in blood pressure and heart rate. Ropivacaine (0.75%) is a safe and an adrenaline-free local anesthetic option for posterior superior alveolar nerve block, which provides adequate intraoperative anesthesia and a stable hemodynamic profile for the removal of the maxillary third molar [11].

Conclusion

1:80000 adrenaline concentrations showed significant rise in pulse rate. For the cardiac and elderly patients, 1:200000 adrenaline concentrations are recommended.

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