

3% Mepivacaine: A Comparison with Conventional Local Anesthetic Agent

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Abstract

Objective: Comparative evaluation of 3% mepivacaine without vasoconstrictor and 2% lignocaine with vasoconstrictor.

Material and method: The study was carried out in twenty (20) patients with 3% mepivacaine hydrochloride (study group) and twenty (20) patients with 2% lignocaine hydrochloride with adrenaline (control group). The parameters used for comparison are time of onset, duration of anesthesia, blood pressure changes.

Result: The mean of time of onset for group M was 2.3 ± 0.432 and for group L was 2.950 ± 0.510 . Duration of anesthesia for group M was 155 ± 1.376 and for group L was 138.6 ± 1.187 . There was not much significant difference in hemodynamic parameters in both the groups were observed.

Conclusion: The study concluded that mepivacaine has a shorter time of onset and longer duration of anesthesia and can be used safely in patients with cardiovascular disease. 3% mepivacaine can also be used as an alternative to 2% lidocaine with vasoconstrictor (1:200000).

Keywords: mepivacaine, lidocaine, vasoconstriction

I. Introduction

The use of 2% lidocaine with vasoconstrictor in the field of oral and maxillofacial surgery is very common. Since vasoconstrictors are contraindicated in many diseases and its essential role in reduced bleeding and increased duration of anesthesia has generated need for a local anesthetic agent with vasoconstriction effect and much safer in cardiovascular diseases. 3% mepivacaine without vasoconstrictor is one of the local anesthetic agent introduced in oral and maxillofacial surgery long back but not much research is done on its local vasoconstriction effect.

Mepivacaine hydrochloride is chemically 1-methyl 2',6' - pipercoloxylididehydrochloride. It is an amide and 2 times more potent than lidocaine. It is metabolized in liver by microsomal fixed-function oxidases and excreted through kidneys. It is a pregnancy category C drug. Table 1¹

II. Materials & Method

A prospective study was carried out in 40 patients reported to the department of oral and maxillofacial surgery of People's College of Dental Sciences & Research Centre. The patients were categorized under two groups, 20 patients in group M and 20 patients in group L. The patients included in the study were under the category of ASA I (American Association of Anesthesiology). All the patients in the study required administration of local anesthesia for extraction of teeth. In group M patients, local anesthesia was administered using non-aspirating syringe (Fig 1.) and cartridge 1.8ml of 3% mepivacaine without vasoconstrictor (Scandonest) Fig 2 & 3. and in group L, 2% lidocaine with vasoconstrictor (Epinephrine) in the ratio of 1:200000 was administered as per the recommended dose. The following criteria's were evaluated after administration of local anaesthesia in both the groups: 1. Time of onset, 2. Duration of anesthesia, 3. Pulse Rate, 4. Systolic and diastolic Blood pressure before procedure, after 2 mins and after 5 mins. The mean and standard deviation was calculated, also the recorded data in the group M and group L was compared using student's t test.

Table 1: Properties of Mepivacaine hydrochloride

1. Potency 2 (prilocaine = 1; lidocaine=2)
2. Toxicity 1.5 to 2
3. pKa 7.6
4. pH of plain solution 5.5 to 6.0
5. pH of Vasoconstrictor containing solution 4.0
6. Pregnancy Classification Category C

7. Safety during lactation S?



Fig2. 3% Mepivacaine hydrochloride (Scandonest) cartridge 1.8ml, Fig1. Use of non-aspirating syringe



Fig3. Nerve block using 3% Mepivacaine without vasoconstrictor

III. Results

The study was done to compare the effects of 3% mepivacaine without vasoconstrictor with 2% lidocaine with vasoconstrictor (1:200000). The hemodynamic parameters were also evaluated and compared. Mean of time of onset for Group M was 2.3 ± 0.432 and for group L it was 2.950 ± 0.510 , there was not much significant difference in time of onset was found between both the groups, still group M patients showed quick onset of anesthesia as compared to group L patients. The value of t-test after comparison of both the groups was -4.14 and probability after assuming null hypothesis was 0.0002.

The mean of duration of anesthesia for group M was 155 ± 1.376 and for group L was 138 ± 1.187 . The duration of anesthesia for group M was more as compared to group L. The t value obtained on comparison was -40.3 and probability of comparison was less than 0.0001.

The mean and standard deviation of pulse rate and blood pressure for both groups is simulated in Table 2 and

Table 3.

Group	Before Procedure	After 2 mins	After 5 mins
Group M	76.75	74.75	74.35
Group L	83.8	80.75	80.45

Group		Before procedure	After 2 mins	After 5 mins
Group M	Systolic	151.3	151.55	153.55
	Diastolic	86.0	86.25	89.15
Group L	Systolic	147.65	144.95	144.75
	Diastolic	83.5	83.1	84.85

IV. Discussion

In our study 3% mepivacaine without vasoconstrictor (Scandonest) is compared with 2% Lidocaine with vasoconstrictor (1:200000), and the statistics concluded that there was shorter time of onset and longer duration of anesthesia with 3% mepivacaine without vasoconstrictor. The hemodynamic changes were also analysed and compared in both the groups and no significant difference was obtained between both the groups. A comparative study done by Su N et al on efficacy and safety of 3% mepivacaine and 2% lidocaine with vasoconstrictor (1:100000) concluded that 3% mepivacaine has a better time of onset and is much safer to use in cardiac patients.²

Ding S et al did a study on efficacy and safety of 3% mepivacaine hydrochloride as a local anesthetic agent and concluded that it had a quicker onset and safer than 2% lidocaine with adrenaline in cardiovascular diseases.³ Ezmek B et al compared the hemodynamic effects 2% lidocaine, 2% prilocaine and 3% mepivacaine without vasoconstrictors in hypertensive patients and deduced that there was no significant change in hemodynamic parameters after administration of all the 3 anesthetic agents from the time of administration to 15 mins.⁴ 2% lidocaine with vasoconstrictor is used in dentistry because of its combined effect of anesthesia and vasoconstriction. The vasoconstrictor reduces toxicity of lidocaine, increases duration of anesthesia and reduced bleeding at local site due to its vasoconstrictor effect.⁵ There are absolute contraindications in various cardiovascular and thyroid diseases and relative contraindications due to adverse interaction with various drugs and therefore there is inhibitory in such conditions⁶, therefore a need of local anesthetic drug with vasoconstrictor effect without vasoconstrictors is required. A study done by Lindorf HH on vascular effect of mepivacaine and prilocaine concluded that mepivacaine is a mild vasoconstrictor.⁷

Allen L Sisk described the role of vasoconstrictors in a review article that rebound phenomenon of vasoconstrictors may cause postoperative bleeding and impaired wound healing.⁸ 3% mepivacaine is composed of mepivacaine hydrochloride, sodium chloride and sterile water¹. The use of 2% lidocaine with vasoconstrictor has many side effects both in healthy and patients with cardiovascular diseases whereas, by the use of 3% mepivacaine without vasoconstrictor helps to avoid these complications related to chemical compounds present in 2% lidocaine with vasoconstrictor.⁹

V. Conclusion

The use of mepivacaine as an alternative to local anesthetic agent with vasoconstrictor can be an option in future. Further studies are required to analyze the vasoconstriction effect of mepivacaine which may enhance the role of 3% mepivacaine without vasoconstrictor in the field of oral and maxillofacial surgery for various surgical procedures.

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