(e) ISSN Online: 2321-9599

(p) ISSN Print: 2348-6805

ORIGINAL ARTICLE

A comparative study of effect of mepivacaine and lignocaine on heart rate in children

Sumit Kumar Gupta[1], Amit Varshney[2]

[1]Assistant Professor, Department of Pediatrics, Major S D Singh Medical College, Farrukhabad, Uttar Pradesh, India
[2]Assistant Professor, Department of General Medicine, Sakshi Medical College, Guna, Madhya Pradesh, India

ABSTRACT:
Background: Local anesthetic drugs, by disrupting nerve conduction lead to a temporary numb into the specific area of the body. The present study compared effect of mepivacaine and lignocaine on heart rate in children.
Materials & Methods: 60 children age <14 years of both genders were divided into 2 groups of 30 each. Group I received 2% lidocaine with adrenaline 1: 80000 and group II received 3% Mepivacaine. In both groups heart rate was recorded before and after injection and compared.
Results: Group I received 2% lidocaine with adrenaline 1: 80000 and group II received 3% Mepivacaine. Group I comprised of 20 males and 10 females and group II had 18 males and 12 females. Heart rate was 74.2 beats/ min before and 83.5 beats/ min after injection. In group II, heart rate was 82.5 beats/ min before and 83.7 beats/ min after injection. The difference was significant (P< 0.05).
Conclusion: Mepivacaine did not alter heart rate whereas with lignocaine having added adrenaline there was more change in heart rate after injection.
Key words: Heart rate, Lignocaine, Mepivacaine

Corresponding author: Dr. Sumit Kumar Gupta, Assistant Professor, Department of Pediatrics, Major S D Singh Medical College, Farrukhabad, Uttar Pradesh, India

This article may be cited as: Gupta SK, Varshney A. A comparative study of effect of mepivacaine and lignocaine on heart rate in children. J Adv Med Dent Scie Res 2016;4(2):193-195.

INTRODUCTION

Hypertension represents one of the most common medical histories obtained from the patients who visit dental clinics. Additionally, increases in blood pressure are common during dental surgery. However, the increase is influenced by many factors, such as psychologic and physical stress, painful stimuli, and the action of catecholamines present in local anesthetic solutions. Previous studies from our laboratory have demonstrated that an increase in blood pressure during dental surgery cannot be predicted by the baseline blood pressure. Rather, the increase is related to the difficulty of tooth extraction and the volume of local anesthetic used during the surgery. Furthermore, the catecholamines present in local anesthetic solutions have been reported to cause increases in blood pressure.
Local anesthetic agents are chemicals that reversibly block the transmission1 of action potential of nerve membrane.[3] An essential pre-requisite to success in dentistry is to achieve good quality local anesthesia (LA). Local anesthetic agents are normally associated with absence of pain during surgical intervention in bone and soft tissue. There are many local anesthetic agents, lignocaine being the gold standard available with the wide selection of vaso-constrictive agents that improve the clinical efficacy and the duration LA.[4]
The two most commonly used local anesthetic drugs are lidocaine and Mepivacaine. Lidocaine is used in order to tropical anesthesia, infiltration injection and nerve block and also has anti-arrhythmic properties. The Mepivacaine activity is basically the same as Lidocaine but it cannot penetrate into the tissues less than lidocaine and also its activity duration is much longer.[5]
The present study compared effect of mepivacaine and lignocaine on heart rate in children.

MATERIALS & METHODS

The present study was conducted among 60 children age <14 years of both genders. Patients' parents were informed regarding the study and written consent was obtained.
Data related to children such as name, age, gender etc was recorded. Patients were randomly divided into 2 groups. Group I (30) received 2% lidocaine with adrenaline 1: 80000 and group II (30) received 3% Mepivacaine. In both groups heart rate was recorded before and after injection and compared. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Group	Group I	Group II
Agent	2% Lignocaine	3% Mepivacaine
M:F	20:10	18:12

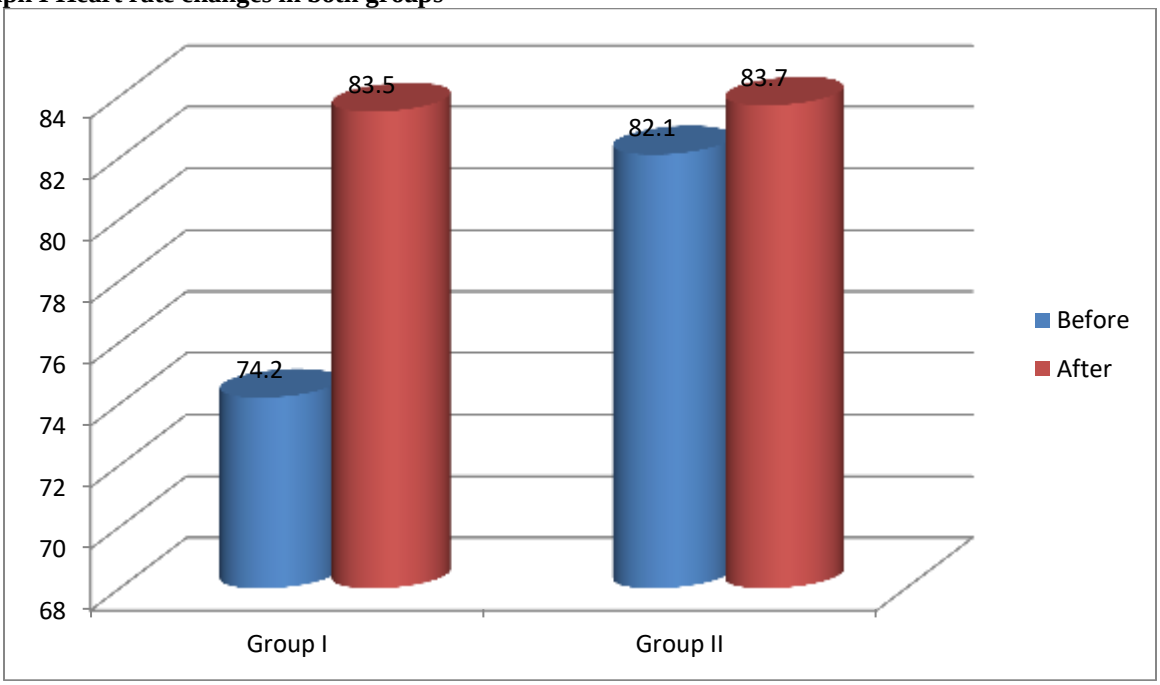
Table II shows that group I received 2% lidocaine with adrenaline 1: 80000 and group II received 3% Mepivacaine. Group I comprised of 20 males and 10 females and group II had 18 males and 12 females.

Table III Assessment of heart rate changes in both groups

Group	Before	After	P value
Group I	74.2	83.5	0.01
Group II	82.1	83.7	0.02

Table III, graph I shows that heart rate was 74.2 beats/ min before and 83.5 beats/ min after injection. In group II, heart rate was 82.5 beats/ min before and 83.7 beats/ min after injection. The difference was significant (P< 0.05).

Graph I Heart rate changes in both groups



DISCUSSION

Local anesthetic drugs have pressure vessel materials, thus they could lead to pathological conditions in people with neurological diseases or patients with cardiovascular problems.[7] Adrenaline has the ability to vasoconstriction could increase the duration and the depth of anesthesia and also could reduce the possible bleeding in the site. Although they are considered as its positive effects but the adrenalin impact on the sympathetic activities might be associated with the various adverse side effects indeed.[8] The present study compared effect of mepivacaine and lignocaine on heart rate in children.

In present study, group I received 2% lidocaine with adrenaline 1: 80000 and group II received 3% Mepivacaine. Group I comprised of 20 males and 10 females and group II had 18 males and 12 females. Matsumura et al[9] determined the changes in blood pressure, pulse rate, and heart rate variability during dental surgery. The study included 40 patients, 19 to 74 years of age (mean age: 42.7 6 3.0 years), who underwent tooth extraction at our hospital. Holter electrocardiographic monitoring was used to determine the power spectrum of R-R variability before and during dental surgery. The low frequency (LF: 0.041 to 0.140 Hz), high frequency (HF: 0.140 to 0.500 Hz), and total spectral powers (TF; 0.000 to 4.000 Hz) were

calculated, and the ratio of LF to HF and percentage of HF relative to TF (%HF: HF/TF 3 100) were used as indices of sympathetic and parasympathetic activities, respectively. The baseline blood pressure and pulse rate were 121 6 3/70 6 2 mm Hg and 70 6 1 beats/min, respectively. After the administration of local anesthetic (2% lidocaine) containing 1:80,000 epinephrine, both the blood pressure and pulse rate increased. During dental surgery, blood pressure increased further to 132 6 3/73 6 2 mm Hg. The increase in blood pressure was greater in middle-aged and older patients (>40 years old) in young patients.

We observed that heart rate was 74.2 beats/ min before and 83.5 beats/ min after injection. In group II, heart rate was 82.5 beats/ min before and 83.7 beats/ min after injection. Bayat and colleagues[10] tested the hemodynamic changes following the use of Lidocaine and Mepivacaine + epinephrine in the patients and stated that after injection of Lidocaine + epinephrine, the 12.25 beats were added to the heart rate every per minute and this change is very significant so Lidocaine + epinephrine combination is significantly leads to heart rate increase in these cases.

Santos et al[11] found that 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.

CONCLUSION

Authors found that mepivacaine did not alter heart rate whereas with lignocaine having added adrenaline there was more change in heart rate after injection.

REFERENCES

1. Umino M, Nagao M: Systemic diseases in elderly dental patients. Int Dent J 1993;43:213–218. 2. Bandl E, Boda K, Sonkodi S: Hypertension screening in a dental surgery: a Hungarian study. J Hum Hypertens 1990;4:253–257.
2. Abraham-Inpijn L, Borgmeijer-Hoelen A, Gortzak RAT: Changes in blood pressure, heart rate, and electrocardiogram during dental treatment with use of local anesthesia. J Am Dent Assoc 1988;116:531–536.
3. Gortzak RAT, Oosting J, Abraham-Inpijn L: Blood pressure response to routine restorative dental treatment with and without local anesthesia. Oral Surg Oral Med Oral Pathol 1992;73:677–681.
4. Haase A, Reader A, Nusstein J, Beck M, Drum M. Comparing anesthetic efficacy of articaine versus lidocaine as a supplemental buccal infiltration of the mandibular first molar after an inferior alveolar nerve block. J Am Dent Assoc 2008;139(9):1228-35.
5. Hersh EV, Hermann DG, Lamp CJ, Johnson PD, MacAfee KA. Assessing the duration of mandibular soft tissue anesthesia. J Am Dent Assoc 1995;126(11):1531-6.
6. Yagiela JA, Duffin SR, Hunt LM. Drug interactions and vasoconstrictors used in local anesthetic solutions. Oral Surg Oral Med Oral Pathol 1985;59(6):565-71.
7. Elad S, Admon D, Kedmi M, Naveh E, Benzki E, Ayalon S, *et al.* The cardiovascular effect of local anesthesia with articaine plus 1:200,000 adrenalin versus lidocaine plus 1:100,000 adrenalin in medically compromised cardiac patients: A prospective, randomized, double blinded study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008;105(6):725-30.
8. Matsumura K, Miura K, Takata Y, Kurokawa H, Kajiyama M, Abe I, Fujishima M. Changes in blood pressure and heart rate variability during dental surgery. American journal of hypertension. 1998 Nov 1;11(11):1376-80.
9. Bayat M, Zaeri F, Sadatnia F. Comparison of O2 saturation, heart and respiratory rate following injection of vasoconstrictor containing anesthetic (lidocaine 2%) and without vasoconstrictor anesthetic (Mepivacaine). JDM. 2005; 18 (3): 45-50.
10. Santos CF, Modena KC, Giglio FP, Sakai VT, Calvo AM, Colombini BL, et al. Epinephrine concentration (1:100,000 or 1:200,000) does not affect the clinical efficacy of 4% articaine for lower third molar removal: A double-blind, randomized, crossover study. J Oral Maxillofac Surg 2007;65(12):2445-52.