Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2017; 5(10E):4183-4186 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com DOI:10.36347/sjams.2017.v05i10.073

Effect of Different Nerve Block of Local Anesthetics with Epinephrine on Selected Cardiovascular Parameters

Bijaraniya Kuldeep[1], Kumar Ravindra[2],
[1]Senior demonstrator, Department of Physiology, S.P. Medical College, Bikaner, Rajasthan, India
[2]Dental Surgeon, Ratna Dental Hospital, Bikaner, Rajasthan, India.

Original Research Article

***Corresponding author**
Dr. Ravindra Kumar

Article History
Received: 10.10.2017
Accepted: 20.10.2017
Published: 30.10.2017

Abstract: Lignocaine can also be used for nerve blocks. Lidocaine, also known as xylocaine or lignocaine is a medication used to numb tissue in a specific area and to treat ventricular tachycardia. Sixty subjects (15 female, 45 male) in the 18–40 years old range, without history of systemic disease and no medications in the previous 6 months with normal BP (≤140/90) were selected for this study. Subjects were divided into two groups: in the first group, the infiltration method (upper arch teeth) and in the second group, inferior alveolar nerve block technique (lower arch teeth) was applied. The mean systolic and diastolic BP was increased after injection of lidocaine with epinephrine in the both maxillary and mandibular nerve block methods. The differences were statistically significant ($P < 0.05$).The mean HR was increased after injection of lidocaine with epinephrine in the both maxillary and mandibular nerve block methods. The differences were statistically significant ($P < 0.05$).
Keywords: lidocaine, adrenaline, mandibular nerve block, maxillary nerve block

INTRODUCTION

Benzodiazepines have long been considered the base of ansiolytic pharmacotherapies. Lidocaine, also known as xylocaine and lignocaine is a medication used to numb tissue in a specific area and to treat ventricular tachycardia[1]. Anxiety and stress are experienced by many patients during dental treatment. Because this is a major health problem, much study has been done to measure the body's physiologic response to routine dental procedures. Although pain during dental procedures can be readily controlled with local anesthesia, psychological stress of the clinical environment, the discomfort associated with oral injections, and the annoyance of oral manipulations, together with fear, may produce varying degrees of non-detectable clinical cardio-circulatory changes[2-4].

Anxiety experienced during a dental visit may cause parasympathetic dominance, with bradycardia and/or syncope[5,6] or even cardiac arrhythmias[7]. Healthy patients are usually able to tolerate these physiologic responses which are due to stress; however, patients with hypertension, heart disease, cerebrovascular disease, or increased age may have a diminished tolerance to stress[8].

Lidocaine mixed with a small amount of adrenaline (epinephrine) is available to allow larger doses for numbing, to decrease bleeding, and to make it last longer. When used as an injectable, it typically begins working within four minutes and lasts for half an hour to three hours[9]. Lidocaine may also be applied directly to the skin for numbing[1]. Lidocaine is available in various forms like injection, cream, gel and spray and in different concentrations of 0.5%, 1%, 2%, 5% and 10%[10].

The purpose of the present study was to compare the effects of 2% lidocaine with epinephrine on BP and HR in two types of different nerve block. The main aim was to verify the effects of lignocaine with epinephrine on vital cardiac parameters.

MATERIAL AND METHOD

The subjects were recruited from Ratna dental hospital Bikaner Rajasthan between january 1 and June end of 2017.Sixty subjects (25 female, 35 male) in the 18–40 years old range, without history of systemic disease and no medications in the previous 6 months with normal BP (≤140/80) were selected for this study. Subjects were divided into two groups: in the first group, the infiltration method (upper arch teeth) and in

the second group, inferior alveolar nerve block technique (lower arch teeth) was applied. Each subject was asked to take rest for at least 5 min before measuring the BP and HR. Then, immediately before and at least 10 min after injection, systolic and diastolic BP and HR were measured.

ANALYSIS OF OBSERVATIONS

Analysis was done by statistical analysis. Students't' test (two tailed) has been used to find the significance. P=0.05 was considered as statistically significant.

RESULT

Table-1: Effect of mandibular nerve block on blood pressure and heart rate

	BEFORE INJECTION	AFTER INJECTION	P VALUE
	MEAN ±S.D.	MEAN ±S.D.	
SYSTOLIC BLOOD PRESSURE	121.76±5.97	125.26±5.39	0.02
DIASTOLIC BLOOD PRESSURE	85±4.02	87.26±4.15	0.03
HEART RATE	75.8±4.31	78.8±7.00	0.05

The mean systolic, diastolic BP and heart rate were increased after injection of lidocaine with epinephrine in the maxillary nerve block method. The differences were statistically significant ($P < 0.05$).

Table-2: Effect of Maxillary nerve block on blood pressure and heart rate

	BEFORE INJECTION	AFTER INJECTION	P VALUE
	MEAN ±S.D.	MEAN ±S.D.	
SYSTOLIC BLOOD PRESSURE	121.7±6.81	125.8±7.54	0.03
DIASTOLIC BLOOD PRESSURE	82.13±4.16	86.13±6.12	0.004
HEART RATE	77.1±5.06	80.43±5.48	0.01

The mean systolic, diastolic BP and heart rate were increased after injection of lidocaine with epinephrine in the maxillary nerve block method. The differences were statistically significant ($P < 0.05$).

Table-3: Effect of different nerve block after lignocaine on blood pressure and heart rate

	Maxillary nerve block	Mandibular nerve block	P VALUE
	MEAN ±S.D.	MEAN ±S.D.	
SYSTOLIC BLOOD PRESSURE	125.8±7.54	125.26±5.39	0.07
DIASTOLIC BLOOD PRESSURE	86.13±6.12	87.26±4.15	0.04
HEART RATE	80.43±5.48	78.8±7.0	0.19

The mean systolic was increased after injection of lidocaine with epinephrine in the both type of nerve block method. The differences were statistically insignificant ($P >0.05$).The mean HR and diastolic blood pressure were increased after injection of lidocaine with epinephrine in the both type of nerve block method. The differences was statistically insignificant ($P >0.05$).

DISCUSSION

Variations of cardio circulatory parameters during dental treatment have long been a major concern for dentists and researchers. Several authors have reported significant changes that might affect physiologic stability in normoactive patients, and particularly in those with circulatory disease[11], as well as elderly patients[2]. Both laboratory research[12] and clinical research have evaluated changes occurring during dental procedures, in pre-, trans-, and postoperative periods[13]. Tranquilizing drugs can be used to control autonomic nervous system responses, and to help minimize cardio circulatory alterations[2]. The effectiveness of this group of drugs has been tested for catecholamine's and other vasoconstrictors in local anesthetics[14].

The findings of this research were mostly in agreement with studies by Meral *et al.*[15] Silvestre *et al.*[4], and Faraco *et al.*[16] all of which showed a small but not clinically important increase in cardiovascular parameters after injection of LA with epinephrine (BP, PR and HR).

Frabetti *et al.*[17] conducted a study with 14 patients whether the epinephrine in the local anesthetics carries cardiovascular risks. The systolic and the

diastolic blood pressure were analyzed, as well as the average and the maximal heart rate. The comparison of the initial blood pressure and the one after the post-anesthetic period showed insignificant tendency towards increasing the systolic pressure and slightly more statistically significant increased diastolic blood pressure. The heart frequency increases only in small number of the patients, however, not more than 10 beats per minute. In general, the group of the studied patients showed a statistically decrease in the average and the maximal heart rate from the beginning to the end of the session. Thus, the dosages of epinephrine administered to these patients result in insignificant changes in the heart rate and blood pressure. The decrease of the heart rate at the end of the therapy underlines the important role of the autonomic nervous system in the modulation of the cardiovascular response during dental therapy.

On the other hand, Faraco *et al*.[18] studied the cardiovascular effects produced by intravascular injection of 2% lidocaine with 20 µg/mL of norepinephrine on systolic, diastolic and mean arterial pressure and HR of rats, and the results showed significant increases in systolic, diastolic and mean arterial pressure and a noticeable decrease in HR.

In the search of anesthetics with optimal effect, studies are comparing not only the different types of anesthetics, but also the different types of vasoconstrictors[19]. In study of Sumer *et al*. [20] was compared the pain from injection during administration of Articaine with adrenaline, Prilocaine with Felypressin, and Lidocaine with adrenaline. 497 patients anesthetized intraoraly with different solutions were included. The patients were evaluated subjectively and asked to rate their injection pain on a six-point scale. After analyzing the results, the authors concluded that there was no statistically significant difference between the pain felt during injection of three types of solutions. Referring to literature sources, according to which solutions with low pH are taken much more painfully, authors considered that the result is due to the similar pH of the solutions. Many authors emphasize the role of the injection method for more successful anesthesia of patients[21,22], and other conduct research aiming at optimisation of the protocols for work with medically compromised patients 23-25.

CONCLUSION

In the present study, anaesthetic solutions containing adrenaline showed similar reaction for cardiovascular parameters and were found to be safe for routine use in dentistry for normotensive subjects.

REFERENCES

1. "Lidocaine". Wikipedia, the free encyclopedia. Retrieved july 27, 2017.
2. Brand HS, Gortzak RA, Palmer-Buova CC, Abraham RE, Abraham-Inpijn LAL. Cardiovascular and neuroendocrine responses during acute stress induced by different types of dental treatment. Int Dent J 1995;45:45-48.
3. Nakamura Y, Matsumura K, Miura K, Kurokawa H, Abe I, Takata Y. Cardiovascular and sympathetic responses to dental surgery with local anesthesia. Hypertens Res 2001:24:209-214.
4. Silvestre FJ, Verdú MJ, Sanchis JM, Grau D. Effects of vasoconstrictors in dentistry upon systolic and diastolic arterial pressure. Med Oral 2001;6:57-63.
5. Davenport RE, Porcelli RJ, Iacomo VJ, Bonura CF, Mallis GI, Baer PN. Effects of anesthetics containing epinephrine on catecholamine levels during periodontal surgery. J Periodontol 1990;61:553-558.
6. Fernieini EM, Bennett JD, Silverman DG, Halaszynski TM. Hemodynamic assessment of local anesthetic administration by La ser Doppler flowmetry. Oral Surg Oral Med Oral Path Oral Rad Endod 2001;91:526-530.
7. Miller RA, Siegeman LI. Dental anesthetic management of patient with ventricular arrhythmias. Anesth Prog 1998;45:68-73.
8. Cioffi GA, Terezhalmy GT, Chenow B, Lake RC, Glahn A. The hemodynamic and plasma catecholamine responses to routine restorative dental care. J Am Dent Assoc 1985;111:67-70.
9. Skinner DV, editor. Cambridge textbook of accident and emergency medicine. Cambridge University Press; 1997 Mar 27.
10. Nagata T, Mishima Y. Anesthetic management of a patient with deteriorated cardiac function following cardiopulmonary resuscitation. Kurume Med J. 2010;57:81–4.
11. Davenport RE, Porcelli RJ, Iacomo VJ, Bonura CF, Mallis GI, Baer PN. Effects of anesthetics containing epinephrine on catecholamine levels during periodontal surgery. J Periodontol 1990;61:553-558.
12. Armonia PL. Efeitos cardiocirculatórios provocados pelo cloridrato de lidocaína 20 mg/ml associado ao cloridrato de fenilefrina 400 µg/ml (Novocol 100®), em decorrência de sua administração intravascular (Estudo experimental em cães)(Doctoral dissertation, Doctoral thesis] São Paulo: Faculdade de Odontologia, Universidade de São Paulo).
13. Niwa H, Satoh Y, Matsuara H. Cardiovascular responses to epinephrine-containing local anesthetics for dental use: a comparison of hemodyamic responses to infiltration anesthesia and ergometer-stress testing. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2000;90:171-181.

14. Meechan JG, Parry G, Rattray DT, Thomason JM. Effects of dental local anaesthetics in cardiac transplant recipients. Br Dent J 2002;192:16-13.
15. Meral G, Tasar F, Sayin F, Saysel M, Kir S, Karabulut E. Effects of lidocaine with and without epinephrine on plasma epinephrine and lidocaine concentrations and hemodynamic values during third molar surgery. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2005;100:25–30.
16. Faraco FN, Kawakami PY, Mestnik MJ, Ferrari DS, Shibli JA. Effect of anesthetics containing lidocaine and epinephrine on cardiovascular changes during dental implant surgery. J Oral Implantol. 2007;33:84–8.
17. Frabetti L, Checchi L, Finelli K. Cardiovascular effects of local anesthesia with epinephrine in periodontal treatment. Quintessence Int. 1992 Jan; 23(1):19-24.
18. Faraco FN, Armonia PL, Malamed SF. Cardiovascular alterations after injection of 2% lidocaine with norepinephrine 1:50,000 (xylestesin) in rats. Anesth Prog. 2007;54:45–9.
19. Sanatkar M, Sadeghi M, Esmaeili N, Naseri MH, Sadrossadat H, Shoroughi M, Fathi HR, Ghazizadeh S. The evaluation of perioperative safety of local anesthesia with lidocaine containing epinephrine in patients with ischemic heart disease. Acta Medica Iranica. 2013 Aug 1;51(8):537.
20. Sumer M, Misir F, Celebi N, Muðlali M. A comparison of injection pain with articaine with adrenaline, prilocaine with phenylpressin and lidocaine with adrenaline. Med Oral PatolOral Cir Bucal. 2008 Jul 1;13(7): E427-30.
21. Lalabonova Hr, Kirova D. Infraorbital anesthesia in the general dental practice. J of IMAB. 2004; 10(2):70-71.
22. Lalabonova Hr, Kirova D, Dobreva D. Intraligamentary anesthesia in general dental practice. J of IMAB. 2005; 11(2):22-24.
23. Lambrecht TJ, Filippi A, Arrigoni J. Cardiovascular monitoring and its consequences in oral surgery. Ann Maxillofac Surg. 2011 Jul-Dec; 1(2):102–106.
24. Popescu MS, Scrieciu M, Mercut V, Tuculina M, Dascãlu I. Hypertensive Patients and Their Management in Dentistry. ISRN Hypert. 2013; vol.2013;Art ID 410740, 8 pages.
25. Renton T, Woolcombe S, Taylor T, Hill CM. Oral surgery: part 1. Introduction and the management of the medically compromised patient. British Dental Journal. 2013 Sep;215(5):213- 223.