Hemodynamic Effect of 2% Lidocaine with 1:80,000 Epinephrine Infiltration in Maxillofacial Surgeries under General Anesthesia

Baratollah Shaban[1], Elham Moradi[2], Amir Hossein Nejat[3], Somayeh Sabzali Zanjanhkhah[4], Touraj Vaezi[1]

[1] Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran
[2] Department of Oral and Maxillofacial Radiology, Khorasgan Azad University, Isfahan, Iran
[3] Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
[4] General Dentist

Received 12 October 2012 and Accepted 11 December 2012

Abstract

Introduction: Epinephrine-containing lidocaine is the most used anestheic drug in dentistry. The aim of this study was to investigate the hemodynamic changes following local infiltration of 2% lidocaine with 1:80,000 epinephrine in subjects undergoing orthognatic surgery under general anesthesia. **Methods**: Twenty five patients without any systemic disease participated. After general anesthesia, two cartridges of 2% lidocaine + 1:80,000 epinephrine were infiltrated around the surgery site. Systolic (SBP) and diastolic (DBP) blood pressure, mean arterial blood pressure (MAP), heart rate (HR), and blood sugar (BS) were measured in three stages: before the injection (M1), at the end of injection (M2), and 10 min after injection (M3). **Results**: No significant difference observed in SBP, DBP, and MAP at the end of injection and 10 min later. HR was increased significantly after injection and remained significantly higher than baseline after 10 min. BS increased slightly at the end of injection and continued to increase after 10 min. However, changes in BS were not significant. **Conclusion**: Using two cartridges of epinephrine-containing lidocaine have slight systemic changes in healthy subjects; as a result, this dosage could be used in patients with cardiovascular complications undergoing general anesthesia.

Key Words: Blood pressure; epinephrine; heart rate; lidocaine; local anesthesia.

Shaban B, Moradi E, Nejat AH, Sabzali Zanjahkhah N, Vaezi T. Hemodynamic Effect of 2% Lidocaine with 1:80,000 Epinephrine Infiltration in Maxillofacial Surgeries under General Anesthesia. J Dent Mater Tech 2013; 2(1): 17-20.

Introduction

The most common anesthetic drug used for local infiltration in dentistry is epinephrine-containing lidocaine (1). Lidocaine has become the Gold Standard anesthesia categorized as amide anesthetic (2). Epinephrine leads to less hemorrhage and elongates the duration of anesthesia with reducing lidocaine systemic absorption (3).

Direct infiltration of epinephrine-containing lidocaine in the surgical site, during general anesthesia, reduces postoperative hyperalgesia and reduces the need for systemic analgesia (4). It also provides better visualization in surgical site (5,6).

However, systemic absorption of lidocaine may lead to central nervous system (CNS) and cardiac depression, hypotension, and cardiac arrhythmia (7). In Addition, systemic absorption of epinephrine may induce hypertension, chest pain, and tachycardia (8).

The aim of this study was to monitor the cardiac indices (systolic blood pressure, diastolic blood pressure, mean arterial pressure, and pulse rate) and blood sugar following infiltration of two cartridges of 2% lidocaine with 1:80,000 epinephrine for orthognathic surgeries under general anesthesia.

Materials and Methods

Study Population

Twenty-five patients who were referred to maxillofacial department of Mashhad dental faculty for orthognathic surgery were participated. This study was approved by the Ethic Committee of Mashhad University of Medical Sciences and detailed informed consent was signed by patients. The inclusion criteria

were: normal blood pressure level, blood sugar, and heart rate. Subjects with diabetes, renal diseases, and cardiac diseases; using immunosuppressive drugs, hypertension medication, alcohol; high levels of blood pressure, blood sugar, and heart rate before surgery due to stress were excluded from this study.

All subjects were undergoing maxillary surgery and the local infiltration was applied at the vestibule of first molar teeth near the incision site.

Patient Monitoring

Complete Blood Count (CBC) was obtained before surgery and analyzed by the maxillofacial surgeon and anesthesiologist. Patients were having NPO regimen 8 hours before surgery and anxiety reduction protocol with benzodiazepines from last night of surgery performed. Blood pressure (BP) and heart rate (HR) were measured with anesthetic device. Blood sugar (BS) was measured using glucometer (Accu-Chek active, Roche co, Germany). After general anesthesia with propofol, two cartridges of 2% lidocaine + 1:80,000 epinephrine were infiltrated around the surgery site. The measurements were performed in three stages: before the injection (M1), at the end of injection (M2), and 10 minutes after injection (M3).

Statistical Analysis

Data were collected in SPSS version 11.5 software and analyzed with Student T-test, repeated measure method, and Bonferroni test. The significance level was 95%.

Results

Twenty five patients (13 male and 12 female) with the mean age of 33.52±10.83 were participated in this study (Table 1).

Blood Pressure Measures

No significant difference observed in the mean amounts of systolic blood pressure, diastolic blood pressure, and mean arterial blood pressure (MAP) at the end of injection and 10 minutes later (Table 2). However, slight increase following injection observed in all blood pressures. This increase followed by a decrease to near the baseline measures in diastolic, systolic, and mean arterial blood pressure. In all stages no hypertension was observed as the mean systolic pressures were under 130 mmHg and mean diastolic pressures were under 90 mmHg.

The pulse rate was increased significantly after injection ($P<0.05$). It was decreased after 10 minutes (Table 2); however, remained significantly higher than baseline pulse rate ($P<0.05$).

There were no significant difference in mean amounts of all blood pressure and pulse rate measures between males and females ($P>0.05$).

Blood Sugar Measures

The blood sugar did not changed significantly after injection; but it was increased slightly at the end of injection and continued to increase after 10 minutes (Table 2). There were no statistically significant difference between males and females in blood sugar amounts in all stages of measurement ($P>0.05$).

Table 1. Demographic and surgical data

Factor	Mean ± SD
Age	33.52±10.83
BMI (Kg/m^2)	22.02±1.38
Gender (F/M)	13 / 12
ASA (I/II)	22 / 3
Duration of surgery (min)	38.21±7.89
Duration of general anesthesia (min)	63.48±4.56

Table 2. Systolic and diastolic blood pressure, mean arterial pressure, pulse rate, and blood sugar in three stages of measurement

	M1	M2	M3	Sig M1-M2	Sig M1-M3	Sig M2-M3
Diastolic BP	83.04±10.24	83.84±8.78	82.88±9.56	0.798	0.915	0.603
Systolic BP	125.48±13.89	125.88±10.77	125.64±10.55	0.995	0.997	0.998
MAP	98.85±10.40	99.52±8.77	98.79±9.21	0.897	0.990	0.885
Pulse Rate	84.60±9.86	91.08±11.39	89.32±11.05	0.001	0.012	0.367
Blood Sugar	112.28±16.02	112.76±17.84	113.56±15.49	0.996	0.954	0.982

Discussion

In this study, we monitored hemodynamic changes with local infiltration of epinephrine-containing 2% lidocaine, as the most common anesthetic in dentistry, during orthognathic surgeries under general anesthesia. To conserve patients' safety, two cartridges of 2% lidocaine with epinephrine as the half dose of the maximum safety dose were used.

Local infiltration of epinephrine-containing lidocaine leads to better surgical visual and less hemorrhage during surgery. It also provides less post-operative pain. In this study we aimed to investigate the safety of local infiltration in surgical site under general anesthesia.

Haghighat et al. (9) observed a significant increase in systolic and diastolic blood pressure, which decreased after injection ended. On the contrary, the results of our study revealed under general anesthesia, changes in systolic, diastolic, and mean blood pressure were not statistically significant and this contrast is due to elimination of dental fear as a interventional factor in the results.

Haghighat et al. (9) were also observed that male diastolic blood pressure was significantly higher than that of female. However, results of current study revealed no difference between male and female and the comparison between these results strengthen the hypothesis that prohibition of fear in male patients lead to increased blood pressure.

The pulse rate was increased significantly at the end of injection and remained at higher level than the baseline measures. These results are in accordance with Haghighat et al. (9) study. The increase in pulse rate after 10 min could be explained according to the vasodilating effect of lidocaine.

The blood sugar was not significantly changed after injection. However, it was increased at the end of injection and the increasing trend remained 10 minutes after infiltration. This increase might be the result of the stress induced by injection as the increase in blood levels of cortisol and catecholamines leads to higher blood glucose (6).

Since the study was a self control measurement, blindness was impossible as all the patients received the same regimen. However, as the study period was limited, the results were greatly related to the injection and all the subjects were undergoing same procedure and same anesthesia.

It is recommended to perform complementary studies in patients with cardiovascular impairments seeing that the results of this study revealed safety of two cartridges injection of epinephrine-containing lidocaine.

Conclusion

The results of this study indicated the slight hemodynamic changes following local infiltration of 2% lidocaine with 1:80,000 epinephrine in healthy patients undergoing general anesthesia.

It is concluded that infiltration of two cartridges of local anesthesia to enhance the visibility in surgical site and attenuate post-surgical pain could be safe in patients with cardiovascular complications. In addition, further studies required.

Acknowledgement

This research was supported by a grant from the Vice Chancellor for Research of Mashhad University of Medical Sciences.

The results described in this paper were part of Somayeh Sabzali Zanjanhkhah's undergraduate thesis (Thesis no: 2462).

References

1. Lustig JP, Zusman SP. Immediate complications of local anesthetic administered to 1,007 consecutive patients. J Am Dent Assoc 1999; 130: 496-9.
2. Malamed SF, Gagnon S, Leblanc D. A comparison between articaine HCl and lidocaine HCl in pediatric dental patients. Pediatr Dent 2000; 22: 307-11.
3. Robert KS, Ronald DM. Basics of anesthesia. Philadelphia: Churchill Livingstone, 2000.
4. Kaufman E, Epstein JB, Gorsky M, Jackson DL, Kadari A. Preemptive analgesia and local anesthesia as a supplement to general anesthesia: a review. Anesth Prog 2005; 52: 29-38.
5. Mcclymont L G, Crowther J A. Local anaesthetic with vasoconstrictor combinations in septal surgery. J Laryngol Otol 1988; 102: 793-5.
6. Vasconcellos RJ, Vasconcelos BC, Genú PR. Influence of local anesthethics with adrenalina 1:100.000 in basic vital constants during third molar surgery. Med Oral Patol Oral Cir Bucal 2008; 13: E431-7.
7. Malamed SF. Handbook of Local Anesthesia. Boston: Mosby, 1997.
8. Robert DH, Sowray JH. Local Anesthesia in Dentistry. Bristol: Wight, 1987.

9. Haghighat A, Kaviani N, Panahi R. Hemodynamic effects of 2% lidocaine with 1:80000 epinephrine in inferior alveolar nerve block. J Dent Res 2006; 3: 4-7.

Corresponding Author:
Touraj Vaezi
Department of Oral and Maxillofacial Surgery
Faculty of Dentistry
Vakilabad Blvd, Mashhad, Iran
P.O. Box: 91735-984
Tel: +9151135613
Fax: +98-511-8829500
Email: VaeziT@mums.ac.ir