

Changes in cardiovascular indices during use of epinephrine in septoplasty

Mir Mohammad Taghi Mortazavi, Seyyed Javad Seyyed Toutounchi, Maarouf Ansari

Departments of Anesthesiology and ENT, School of Medicine, University of Medical Sciences, Tabriz, Iran

Objective: To assess cardiovascular changes in the use of epinephrine in septoplasty as well as to achieve the optimal dilution of the epinephrine to minimize these changes.

Methodology: In a randomized clinical trial, 100 patients who were about to undergo septoplasty in Imam Reza hospital, Tabriz, Iran, were randomly assigned to receive epinephrine with the dilution of 1:200,000 (group A) or lidocaine containing epinephrine with the dilution of 1:80,000 (group B). The changes in blood pressure, heart rate, and bleeding were compared between the two groups.

Results: There was no significant difference between the two groups in terms of gender, age, duration of operation, history of surgery on nasal

septum, complications in previous surgeries, and the drugs used for anesthesia. However, the increase in blood pressure, and the bleeding in group A was significantly more than that in group B (14% vs. 2%). There was no significant difference between the two groups in terms of fluctuations in heart rate.

Conclusion: The use of lidocaine 2% with epinephrine 1:80,000 is preferable than the epinephrine 1:200,000 in terms of amount of bleeding and changes in blood pressure in septoplasty. (Rawal Med J 201;41:86-89).

Keywords: Septoplasty, epinephrine, lidocaine, blood pressure, heart rate, bleeding.

INTRODUCTION

Septoplasty is considered to be one of the most common surgical procedures to repair the nasal septum deviation. Deviation of the nasal septum can occur following trauma to the nose or due to congenital causes, and in most cases, septoplasty is required to reform the deviation.¹ At the beginning of the surgery, diluted epinephrine is injected to reduce bleeding and to lift mucosal flap easier.² In some countries, a combination of cocaine and epinephrine was used for vasoconstriction leading to considerable changes in cardiovascular indices.³ The main indications of septoplasty include nasal obstruction, epistaxis, obstruction of sinus openings, and access to surgery for resection of pituitary tumors.^{4,5} In a recent study, it was shown that the concomitant use of epinephrine and cocaine in proper dosage and volume can be effective with regard to changes in cardiovascular indices in some patients.⁶

A successful septoplasty depends on a variety of factors including drugs used of an appropriate dosage and volume. Thus, inappropriate drug prescription whether in volume or dosage could

bring about a bloody surgical field, which could block the surgeon's view, and may not be anatomically accurate correction of nasal septum deviation.⁷ Due to the increasing use of epinephrine along with general anesthesia in patients undergoing septoplasty, we decided to assess two different dosages of epinephrine on cardiovascular parameters. We also opted for a high dosage of epinephrine which was thought to reduce bleeding in the surgical field and improve the surgeon's view, and thus provide for the surgeon's satisfaction.

METHODOLOGY

In a randomized double-blind clinical trial, 100 patients who had undergone septoplasty at Imam Khomeini Hospital, Tabriz, Iran from March 2011 to March 2013 were included in the study. All were divided with simple random sampling into two groups; Group A received 3/5 ml normal saline containing epinephrine with the dilution of 1:200000 in group A, and Group B received 3/5 ml lidocaine 2% containing epinephrine with the dilution of 1:80000. The patients in both groups were similarly anesthetized with thiopental (4

mg/kg), atropium (0.4 to 0.5 mg/kg) and fentanyl (2 to 3 µg/kg). Maintenance of anesthesia was similar using isoflurane 1/2% to 1/6 % and nitrous oxide 50% with 50% oxygen. In case of bradycardia, atropine (0.5 mg) was injected and in case of tachycardia, propranolol 1 to 3 mg was injected. In case of arrhythmia, lidocaine (1 mg/kg) was injected in both groups.

To avoid excessive bleeding of surgical field the same temperature was set for the operating room, and the position of the patients' head was elevated between 10 to 15 degrees, venous return was controlled by placing the patients' head in a proper position, and ventilation pressure was adjusted in the normal range. To assess the amount of bleeding in the surgical field, attention was paid to the volume of bleeding and the surgeon's satisfaction. If the volume of bleeding was less than 75 ml, the surgeon was satisfied from the surgical field. Therefore, patients who had less than 75 ml blood loss from surgical field were placed in the low bleeding group. Data, including demographic characteristics, type of nasal septal deformity (due to trauma or congenital), history of previous surgery, history of nasal trauma, history of sinusitis, history of epistaxis, history of turbinate hypertrophy, symptoms of allergic rhinitis, during surgery, heart rate and mean arterial blood pressure before and after injection of epinephrine, and changes in arterial oxygen saturation (Spo_2), end - tidal co_2 (ETco_2), ECG were obtained from the hospital records, questionnaires and through the interviews with the patients. Also, systolic and diastolic blood pressures were recorded immediately before and also after the injection of epinephrine. In order to study qualitative variables χ^2 , and quantitative variables t- test were employed. Fisher's exact test was employed when the number of specimen was not enough. For data analysis, SPSS version 16 was used. $P=0.05$ or less were considered statistically significant.

RESULTS

The mean age of the patients in the groups A and B was 22.36 ± 5.94 years (17 to 55 years) and 21.40 ± 5.87 years (17 to 56 years), 50% and 52% of them were females, respectively. The overall

prevalence of the postnasal drip, recurrent sinusitis, and epistaxis were 46%, 14%, and 8%, respectively in group A and 36%, 16% and 10%, respectively in group B. Changing the shape of the nose was also prevalent 34% in group A and 30% in group B. Also, 98% in group A and 100% in group B suffered from nasal stuffiness. No significant differences were found in demographic characteristics and pointed main complaints.

Table 1. Comparison of two groups.

| Parameters | Group A | Group B |
|---------------------|------------------|------------------|
| Age (years) | 22.36 ± 5.94 | 22.40 ± 5.87 |
| Female (n) | 25 (50%) | 26 (52%) |
| Male (n) | 25 (50%) | 24 (48%) |
| Nasal stuffiness | 98% | 100% |
| Postnasal drip | 46% | 36% |
| Recurrent sinusitis | 14% | 16% |
| Epistaxis | 8% | 10% |
| Septal deformity | 34% | 30% |
| Allergy symptoms | 30% | 12% |

All patients in both groups had middle nasal septal deformities accompanied by sinusitis in 5 patients in group A, and 6 patients in group B, as assessed by CT scan. Turbinate hypertrophy was detected in 24 patients in group A and 18 patients in group B. There was no statistically significant difference between the two groups ($p=0.15$). The mean duration of operation in group A, was 67.00 ± 14.81 minutes and in group B was 63.60 ± 13.40 minutes ($p = 0.23$). The patients in the two groups were studied with respect to previous history of septoplasty, and 8% of the patients in group A and 2% in group B were found to have such histories. Also, previous history of other types of surgeries under general anesthesia was reported in 22% of patients in group A and 8% of subjects in group B, which led to no significant differences ($p=0.40$).

As for the changes in cardiovascular parameters following administration of epinephrine, the elevation of blood pressure occurred more frequently in group A as compared to group B (14% versus 2%, $p=0.03$). With respect to the changes in heart rate, bradycardia did not occur in group A, but it did occur only in one patient in group B. Low and

high bleeding occurred in 21 (42%) and 29 (58%) patients in group A and in 35 (70%) and 15 (30%) patients in group B, respectively. In this regard, the high bleeding was significantly higher in the group A ($p=0.04$). As for the severity of bleeding, low and high bleeding occurred in 42% and 58% of patients in group A and 70% and 30% of patients in group B, respectively. In this regard, the high bleeding was significantly higher in the group A ($p = 0.04$). Other findings of patients in two groups are compared (Table 1).

DISCUSSION

The present study assessed cardiovascular changes and bleeding rate with epinephrine used at different dosage for the patients undergoing septoplasty, and the results obtained from the two groups who had received epinephrine of different dosages and dilutions were compared. In our study, high bleeding was more frequently observed in the patients in group A than group B. In another study, there was no significant difference regarding the bleeding rate and the conditions of surgical field or the operation time between the two groups.⁸ Our study revealed that there was a significantly higher rate of increase in blood pressure following the use of normal saline containing epinephrine with the dilution of 1:200,000 (group A) compared with lidocaine containing epinephrine with the dilution of 1:80,000 (group B).

In another study by Kara et al the assessment of the differences in vital signs following administration of cocaine in the presence of epinephrine 1:100,000 and lidocaine showed no significant changes in blood pressure before and after the operation.⁶ In another study by Yang et al hemodynamic changes were compared in three groups of patients who had received epinephrine 1:200,000 combined with lidocaine 2%, or epinephrine 1:200,000, or normal saline without epinephrine. In their study, a considerable decrease in blood pressure was found in the two groups receiving epinephrine 1:200,000, with no changes in the other hemodynamic parameters.⁹ Based on the findings of our study and Yang's the probable blood pressure increase in our study might have been due to the fact that the number of the people with allergies in the group

receiving epinephrine 1:200,000 was significantly higher than that in the other group.

With respect to the changes in heart rate and occurrence of arrhythmia, no significant difference was found between the two groups, which is in line with the findings by Yang⁶ and Kara.⁹ However, in another study by CohenKerem et al using epinephrine 1:100,000 combined with lidocaine 1% led to lower heart rate than those who received 1:100,000 combined with normal saline indicating higher anti-stress effects of lidocaine by inhibiting secretion of catecholamine hormones.¹⁰ In a study by Majstorovic et al, hemodynamic indices were compared among the patients that received epinephrine 1:100,000 mixed with lidocaine 2% and those who did not receive any anesthetic agents; hemodynamic indices changes brought about were not statistically significant.¹¹

As it is readily observable none of the studies mentioned above has been done in a similar way to ours, and the present study is the first case. An attempt was made to minimize the interventionist factors, including age, gender, the duration of surgery, previous history of septum surgery, and etc, which was one of the major advantages of the present study. The main strength of our study was to design the study as a randomized clinical trial that matched the two study groups in baseline parameters. However, having a small sample size and also not following the cardiovascular parameters at different time points after the surgery were the main limitations that should be considered in further studies.

CONCLUSION

Percentage of increase in the blood pressure was significantly higher in group A than group B (14% versus 2%). It seems that lidocaine with the creation of local anesthesia may reduce the secretion of catecholamine and these results in less fluctuation of blood pressure in the patients in group B compared with the patients in group A. There was no significant difference in changes of heart rate between the patients of the two groups. The amount of bleeding in the patients in group B was significantly lower than that in the patients in group A. Given that the current study is the first in this

field, next studies seem necessary with more patients in two groups with similar epinephrine concentrations, in one group lidocaine plus epinephrine, but in the another group with normal saline containing epinephrine.

Author Contributions:

Conception and design: Maarouf Ansari
Collection and assembly of data: Mir Mohammad Taghi Mortazavi, Seyyed Javad Seyyed Toutounchi
Analysis and interpretation of the data: Mir Mohammad Taghi Mortazavi, Maarouf Ansari
Drafting of the article: Mir Mohammad Taghi Mortazavi, Seyyed Javad Seyyed Toutounchi, Maarouf Ansari
Critical revision of the article for important intellectual content: Maarouf Ansari
Statistical expertise: Mir Mohammad Taghi Mortazavi, Maarouf Ansari
Final approval and guarantor of the article: Maarouf Ansari
Corresponding author email: marof_ansari@yahoo.com
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