

## The haemostatic and hemodynamic effects of Epinephrine in septoplasty

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**Abstract:** The aimed of this study was to compare 2 different concentration of adrenaline (epinephrine) on patients' hemodynamic effect and intra-operative bleeding. A prospective randomized double blind control study using 2 different concentrations of epinephrine was designed to observe hemodynamic and haemostatic changes during septoplasty and to observe any cardiac complications. Sixty patients underwent elective septoplasty, age range between 21 and 70 years were enrolled in this study, started March 2013 to June 2014 and all done in Muhayl Hospital, Aseer Region, Saudi Arabia by the same surgeon using the same technique and same anesthetist. Patients randomized to group 1 received 1:100 000 epinephrine (n=30patients), and patients randomized to group 2 received 1:200 000 epinephrine (n=30patients). Data of the patients' parameters were collected during the procedure: HR, systolic (SBP) and diastolic (DBP) and mean arterial pressure (MAP). These parameters were monitored by the anesthesiologist throughout the procedure and were repeated at 1-minute intervals for 5 minutes. Significant hemodynamic fluctuations were noted in group 1. The increase was found to be significant ( $P<.001$ ) in the first and second and third minutes after injection and decreased to baseline level by the 4th and 5th minutes, while in group 2 who received lidocaine, 2%, 1:200 000 epinephrine no changes noted. No statistical difference in the 2 groups was observed of intra-operative bleeding ( $P>.05$ ). The baseline hemodynamic parameters were similar in both groups (Table 1). Table 2 summarizes the hemodynamic changes after injection of epinephrine. We concluded that the use of adrenaline 1:200,000 not cause hemodynamic effect or increase in intra-operative bleeding.

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### 1. Introduction

Deviated nasal septum is a common problem in ENT patients. The most common cause is trauma, but it can be also due to compression of the nose during delivery [1].

Nasal septum composed of bony and cartilaginous parts dividing nasal cavity into two cavities. Normally, the septum lies centrally, and thus the nasal passages are symmetrical [2], when the septum deviated to right or left it will cause unilateral nasal obstruction or sometimes as S shaped causing bilateral nasal obstruction. The patients complaining of nasal obstruction, post nasal discharge, headaches, epistaxis, and snoring or sleep apnea [3].

The aim of septoplastic surgery is to clear the nasal cavity of disease and improve nasal breathing. Often, a slight hemorrhage is sufficient to reduce visibility, creating a poor surgical field. Thus, to obtain a adequate homeostasis is of utmost importance during surgery to improve the surgical field and prevent complications.

Local infiltration of epinephrine 1:100,000 and 1:200,000- is widely used particularly in septoplasty to provide good haemostasis.

### 2. Material and Methods

A total of 60 patients involved in this study, Patients for septoplasty were serially admitted into the

hospital one day before surgery. All cases were admitted to Mohyl Hospital, Aseer Region, Saudi Arabia and treated by the same surgeon and same anesthetist. This study done between March 2013 to June 2014 through a prospective randomized double blind control study using 2 different concentrations of epinephrine was designed to observe hemodynamic and haemostatic changes during septoplasty and to observe any cardiac complications such as tachycardia, hypertension, as well as arrhythmias. Patients were randomly assigned to either group 1 (30 patients) or group 2 (30 patients) according to a double-blind randomization. Patients ages between 21 to 70 year-old, 33 (55%) males and 27 (45%) females. All patients underwent clinical examination and evaluation of medical history prior to surgery. We excluded patients less than 18 or more than 70 year-old, patients with high blood pressure, diabetic, heart diseases and patients using anticoagulation medicines. Patients presented to our ENT clinic with one or more symptoms of nasal obstruction, snoring, post nasal discharge. On examination all had septum deviation. First group received 2% lidocaine with 1:100,000 adrenaline and second group received 2% lidocaine with 1:200,000 adrenaline. Baseline and post-injection hemodynamic parameters were recorded at 1-minute intervals for 5 minutes. Patient demographics, the

extent of surgery, were recorded in both groups. Hemodynamic and haemostatic parameters and intra-operative blood loss were compared.

### 3. Results

Significant hemodynamic fluctuations were noted in group 1: following injection of lidocaine, 2% with 1:100,000 epinephrine: Increases in heart rate (HR), systolic (SBP), diastolic (DBP), and mean arterial blood pressure (MP). The increase found to be significant ( $P < .001$ ) in the first and second and third minutes after injection and decreased to baseline level by the 4th and 5th minutes, while in group 2 who

received lidocaine, 2%, 1:200 000 epinephrine no changes noted. Using a standardized scale to assess surgical bleeding, no statistical difference in the 2 groups was observed ( $P > .05$ ).

The baseline hemodynamic parameters were similar in both groups (Table 1) Table 2 summarizes the hemodynamic changes noted following sub mucosal injection of the adrenaline in the 2 groups.

We concluded in this study that the hemodynamic fluctuations noted during the first few minutes after injection of epinephrine 1:100 000 can be prevented by using 1:200 000 epinephrine.

Table 1: Patient Demographics and Baseline Data Characteristic group1 (1:100 000 Epinephrine) group 2 (1:200 000 Epinephrine)

	G1: 1:100000 adrenaline	G2 1:200000 adrenaline
<i>Characteristics</i>		
Patients No.	30	30
Age, Mean	21-70 , mean 38	23-68,mean 37
M:F	16:15	17:12
<i>Base line parameter ,Mean <math>\pm</math>SD</i>		
HR bpm	75 $\pm$ 16	75 $\pm$ 15
SBP mmHg	104 $\pm$ 13	103 $\pm$ 14
DBP mmHg	62 $\pm$ 11	63 $\pm$ 10
MAP mmHg	74 $\pm$ 11	75 $\pm$ 12

Table 2: Mean (SD) hemodynamic parameters at baseline and postinjection of epinephrine at 1-minutes intervals Groups 1, 2 (dose of epinephrine)

Time-minutes	0	1	2	3	4	5
<b>G1: 1:100,000</b>						
HR, bpm	75 $\pm$ 16	84 $\pm$ 18	83 $\pm$ 17	82 $\pm$ 17	77 $\pm$ 18	75 $\pm$ 16
SBP mmhg	104 $\pm$ 13	127 $\pm$ 25	128 $\pm$ 26	125 $\pm$ 25	107 $\pm$ 20	104 $\pm$ 16
DBP mmhg	62 $\pm$ 11	73 $\pm$ 15	72 $\pm$ 13	70 $\pm$ 13	61 $\pm$ 13	60 $\pm$ 12
MAP mmhg	74 $\pm$ 11	93 $\pm$ 15	91 $\pm$ 16	87 $\pm$ 16	75 $\pm$ 12	73 $\pm$ 11
<b>G2 : 1:200,000</b>						
HR bpm	75 $\pm$ 15	77 $\pm$ 14	76 $\pm$ 13	76 $\pm$ 11	75 $\pm$ 12	75 $\pm$ 11
SBP mmhg	103 $\pm$ 14	106 $\pm$ 15	105 $\pm$ 14	104 $\pm$ 13	103 $\pm$ 14	103 $\pm$ 2
DBP mmhg	63 $\pm$ 10	63 $\pm$ 12	62 $\pm$ 11	60 $\pm$ 12	59 $\pm$ 12	59 $\pm$ 9
MAP mmhg	75 $\pm$ 12	77 $\pm$ 10	76 $\pm$ 11	75 $\pm$ 10	74 $\pm$ 11	73 $\pm$ 9

### 4. Discussions

General anesthesia itself and some local anesthetics may cause vasodilatation effect that makes hyperemic local mucosa and a bloody surgical field, which distracts the surgeons during a surgical procedure [4]. Hence the need for a topical application of different drug agents to decongest the nasal mucosa or use of vasoconstrictors adrenaline in addition to local anesthetics to reduce the nasal blood flow and optimize the surgical field [5], and we can get that easily because nasal septum has abundant vascularity and can absorb epinephrine quickly [6]. Various studies showed that adding adrenaline to solutions containing lidocaine in the surgical procedure on nasal

field provides good homeostasis, improves visibility of a surgical field, decreases blood loss and prolongs effectiveness of local anesthesia [7]. injection of epinephrine is used routinely during septoplasty to reduce bleeding in the nasal mucosa and hence improve visualization of the surgical field [8].

Vasoconstriction is typically achieved by the combination of topical application and local infiltration of anesthetic containing epinephrine [9]. Epinephrine produce vasoconstriction by direct effect on  $\alpha$ -adrenergic receptors, thus will decrease surgical bleeding, lessen mucosal congestion and keep clear surgical field [10]. Cohen-Kerem et al. reported that sub mucosal injection of local anesthetic with

epinephrine. 1:100 000 facilitated improved surgical condition but increased hemodynamic fluctuations [11]. Epinephrine can lead to potential adverse effects, such as hypotension, hypertension, tachycardia, and arrhythmias [12]. The hemodynamic effects of epinephrine are dose-dependent and different dose epinephrine may activate different types of sympathetic receptors [13]. Systemic absorption of epinephrine occurs when local infiltration is applied and systemic effects of epinephrine are variable in different patients and are related to its blood concentrations. Various studies have shown that the hemodynamic changes after local infiltration of epinephrine depend on physical status of the patient, epinephrine dose used, vascularity of the site of administration and its rate of absorption from the area infiltrated [14]. Many reports have shown that injection of epinephrine, even in therapeutic doses, can lead to increased HR and arrhythmia in susceptible patients [15]. The incidence of cardiovascular toxic adverse effects has been shown to increase in a dose-dependent manner [16].

Conclusion: Local injection of lidocaine, 2%, with 1:200 000 epinephrine during septoplasty does not lead to hemodynamic fluctuations or increased intra-operative bleeding compared with lidocaine, 2%, with 1:100 000 epinephrine. For this reason we advise to use 1:200,000 epinephrine because it is more safe.

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