

Comparing Cardiac Complications of Bilateral Nasal Packing versus Bilateral packing with Airway after Septoplasty; a Randomized Clinical Trial

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Abstract

Introduction: Anterior nasal packing is a common method in nasal surgery. One of the complications that is debated today is about cardiovascular effects due to using nasal packing. **Objective:** This study aimed to evaluate some cardiac parameters in different groups to identify the safest way and use it in treatment to minimize cardiovascular complications. **Method:** In this clinical trial, 104 candidates for septoplasty were initially screened and 14 patients were excluded and 90 patients selected by block randomization. Blood pressure, heart rate and cardiac rhythm were monitored by different assessor for three time before surgery, then a classic septoplasty was done for all patients and after it patients were randomly divided into three groups: 1.without nasal packing 2.with nasal packing 3.with nasal packing that had airway. Then, 24 hours after surgery, blood pressure and heart rate were monitored by 24-hour Holter. The monitoring results were interpreted by a cardiologist and the data were analyzed. Significance criterion of data was assumed as p-value ≤ 0.05 . **Results :** Mean diastolic blood pressure after surgery in group 1-3 was: 73.4 \pm 7.3 mmHg, 76.4 \pm 5.8 mmHg, 80.9 \pm 6 mmHg respectively and this criterion was lower in patients without nasal packing and showed a significant difference with patients that had nasal packing with airway (p=0.03). Mean heart rate after surgery in group 1-3 was 71.8 \pm 11.3, 77.7 \pm 7.9, 79.1 \pm 6.7 respectively and the first group showed a significant difference with group(3) (p=0.043). **Conclusion:** This research showed that the use of anterior nasal packing with and without airway leads to cardiovascular changes such as increased diastolic blood pressure and heart rate. More studies should be conducted to create certain conclusion, so it is better that the use of nasal packing be considered on the balance of its risk and benefit.

Key words: Nasal Packing; Nasal Packing with Airway; Cardiac Complication, Hypertension, Cardiac Arrhythmia

Introduction

Nose is the main breathing route of the body that has critical role in dampening, heating, and ventilating inhaled air and regulates breathing through nasopharyngeal reflex. (Ogretmenoglu et al., 2002). A common method to control nose bleeding after septoplasty,

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rhinoplasty, and endoscopic sinus surgeries is the use of anterior nasal packing. (Flint et al., 2015) Anterior nasal packing is closing nasal cavity and posterior choana.(Rekabi et al., 2001). In different studies, various complications such as epiphora, sleep disorder, damage to the nasal mucosa, pain, unpleasant feeling during swallowing, and even aspiration and asphyxia have been pointed out about this procedure.(Weber et al., 200)

One of the complications that is debated today is cardiovascular effects after nasal packing. Some studies have mentioned increased heart rate following bilateral nasal packing, (Ogretmenoglu et al., 2002; Fan et al., 2011) some other mentioned decreased heart rate,(Adbikari et al., 2008).and other studies have pointed to the significant increase or decrease in blood pressure in patients with nasal packing. (Gupta et al., 2011; Deniz et al., 2004).

Various reasons are predicted for increased heart rate and blood pressure such as increased airway resistance, hypoxia, and hypercapnia. (Ogretmenoglu et al., 2002; Fan et al., 2011; Gupta et al., 2011) Several studies consider pressure on nasal mucosa and neural stimulation as the main reasons for cardiovascular changes,(Zayyan et al., 2010) and another study has related these changes to the complications of anesthesia.(Bayar et al., 2008).

Since the cardiovascular effect of nasal packing is not exactly clear and according to the widespread application of this therapeutic method in different patients, this study aims to evaluate the cardiac changes in different groups and investigate potential reasons.

Methods

This randomized clinical trial, was conducted 2015-2017. The study protocol was registered at ethics committee (Ref. No: IR.BMSU.REC.1395.346) (Fig 1).

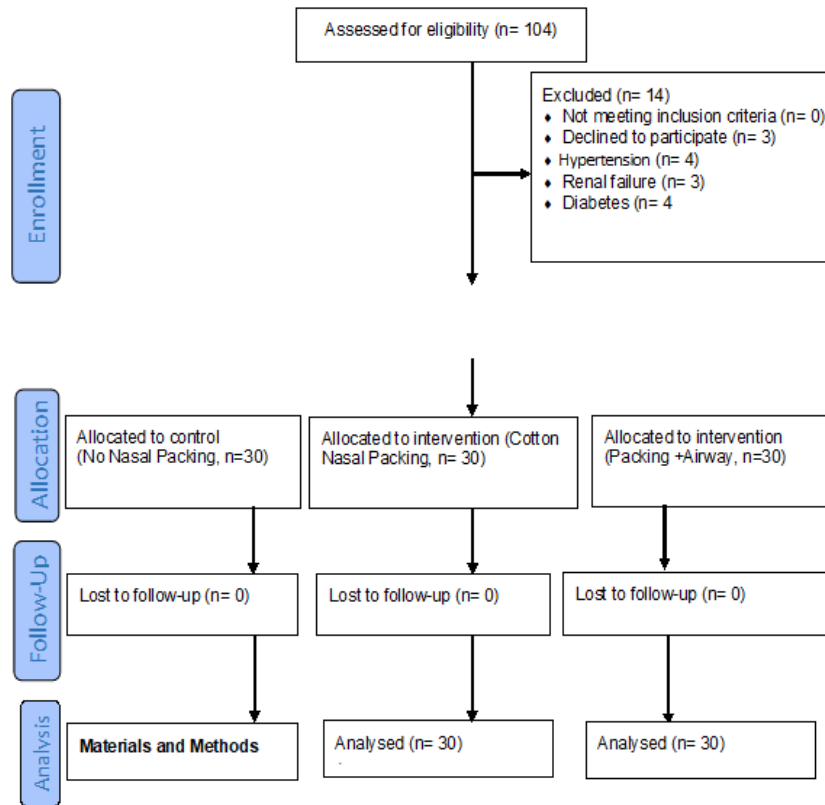


Figure 1: Shows a flowchart of the trial.

104 patients candidate for septoplasty were selected using random sampling method and assessed for eligibility. Patients without hypertension, pulmonary disorders, renal failure, diabetes and other metabolic diseases, thyroid dysfunction, smoking, alcohol consumption as well as using medications since a month ago were included in the trial. Patients with blood pressure or heart rate

disturbance in pre-operative monitoring, cardiovascular disorder during anesthesia or bleeding after surgery were excluded from trial and analysis.

Patients were randomly allocated to three groups using block randomization in a 1:1:1 ratio; the first group had no nasal packing after surgery. The second group underwent bilateral cotton nasal packing after septoplasty. Patients in the third group had bilateral nasal packing with bilateral airway after septoplasty. All surgeries were done by single surgeon and anesthesia team, also similar drugs including antibiotics and analgesics were prescribed for all patients post-operatively.

Blood pressure (BP) and heart rate (HR) were monitored by different assessor before surgery for three times, also, cardiac rhythm were monitored for three time before surgery. Then, a classic septoplasty include: hemi transfix incision and correct septal deviation and at the end, suture and quilting was done for all patients and at the end of surgery bleeding was controlled with accurate.

Then, 24 hours after surgery, blood pressure and heart rate were monitored by 24-hour Holter. All patients were monitored by MOBILOGRAPH and Carditite devices, regarding blood pressure and heart rate, respectively. The monitoring results were interpreted by a cardiologist.

Data was analyzed using SPSS software version 21 (SPSS Inc., Chicago, IL) for Microsoft Windows. Normal distributed variables (approved by 1-sample Kolmogorov-Smirnov test) were compared using independent sample *t* test between the groups. The chi square test was used to compare categorical variables in the 2 groups. P-values less than 0.05 were considered significant.

Results

Eventually; 90 patients, 63male and 27female underwent analysis. The age range was 16 to 69 years old and the mean age was 35.7±12.7 years old, no significant difference was observed between research groups in terms of demographic characteristics (P>0.05).

The mean systolic blood pressure (SBP) was 122.1±6.2mmHg in group (1) (patients without nasal packing) before surgery, in group (2) (patients with bilateral nasal packing) this was 123 ±6.2mmHg, and in group (3) (patients with nasal packing with airway) this was 121.2±7.1 mmHg. There was no significant difference between groups for pre-operative mean systolic blood pressure (P>0.05). Mean SBP was 120.7±9.5 mmHg in group (1) after surgery, in group (2) this was 123.1±10.8 mmHg, and 126.4±8.6 mmHg in group (3). There was no significant difference between them regarding post-operative mean SBP (P>0.05).

Mean diastolic blood pressure (DBP) was 78.8±5.2 mmHg in group (1) before surgery. Also it was 80.5±6.3 mmHg in group (2), and 78±4.2 mmHg in group (3). No significant difference was observed between them for pre-operative mean DBP (P>0.05). Mean DBP was 73.4±7.3 mmHg in group (1) after surgery. Also it was 76.4±5.8 mmHg in group (2), and 80.9±6 mmHg in group (3). This value was lower in patients without nasal packing and showed a significant difference with patients with nasal packing with airway (p=0.03).

Mean heart rate (HR) was 76.2±9.7 in group (1) before surgery. Also it was 79.6±14.1 in group (2), and 76.6±9.2 in group (3), and there was no significant difference between them (P>0.05). Mean HR was 71.8±11.3 in group (1) after surgery. While it was 77.7±7.9 in group (2), and 79.1±6.7 in group (3). Patients in the first group showed a significant difference with those in group (3) (p=0.043).

In pre-operative monitoring, no cardiac arrhythmia was detected. According to the monitoring after the surgery, one patient (3.3%) in group (1) showed sinus tachycardia (ST) and one patient (3.3%) showed sinus ventricular tachycardia (SVT). In group (2), two patients (6.6%) showed SVT and one patient (3.3%) showed ST. Among patients in group (3), two patients (6.6%) showed SVT. However, there was no significant difference between these groups (P>0.05).

Comparison of mean SBPs during day and night did not show any significant difference between the groups postoperatively, However, mean DBP was lower in group(1) in comparison with other groups and had a significant difference compared with group(3) (Table 1,2)

Table 1- Mean of systolic and diastolic blood pressure parameters during day and night

		Day Mean± SD	Night Mean± SD	Day Mean± SD	Night Mean± SD
Groups	1	121.9±9.9	115.9±8.3	73.5±7.2	70.5±6.3
	2	124.2±10.5	118.3±16.2	76.9±5.6	72±7.8
	3	126.9±8.6	123.6±8.7	81.6±6.6	79.5±6.2
Between group P-Value		P=0.31	P=0.14	P=0.002	P=0.001

Table 2- Comparison mean of DBP during day and night

Comparison mean of DBP during day	group 1	group 2	.238
		group 3	.001
	group 2	group 1	.238
		group 3	.085
	group 3	group 1	.001
		group 2	.085
Comparison mean of DBP during night	group 1	group 2	.912
		group 3	.027
	group 2	group 1	.912
		group 3	.069
	group 3	group 1	.027
		group 2	.069

Monitoring the Heart beats of patients for 24 hours after surgery showed that the patients in group (1) had 95900.7 ± 29996.4 beats, group (2) had 107143.3 ± 15352.1 beats, and group (3) had 103716.4 ± 14376 beats. Patients without nasal packing had lower heart beats compared to patients with full nasal packing ($p=0.05$).

None of the outcome measures mentioned in this section, had significant difference between patients with bilateral nasal packing and patients with nasal packing with airway. None of the groups, had post operation bleeding or septal hematoma.

Discussion

In this study, the mean of DBP during night in patients without nasal packing was lesser than other groups. Also, the mean of DBP during day in patients without nasal packing was lower than other groups and a significant difference was observed between this group and the group without airway. The mean of HR was lesser in patients without nasa (Bayar et al., 2008) packing, compared to other groups and this difference was significant compared to the group with nasal packing with airway. No significant difference was observed among patients with full nasal packing and patients with nasal packing with airway.

Consistent with this study, Ogretmenoglu and colleagues stated that patients with bilateral nasal packing showed increased BP and HR compared to those without nasal packing (Ogretmenoglu et al., 2002). Investigations in this context show that patients with bilateral nasal packing experience decreased o_2sat and increased Pco_2 and this stimulates environmental chemoreceptors and creates nasopulmonary reflex and increases sympathetic activity, BP, and HR. (Cook & Komorn, 1973).

Gupta and colleagues in their study pointed to hypoxia following the application of bilateral nasal packing and increased BP and HR and proposed that the application of nasal packing with airway decreases the complications. This study showed that this will not decrease cardiovascular complications. (Adbikari et al., 2008). In this case, the result of a study by Yuss and colleagues showed that the use of nasal packing with airway did not create any difference in decreasing o_2sat . Also, BP and HR among patients with full nasal packing and those with nasal packing with airway did not show any significant difference and even patients with nasal packing with airway experienced more pain ,that pain can increasing HR and BP.(Yu et al., 2013).

Kurtaran and colleagues in their study mentioned that the use of nasal packing with airway does not create hypoxia. (Kurtaran ety al., 2009). Consistent with this, Zayan and colleagues proposed that the use of nasal packing with airway maintains So_2 at normal level and does not create any significant change at blood gases, but bilateral nasal packing decreases Hco_3 and Pco_2 and does not create any significant change in po_2 , o_2 , and Ph . However, in both groups, patients did not show any significant difference regarding the mean of HR, but compared to the condition before the surgery, HR_{max} decreased and HR_{min} increased and it has been concluded that hypoxia cannot create these changes, but the use of nasal packing has stimulated the vagus nerve and created vasodilation that lead to these changes. It is recommended that to decrease hypoxia in patients, nasal packing with airway should be used.(Zayyan et al., 2010) Adhikari and colleagues pointed to this mechanism and proposed that the use of nasal packing decreases BP and HR following the stimulation of the vagus nerve.(Fan et al., 2011). While in the present study, patients with nasal packing showed higher HR mean compared to those without nasal packing. In addition, the heart rate of patients without nasal packing during 24 hours was less than others and this difference was significant and positive. This is not consistent with the results of the above study. Furthermore, the use of nasal packing with airway did not create any significant change compared to patients with full nasal packing.

Since the use of nasal packing has not indicated any established effect in preventing complications after the surgery such as bleeding, hematoma, and adhesion,(Banglawala et al., 2013) since lack of nasal packing creates more comfort and life quality after the surgery,(

Kayahan et al., 2017). It is recommended that the use of nasal packing be considered on the balance of its risk and benefit.

Conclusions

This study showed that the use of anterior nasal packing with and without airway leads to cardiovascular changes such as increased DBP and HR, but more studies are needed to create certain conclusion. So it is better that the use of nasal packing should be considered on the balance of its risk and benefit.

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Conflict of interest

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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