

Effects of Bilateral Nasal Packing on Oxygen Saturation and Blood Pressure

Meera Bista¹

¹Department of ENT-HN Surgery, Kathmandu Medical College, Kathmandu, Nepal.

ABSTRACT

Introduction: Nasal packing is one of the most common rhinological procedures in ENT practice exerting local in nose and systemic effects. Systemic effects may be due to poor sleep quality, respiratory difficulty, decreased oxygen saturation, circulatory problems and toxic shock syndrome which can threaten the life of a person. The study was done to investigate the effect on bilateral nasal packing on blood oxygen saturation and blood pressure changes.

Methods: A cross-sectional prospective study was undertaken in Kathmandu Medical College from January 2017 to June 2017. The ethical approval was taken from institutional review committee of KMC and verbal consent was taken from each patient. Thirty patients were included in the study by simple randomized sampling. The association between nasal packing and oxygen saturation and blood pressure was done using ANNOVA and Fisher Exact test. P value of <0.005 was considered statistically significant. SPSS version 20 for windows OS was used for analysis.

Results: Blood oxygen saturation on four different days was compared using ANNOVA and paired sample tests. It showed a significant dip on the day of bilateral nasal packing compared to other readings (P value <0.001). Likewise, systolic and diastolic blood pressures showed a significant rise on the day of bilateral nasal packing compared to readings on other days (P value <0.001).

Conclusions: Bilateral nasal packing can lead to significant rise in systolic and diastolic blood pressure and a dip in blood oxygen saturation. Thus care has to be taken while performing bilateral nasal packing in normal patients but much more in high risk patients.

Keywords: *blood pressure; nasal obstruction; nasal packing; oxygen saturation; pulse oximetry.*

INTRODUCTION

Nasal packing is one of the routine procedures done to control bleeding from the nose. It is performed for epistaxis and any nasal surgeries. This procedure induces local effects in nose such as mucosal damage and may contribute to rhino-sinusitis. Additionally, it causes acute and complete obstruction of nasal airways which leads to obligatory oral breathing. Rhinologists are well versed with such local effects on nose however are quite unaware of its systemic effects. Common systemic complications induced by nasal packing are poor sleep quality, respiratory difficulty, decreased oxygen saturation and toxic shock syndrome.¹ Nasal

packing compromises respiration leading to hypoxemia, daytime somnolence and exaggeration of pulmonary dysfunction especially in elderly patients. When these factors are complicated by acute anemia of blood loss, they can lead to serious tissue hypoxia, which may sometimes prove fatal.²

Hence, the objective of the present study was to

Correspondence: Dr. Meera Bista, Department of ENT-HN Surgery, Kathmandu Medical College, Kathmandu, Nepal. Email: meerabista@hotmail.com, Phone: +977-9841256711.

evaluate the association of bilateral nasal packing and its effect on oxygen saturation and blood pressure.

METHODS

A prospective cross-sectional study was conducted in the Department of ENT-HN Surgery, Kathmandu Medical College (KMC), Sinamangal from January 2017 to July 2017. The ethical clearance was taken from the Institutional Review Committee of KMC with verbal consent from each patient.

Total thirty patients irrespective of sex and age undergoing bilateral nasal packing after nasal surgery or epistaxis or nasal bone fracture in KMC were included in the study. Only those patients who gave verbal consent to get enrolled in the study were included.

During the study, pulse oxygen saturation was carried out four times on each patient to record the blood oxygen saturation (SpO₂) using digital pulse oximeter. The percentage of blood oxygen saturation and blood pressure were recorded pre operatively/on the first day of admission, after bilateral nasal packing was done, on the day of removable of nasal packs and on the day of discharge. Oxygen saturation readings and blood pressure readings of the respected days were tabulated, mean was calculated and recorded. Results were analyzed with SPSS version 20 by using ANNOVA. Categorical data were tested by Fisher Exact test and P-value of <0.005 was considered statistically significant. Observer variability was modified by using the same pulse oximeter and sphygmomanometer.

RESULTS

Blood oxygen saturation: Blood oxygen saturation

showed a significant dip (Figure 1) on the day of bilateral nasal packing compared to other readings with significant P value <0.001 (Table 1).

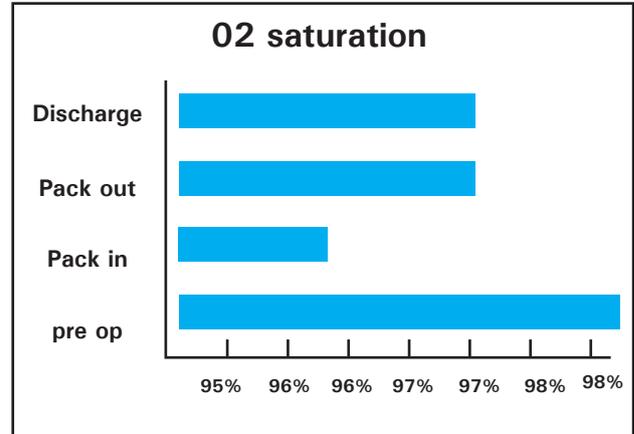


Figure 1. Relation of oxygen saturation with nasal packing.

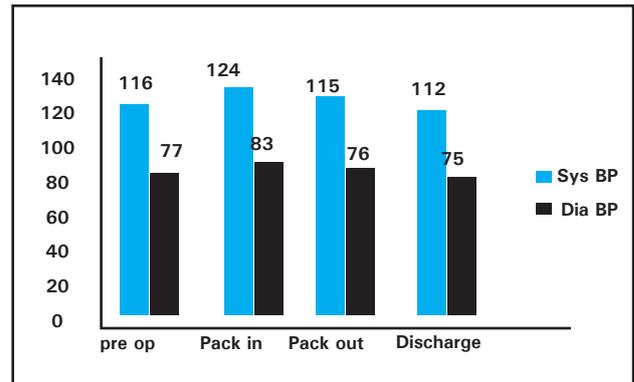


Figure 2. Relation of blood pressure with nasal packing.

		Sum of Squares	df	Mean Square	F	Sig.
V9	Between Groups	37.064	5	7.413	6.103	.001
	Within Groups	29.151	24	1.215		
	Total	66.215	29			
V10	Between Groups	3.455	5	.691	.943	.471
	Within Groups	17.584	24	.733		
	Total	21.039	29			
V11	Between Groups	3.528	5	.706	2.124	.097
	Within Groups	7.972	24	.332		
	Total	11.500	29			

Blood Pressure: Likewise, systolic and diastolic blood pressures which were compared showed a significant

rise (Figure 2) on the day of bilateral nasal packing compared to readings on other days with significant P value <0.001 (Table 2, Table 3).

Table 2. Paired sample test (systolic blood pressure).

Mean	Paired Differences			95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
	Std. Deviation	Std. Error Mean		Lower	Upper			
Pair 1 Preopsys - Nasalsys	-8.66667	8.19307		1.49584	-11.72601 -5.60732	-5.794	29	.000

Table 3. Paired sample test (diastolic blood pressure).

Mean	Paired Differences			95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
	Std. Deviation	Std. Error Mean		Lower	Upper			
Pair 1 preopdias - nasldias	-6.333333	9.64305		1.76057	-9.93411 -2.73256	-3.597	29	.001
Pair 2 nasldias - outdiast	6.66667	6.60895		1.20662	4.19885 9.13449	5.525	29	.000

Age and Sex distribution of the respondents: Among thirty patients, male were 19 and 11 were female (Figure 3). There was the highest number of the respondents in between the age group of 21-30 year (Figure 4).

Conditions where Nasal Packing was done: The most common cause for nasal packing was septoplasty for symptomatic deviated nasal septum followed by epistaxis (Figure 5).

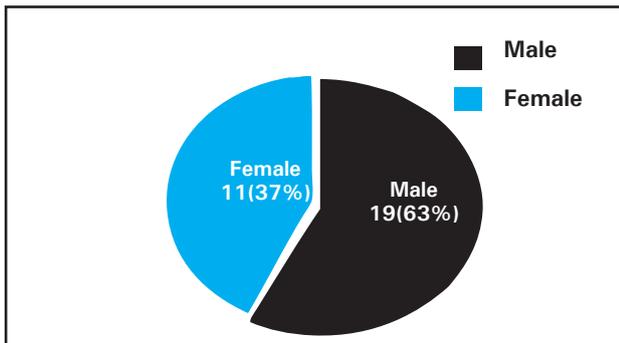


Figure 3. Sex distribution of the respondents.

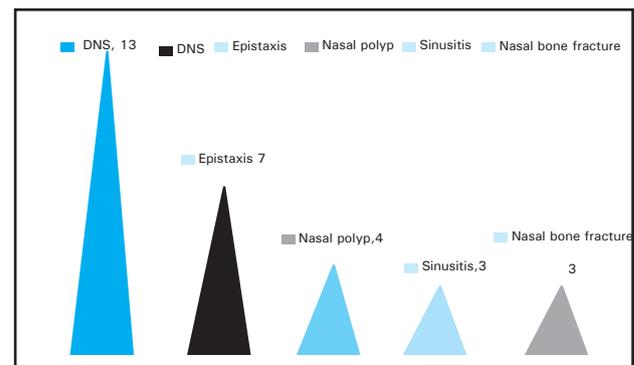


Figure 5. Conditions where nasal packing was done.

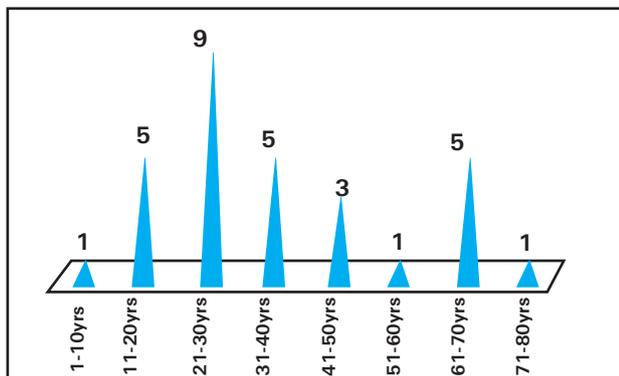


Figure 4. Age distribution of the respondents.

DISCUSSION

This study compares the results of effects of bilateral nasal packing on blood oxygen saturation and blood pressure who underwent various rhinological procedures in KMC. Among the respondents, maximum number (43%) of patients belonged to septoplasty. This must be due to the fact that deflected nasal septum (DNS) is a common condition caused by trauma or errors of development. Its incidence is quite high; about 20% in newborns, 27% in infants and 37% in adults. Most of these patients are asymptomatic. Symptomatic DNS causing nasal obstruction, headache, epistaxis,

sinusitis, hypoxemia or cosmetic deformity, will require septoplasty.^{3,4}

When blood oxygen saturation recorded with pulse oximeter on four different days and compared using ANNOVA and paired sample tests, it showed a significant ($P < 0.001$) dip of average of 95.63% on the day of bilateral nasal packing. However, on the preoperative day it was 97.53%, on the day of removal of pack it came up to 97.16% and on the day of discharge it was 97.5%. These results were similar to a study done by Surendra Singh et al. Their findings elicited pre-operative mean SpO_2 of $98.3 \pm 0.794\%$, after 24 hours of nasal packing $97.17 \pm 1.744\%$ and three weeks after surgery 98.87 ± 0.629 . On statistical analysis, the difference in SpO_2 was highly significant ($P < 0.001$). Thus, application of nasal packing can be risky in high risk patients, more so having cardiopulmonary disease.² Nocturnal sudden death can occur in patient after nasal packing, most probably, due to stroke or myocardial infarction.⁵ Nasal packs can also cause hypoxemia which in normal person is not severe enough to cause tissue hypoxia. However in patients with impaired pulmonary functions, nasal packing can cause tissue hypoxia precipitating life threatening lactic acidosis along with increase in PCO_2 and HCO_3 levels. Therefore patients with cardiopulmonary disease can be benefited with ventilating nasal packs with closed monitoring in intensive care units (ICU).⁶ In a study done by Ogritmenoglu O et al reported a significant decrease in O_2 saturation and a significant increase in mean heart rates after nasal packing.⁷ Suratt et al. in their study found a significant increase in number of apneas and hypopneas per hour of sleep in patients with nasal packs.⁸

Likewise systolic and diastolic blood pressures which were compared in this study showed a significant rise on the day of bilateral nasal packing compared to readings on other days with P value at < 0.0001 for systolic and $P < 0.001$ for diastolic blood pressure. Pre-operative mean blood pressure was seen to be 116/77mm of Hg, on the day of nasal packing it was 124/83mm of Hg, on the day of nasal pack removal it came down to 115/76mm of Hg and on discharge it was seen to be 112/75mm of Hg. This may be due to the obstruction of airflow in patients with nasal packs causing oxygen desaturation and hypercapnia. This

might have led to hypoxic stimulation of the carotid body and hypercapnic stimulation of the peripheral and central chemoreceptors leading to increased sympathetic neural activity, which in turn increases the peripheral vascular tone and heart rate, thus leading to increase in cardiac output which in turn leads to significant rise in systolic and diastolic blood pressure.⁵ Mustafa Deniz et al in his study, "the effects of nasal packs on systemic blood pressure after septoplasty" revealed similar results. In his study the mean night systolic and diastolic blood pressure were found to be significantly increased in second postoperative day in nasal packing group ($P < 0.05$). In the transseptal suturing group, the mean night systolic and diastolic BP were found to be slightly increased, but these changes were not statically significant ($P > 0.05$). The blood pressure levels were found significantly higher in the nasal packing group when the postoperative 2nd day mean night systolic and diastolic BP of both study groups were compared ($P < 0.05$). Thus it concluded that acute airway obstruction by nasal packs after nasal operations may lead to a significant increase in mean nocturnal systolic and diastolic BP in normotensive patients.

Therefore it is recommended that care must be taken when nasal packs are used in patients with cardiologic and vascular diseases.⁵ Oxygen desaturation is seen in patients with bilateral nasal packing after nasal surgery or epistaxis. This factor must be taken into account particularly in patients with Chronic obstructive pulmonary disease (COPD), ischemic heart disease (IHD), obesity and sleep apnoea syndrome (SAS).^{6,9,10} Thus quilting is a safe procedure to keep nasal cavity open after septal surgeries or in patients needing bilateral nasal packing, best option would be ventilating anterior nasal packing to prevent complications.¹¹

CONCLUSIONS

Bilateral nasal packing can cause acute airway obstruction which may lead to significant rise in systolic and diastolic blood pressure as well as a significant dip in blood oxygen saturation. Thus we conclude that utmost care has to be taken while performing bilateral nasal packing in normal patients but much more in high risk patients.

Conflict of Interest: None.

REFERENCES

1. Sedwick JD, Lopez AB, Gajerwski BJ, Simons RL. Caudal septoplasty for treatment of septal deviations: aesthetic and functional correction of the nasal base. *Arch Facial Plat Surg.* 2005;7(3):158-162. [[PubMed](#)]
2. Singh S, Singh J, Kakkar V, Yadav SPS, Bishnoi A, Kathuria B, Gulati A, Sharma C. To Evaluate the Effects of Nasal Packing on Blood Oxygen Saturation. *Otorhinolaryngology Clinics: An International Journal.* 2015;7(2):41-44. [[Full Text](#) | [DOI](#)]

3. Saboo R, Modwal A. Septoplasty: Postoperative Alternative for Control of Hemorrhage and Discomfort. *Sch. J. App. Med. Sci.* 2014; 2(4D): 1376-1380. [[Full Text](#)]
4. Harugop AS, Mudhol RS, Hajare PS, Nargund AI, Metgudmath VV, Chakrabarti S. Prevalence of Nasal Septal Deviation in New-borns and Its Precipitating Factors: A cross sectional study. *Indian J Otolaryngol Head Neck Surg.* 2012;64(3):248-251. [[PubMed](#)]
5. Yilmaz MD, Onrat E, Altuntas A, Kaya D, Kahveci O, Derekoy S, Celik A. The effects of nasal packs on systemic blood pressure after septoplasty. *KBB-Forum Afyon Turkey.* 2004; 3(4). [[Full Text](#)]
6. Goel L, Goel HC, Naik A. Impact of nasal packing on arterial blood gases and acid base balance. *The Pharma Innovation Journal.* 2016;5(1):106-8. [[Full Text](#)]
7. Ogretmenoglu O, Yilmaz T, Rahimi K, Aksoyek S. The effects on arterial blood gases and heart rate of bilateral nasal packing. *Eur Arch Otorhinolaryngol.* 2002;259(2):63-6. [[PubMed](#)]
8. Suratt PM, Turner BL, Wilhoit SC. Effects of intranasal obstruction on breathing during sleep. *Chest.* 1986;90(3):324-9. [[PubMed](#)]
9. Gupta M, Singh S, Chauhan B. Comparative study of complete nasal packing with and without airways. *B-ENT.* 2011;7(2):91-6. [[PubMed](#)]
10. Armengot M, Hernandez R, Miguel P, Navarro R, Basterra J. Effect of total nasal obstruction on nocturnal oxygen saturation. *Am J Rhinol.* 2008; 22(3):325-8. [[PubMed](#)]
11. Farooq M. Ventilating Anterior Nasal Packing after Septoplasty. *International Journal of Pathology.* 2016;14(1):1-5. [[Full Text](#)]