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RESEARCH

THE EFFECTS OF NASAL PACKS ON SYSTEMIC BLOOD PRESSURE AFTER SEPTOPLASTY

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SUMMARY

Objective: Nasal packs are widely used in nasal operations causing acute and complete obstruction of the nasal passage. The aim of this study was to investigate the effects of nasal packs on systemic blood pressure (BP) after septoplasty operations. Methods: Forty randomly selected patients (24 male, 16 female) aged between 18-55 (mean 31,3±10,4) with septal deviaton were included in our study. These patients were divided into two groups with twenty patients each. In the first group Merocel nasal packs were used after septoplasty and in the second group transseptal suturing was done. Sex and age matched twenty adults were assigned as controls. All the patients in the study groups were put onto 24-hour ambulatory blood pressure monitoring before septoplasty and on the second postoperative day (with nasal packs). The data were compared using SPSS 10.0 software. Results: The mean night systolic and diastolic BP were found to be significantly increased in the 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 this changes were not statically significant ($p>0,05$). The BP 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 ($p<0,05$). Conclusion: 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 care must be taken when nasal packs are used in patients with cardiologic and vascular diseases.

Keywords: Nasal obstruction, hypertension, septoplasty, blood pressure

SEPTOPLASTİ SIRASINDA KULLANILAN NAZAL TAMPONLARIN KAN BASINCI ÜZERİNE ETKİLERİ

ÖZET

Giriş: Burun tamponları nazal operasyonlarda sıklıkla kullanılırlar ve pasajın akut ve tam obstrüksiyonuna yol açarlar. Çalışmamızın amacı septoplasti sırasında kullanılan nazal tamponların hastaların sistemik kan basıncı üzerine etkisini araştırmaktır. Materyal ve Metod: Çalışmamıza randomize olarak seçilen ve septum deviasyonu tanısıyla ameliyat önerilen 40 hasta (24 erkek, 16 kadın) dahil edilmiştir. Yaşları 18-55 (ortalama 31,3±10,4) arasında değişmekteydi. Hastalar 20'şer hastadan oluşan 2 gruba ayrıldı. 1. grupta ameliyat sonrası Merocel tampon kullanılırken 2. grupta transseptal sütür yöntemi uygulandı. Yaş ve cinsiyet bakımından gruplara benzer 20 kişilik bir kontrol grubu oluşturuldu. Tüm hastalar ameliyat öncesinde ve ameliyatın 2. gününde (tamponluyken) 24 saatlik ambulatuar kan basıncı monitörizasyonuna tabi tutuldu. Veriler SPSS 10.0 programı kullanılarak karşılaştırıldı. Bulgular: Tampon konulan grupta, postoperatif 2. günde hastaların ortalama sistolik ve diastolik kan basınçlarının arttığı saptanmış ve bu artış istatistiksel olarak anlamlı bulunmuştur ($p<0,05$). Transseptal sütür konulan grupta ise ortalama sistolik ve diastolik kan basınçlarında hafif bir artış saptanmıştır, fakat ve bu artış istatistiksel olarak anlamlı değildir ($p>0,05$). Her iki grubun postoperatif ortalama sistolik ve diastolik kan basınçları karşılaştırıldığında, nasal tampon grubunun sonuçları belirgin derecede yüksek bulunmuştur ($p<0,05$). Sonuç: Nazal tamponlara bağlı akut üst solunum yolu obstrüksiyonunun normotansif hastaların kan basınçlarında (hem sistolik hem diastolik) belirgin artışa neden olduğu saptanmıştır. Bu nedenle kardiyolojik ve vasküler hastalığı olanlarda tampon kullanılırken dikkatli olunmalıdır.

Anahtar Sözcükler Nazal obstrüksiyon, hipertansiyon, septoplasti, kan basıncı

INTRODUCTION

Packs are wildly used by many surgeons in nasal operations to control postoperative bleeding and to prevent hematoma. Patient discomfort and necessity for hospital stay are some of the disadvantages of nasal packing. Nasal obstruction resulting in obligate oral breathing is an other important adverse effect.

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Many previous studies showed that some severe conditions (i.e Obstructive Sleep Apnea) causing chronic upper airway obstruction may lead to hypoventilation, hypoxemia, hypercarbia and acidosis. In some cases these may initiate pulmonary vasoconstriction giving rise to pulmonary hypertension and cardiac failure or vagal bradycardias and ectopic beats causing sudden deaths[1]. Nasal packs by totally obstructing the nose causes an acute upper airway obstruction but the effects of these packs on systemic blood pressure (BP) has not been documented yet. The aim of this study was to investigate the effects of nasal packs on

systemic BP after septoplasty operation which is one of the most frequently performed nasal operations.

MATERIALS AND METHOD

Forty randomly selected patients(24 male, 16 female) aged between 18-55 (mean 31,3±10,4) with septal deviaton were included in our study. They had upper airway obstruction due to septal deviation. They were all normotensive patients and none of them had any chronic disease. Informed consent was obtained from all patients. The patients were divided into 2 groups with 20 patients each. In the first group nasal packs were used after septoplasty and in the second group transseptal suturing was done. Sex and age matched twenty adults were assigned as controls.

All the patients in the nasal packing (NP) group and the transseptal suturing (TSS) group were put onto 24-hour ambulatory blood pressure monitoring (ABPM) (Reynolds Medical Tracker NIBP Software version 2.02.001 device, USA) before septoplasty and on the second postoperative day. This procedure was done only once for the control group. Local infiltrative anestesia (lidocaine) without adrenalin was used during all septoplasty operations. No local or topical decongestants were used in any of the patients. Merocel (USA) nasal packs without airways were used for nasal packing in the study group. These packings were withdrawn 48 to 72 hours after the operation. In the second group continious transseptal suturing described by Lee[2] was done instead of nasal packing to prevent postoperative hematoma.

RESULTS

No significant difference was seen when the preoperative (daytime and nocturnal) mean BP levels of the patients in NP, TSS and control groups were compared (p>0,05).

When the preoperative and postoperative 2nd day data were compared, the mean night systolic and diastolic BP were found to be significantly increased in the NP group (p<0.05) (Table 1). However in the TSS group, despite the mean night systolic and diastolic BP were found to be slightly increased, this increase was not found statically significant (p>0,05). The BP levels were found significantly higher in the NP group when the postoperative 2nd day mean night systolic and diastolic BP of both study groups were compared (p<0,05) (Table 2).

DISCUSSION

It was previously reported that obstruction of the nasal passage by nasal packs cause functional changes in cardiopulmonary system and changes in blood gase levels[2,3,4,5,6,7].

In a study done by Yiğit et al.[3] The blood pa02 levels decreased significantly on second postoperative night in patients with nasal packs who had septoplasty operation. Ögretmenoğlu[8] reported a significant decrease in 02 saturation, and a significant increase in minimum and mean heart rates after nasal packing. Suratt et al.[9] in their study found a significant increase in number of apneas and hypopneas per hour of sleep in patients with nasal packs. The present study showed a significant rise in nocturnal BP in patients with nasal packs demonstrated by 24-hour ABPM. To the best of our knowledge this is the first study reporting this rise in English medical literature.

In the older articles these changes in cardiopulmonary parameters were attributed to an entity called 'Nasopulmonary reflex' by some authors, but others claimed that infact, there was no such phenomenon exists that could be called nasopulmonary reflex[10,11,12]. The reason why nasal packs cause a rise in blood pressure is not clear. It may be associated with the following factors; the airflow passing from the nose into the nasopharynx has a laminar flow pattern in contrast to the transoral airflow which has a turbulent character[13,14,15]. This laminar airflow helps to keep soft palate and the uvula in an anterior position and prevents collapse of nasopharyngeal walls by maintaning the intraluminal air pressure[16]. Additionally the air that passes from the nose is heated and humidified. The humidification especially is important in keeping normal function of the upper airway mucosal lining liquid[17,18,19]. During sleeping in supine position the bulk of the tongue mainly composed of genioglossus muscle displace backwards by the influence of gravity obstructing the airway. When nasal packs are used oral breathing is obligatory. During oral breathing which causes a turbulent airflow the intraluminal air pressure cannot reach the appropriate level to keep the nasopharyngeal and orophayngeal structures open in supine position. This causes a collapse in pharyngeal walls and soft palate. The uvula sticks back to the posterior pharyngeal wall as well. Moreover, the drying effect of the turbulent flow also causes an increase in the viscosity of the upper airway mucosal lining liquid increasing surface tension. The increase in surface tension causes a rise in upper airway opening and closing pressures increasing upper airway resistance[17,18]. It also cause uvula to stick more effciently to posterior pharyngeal wall.

Another way by which nasal packs causes airflow obstruction may be their irritation effect of upper airway mucosa. In a study conducted on normal and laryngectomised individuals, it is

observed that nasal mucosal irritation causes an increase in airway resistance in supralaringeal airways, while causing a decrease in infralaringeal airways[20]. It is possible that nasal packs cause an increase in airway resistance by irritating nasal mucosa.

(n=20)		Preoperative	Postoperative 2nd day	Statistics
TA (mmHg)	Mean night systolic	102,7	109,3	Wilcoxon signed rank test (p<0,05)
	Mean night diastolic	57,3	63,1	Wilcoxon signed rank test (p<0,05)

Table 1. The comparison of preoperative and postoperative 2nd day results of the 1st (nasal packing) group.

(n=40)		1st (nasal packing) group	2nd (transseptal suturing) group	Statistics
TA (mmHg)	Mean night systolic	109,3	104,1	Mann-Whitney U test (p<0,05)
	Mean night diastolic	63,1	59,7	Mann-Whitney U test (p<0,05)

Table 2. The comparison of postoperative 2nd day results of the 1st (nasal packing) group and 2nd (transseptal suturing) group.

The sum of the above mentioned effects of turbulent transoral airflow which is caused by nasal packing probably leads to an obstructive sleep apnea (OSA) like effect.

Christopher showed that airflow obstruction in sleeping patients with OSA lead to increased digital vasoconstriction in the absence of detectable electroencephalogram (EEG) arousal. Moreover he found that this increase is more significant in detectable EEG arousals[21]. Regarding our finding and previous reports we think that obstruction of airflow in patients with nasal packs causes 02 desaturations and hypercapnia in our patients. This leads to hypoxic stimulation of the carotid body and hypercapneic stimulation of the peripheral and central chemoreceptors leading to an increased symphatetic neural activity. Besides, multiple inputs from lung and airway strech receptors, chest wall receptors and many other neural reflexes during arousal may contribute to this activity. The increased symphatetic neural activity increases peripheral vascular tone and hearth rate increasing cardiac output and these lead to a significant rise in nocturnal systolic and diastolic BP.

A decreased ventilatory response was demonstrated in patients with OSA. This has been attributed to decreased chemosensitivity of the peripheral receptors to hypoxia and hypercapnia. Osanai[22] suggested that this decrease was due to adaptation of chemoreceptors to prolonged hypoxic and hypercapneic conditions. Because nasal packing is an acute event, we believe that our patients respond to hypoxia and hypercapnia more efficiently than OSA patients and a more significant rise in blood pressure had taken place.

The rise in blood pressure can not be attributed to other factors like just surgery or anesthetic medication, because the same type of technique and medication was used in both our study groups.

Because nasal packing caused a significant increase in nocturnal BP of normotensive and healthy young adults, we suggest that this increase may reflect more significantly to patients who have cardiovascular diseases (i.e.hypertensive patients even if their BP is under control by medications). Nocturnal sudden deaths due to nasal packing and posterior nasal tamponade in elderly has been reported in some studies[10,12,23]. These deaths occurred probably due to an acute rise in BP of these patients, causing some deadly events like myocardial infarction in regard to increased afterload.

Regarding our findings, we conclude that it is better not to use nasal packs in patients with cardiologic and vascular diseases. If packs are going to be used, close follow-up of the patients is needed and dosage adjustments in patient's medications may be required.

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