



Evaluation of the Effect of Nasogastric Intubation on Olfactory Function

Nazogastrik Entübasyonun Koku Fonksiyonu Üzerine Etkisinin Değerlendirilmesi

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ABSTRACT

Aim: To evaluate the olfactory functions in patients having had nasogastric intubation.

Material and Methods: The study included 40 adult patients who underwent general anesthesia between January 2021 and June 2021 for elective abdominal surgery requiring a nasogastric tube (NGT) insertion. Olfactory function [Brief Smell Identification Test (B-SIT)] was evaluated prior to surgery and four weeks post-surgery in all the patients. The demographic characteristics of the patients, duration of NGT application, and B-SIT scores before and after NGT application were recorded. B-SIT scores were recorded separately for the NGT-applied and non-NGT-applied nasal side.

Results: The mean NGT application time was 3.4 ± 1.5 (3-7) days. The mean preoperative and postoperative B-SIT scores of the NGT-applied side were 5.20 ± 2.06 and 5.01 ± 2.02 , respectively. There was no statistically significant difference between the mean preoperative and postoperative B-SIT scores of the NGT-applied side ($p = 0.421$). The mean pre- and postoperative B-SIT scores of the patients in the non-NGT-applied nasal side group were 5.28 ± 2.16 and 5.11 ± 2.07 , respectively. No statistically significant difference was found in the mean preoperative and postoperative B-SIT scores in the non-NGT-applied nasal side ($p = 0.370$). No statistically significant difference was found in the mean preoperative and postoperative B-SIT scores between the NGT-applied and non-NGT-applied nasal sides, respectively ($p = 0.890$, $p = 0.654$).

Conclusion: The result of our study showed that there was no change in the olfactory function of patients after nasogastric intubation.

Keywords: Nasogastric intubation, Olfactory function, B-SIT test

ÖZ

Amaç: Nazogastrik tüp (NGT) entübasyonu uygulanan hastalarda koku alma fonksiyonlarını değerlendirmek.

Gereç ve Yöntemler: Çalışmaya Ocak 2021 ile Haziran 2021 arasında NGT takılmasını gerektiren elektif karın ameliyatı için genel anestezi uygulanan 40 yetişkin hasta dahil edildi. Tüm hastaların olfaktör fonksiyonları [Kısa Koku Tanımlama Testi (B-SIT)] cerrahi öncesi ve cerrahiden dört hafta sonra değerlendirildi. Hastaların demografik özellikleri, NGT uygulama süreleri ve NGT uygulaması öncesi ve sonrası B-SIT puanları kaydedildi. B-SIT puanları NGT uygulanan ve NGT uygulanmayan burun tarafı olmak üzere ayrı ayrı kaydedildi.

Bulgular: Ortalama NGT uygulama süresi 3.4 ± 1.5 (3-7) gündü. NGT uygulanan tarafta ameliyat öncesi ve ameliyat sonrası ortalama B-SIT skorları sırasıyla 5.20 ± 2.06 ve 5.01 ± 2.02 idi. NGT uygulanan tarafta ameliyat öncesi ve sonrası ortalama B-SIT skorları arasında istatistiksel olarak anlamlı bir fark yoktu ($p = 0.421$). NGT uygulanmayan tarafta ameliyat öncesi ve sonrası ortalama B-SIT skorları sı-



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rasıyla 5.28 ± 2.16 ve 5.11 ± 2.07 idi. NGT uygulanmayan tarafta ameliyat öncesi ve sonrası ortalama B-SIT skorlarında istatistiksel olarak anlamlı bir fark bulunmadı ($p = 0.370$). Sırasıyla NGT uygulanan ve NGT uygulanmayan burun tarafları arasında ameliyat öncesi ve sonrası ortalama B-SIT skorlarında istatistiksel olarak anlamlı bir fark bulunmadı ($p = 0.890$, $p = 0.654$).

Sonuç: Çalışmamızın sonucu, nazogastrik entübasyon sonrası hastaların koku alma fonksiyonlarında değişiklik olmadığını gösterdi.

Anahtar Sözcükler: Nazogastrik entübasyon, Koku fonksiyonu, B-SIT testi

INTRODUCTION

Nasogastric intubation is achieved by directing and maintaining the nasogastric tube (NGT) into the ventral meatus of the nasal cavity, without traumatizing the nasal turbinates and the ethmoid turbinates. NGTs are used for enteral feeding, gastrointestinal decompression, nasobiliary drainage, drug administration, and upper gastrointestinal bleeding.

NGT-related morbidity is rare but can sometimes be severe. The blind manipulation and passage of the tube can result in trauma to the associated tissues along the intended pathway, and trauma to structures if the tube is misdirected. The risk of complications (perforation, pulmonary injury, aspiration, and penetration of the tube into the intracranial space) is often further increased by the difficulty of NGT insertion.

Common NGT-related sinonasal pathologies include sinusitis, inflammation/granulation, erosion of the nasal septal mucosa, and epistaxis (1). Since the olfactory mucosa is part of the airway mucosa, sinonasal pathology, in turn, makes up a critical proportion of etiologies underlying olfactory disturbances.

To our knowledge, the literature contains no study evaluating olfactory function in patients with nasogastric intubation. Therefore, in the current study, we evaluated the olfactory function of patients that underwent NGT placement for various indications.

MATERIAL and METHODS

The primary aim of this study was to investigate whether there was a change in the olfactory function of patients after nasogastric intubation. This prospective study was evaluated and approved by the ethics committee of Bülent Ecevit University Medical Faculty (decree no: 2020/19, date: 30/09/2020). All the patients provided written informed consent to participate in the study. The study was conducted in accordance with the ethical principles stated in the Declaration of Helsinki. Forty adult patients who underwent general anesthesia between January 2021 and June 2021 for elective abdominal surgery requiring NGT placement were included in the study (Figure 1). Olfactory function was evaluated bilaterally in all the patients before and after NGT insertion. The NGT-applied nasal side of each participants was considered as study ($n = 40$) and the non-NGT-applied nasal side was considered as control ($n = 40$).

We used the Turkish version of the modified Brief Smell Identification Test (B-SIT) (Sensonics Inc.; Haddon Heights, NJ, USA) containing 12 odors (turpentine, chocolate, cinnamon, gasoline, lemon, onion, paint thinner, pineapple, rose, soap, smoke, and banana) to detect olfactory disorders. In this test, patients are asked to smell each odor and select one of the four options that described the odor. It takes approximately five minutes for each patient to complete the test.

Patients with a history of coagulopathy, immunodeficiency, autoimmune disease, cystic fibrosis, systemic diseases such as diabetes mellitus, rheumatologic disorders and oncological diseases, previous sinonasal surgery, hyposmia/anosmia, or upper respiratory tract anomalies and those that did not cooperate during B-SIT were excluded from the study.

All patients underwent detailed nasal endoscopy by 0 degree nasal endoscope. Patients with nasal polyposis, active sinonasal infection, allergic rhinitis, septal deviation and inferior turbinate hypertrophy were excluded from the study. Perioperative antibiotic prophylaxis with cefazolin at a dose of 30 mg/kg IV (maximum dose 2 g) was administered within 30 min before surgery. Antibiotic treatment was continued for 48-72 hours during hospitalization followed by oral therapy (first generation cephalosporin) for seven days. The demographic characteristics of the patients, duration of NGT application, and B-SIT scores before and after NGT application were recorded.

Statistical Analysis

The SPSS 20 software (IBM Corporation, USA) was used for statistical analysis. Data were expressed as mean \pm SD (standard deviation). The Shapiro-Wilk test was used to examine the normality of the data. The paired-sample t-test was applied to data of normal distribution and MannWhitney U-test was applied to data of questionably normal distribution. A P value less than 0.05 was considered statistically significant.

RESULTS

The study included 40 patients (16 female, 24 male). The mean age of the study group was 51.8 ± 16.2 years. The mean age was 45.5 ± 9.2 years for women and 55.9 ± 5.3 years for men (Table 1). The mean NGT application time

was 3.4 ± 1.5 (3-7) days. No complication developed after NGT placement.

The mean pre- and postoperative B-SIT scores of the patients in the NGT-applied side were 5.20 ± 2.06 and 5.01 ± 2.02 , respectively. No statistically significant difference was found in the mean preoperative and postoperative B-SIT scores in the NGT-applied side ($p = 0.421$) (Table 2).

The mean pre- and postoperative B-SIT scores of the patients in the non-NGT-applied side were 5.28 ± 2.16 and 5.11 ± 2.07 , respectively. No statistically significant difference was found in the mean preoperative and postoperative B-SIT scores in the non-NGT-applied side ($p = 0.370$) (Table 2).

No statistically significant difference was found in the mean preoperative and postoperative B-SIT scores between the NGT-applied and non-NGT-applied sides, respectively ($p = 0.890$, $p = 0.654$) (Table 2).

The results including the postoperative comparison of B-SIT scores by gender are given in Table 3.

DISCUSSION

Our results showed that there was no significant change in the olfactory function of patients with NGTs. NGT placement is a widespread procedure in hospitals and is mostly undertaken for gastric decompression and enteral feeding.

Table 1: Demonstrating the characteristics of patients

Demographic Parameters	All patients (n=40)	Male (n=24)	Female (n=16)
Age (years \pm SD)	51.8 ± 16.2	55.9 ± 5.3	45.5 ± 9.2
BMI (kg/m^2 \pm SD)	48.4 ± 5.2	49.8 ± 4.7	46.4 ± 3.6

Table 2: Demonstrating the B-SIT scores

B-SIT score (mean \pm SD)	Preoperative	Postoperative	p
NG side	5.20 ± 2.06	5.01 ± 2.02	0.421
Non-NG side	5.28 ± 2.16	5.11 ± 2.07	0.370
p	$p=0.890$	$p=0.654$	

Table 3: Comparison of postoperative B-SIT scores by gender

Postoperative B-SIT scores (mean \pm SD)	Gender		p
	Male	Female	
NG side	4.9 ± 0.05	5.1 ± 0.02	0.311
Non-NG side	5.08 ± 1.66	5.16 ± 1.09	0.274
p	$p=0.180$	$p=0.371$	

Despite being generally safe, NGT placement is sometimes reported to have associated complications resulting from the misplacement of the tube, trauma during intubation, or damage to the tube contact area.

NGT placement is also associated with a variety of nasal complications. Epistaxis may result from trauma to nasal mucosal or vascular structures. Selcuk et al. reported a patient presenting with persistent epistaxis for 20 days, which had started 14 days after the removal of NGT (2). In this case, the etiology of epistaxis was found to be a pseudoaneurysm of the ophthalmic artery. Rarely, pressure necrosis may occur in the nasal tip or alar wing region due to NGT placement (3).

The inflammation and infection of the sinonasal mucosa are known to occur due to obstructive agents in the nasal cavity, such as foreign bodies. NGT can cause sinus inflammation by acting as a foreign body. In a previous study, acute mycotic sinusitis with bacterial sepsis was reported in a case with NGT, in which NGT insertion was considered as a possible source of infection (4). In another study, 72% of patients who were on NGTs for 48 hours were found to develop rhinitis, and 50% developed sinonasal inflammation and associated sinusitis. In the same study, it was noted that sinusitis that developed in these patients was independent of the duration of NGT administration, age of the patient, or concomitant antibiotic use, and mucosal inflammation regressed a few hours after NGT removal (5).

The olfactory mucosa is located in the upper region of the nasal cavity. Inflammation or infection that may develop in the nasal cavity may cause deterioration in the olfactory mucosa and its function. To our knowledge, there is no study in the literature to investigate the effect of NGT placement on olfactory function. In our study, no significant changes were found in olfactory function secondary to NGT placement. The duration of NGT application was 72 hours at least and seven days at most.

Our study has certain limitations. It only provides preliminary data on the olfactory function of patients with NGTs based on a single assessment tool. Further studies with a larger sample size using more specific smell function tests are needed to more clearly and accurately reveal the effects of NGT placement on olfactory function. In addition, considering that our longest NGT application period was one week, it remains open to question whether olfactory function is affected in patients that are intubated longer than this period.

The result of our study showed that there was no change in the olfactory function of patients after nasogastric intubation. Our study is of preliminary nature, and there is a need for prospective and further studies to be conducted with larger populations over longer follow-up periods.

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Author Contributions

Concept: **Deniz Baklaci** , **Ergin Bilgin**, Design: **Deniz Baklaci**, Data collection or processing: **Ergin Bilgin**, **İlhan Taşdöven**, Analysis or Interpretation: **Deniz Baklaci**, Literature search: **Deniz Baklaci**, Writing: **Deniz Baklaci**, Approval: **Deniz Baklaci**.

Conflicts of Interest

There is no conflict of interest.

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During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Ethical Approval

Approved by Ethical Committee of Bülent Ecevit University Medical Faculty (2020/19).

Review Process

After the blind peer-review process, it was found suitable for publication and accepted.

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