

Main Article

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Does surgical treatment of nasal airway obstruction improve sexual functions?

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Abstract

Objective. To investigate the effects of surgical treatment for nasal obstruction on sexual functions, regardless of the condition causing the nasal obstruction.

Methods. Of 238 patients identified with nasal obstruction, 57 complained of erectile dysfunction and were included in the analysis. Patients underwent septoplasty, functional endoscopic sinus surgery, concha bullosa excision or radiofrequency ablation of the inferior turbinates, depending on their obstruction-causing disease. Pre- and post-operative evaluation of perceived nasal obstruction was performed using the Nasal Obstruction Symptom Evaluation questionnaire. Pre- and post-operative assessment of sexual functions was performed using the International Index of Erectile Function.

Results. Mean post-operative scores for erectile function, orgasmic function, sexual desire, intercourse satisfaction and overall sexual satisfaction were significantly higher compared to the pre-operative scores ($p = 0.022$, $p = 0.036$, $p = 0.033$, $p = 0.016$ and $p = 0.029$, respectively).

Conclusion. Surgical treatment of nasal obstruction by septoplasty, endoscopic sinus surgery, concha bullosa excision or radiofrequency can significantly improve sexual performance.

Introduction

Nasal airway obstruction is one of the most common complaints encountered in daily otolaryngology practice. Specific treatment modalities, including various surgical procedures, are commonly utilised to remedy the nasal airway obstruction, depending on the condition causing the obstruction. The most common causes of nasal airway obstruction in adults are nasal septal deviation, nasal polyposis, inferior turbinate hypertrophy and concha bullosa, and the main treatment option for these conditions is surgery.¹

Nasal polyposis is a chronic inflammatory disease of the upper airway. It has a variable clinical course and negative effects on quality of life. It generally affects male adults.¹ Nasal septal deviation is one of the most common causes of nasal airway obstruction and may be an aetiological factor for sleep-disordered breathing, particularly in adults.² Concha bullosa (middle turbinate pneumatization) and inferior turbinate hypertrophy are the other causes of nasal airway obstruction. Inferior turbinate hypertrophy is usually associated with allergic rhinitis. Chronic sinusitis, environmental irritants (such as cigarette or cigar smoke), pregnancy or other hormonal changes, the ageing process, and congenital variations may also be associated with inferior turbinate hypertrophy.^{3,4}

Nasal airway obstruction can result in alveolar hypoventilation, chronic hypoxaemia and hypercarbia.³ Chronic hypoxaemia and hypercarbia may have a role in the aetiopathogenesis of sexual dysfunctions.⁵ Sexual dysfunction, including erectile dysfunction, affects 5 per cent of the male population, and is defined by the National Institutes of Health as 'the inability to attain and maintain erections of sufficient quality to permit satisfactory sexual intercourse'.⁶ The effects of halitosis, sensorineural hearing loss and allergic rhinitis on sexual life have been described previously.^{7,8} Obstructive sleep apnoea (OSA) has been reported to reduce the quality of sexual life, and a significant improvement in sexual performance was found following the treatment of OSA.⁹

This study, which included patients with nasal airway obstruction, investigated the effects of surgical treatment for nasal airway obstruction on sexual dysfunction. Our study group comprised patients with different conditions that cause nasal airway obstruction, including nasal septal deviation, nasal polyposis, concha bullosa and inferior turbinate hypertrophy. We aimed to: determine whether sexual dysfunction was present in men with nasal airway obstruction aged under 50 years, investigate the association between nasal airway obstruction patients with erectile dysfunction and their quality of life, and examine the effects of surgical treatment for nasal airway obstruction on sexual dysfunction and quality of life, regardless of the condition causing the nasal airway obstruction.

Table 1. Pre- and post-operative NOSE scale scores and nasal resistance values

Parameter	Pre-operative	Post-operative	P-value
Median NOSE scale score (median (range))	14 (0–20)	2 (0–17)	0.01
Mean nasal resistance (mean \pm SD; Pa/cm ³ /second)	0.41 \pm 0.02	0.28 \pm 0.02	0.012

NOSE = Nasal Obstruction Symptom Evaluation; SD = standard deviation

Table 2. Pre- and post-operative IIEF-15 questionnaire scores

Questionnaire domain	Pre-operative (mean \pm SD)	Post-operative (mean \pm SD)	P-value
Erectile function	18.46 \pm 2.88	24.33 \pm 2.43	0.022
Orgasmic function	7.23 \pm 1.34	8.62 \pm 0.82	0.036
Sexual desire	6.12 \pm 1.47	7.64 \pm 0.89	0.033
Intercourse satisfaction	6.33 \pm 1.46	10.38 \pm 1.31	0.016
Overall satisfaction	5.80 \pm 1.47	8.69 \pm 1.53	0.029

IIEF-15 = 15-item International Index of Erectile Function; SD = standard deviation

The body mass index of all patients was calculated. In addition, blood parameters that might be associated with erectile function, such as serum glucose level, lipid profile, thyroid hormones and testosterone level, were evaluated.

Patients were excluded from the study if they had: diagnosed risk factors for erectile dysfunction, including obesity, hypertension, diabetes mellitus and penile deformities; neurological or metabolic disorders known to induce peripheral neuropathy; a history of prostate surgery; a history of prior sinonasal surgery; or received any treatment for erectile dysfunction during the previous three months.

All surgical interventions were performed under general anaesthesia. Septoplasty operations were performed using Cottle's method.¹³ Initially, polypectomy was performed using a microdebrider (Xomed, Jacksonville, Florida, USA). Subsequently, the endoscopic sinus surgery procedure defined by Messerklinger^{14,15} was employed for the treatment of nasal polyposis. Endoscopic lateral laminectomy surgery of the middle turbinate was carried out for the treatment of concha bullosa. For inferior turbinate hypertrophy, surgery using a radiofrequency ablation system (Celon Lab Precision, Olympus, Singapore) was performed. Specifically, the probe was introduced into the inferior turbinate head under direct vision, and three to four tunnels were created, maintaining sufficient distance between the mucosa and bone.

The study was conducted with the collaboration of the otolaryngology and urology departments. Questionnaires were given to all participants. The data (questionnaire scores and nasal resistance values) collected at three months post-operatively were compared with the pre-operative data (collected one week before surgery).

This study was approved by the local ethical committee (institutional review board number: E-18-2302), and was conducted in line with the dictates of the World Medical Association Declaration of Helsinki. Written informed consent was obtained from all participants.

Statistical analysis

The results are presented as: mean \pm standard deviation for normally distributed data, median (range) for abnormally distributed data, and percentage for descriptive data. The distribution of all data was investigated using the Kolmogorov–Smirnov test. The paired samples *t*-test (for normally distributed data) and

Wilcoxon signed rank test (for abnormally distributed data) were used to compare the pre- and post-operative values. The chi-square test was used for comparing categorical variables. SPSS version 21 software for Windows (SPSS, Chicago, Illinois, USA) was used for statistical analysis. A *p*-value of less than 0.05 was considered statistically significant.

Results

Of 238 patients identified with nasal airway obstruction, 57 complained of erectile dysfunction and were included in the analysis. Thus, the overall ratio of erectile dysfunction was 23.9 per cent in patients with nasal airway obstruction. Of the 57 patients, 38 had septal deviation, 9 had nasal polyposis, 5 had concha bullosa and 5 had inferior turbinate hypertrophy. The mean age of the participants was 39.5 \pm 4.6 years and the mean body mass index was 22.4 \pm 1.3 kg/m².

The laboratory test results were within normal limits and did not show any signs of the following conditions that might be risk factors for erectile dysfunction: diabetes mellitus, dyslipidaemia, hypothyroidism and hypogonadism.

The post-operative median Nasal Obstruction Symptom Evaluation score of 2 (range, 0–17) was significantly lower than the pre-operative median score of 14 (range, 0–20) (*p* = 0.01; Table 1). The mean pre- and post-operative nasal resistance values were 0.41 \pm 0.02 Pa/cm³/second and 0.28 \pm 0.02 Pa/cm³/second, respectively. This indicates that the patients had moderate nasal obstruction; however, there was a significant post-operative decrease in nasal resistance (*p* = 0.012; Table 1).

The pre- and post-operative International Index of Erectile Function scores are shown in Table 2. The mean post-operative scores for erectile function, orgasmic function, sexual desire, intercourse satisfaction and overall sexual satisfaction were significantly higher than the pre-operative scores (*p* = 0.022, *p* = 0.036, *p* = 0.033, *p* = 0.016 and *p* = 0.029, respectively).

Discussion

The prevalence of erectile dysfunction may vary among different countries, but overall prevalence in the general male population was reported as 16 per cent in previous literature.¹⁶ In our study, the prevalence of erectile dysfunction in patients with nasal airway obstruction was higher, at 23.2 per cent.

Although it lacks a control group, this study aimed to investigate the positive effects of surgical treatment for nasal airway obstruction on impaired sexual functions. Accordingly, the post-operative International Index of Erectile Function scores were significantly greater than the pre-operative scores in patients with nasal airway obstruction.

Previous recent studies have focused on the co-existence of nasal pathologies and urological symptoms.^{7,9,17} The mechanism of impaired sexual functions in patients with nasal pathologies, particularly septal deviation, was a main interest of the researchers. Significant changes in erectile dysfunction have previously been reported following surgical treatment.¹⁸ Unlike prior studies, our study comprised patients with different conditions that cause nasal airway obstruction, including nasal septal deviation, nasal polyposis, concha bullosa and inferior turbinate hypertrophy. We aimed to investigate the effect of these conditions on quality of life relating to the sexual functions of patients before and after surgical treatment. To our knowledge, no studies up to date have evaluated such a variety of conditions causing nasal airway obstruction in patients with erectile dysfunction, and demonstrated changes in sexual functions after surgical treatment.

In this study, the post-operative scores for erectile function, orgasmic function, sexual desire, intercourse satisfaction and overall sexual satisfaction were significantly higher than the pre-operative scores. Our results indicate that surgical treatment for nasal airway obstruction significantly improved sexual functions in males, regardless of the condition causing the nasal airway obstruction.

Nasal airway obstruction is one of the most common complaints encountered in daily otolaryngology practice, and nasal septal deviation is a common cause of nasal airway obstruction. Chronic nasal airway obstruction causes alveolar hypoventilation as a result of upper airway obstruction, leading to chronic hypoxaemia and hypercarbia.² In patients with nasal septal deviation, nasal breathing disorder may also lead to a decrease in sleep quality.¹⁹

Erectile functions might be significantly affected by sleep quality. Sleep-related nocturnal erections, referred to as 'nocturnal penile tumescence', mainly occur in rapid eye movement sleep.²⁰ Because of chronic hypoxaemia and hypercarbia, the active sympathetic nervous system can interfere with the physiological mechanisms of a normal erection.²¹ In addition, chronic hypoxaemia disrupts endothelial functions. Low plasma nitric oxide levels and the increased production of endothelin lead to vasoconstriction and antagonise penile tumescence.^{22,23}

- Nasal airway obstruction is a common complaint in otolaryngology practice
- Nasal airway obstruction can result in alveolar hypoventilation, chronic hypoxaemia and hypercarbia
- Chronic hypoxaemia and hypercarbia may have a role in the pathogenesis of various conditions including sexual dysfunction
- This study investigated the effects of surgical treatment for nasal obstruction on sexual functions
- Such surgical treatment can improve sexual performance, regardless of the condition causing nasal airway obstruction

Possible pathophysiological mechanisms that explain the association between nasal airway obstruction and erectile dysfunction therefore include: an increase in sympathetic activity,

the decreased production of nitric oxide and increased production of endothelin (leading to vasoconstriction), and antagonising penile tumescence.

Consistent with previous literature, our study showed significant improvements in all subdomains of the erectile function questionnaire after surgical treatment. As this study was conducted with the co-operation of the otolaryngology and urology departments, a multidisciplinary approach should be considered when treating sexual dysfunction in patients with nasal airway obstruction.

For every condition causing nasal airway obstruction included in this study, there might be another distinct causative mechanism for sexual dysfunction. This study was not able to investigate the potential underlying disease-related mechanisms for sexual dysfunction. However, nasal airway obstruction related mechanisms are considered to contribute to sexual dysfunction in these patients. The main limitation of this study was the absence of a control group. Although this study did not focus on the effects and the mechanisms of effects of nasal airway obstruction on sexual functions, because of the absence of a control group, the comparison between pre- and post-operative scores revealed the positive effects of nasal airway surgery on sexual functions.

Conclusion

The quality of sexual life in males can be negatively affected by nasal airway obstruction. The surgical treatment of nasal airway obstruction, via septoplasty, endoscopic sinus surgery, concha bullosa excision and radiofrequency for inferior turbinates, can significantly improve sexual performance, regardless of the condition causing the nasal airway obstruction.

Competing interests. None declared

References

- 1 Johansson L, Bramerson A, Holmberg K, Melen I, Akerlund A, Bende M. Clinical relevance of nasal polyps in individuals recruited from a general population-based study. *Acta Otolaryngol* 2004;**124**:77–81
- 2 Fidan V, Aksakal E. Impact of septoplasty on pulmonary artery pressure in patients with markedly deviated septum. *J Craniofac Surg* 2011;**22**:1591–3
- 3 Bergmark RW, Gray ST. Surgical management of turbinate hypertrophy. *Otolaryngol Clin North Am* 2018;**51**:919–28
- 4 Kalaifarasi R, Ramakrishnan V, Poyyamoli S. Anatomical variations of the middle turbinate concha bullosa and its relationship with chronic sinusitis: a prospective radiologic study. *Int Arch Otorhinolaryngol* 2018;**22**:297–302
- 5 Meuleman EJ. Prevalence of erectile dysfunction: need for treatment? *Int J Impot Res* 2002;**14**(suppl 1):S22–8
- 6 NIH Consensus Development Panel on Impotence. NIH Consensus Conference. Impotence. *JAMA* 1993;**270**:83–90
- 7 Benninger MS, Benninger RM. The impact of allergic rhinitis on sexual activity, sleep, and fatigue. *Allergy Asthma Proc* 2009;**30**:358–65
- 8 Zapata C, López-Escámez JA. A pilot study of sexual health in patients with Ménière's disease [in Spanish]. *Acta Otorrinolaringol Esp* 2011;**62**:119–25
- 9 Irer B, Celikhisar A, Celikhisar H, Bozkurt O, Demir O. Evaluation of sexual dysfunction, lower urinary tract symptoms and quality of life in men with obstructive sleep apnea syndrome and the efficacy of continuous positive airway pressure therapy. *Urology* 2018;**121**:86–92
- 10 Onerci Celebi O, Araz Server E, Yigit O, Longur ES. Adaptation and validation of the Turkish version of the Nasal Obstruction Symptom Evaluation scale. *Int Forum Allergy Rhinol* 2018;**8**:72–6
- 11 Weiss P, Brody S. International Index of Erectile Function (IIEF) scores generated by men or female partners correlate equally well with own satisfaction (sexual, partnership, life, and mental health). *J Sex Med* 2011;**8**:1404–10

- 12 Bayraktar Z. The reliability of the Turkish version of the International Index of Erectile Function (IIEF): literature review [in Turkish]. *New Journal of Urology* 2017;**12**:63–70
- 13 Cottle M, Loring R. Newer concepts of septum surgery; pre-sent status. *Eye Ear Nose Throat Mon* 1948;**27**:403–6
- 14 Messerklinger W. Endoscopy technique of the middle nasal meatus [in German]. *Arch Otorhinolaryngol* 1978;**221**:297–305
- 15 Stammberger H, Posawetz W. Functional endoscopic sinus surgery. Concept, indications and results of the Messerklinger technique. *Eur Arch Otorhinolaryngol* 1990;**247**:63–76
- 16 Rosen RC, Fisher WA, Eardley I, Niederberger C, Nadel A, Sand M *et al*. The multinational Men's Attitudes to Life Events and Sexuality (MALES) study: I. Prevalence of erectile dysfunction and related health concerns in the general population. *Curr Med Res Opin* 2004;**20**:607–17
- 17 Kirmaz C, Aydemir O, Bayrak P, Yuksel H, Ozenturk O, Degirmenci S. Sexual dysfunction in patients with allergic rhinoconjunctivitis. *Ann Allergy Asthma Immunol* 2005;**95**:525–9
- 18 Varendh M, Johannisson A, Hrubos-Strom H, Andersson M. Sleep quality improves with endoscopic sinus surgery in patients with chronic rhinosinusitis and nasal polyposis. *Rhinology* 2017;**55**:45–52
- 19 Fidan T, Fidan V, Ak M, Sutbeyaz Y. Neuropsychiatric symptoms, quality of sleep and quality of life in patients diagnosed with nasal septal deviation. *Kulak Burun Bogaz Ihtis Derg* 2011;**21**:312–17
- 20 Jankowski JT, Seftel AD, Strohl KP. Erectile dysfunction and sleep related disorders. *J Urol* 2008;**179**:837–41
- 21 Somers VK, Dyken ME, Clary MP, Abboud FM. Sympathetic neural mechanisms in obstructive sleep apnea. *J Clin Invest* 1995;**96**:1897–904
- 22 Guo QH, Tian YL, Wang Z, Li AY, Ma ZH, Guo YJ *et al*. Endothelin receptors in augmented vasoconstrictor responses to endothelin-1 in chronic intermittent hypoxia. *Clin Exp Pharmacol Physiol* 2013;**40**:449–57
- 23 Siques P, Lopez de Pablo AL, Brito J, Arribas SM, Flores K, Arriaza K *et al*. Nitric oxide and superoxide anion balance in rats exposed to chronic and long-term intermittent hypoxia. *Biomed Res Int* 2014;**2014**:610474