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Could Nasal Surgery Affect Multilevel Surgery Results for Obstructive Sleep Apnea?

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Abstract

Objective: To study the role of nasal surgery as a part of multilevel surgery for management of OSA.

Methods: All patients underwent multilevel surgery for relieving OSA symptoms and they were classified according to type of surgical intervention into: group A (20 patients), who underwent hyoid suspension (Hyoidthyroidpexy), tonsillectomy, suspension (El-Ahl and El-Anwar) sutures and nasal surgery (inferior turbinate surgery). Group B (20 patients), who underwent hyoid suspension (Hyoidthyroidpexy), tonsillectomy and suspension sutures. Pre and postoperative sleep study, Epworth Sleepiness Scale (ESS), snoring score were reported and compared.

Results: Apnea Hypoapnea Index (AHI) dropped significantly in both groups. The mean preoperative AHI was significantly less in patients had no nasal obstruction (P= 0.0367), while the difference in postoperative values was non-significant (p =0.7358).

The mean ESS improved significantly in both groups, but the difference between pre and postoperative values in both groups was non-significant. The lowest oxygen saturation elevated significantly in both groups, but the difference between pre and postoperative values in both groups was non-significant. As regards snoring scores, they dropped significantly in both groups. The preoperative snoring score was reported to be significantly more in patients had associated nasal obstruction (group A) (P =0.0113). But after surgery and the difference in postoperative values was non-significant (P =0.1296).

Conclusion: Treatment of nasal obstruction should be considered as an important component in the comprehensive management plan OSA patients as it has significant impact on the patients AHI and snoring.

Keywords: Obstructive sleep apnea; Multilevel surgery; Nose; Snoring

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Introduction

Sleep disordered breathing is related to reduced airflow through the upper airway during sleep, due to upper airway obstruction or increased upper airway resistance. These include simple snorers, Upper Airway Resistance Syndrome (UARS) and Obstructive Sleep Apnea (OSA) [1].

OSA is mostly attributed to from the collapse of the upper airway coupled with muscle tone relaxation during sleep. The main sites of obstruction are the oropharynx and hypopharynx [1,2].

Multi-level procedures for OSA were presented for the first time in 1989 by Waite and colleagues [3]. Basically, the classification of the upper airway into different levels of obstruction goes back to Fujita [4] who discriminated between retropalatal and retrolingual obstruction. On the basis of this definition, Riley et al. [5-7] developed the concept of multilevel surgery. The nasal valve is the narrowest part of the upper airway. Because the upper airway accounts for two-thirds of the entire airway that extends down to the alveoli, hence, simple widening of the nasal valve and the entire nasal passage would significantly contribute to a decrease in negative pressure at inspiration during sleep and contribute to improve OSA [1,2]. The role of nasal surgery as a part of multilevel surgery for management of OSA is a point of controversy, so we aimed in this study to investigate this controversial issue.

Patients and Methods

A prospective study was conducted on patients had OSA referred to the Otorhinolaryngology,

Table 1: Results of thyrohyoidopexy plus suspension sutures with (group A) and without nasal surgery (group B).

		(20 cases) Group A		(20 cases) Group B		T test	P value
Variable		SD	Mean	SD	Mean		
Age		9.2	47.1	4.7	46	0.4762	0.6367
BMI		2.5	33.4	2.01	33.4	0	1
AHI	Pre	31.6	48.8	25.3	68.4	2.1653	0.0367 **S**
	Post	10.9	24.5	9.52	25.6	0.3399	0.7358
ESS	Pre	5.6	12.6	5.4	13.8	0.6898	0.4945
	Post	2.7	4.1	1.6	5.2	1.5674	0.1253
LOS	Pre	14.8	73.5	11.3	66.8	1.6091	0.1159
	Post	5.3	84	2.9	83.2	0.5941	0.556
Snoring score	Pre	0.4	3.8	0.54	3.4	2.6619	0.0113 **S**
	Post	0.51	2.3	0.7	2	1.5491	0.1296

BMI: Body Mass Index; AHI: Apnea Hypopnea Index; ESS: Epworth Sleepiness Score; LOS: Lowest Oxygen Saturation; SD: Standard Deviation; S: Significant

Head and Neck Surgery department, Zagazigand Mansoura University Hospitals over the period from June 2015 to August 2017. This study included forty patients with OSA symptoms scheduled for multilevel surgery. All patient had Apnea Hypopnea Index (AHI) >15 and Body Mass Index (BMI) ≤ 35 kg/m². Exclusion criteria included patients with history of previous surgical intervention for OSA, or for neck pathology. Patients who did not obey the schedule of follow up sessions were also excluded from the study.

After detailed history taking; flexible nasoendoscopy during Muller's maneuver, polysomnography and Drug Induced Sleep Endoscopy (DISE) was performed for all patients. Moreover, all patients had subjective analysis with the Epworth Sleepiness Scale (ESS) as a measure of daytime somnolence.

Six months after surgery, all patients underwent nasopharyngolaryngoscopy as part of the standard post-surgical protocol using the Muller maneuver. A postoperative sleep study, ESS, snoring score were also performed and assessed. All patients underwent multilevel surgery for relieving OSA symptoms and they were classified according to type of surgical intervention into:

Group A (20 patients), who underwent hyoid suspension (Hyoidthyroidpexy), tonsillectomy, suspension (El-Ahl and El-Anwar) sutures and nasal surgery (inferior turbinate surgery) [8].

Group B (20 patients), who underwent hyoid suspension (Hyoidthyroidpexy), tonsillectomy and suspension sutures [8].

Apnea was defined as complete airflow cessation for at least 10 seconds. Hypopnea was defined as a decrease in airflow ≥ 30%, accompanied by 4% desaturation.

Preoperative and postoperative evaluations were statistically compared using tests from the SPSS program version 17.0 (Chicago, Illinois, USA). P value ≤ 0.05 is considered significant. Ethical Considerations: The study was approved by the International Review Board of our institution and a written informative consent was obtained from each patient after clarification of the procedures in details.

Results

Forty patients, 22males (55%) and 18 females (45%), were included in this work. The mean age was 47.1 ± 9.2 in group A and 44.6 ± 4.7 in group B with no statistically significant difference between the two groups (p =0.6367). The preoperative mean BMI was 33.4 ± 2.5 in group A and 33.4 ± 2.01 in group B (p =1).

No significant changes were recorded as regard BMI in the postoperative follow up visits. The follow-up period ranged from 6 to 14 months. No early or late postoperative complications were reported.

Mean AHI in group A dropped from68.4 ± 25.3 preoperatively to 24.5 ± 10.9 postoperatively. While in group B, it was 48.8 ± 31.6 preoperatively and decreased to 25.6 ± 9.52 postoperatively. The mean preoperative AHI was found to be significantly less in patients had no nasal obstruction (P =0.0367), while the difference in postoperative values was non-significant (p =0.7358).

The mean ESS improved in both groups as it was dropped from 12.6 ± 5.6 to 4.1 ± 2.7 in group A and from 13.8 ± 5.4 to 5.2 ± 1.6 in group B, but the difference between preoperative and postoperative values in both groups was non-significant (Table 1).

The lowest oxygen saturation improved in both groups as it was elevated from 73.5 ± 14.8 to 84 ± 5.3 in group A and from 66.8 ± 11.3 to 83.2 ± 2.9 in group B, but the difference between preoperative and postoperative values in both groups was non-significant (Table 1).

As regards snoring scores, they dropped in group A from 3.8 ± 0.4 preoperatively to 2.3 ± 0.51 postoperatively, and from 3.4 ± 0.54 preoperatively to 2 ± 0.7 postoperatively in group B. The preoperative snoring score was reported to be significantly more in patients had associated nasal obstruction (group A) (P =0.0113). But after surgery and the difference in postoperative values was non-significant (P =0.1296) (Table 1).

Discussion

As oropharyngeal surgery alone is often not able to completely treat OSA [6,7], multilevel surgery concept emerges and acquire more acceptance with time among OSA surgeons [9,10]. Authors began to think differently and described different techniques that addressed the importance of hypopharyngeal airway widening and stabilization e.g., genioglossus advancement, hyoid myotomy and suspension, surgical reduction of the tongue base and maxillomandibular advancement. These procedures could be performed either alone or in combination [8].

It was suggested by previous studies that sleep breathing disorders might be triggered by different consequences of nasal obstruction. Various clinical and experimental studies showing that nasal pathologies trigger OSA symptoms by increasing nasal resistance [11,12]. Some studies also, showed that in healthy men, artificial nasal obstruction decreased the quality of sleep and increased the number of arousals, apnea, and hypopnea [13,14]. The role of nasal surgery in the OSA is still disputable as controversial results have been reported in the literature. Nasal surgery is considered at least as a worthwhile adjunct treatment modality [15].

The current study investigated the effect of nasal surgery on the results of multilevel surgery for patient suffering from OSA, patients of group A underwent palatal, hyoid and nasal surgery, while group B did not undergo nasal surgery. It was clear that patients had nasal obstruction level beside retropalatal and retrolingual obstructions levels showed significantly more AHI than those have the same obstruction levels without nasal level ($p = 0.0367$). Then, AHI markedly dropped postoperatively in group A so the difference in postoperative AHI values between the two groups was non-significant. This reflects the effect of nasal surgery in improving OSA symptoms.

Additionally, the preoperative snoring score was reported to be significantly more in patients had associated nasal obstruction (group A) ($P = 0.0113$). But after surgery, the difference in postoperative values was non-significant ($P = 0.1296$) reflecting the value of performing nasal surgery in this group of patients.

The results of this work support the idea of including nasal surgery when needed as a step in multilevel surgery for patients suffering from OSA symptoms. Our results agree with the study of Mickelson [16] who reported that Surgical treatment of nasal obstruction, has been shown to improve sleep disordered breathing, as well as CPAP requirement and compliance with CPAP.

Nasal obstruction cause significantly more mean AHI and more snoring scale than patient without nasal obstruction refereeing to the significant role of chronic nasal obstruction as a precipitating factor for OSA and snoring. Therefore, after nasal obstruction release and widening of nasal airway this lead to restoring achieving non-significant difference from postoperative AHI and snoring scale. This indicate that the significant more AHI and snoring scale is attributed to the nasal obstruction reflecting the important share of the nose in severity of OSA and snoring. Therefore, adding nasal level in the multilevel surgery significantly improves the outcome.

This may be explained by that nasal resistance results in negative oropharyngeal pressure during respiration, therefore, the muscles supporting the patency of the upper air way cannot withstand the prolonged negative forces. So nasal obstruction may be the cause in the pathogenesis of the distal collapse which may persist even after correction of nasal obstruction. We agree with Pang 2013 that nasal surgery as a single operative site has minimal effect on sleep apnea parameters, with low success rates [17].

Our results are also consistent with the study of Friedman, et al. [18] who reported that symptoms of OSA improved after nasal surgery as regards nasal breathing, snoring and day time energy levels. Generally, correction of an obstructed nasal airway ameliorates symptoms in OSA patients. However, nasal surgery is of great importance in the surgical armamentarium of OSA due to its ability to facilitate other OSA treatments and maximize patient quality of life.

Nasal Surgery in OSA is pivotal but not primary treatment of the nose in OSA is crucial in its pathophysiology and in terms of improving airflow dynamics. In a multi-level surgical plan, the nose should be considered and its repair will significantly aid in the success rate of OSA surgery. Surgical correction of the nose depends on the anatomical abnormality such as septoplasty, inferior turbinate reduction [17]. In addition, it is well known that restoring patent nasal airway is also highly effective in increasing tolerance for CPAP that is delivered via a nasal or full face mask if needed.

Conclusion

Treatment of nasal obstruction should be considered as a crucial component in the comprehensive management plan OSA patients as it has significant impact on the patients AHI and snoring.

References

1. Kohler M, Bloch KE, Stradling JR. The role of the nose in the pathogenesis of obstructive sleep apnea and snoring. Eur Respir J. 2007;30(6):1208-15.
2. Piccin O, Scaramuzzino G, Martone C, Marra F, Gobbi R, Sorrenti G. Modified hyoid suspension technique in the treatment of multilevel related obstructive sleep apnea. Otolaryngol Head Neck Surg. 2014;150 (2):321-4.
3. Waite PD, Wooten V, Lachner J, Guyette RF. Maxillomandibular advancement surgery in 23 patients with obstructive sleep apnea syndrome. J Oral Maxillofac Surg. 1989;47(12):1256-61.
4. Fujita S. Obstructive sleep apnea syndrome: pathophysiology, upper airway evaluation and surgical treatment. Ear Nose Throat J. 1993;72(1):67-72:75-76.
5. Riley RW, Powell NB, Guilleminault C. Obstructive sleep apnea syndrome: a review of 306 consecutively treated surgical patients. Otolaryngol Head Neck Surg. 1993;108(2):117-25.
6. Sher AE, Schechtman KB, Piccirillo JF. The efficacy of surgical modifications of the upper airway in adults with obstructive sleep apnea syndrome. Sleep. 1996;19(2):156-77.
7. Benazzo M, Pagella F, Matti E, Zorzi S, Campanini A, Frassineti S, et al. Hyoidthyroidpexia as a treatment in multilevel surgery for obstructive sleep apnea. Acta Otolaryngol. 2008;128(6):680-4.
8. El-Ahl MA, El-Anwar MW. Expansion pharyngoplasty by new simple suspension sutures without tonsillectomy. Otolaryngol Head Neck Surgery. 2016;155(6):1065-8.
9. Askar SM, El-Anwar MW, Amer HZ, Awad A. Single triangular suture: A modified technique for hyoid suspension as a treatment for obstructive sleep apnea: our experience with 24 patients. Clin Otolaryngol. 2017;42(6):1418-21.
10. Tantawy AA, Askar Sherif M, Amer HZ, Awad A, El-Anwar MW. Hyoid bone suspension as a part of Multilevel Surgery for Obstructive Sleep Apnea Syndrome. Int Arch Otorhinolaryngol. 2017.
11. Verse T, Pirsig W. Impact of impaired nasal breathing on sleep disordered breathing. Sleep Breath. 2003; 7(2):63-76.
12. Young T, Finn L, Kim H. Nasal obstruction as a risk factor for sleep-disordered breathing. The University of Wisconsin Sleep and Respiratory Research Group. J Allergy Clin Immunol. 1997;99(2):S757-62.
13. Hudgel D, Hendricks C. Palate and hypopharynx-sites of inspiratory narrowing of the upper airway during sleep. Am Rev Respir Dis. 1988;138(6):1542-7.
14. Olsen K, Kern E, Westbrook P. Sleep and breathing disturbance secondary to nasal obstruction. Otolaryngol Head Neck Surg. 1981;89(5):804-10.
15. Verse T, Maurer J, Pirsig W. Effect of nasal surgery on sleep related breathing disorders. Laryngoscope. 2002;112(1):64-68.

16. Mickelson SA. Nasal Surgery for Obstructive Sleep Apnea Syndrome. Otolaryngol Clin North Am. 2016;49(6):1373-81.

17. Pang KP. The Role of Nasal Surgery in the Treatment of OSA. Curr Otorhinolaryngol Rep. 2013;1(1):20- 24.

18. Friedman M, Tanyer H, Lim JW, Landsberg R, Vaidyanathan K, Caldarelli D. Effect of improved nasal breathing on obstructive sleep apnea. Otolaryngol Head Neck Surg. 2000;122(1):71-4.