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Nasal Mass Presenting as Obstructive Sleep Apnea Syndrome

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Background and Objective The aim of this study was to analyze the clinical symptoms, physical examinations, imaging studies, polysomnographic evaluations, and pathologic findings of patients with a nasal mass presenting as obstructive sleep apnea syndrome (OSAS).

Methods The study population consisted of adult OSAS patients who had a nasal mass and were successfully treated by nasal surgery alone. In this study, we analyzed clinical symptoms, physical examinations, imaging studies, pre and postoperative polysomnographic parameters, and pathologic results of these patients.

Results A series of four patients with OSAS due to a nasal mass were analyzed. The analysis revealed the following: 1) A nasal mass involving the nasopharyngeal space may cause mild to severe OSAS. 2) Isolated nasal surgery may be efficient for the improvement of respiratory disturbances in an OSAS patient with a large nasal mass. 3) We speculated that favorable indications for isolated nasal surgery for the treatment of OSAS are as follows: (1) a huge nasal mass occupying the nasopharynx, (2) small tonsils, (3) low-leveled tongue, (4) relatively young age, and (5) the absence of morbid obesity.

Conclusions Nasal masses should be considered surgically correctable anatomical abnormalities and potential causes of obstruction when assessing patients with suspected OSAS.

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Key Words Obstructive sleep apnea syndrome, Nasal obstruction, Nasal surgery, Physical examination, Polysomnography.

INTRODUCTION

Obstructive sleep apnea syndrome (OSAS) is characterized by repetitive upper airway collapse, including apnea and hypopnea, during sleep and may lead to various clinical symptoms, such as excessive daytime sleepiness (EDS), restless sleep, morning headache, non-refreshing sleep, memory loss, decreased libido, and irritability, and complications, such as hypertension, myocardial infarction, stroke, and symptoms resulting in motor vehicle accidents.[1] The exact etiology and mechanism of OSAS have not been determined, and the pathophysiology of OSAS is considered complex and multifactorial, involving upper airway anatomy, neuromuscular activity, hormonal influences, and genetic predisposition.[2,3]

The diagnostic process for OSAS generally includes a comprehensive sleep history, physical examination, and sleep study.[1,3] To confirm the structural features of upper airway, including nasal abnormalities, adenoids, elongated or enlarged uvula, tonsillar hypertrophy, lateral peritonsillar narrowing, macroglossia, lingual tonsils, epiglottis, and vocal folds, it is necessary to perform a physical examination that includes nasal, nasopharyngeal, oropharyngeal, hypopharyngeal, and laryngeal endoscopies.[1,4]

In young children, anatomical problems, such as tonsillar hypertrophy or adenoid vegetations, are usually associated with OSAS.[5] However, rather than structural abnormality, in adults, obesity is more commonly related to OSAS.[1,5] Theoretically, any structural obstruction of upper airway may cause OSAS; however, it is relatively rare for an anatomical factor that is surgically correctable to be the only contributing factor to OSAS in adult.[1] Furthermore, little is known about the patients with a nasal mass as the only factor contributing to OSAS.

To identify clinical characteristics in OSAS caused solely by a nasal mass, we analyzed cases

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of adult OSAS patients with a nasal mass who were successfully treated with nasal surgery. Therefore, the objective of this study was to evaluate the clinical symptoms, physical examinations, imaging studies, pre and postoperative polysomnographic results, and pathologic findings of patients with a nasal mass presenting as OSAS.

METHODS

The study was reviewed and approved with a waiver of informed consent by the Institutional Review Board of Korea University Ansan Hospital. Eligible subjects were adults (age ≥ 18 years) who met the following criteria: 1) complained of nasal obstruction and clinical symptoms suggestive of OSAS; 2) apnea-hypopnea index (AHI) ≥ 5 per hour of total sleep time (TST) on sleep study; 3) nasal mass; 4) did not improve with medical treatment; 5) treated with nasal surgery; 6) evaluated with a follow-up sleep study three months after operation; and 7) successful response to surgery. Subjective EDS was evaluated with the Epworth Sleepiness Scale (ESS).[6]

All patients underwent pre and postoperative polysomnographic evaluations using in-laboratory full polysomnography (Alice 4; Respironics, Atlanta, GA, USA) or portable monitoring (Stardust II; Respironics, Monroeville, PA, USA). All sleep studies were manually interpreted by a sleep technician according to the standard criteria of the American Academy of Sleep Medicine (AASM) manual for the scoring of sleep and associated events and were reviewed by certified physicians.[7] Apnea was defined as an absence of airflow for a period lasting at least 10 seconds and hypopnea was defined as a 30% or greater reduction in airflow associated with a 4% or greater decrease in oxygen saturation. The apnea index was defined as the number of apneic episodes per hour of TST, and the AHI was defined as the number of episodes of apnea and hypopnea per hour of TST. The arousal index was defined as the number of arousals per hour of TST.

All patients were treated with isolated nasal surgery such as endoscopic sinus surgery, septal surgery, or turbinate surgery. Surgical success was defined as a reduction of at least 50% in the preoperative AHI and a postoperative AHI of less than 20 per hour.

RESULTS

A total of four consecutive eligible male adult patients were

Table 1. Clinical characteristics of OSAS patients with a nasal mass who were successfully treated with nasal surgery alone

	Case 1	Case 2	Case 3	Case 4
Age/sex	49 yr/male	34 yr/male	44 yr/male	50 yr/male
BMI (pre/post)	23.2/23.6	22.1/24.9	27.8/27.9	25.6/25.9
Clinical symptoms				
Main symptoms	Nasal obstruction, snoring	Nasal obstruction, apnea	Nasal obstruction, snoring, apnea	Snoring, nasal obstruction
ESS score (pre/post)	15/7	8/3	6/4	21/14
Duration	3 yr	1 yr	5 yr	4 yr
Physical examinations				
Nasal abnormalities	Nasal mass, NSD, ITH	Nasal mass, CRS, NSD, ITH	Nasal mass, CRS, NSD, ITH	Nasal mass, NSD, ITH
Tonsil size	Grade 1	Grade 1	Grade 1	Grade 1
Palate-tongue position	Grade 2	Grade 1	Grade 2	Grade 1
Sleep study				
Methods	PM	Full PSG	Full PSG	Full PSG
AHI (pre/post)	11.8/1.7	54.5/1.4	24.2/5.7	31.0/14.2
AI (pre/post)	9.7/1.0	50.6/0.4	13.0/3.6	22.4/11.1
Minimum SaO_2 (pre/post)	77/88	68/91	77/78	84/79
Nasal surgery	Polypectomy (R), septoturbinoplasty	Endoscopic sinus surgery (R), septoturbinoplasty	Endoscopic sinus surgery (B), septoturbinoplasty	Polypectomy (L), septoturbinoplasty
Pathology	Nasal polyp (5.4 × 3.5 cm)	Inverted papilloma (5.8 × 3.5 cm)	Nasal polyp (5.5 × 3.0 cm)	Nasal polyp (1.5 × 1.2 cm)

OSAS: obstructive sleep apnea syndrome, BMI: body mass index (kg/m^2), ESS: Epworth Sleepiness Scale, AHI: apnea-hypopnea index (events/hour of total sleep time), AI: apnea index (events/hour of total sleep time), SaO_2: arterial oxygen saturation (%), CRS: chronic rhinosinusitis, NSD: nasal septal deviation, ITH: inferior turbinate hypertrophy, PM: portable monitoring, PSG: polysomnography, (R): right, (L): left, (B): both.

analyzed in this study. Clinical characteristics for each of the OSAS patients with a nasal mass who were successfully treated with nasal surgery alone are displayed in Table 1. Endoscopic and radiologic findings of a nasal mass presenting as mild, moderate, or severe OSAS are shown in Figs. 1, 2, and 3, respectively. We summarized these clinical characteristics as follows: 1) a nasal mass involving the nasopharyngeal space may cause mild to severe OSAS; 2) isolated nasal surgery may be efficient for the improvement of respiratory disturbances, such as apnea and hypopnea, in OSAS patients with a large nasal mass; 3) we speculated that favorable indications for isolated nasal surgery for the treatment of OSAS are as follows: (1) huge nasal mass occupying the nasopharynx, (2) small tonsils, (3) low-leveled tongue, (4) relatively young age, and (5) absence of morbid obesity.

DISCUSSION

The results of this study suggested that a large nasal mass occupying the nasopharyngeal space may result in OSAS, and nasal surgery alone may be an effective treatment for such OSAS patients. In addition, we speculated about the favorable indications for isolated nasal surgery for the treatment of OSAS.

It is well known that nasal obstruction is one of the most common clinical symptoms in OSAS patients. In this study, nasal obstruction and snoring were the most common symptoms in patients with a nasal mass presenting as OSAS. Witnessed apnea, foreign body sensation, and EDS were also frequently observed.

In assessing patients with suspected OSAS, physical examination that includes nasal endoscopic inspection, tonsil size, and palate-tongue position is very important because anatomical features may aid in predicting surgical outcomes. Oropharyngeal surgical success rates for OSAS patients with large tonsils and a low-leveled tongue may be higher than those for OSAS patients with small tonsils and a high-leveled tongue.[8,9] However, in this study, the OSAS patients with a nasal mass who were successfully treated with isolated nasal surgery had small tonsils and a low-leveled tongue. These results imply that small tonsils and a low-leveled tongue may be favorable factors for isolated nasal surgery.

A patent nasal or nasopharyngeal pathway may play a criti-

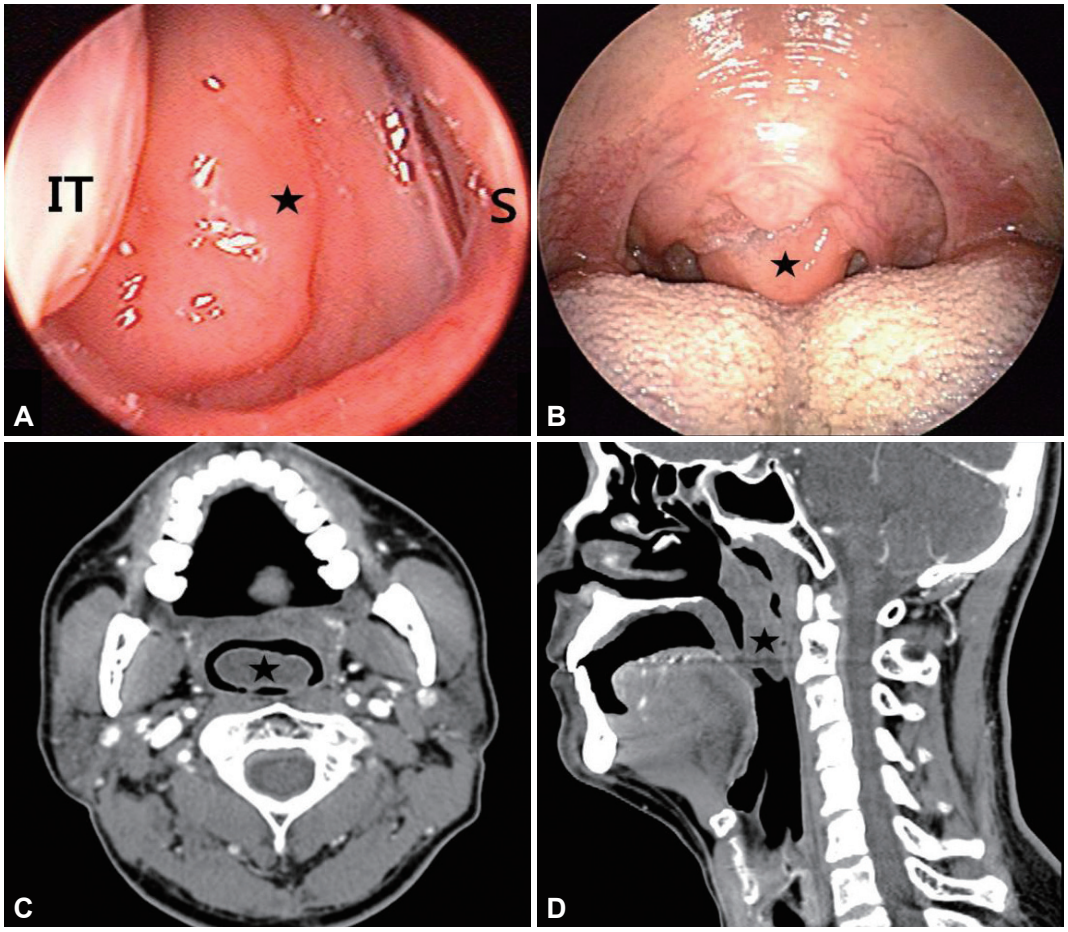

Fig. 1. Nasal mass presenting as mild obstructive sleep apnea syndrome (Case 1). Right posterior nasal (A) and oral (B) endoscopic findings and axial (C) and sagittal (D) views of computed tomography showed a large mass occupying the naso and oropharynx. IT: inferior turbinate, S: septum, black asterisk (★): nasal mass.

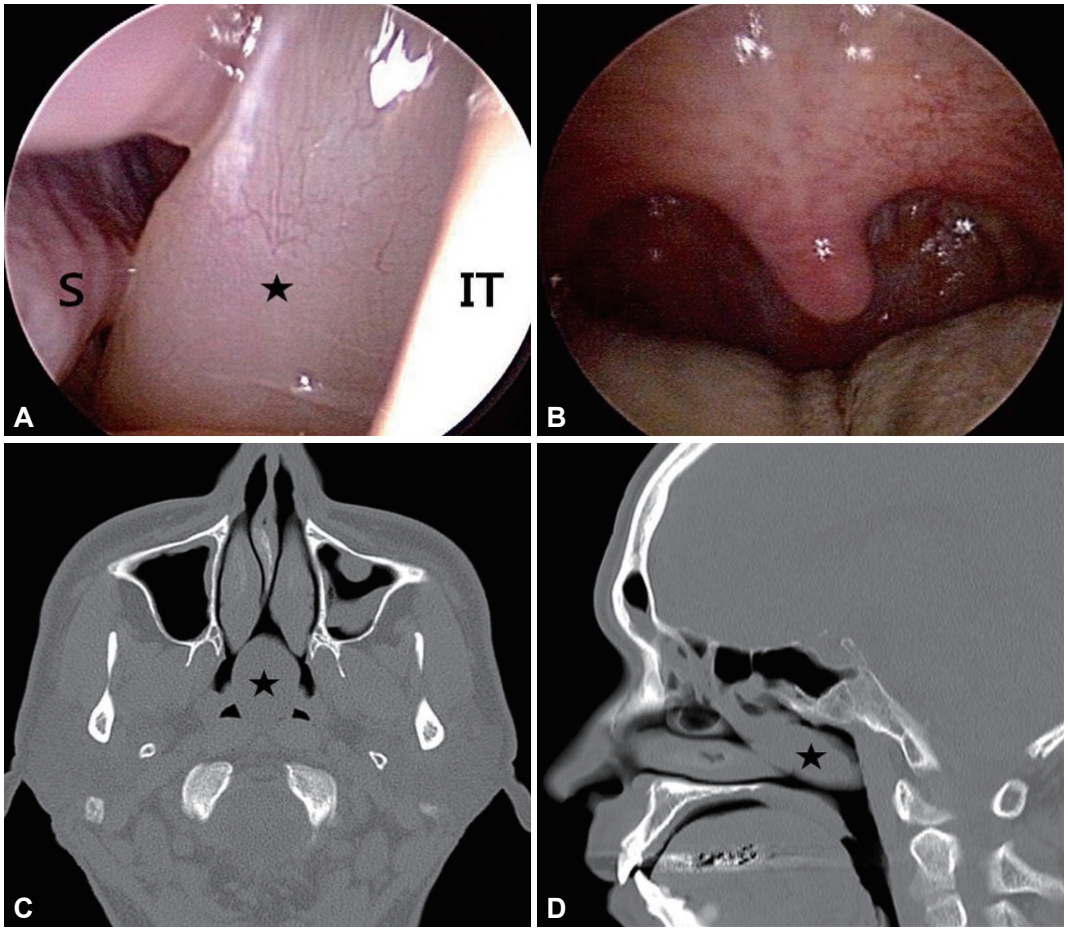

Fig. 2. Nasal mass presenting as moderate obstructive sleep apnea syndrome (Case 3). Left posterior nasal (A) and oral (B) endoscopic findings and axial (C) and sagittal (D) views of computed tomography showed a large mass occupying the nasopharynx. IT: inferior turbinate, S: septum, black asterisk (★): nasal mass.

cal role in respiration during sleep by preventing frequent nighttime arousals caused by interruptions in nasal breathing. There are many studies suggesting that nasal obstruction may be associated with the development or deterioration of sleep-disordered breathing (SDB), including snoring and sleep apnea.[10,11] Nasal obstruction may be caused by various nasal or nasopharyngeal findings, such as turbinate hypertrophy, septal deviation, valve abnormalities, polyp or other tumor, adenoid vegetation, or nasopharyngeal mass. Although the exact pathophysiologic mechanisms linking nasal obstruction and SDB are not completely understood, there are several potential mechanisms, including augmented airway resistance, change to unstable mouth breathing, disappearance of nasal reflexes, and increased inspiratory suction.[12] In this study, three (Case 1–3) of four cases had a large nasal mass that occupied most of the nasopharyngeal space. It is thought that these masses may lead to OSAS through the mechanisms mentioned above. The nasal mass in the other case (Case 4), which did not occupy most of the nasopharyngeal space, may have partially influenced the OSAS. In addition, nasal septal deviation and inferior turbinate hypertrophy in all cases may have an unfavorable effect on their SDB. Therefore, septoturbinoplasty with nasal mass removal may be associated with the improvement of SDB by decreasing nasal obstruction and resistance.

Most studies have described that the effect of isolated nasal surgery on sleep apnea is limited.[13,14] The reported success rate of isolated nasal surgery for OSAS is very low (less than 20%).[14] To date, there has been no study that tried to analyze adult OSAS patients with a nasal mass who have a successful treatment response to nasal surgery alone, likely because these cases are rare. Moreover, favorable indications for isolated nasal surgery in OSAS patients with a nasal mass have been not investigated. To our knowledge, this is the first study to evaluate the clinical symptoms, physical examinations, imaging studies, pre and postoperative polysomnographic results, and pathologic findings in patients who have a nasal mass presenting as OSAS.

According to the AASM clinical guideline for OSAS, surgery is generally indicated to treat OSAS in patients who have a specific, surgically correctable underlying abnormality that is causing the sleep apnea.[1] Based on this recommendation and our results, isolated nasal surgery may be considered as a primary treatment for OSAS patients with a large nasal mass that

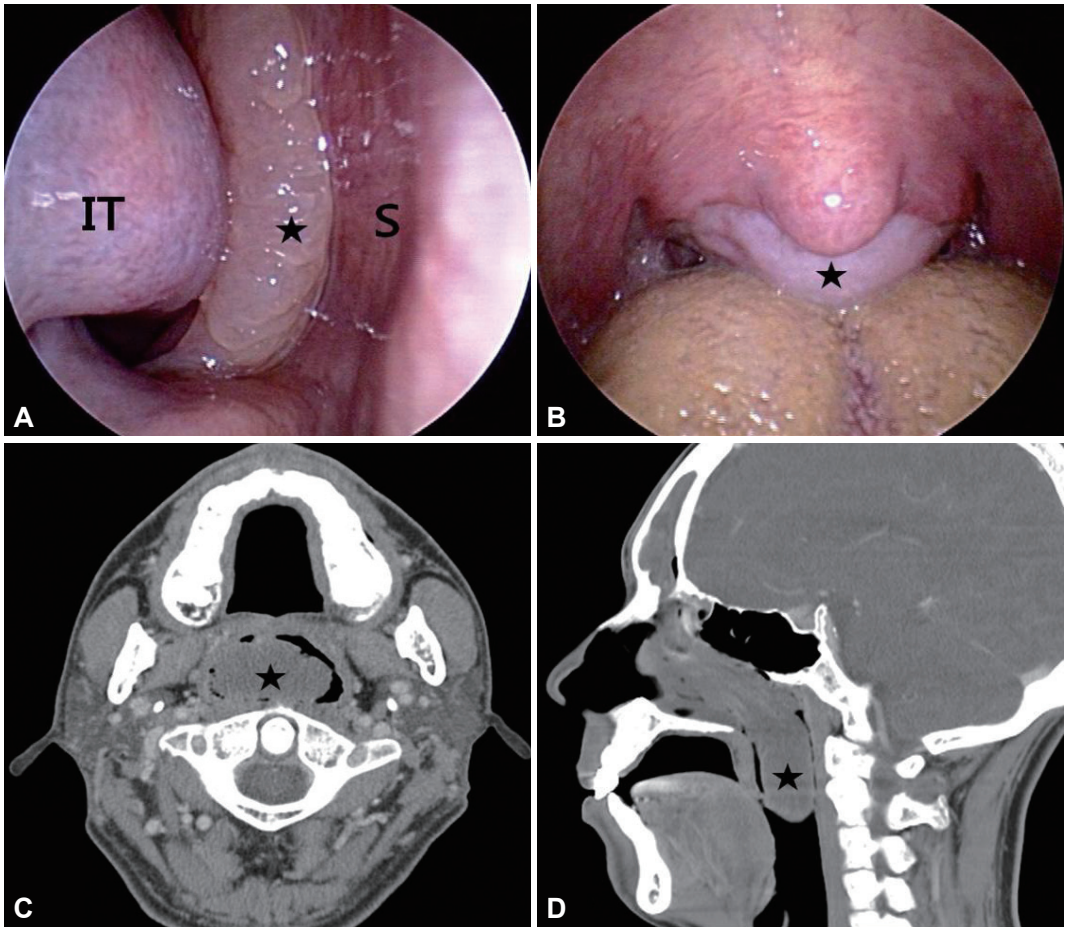

Fig. 3. Nasal mass presenting as severe obstructive sleep apnea syndrome (Case 2). Right anterior nasal (A) and oral (B) endoscopic findings and axial (C) and sagittal (D) views of computed tomography showed a large mass occupying the naso and oropharynx. IT: inferior turbinate, S: septum, black asterisk (★): nasal mass.

occupied most of the nasopharyngeal space.

This study has several important limitations. First, the number of cases in our study was very small because these cases are rare, and there are few efforts to evaluate polysomnography in OSAS patients with a nasal mass before and after nasal surgery alone. Second, we did not perform statistical analyses in this study. Third, the study has the inherent limitations of a retrospective investigation. Further prospective studies with large samples are required to confirm our findings.

In conclusion, the results of this study may enhance our understanding of the clinical characteristics of patients with OSAS caused by a nasal mass. A nasal mass should be considered a potentially causative, surgically correctable anatomical abnormality when assessing patients with suspected OSAS.

Acknowledgments

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Conflicts of Interest

The authors have no financial conflicts of interest.

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