

## An Anti-Snoring Oral Appliance to Reduce Simple Snoring as a Non-Invasive Method for Management of Snoring: A Case Report and Literature Review

Maryam Edalatifard<sup>1</sup>, Maryam Albaji<sup>1\*</sup>, Besharat Rahimi<sup>2</sup>

<sup>1</sup> Pulmonary Diseases Research Center, Imam Khomeini Hospital Complex, Tehran University of Medical Sciences, Tehran, Iran

<sup>2</sup> Imam Khomeini Hospital Complex, Tehran University of Medical Sciences, Tehran, Iran

Received: 10 Apr. 2020 Accepted: 27 May 2020

### Abstract

**Background and Objective:** Simple snoring affects millions of people and their partners in the world and it indicates increased upper airways resistance and pharyngeal collapsibility. Snoring, particularly loud and habitual, may indicate obstructive sleep apnea (OSA).

**Case Report:** The presenting patient was a middle-aged man with chief complaint of snoring, who was diagnosed with simple snoring after undergoing an overnight polysomnography (PSG). By using a simple oral appliance that retracted the tongue and improved airway patency, snoring improved completely.

**Conclusion:** Simple snoring is a common condition and after excluding OSA, particularly in suspected patients, it can be managed by some instructions and interventions such as using available oral appliances.

**Keywords:** Obstructive sleep apnea; Polysomnography; Snoring

**Citation:** Edalatifard M, Albaji M, Rahimi B. An Anti-Snoring Oral Appliance to Reduce Simple Snoring as a Non-Invasive Method for Management of Snoring: A Case Report and Literature Review. *J Sleep Sci* 2020; 5(3): 117-119.

### Introduction

Snoring is a common problem in the population. There are some predisposing factors such as obesity, alcohol, smoking, nasal congestion, and pharyngeal or laryngeal abnormalities. Although there is not clear long-term significant medical effects of snoring, due to the sleep fragmentation caused by the snoring itself or the patient's partner attempts to stop it, it needs more investigations (1).

Practice guidelines from the American Academy of Sleep Medicine (AASM) recommend oral appliances for patients who fail conservative measures and request treatment for their snoring (2). Oral appliances may be highly effective for snoring when used properly; however, they are

the overlooked part of snoring management in the region which need more attention of health care providers in the field of sleep medicine. In fact, oral appliances require more attention of sleep specialists as an alternative for management of snoring. In the advanced position, both snoring intensity (as rated by bed partners) and the number of snores per hour (during recorded home study) were reduced (3).

Here, we report a patient with simple snoring who refused conventional treatments for his snoring and used an oral appliance as a management method.

### Case Report

The patient was a 57-year-old man, complaining from severe snoring; the snoring was so loud that annoyed the patient's partner and sometimes led to patient awakening.

\* **Corresponding author:** M. Albaji, Pulmonary Diseases Research Center, Imam Khomeini Hospital Complex, Tehran University of Medical Sciences, Tehran, Iran  
Tel: +98 916 310 3631, Fax: +98 21 66581615  
Email: albijm60@gmail.com



The patient was not smoker and never used opium and alcohol. He had no specific past medical history and no history of car accident due to sleepiness.

In physical examination, he had a body mass index (BMI) of 28.7 kg/m<sup>2</sup>, neck circumference of 41 cm, and blood pressure (BP) of 130/80 mmHg. The laboratory data showed thyroid stimulating hormone (TSH) of 2.7 mIU/l and hemoglobin (Hb) of 15.5 g/dl. The patient had no septal deviation. He had Mallampati grade 1, normal tonsil size, and normal dental status. To rule out sleep-related breathing disorder, night polysomnography (PSG) was performed.

The PSG result showed that the overall sleep pattern was normal. Apnea-hypopnea index (AHI) was 3.7/hour and severe snoring was seen in 3-minute and 5-minute epochs, which both happened at supine and lateral position. We suggested and explained to patient the treatment options such as continuous positive airway pressure (CPAP) therapy or surgery, but he refused them.

## Discussion

Simple snoring is an old issue, known as a social problem. The first problem in these patients is snoring and next issue that makes a challenge is to exclude the sleep-related breathing disorders and pathologies. The definition of snoring is the sound produced in the upper aerodigestive tract during sleep and can be considered as a part of the spectrum of sleep-disordered breathing (SDB). In fact, muscle tone variation, airway diameter, and site of breathing initiation (oral or nasal) can affect the snoring production (1).

Two important parameters in determining the patient situation in the sleep-related breathing spectrum are critical closing pressure (Pcrit), the pressure at which the pharynx closure happens, and the resistance to airflow in the upstream of the pharynx (Rup) (4).

In normal sleep, resting muscle tone acts against gravity and keeps the airway open although relative hypotonia occurs compared to awakeness. If muscle tone is too low and the external forces are too high, the upper airways partially collapse and in turn, the inspiratory negative pressure increases which causes further collapse. In comparison between snorers and nonsnorers, the snorers lead to more negative inspiratory pressures, prolongation of inspiratory time (5), and limitations of respiratory flow (6).

These changes generate turbulent flow in upper airways and tissue vibration, which lead to noise production. Snoring happens more frequently in slow-wave sleep phase and in the beginning of sleep and less frequently in the rapid eye movement (REM) phase (7).

Studies in patients with snoring have shown BP fluctuations, but there was no evident correlation between snoring and cardiovascular diseases (CVDs) (8), and it is still unclear if snoring can cause daily sleepiness (1).

For evaluating patients with simple snoring, first one should confirm the presence of snoring, exclude other sleep disorders specially OSA, and finally offer the optimum treatment to the patient. Most commonly, snoring is complained by the patient's bed partner. Sleep-related disorder must be excluded carefully in obese male cigarette smokers and alcoholic patients. Careful attention is needed if apnea and daily sleepiness is detected by the partner (1).

The gold standard for excluding SDB is night PSG. There is debt about which patient needs to perform PSG, that needs a careful attention of the physician.

The first step in treatment of patients with simple snoring is to locate the level of snore production. For this purpose, fiberoptic nasal endoscopy with Muller's maneuver can be performed, which is not completely accurate (8).

Drug-induced sleep endoscopy (DISE) is another technique in which the patient is sedated by drugs and fiberoptic endoscopy is performed under sedation to evaluate different levels of collapse (9).

The issue with this method is that the patient with drug sedation may have apnea, while in natural sleep, it does not occur (10).

Other techniques include upper airway pressure recording during sleep, radiology and cephalometry, and acoustic analysis based on different acoustic characteristic at different levels.

Treatment options for simple snoring include weight loss, avoiding alcohol and smoking, not to sleep at supine position, nasal dilators, oral appliances such as mandibular advancement device (MAD), tongue-retaining device (TRD), CPAP, and surgical options including nasal surgery, palatal surgeries including intra-palatal and shortening of the palate, and bariatric surgery for weight reduction.

In our case, the patient had no obstructive sleep apnea (OSA) and the ear, nose and throat

(ENT) examinations were normal; therefore, we advised him to lose weight, not to sleep in supine position, and use an oral appliance and the patient's snoring improved completely as reported by his partner.

In fact, these kinds of oral appliances are available as over the counter (OTC) with low cost, which improve the patient without mandibular repositioning and temporomandibular joint (TMJ) pain. Using available OTC oral appliances should not be overlooked by sleep medicine clinicians, as conventional treatments such as CPAP are expensive and not covered by insurance companies. Furthermore, price for providing an oral appliance specific for patients is also high and not affordable by most patients. Regarding the aforementioned issues and non-appropriate indication of upper airway surgery for patients with normal anatomy, using available OTC oral appliances becomes important.

### Conclusion

Snoring is a common problem, after excluding sleep-related breathing disorders, with several treatment options including weight loss, avoiding alcohol use, correcting sleep position, and oral appliances. Our patient had simple snoring and treated successfully with an available OTC oral appliance. Considering the cost and availability of these kinds of oral appliances, these are good options for treating snoring. Further evaluation in effectiveness and designing of this device for more patient comfort and adherence to treatment may be needed in the future.

### Conflict of Interests

Authors have no conflict of interests.

### Acknowledgments

We would like to thank our patient for his nice contribution.

### References

1. Counter P, Wilson JA. The management of simple snoring. *Sleep Med Rev* 2004; 8: 433-41.
2. Ramar K, Dort LC, Katz SG, et al. Clinical practice guideline for the treatment of obstructive sleep apnea and snoring with oral appliance therapy: An update for 2015. *J Clin Sleep Med* 2015; 11: 773-827.
3. Cooke ME, Battagel JM. A thermoplastic mandibular advancement device for the management of non-apnoeic snoring: a randomized controlled trial. *Eur J Orthod* 2006; 28: 327-38.
4. Schwartz AR, Smith PL, Wise RA, et al. Effect of positive nasal pressure on upper airway pressure-flow relationships. *J Appl Physiol* (1985) 1989; 66: 1626-34.
5. Stoohs R, Guilleminault C. Snoring during NREM sleep: Respiratory timing, esophageal pressure and EEG arousal. *Respir Physiol* 1991; 85: 151-67.
6. Skatrud JB, Dempsey JA. Airway resistance and respiratory muscle function in snorers during NREM sleep. *J Appl Physiol* (1985) 1985; 59: 328-35.
7. Schmidt-Nowara WW, Coultas DB, Wiggins C, et al. Snoring in a Hispanic-American population. Risk factors and association with hypertension and other morbidity. *Arch Intern Med* 1990; 150: 597-601.
8. Ritter CT, Trudo FJ, Goldberg AN, et al. Quantitative evaluation of the upper airway during nasopharyngoscopy with the Muller maneuver. *Laryngoscope* 1999; 109: 954-63.
9. Croft CB, Pringle M. Sleep nasendoscopy: A technique of assessment in snoring and obstructive sleep apnoea. *Clin Otolaryngol Allied Sci* 1991; 16: 504-9.
10. Dolly FR, Block AJ. Effect of flurazepam on sleep-disordered breathing and nocturnal oxygen desaturation in asymptomatic subjects. *Am J Med* 1982; 73: 239-43.