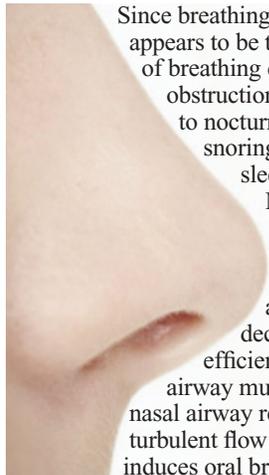




Nasal Breathing and OSA



Since breathing through the nose appears to be the preferred route of breathing during sleep, nasal obstruction frequently leads to nocturnal mouth breathing, snoring, and obstructive sleep apnea (OSA).¹

Mouth breathing may contribute to increased collapsibility of the upper airways due to decreased contractile efficiency of the upper airway muscles. Increased nasal airway resistance produces turbulent flow in the nasal cavity, induces oral breathing, promotes oscillation of the pharyngeal airway and can cause snoring.^{2,3} In addition, nasal obstruction can cause sleep fragmentation, sleep deprivation, and disturbed sleep architecture, worsening excessive daytime sleepiness. It has been postulated that the switch from nasal to oronasal breathing that occurs with chronic nasal congestion or obstruction may in some cases be a final common pathway for sleep disordered breathing.⁵

During sleep there is a discrete fall in minute ventilation and an associated increase in upper airway resistance. In normal subjects, the nasal part of the upper airway contributes only little to the elevation of the total resistance, which is mainly the consequence of pharyngeal narrowing, yet swelling of the nasal mucosa due to congestion of the submucosal capacitance vessels may significantly affect nasal airflow. In many healthy subjects an alternating pattern of congestion and decongestion of the nasal passages is observed. Some individuals demonstrate congestion of the ipsilateral half of the nasal cavity when lying down in the lateral position. In other words, ipsilateral nasal venous congestion may be exacerbated by a dependency to gravity. Structural nasal anomalies may also increase nasal resistance during sleep.⁶

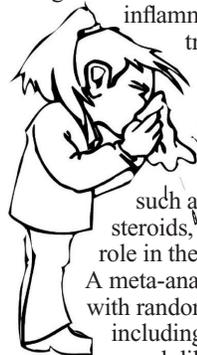
One study that examined the patency of the nasal airway during REM and non-REM sleep with the use of acoustic rhinometry demonstrated that REM sleep is characterized by more significant nasal congestion while non-REM sleep was characterized by less significant nasal congestion. The authors hypothesized that this phenomenon may be attributable to REM-dependent variation in cerebral blood flow that



affects nasal congestion via the internal carotid system, and that REM-induced nasal congestion may partially contribute to the higher frequency of obstructive events in REM sleep.⁷

Can treatment of nasal congestion or nasal obstruction have a positive effect on snoring and sleep disordered breathing?

Rhinitis alone is associated with OSA, which may cause microarousals and sleep fragmentation. Reduction of nasal inflammation with topical treatment may improve sleep quality and subsequent daytime sleepiness and fatigue.⁸



Do medical therapies such as nasal dilators, nasal steroids, and nasal saline have a role in the treatment of OSA?

A meta-analysis of 11 studies with randomized controlled designs including 5 studies using external nasal dilators, 1 study involving topically applied steroids, 3 studies involving nasal decongestants, and 2 studies involving surgical treatment determined that these treatments may result in only minor improvement in the symptoms and severity of OSA.⁹ However, another meta-analysis of 9 studies involving 5 studies using external nasal dilators, 1 study using topically applied steroids, 2 studies using nasal decongestants in two, and 1 study implementing surgical treatment determined that these treatments do

provide beneficial effects on sleep architecture, although they were shown to demonstrate only minor improvement of OSA symptoms or severity. The authors concluded that the impact of treating nasal obstruction in patients with snoring and obstructive sleep apnea on long-term outcome remains to be defined through randomized controlled trials of medical and surgical therapies.¹⁰

Recently there has been a significant increase in the use of nasal saline irrigation, sprays and rinsing as an adjunct to the medical management of chronic rhinosinusitis. A meta-analysis of 8 clinical trials examining of the efficacy of nasal saline in the treatment of rhinosinusitis has determined that saline is beneficial in the treatment of the symptoms of chronic rhinosinusitis when used as the sole modality of treatment, as well as having a role as a treatment adjunct. However, saline was not determined to be as effective as an intranasal steroid.¹¹

Does nasal surgery have a role in the treatment of OSA? A study of 49 OSA patients with symptomatic nasal obstruction secondary to a deviated nasal septum with a mean apnea/hypopnea index (AHI) of 30.1 were randomly assigned to either septoplasty or sham surgery. This study demonstrated that all patients in the placebo group were nonresponders, whereas 14.8% of the patients in the septoplasty group were responders and exhibited a considerable improvement. However, 23 patients were nonresponders, presenting a modest improvement in nasal breathing. The authors concluded that nasal surgery alone may have limited efficacy as a sole treatment for OSA.¹²

Nasal obstruction and nasal congestion are important pieces in the OSA puzzle that deserve attention within a more complete evaluation and treatment plan for sleep disordered breathing.

¹ *Ann Allergy Asthma Immunol.* 1998 Oct;81(4):279-87; quiz 287-90.

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³ *Acta Otolaryngol Suppl.* 1998;537:43-6.

⁴ *Mayo Clin Proc.* 1990 Aug;65(8):1095-105.

⁵ *Chest.* 2003 Dec;124(6):2309-23.

⁶ *Sleep Med Rev.* 2005 Dec;9(6):437-51. Epub 2005 Oct 19.

⁷ *Otolaryngol Head Neck Surg.* 2008 Nov;139(5):619-23.

⁸ *Curr Allergy Asthma Rep.* 2004 May;4(3):193-9.

⁹ *Curr Opin Otolaryngol Head Neck Surg.* 2009 Feb;17(1):33-7.

¹⁰ *Eur Respir J.* 2007 Dec;30(6):1208-15.

¹¹ *Cochrane Database Syst Rev.* 2007 Jul 18;(3):CD006394.

¹² *Eur Respir J.* 2008 Jan;31(1):110-7. Epub 2007 Sep 26.