

Empty nose syndrome: Case report

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Introduction

Empty Nose Syndrome (ENS) is a term first introduced by Kern and Moore which is used to describe a rare spectrum of various symptoms suffered by patients who had had previous radical turbinate surgery with a CT scan appearance of the paranasal sinuses after gross tissue loss. The most common symptom is so-called “paradoxical” nasal obstruction, reported by the patient despite objectively permeable cavities on clinical examination with no obstacle found on imaging or rhinomanometry and acoustic rhinometry.¹ In most cases, the inferior turbinate (IT) has been resected radically even though middle turbinate (MT) resection has also been implicated.² Incidence is unknown, as there have been no specific studies published. The estimated rate of ENS following inferior turbinate resection is 20%, which induces simple dry nose.¹⁻²

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Houser distinguished several subtypes of ENS according to the resected turbinate: inferior, medial, both, or fourthly, a subtype in which turbinate structures paradoxically appear normal. ENS subcategories are based on the type of tissue that is resected; hence “ENS-both” indicates both the IT and MT were at least partially resected. The management is problematic. We report an elderly gentleman of high social standing with long-standing nasal discharge and chronically blocked nose post radical turbinate surgery many years prior to his presentation, and the management options of ENS.

Keywords

Empty nose syndrome, ENS subtypes, presentation, treatment options.

Case report

A 59-year-old Chinese gentleman of high social standing presented at the ENT clinic with a chronic nasal problem of 30 years duration. His symptoms were mainly nasal blockage, post nasal drip with occasional mucoid yellowish phlegm, and intermittent voice changes. His sense of smell was intact. He had radical turbinate surgery and septoplasty back in 1984 which gave him some symptomatic relief for about 1 year. Endonasal endoscopic examinations revealed very patent nasal cavities as were all the ostia apart from the left middle ostium which was relatively narrow. There were thick mucoid secretions and synechiae between the left superior turbinate and the septum with evidence of remnants of the left middle and inferior turbinates. Initially he was treated conservatively by steroid nasal sprays, mucolytics and oral antibiotics with follow-up on a three monthly basis. Subsequently his symptoms had been fairly relieved, however these worsened intermittently with infections and the nasal blockage and secretions never really settled.

For persistent of the nasal symptoms despite optimal medical treatment, CT scan of the paranasal sinuses was performed and showed evidence of previous sinus and reductive turbinate surgery with wide right maxillary ostium. (**Figure 1**) The CT scan finding is consistent with empty nose syndrome. Conservative management was continued despite mild to moderate improvement of nasal symptoms.

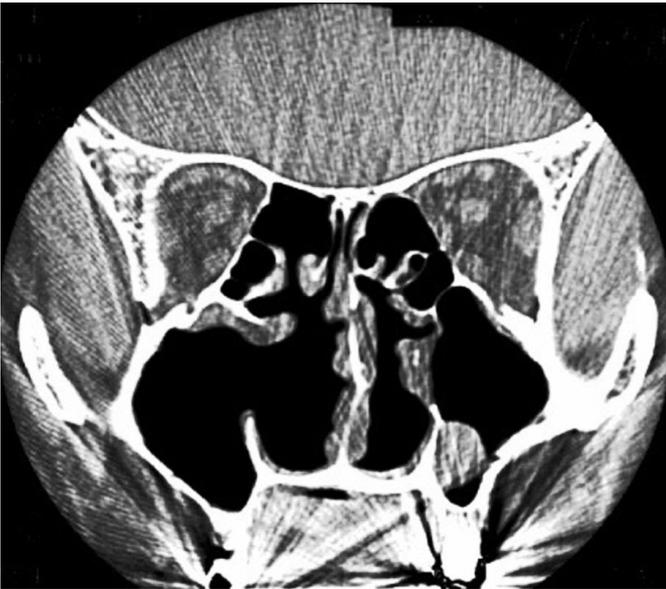


Figure 1: Coronal CT scan of paranasal sinuses reveals widely patent nasal cavities with evidence of radical turbinate reductive surgery. Only vestiges of the right middle turbinate have been preserved.

Discussion

ENS is a recognized complication caused by aggressive surgical reduction of the turbinate mucosal tissue from the nasal cavity with onset at an interval of months or years after inferior and/or medial turbinate surgery.¹ It is potentially debilitating condition associated with severe reduction in the quality of life of patients. Turbinate reduction surgery is performed when a patient has persistent nasal obstruction which does not respond to medical therapies. The most common operation is an inferior turbinoplasty or partial turbinectomy. There is no standard of how much turbinate tissue can be removed before it causes damage to the physiology of the nose, thus resulting in ENS. Most of the ENS cases reported are associated with radical turbinate surgery. The pathophysiology of ENS remains poorly elucidated. It may result from loss of physiological nasal functions due to reduced mucosal area inducing proportional loss of the sensory, tactile and thermal receptors.³ ENS is associated with decreased humidification, increased warming and reduced nasal airflow resistance.⁴ Poor re-growth of sensory nerves that are injured during turbinate surgery also takes place in ENS.⁵ Several studies clearly demonstrated that significantly reduced inferior turbinate volume affects nasal cavity outflow regime, accelerating and increasing flow in the inferior at the expense of the superior part.⁶ The paradox between subjective congestion and reduced nasal resistance could be due to alterations either in nasal permeability or in the valence of neural efferent from the nasal mucosa.³ The proper nasal resistance is diminished in radical resection of the turbinates and this decreases

the suction power of the lungs, forcing the patient to breathe in much harder to receive normal amounts of oxygen. This phenomenon manifests itself as chronic shortness of breath, and is known as “paradoxical obstruction”. The paradox being the fact that although the nose is wide and open, the end result is nasal obstruction. ENS is difficult to diagnose due to lack of consensual clinical definition, the variety of symptoms and the associated psychological and social distress. Diagnosis is clinical, founded on subjectively reported symptomatology and clinical examination based on nasal cavity endoscopy performed during consultation. The characteristic presenting symptom is a sensation of nasal obstruction, sometimes associated with sensations of suffocation, breathlessness or difficult breathing. Other symptoms are also reported like pain, rhinopharyngeal dryness, loss of concentration (nasal aprosexia), fatigue, anxiety, irritability and depression. Symptom intensity varies, and may restrict everyday activity. Endonasal endoscopic examination finds permeable nasal cavities enlarged by previous surgery, with turbinal structures missing or greatly reduced. The mucosa is generally pale and dries with crusts. ENS is subcategories based on their anatomic characteristics indicating the type of tissue that resected; hence “ENS-IT” indicates that the inferior turbinate (IT) fully or sub totally resected and “ENS-MT” indicates similar insult to the middle turbinate (MT), whereas “ENS-both” indicates both the IT and MT at least partially resected. ENS-IT is the most frequent. The basic complaint is paradoxical nasal obstruction and very dry mucosa. One hypothesis for such frequent obstruction following inferior turbinectomy would concern its role in modulating nasal airflow. ENS-MT is rarer. As well as the typical nasal obstruction, it involves pain on respiration; possibly due to lack of mucosa protecting the pterygopalatine ganglion.

Table 1 summarizes the findings in 8 patients who have different type of reductive turbinate surgery and ENS subtypes.⁷ The onset of ENS symptoms after turbinate surgery is variable. In ENS-both subtype symptoms usually occur within weeks. Indications for any turbinate surgery should be carefully considered, and functional exploration should be generalized to prevent ENS. Surgery used to aim at maximal resection to maximize gain in nasal cavity volume; with improvements in knowledge of the complications of total and subtotal turbinectomy, including ENS, present attitudes favour conservative surgery. The techniques currently recommended are laser surgery and electrical cauterization; partial turbinectomy; submucosal turbinoplasty; submucosal resection by micro-debrider; and radiofrequency surgery.⁸

Table 1: Characteristic of the patients with ENS subtypes after different reductive turbinate surgery
 ENS, empty nose syndrome; IT, inferior turbinate; MT, middle turbinate; ENS-type indicates patients who have lost relatively little of their turbinate tissues and whose turbinates appear to be almost normal in size.

Case	Prior Surgery	ENS Subtypes	Onset of symptoms	Additional Symptoms
1	MT resection	ENS-MT	Within days	Dryness, pain
2	IT resection	ENS-IT	Within months	Dryness, difficulty breathing
3	Turbinate resection	ENS-type	Within months	Dryness, thick postnasal drip
4	MT resection	ENS-MT	Within days	Pain, feeling of suffocation
5	Turbinate resection	ENS-type	Within 1-2 years	difficulty breathing, fatigue
6	IT and MT resection	ENS-both	within days	Dryness, crust, pressure
7	MT resection	ENS-MT	Within days	Cough, dryness, difficulty breathing
8	Turbinate resection	ENS-type	Within days	Dryness, too open

Medical treatment is the first-line treatment focusing on moisturization and an honest discussion of patient's concerns. It includes nasal lavage by physiological saline, nasal hydration ointment, directed antibiotic therapy and local corticosteroids. Adding menthol to the classical local treatments may provide benefit in terms of the nasal obstruction sensation. Follow-up should include psychological support for patients showing signs of depression. The objectives of endonasal repair surgery are: to reduce nasal cavity volume to increase resistance to airflow, to reduce airflow to increase air humidity, and deviate airflow from the surgical site toward a healthy or non-operated area. The principle consists in positioning an implant on the septum, floor or lateral wall.⁹ Creating a neo-turbinate has been achieved by submucosal implantation of a turbinal or septal cartilage graft to restore inferior turbinate volume. The aim is to restore a mucosal area sufficient to ensure the physiological functions of warming, filtering and humidification of inhaled air. Biomaterials materials (hydroxyapatite, goretex, teflon, plastipore) have also given satisfactory results. Hyaluronic acid gel, an injectable can improve symptoms without increasing complications.¹⁰ Houser described a technique of submucosal acellular dermis graft filling. The dermis showed integration within 3 to 6 months, and the resultant volume proved durably effective. These techniques are only possible if there is some residual turbinate. Otherwise, the problem confronting surgery is more complex.

The ENS-both subtype patients may benefit from a large septal implant bridging the regions of the IT and MT and the grafts becomes incorporated within the patient's tissue within 3 months following implantation. Deploying the full range of simple nasal cavity hygiene and humidification techniques, will usually be sufficient in the majority of cases, with surgery reserved for the most severe cases. Whatever the technique, surgery aims at partial filling of the nasal airway. Prevention is the most important strategy as the ENS therapy is unsatisfactory for both patient and doctor.

Minimal invasive surgery on the turbinate which preserves the mucosa remains one of the most important principles for rhinosurgical therapy.

References

1. Chhabra N, Houser SM. The diagnosis and management of empty nose syndrome. *Otolaryngol Clin North Am* 2009; 42:311—30 [ix].
2. Houser SM. Empty nose syndrome associated with middle turbinate resection. *Otolaryngology – Head & neck Surgery* December 2006 135(6): 972-73.
3. Freund W, Wunderlich AP, Stocker T, et al. Empty nose syndrome: limbic system activation observed by functional magnetic resonance imaging. *Laryngoscope* 2011; 121:2019—25.
4. Scheithauer MO. Surgery of the turbinates and “empty nose” syndrome. *GMS Curr Top Otorhinolaryngol Head Neck Surg* 2010; 9:Doc03.
5. Wu X, Myers AC, Goldstone AC, et al. Localization of nerve growth factor and its receptors in the human nasal mucosa. *J Allergy Clin Immunol* 2006; 118:428-33.

6. Payne SC. Empty nose syndrome: what are we really talking about? *Otolaryngol Clin North Am* 2009; 42:331—7 [ix-x].
7. Houser SM. Surgical treatment for empty nose syndrome. *Arch Otolaryngol Head Neck Surg* 2007; 133:858—63.
8. Fischer Y, Gosepath J, Amedee RG, et al. Radiofrequency volumetric tissue reduction (RFVTR) of inferior turbinates: a new method in the treatment of chronic nasal obstruction. *Am J Rhinol* 2000; 14:355—60.
9. Jang YJ, Kim JH, Song HY. Empty nose syndrome: radiologic findings and treatment outcomes of endonasal microplasty using cartilage implants. *Laryngoscope* 2011; 121:1308—12.
10. Modrzynski M. Hyaluronic acid gel in the treatment of empty nose syndrome. *Am J Rhinol Allergy* 2011; 25:103—6.