

# Empty Nose Syndrome (ENS )

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## Abstract:

### Aim:-

To review the causes and treatment of Empty Nose Syndrome

### Objective:-

To review about the symptoms, causes, diagnosis and treatment of Empty Nose Syndrome.

### Background:-

Empty nose syndrome describes a nose that has been physiologically crippled by excessive surgical removal of the turbinates in the nose mainly the inferior turbinates in a surgical procedure known as turbinectomy. Our study is to do a clear review of Empty Nasal Syndrome due to the removal of turbinates, its postoperative problems and related treatment taken for the same.

### Reason:-

The reason for the review study is to find out the importance of turbinates in protecting the inner nasal mucosa and allowing it to recuperate and regenerate.

**Key words :** Empty nose syndrome, pathophysiology, diagnosis, clinical examinations, treatment.

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## INTRODUCTION :

Empty Nose Syndrome (ENS) is a poorly understood iatrogenic syndrome that may follow surgery involving turbinate reduction. Mucosal damage, rather than the sheer volume of tissue loss, appears to be of critical importance in ENS. Turbinate reduction is often appropriate therapy, but conservative mucosal sparing techniques should be employed. In this review we are gonna discuss about the causes of empty nasal syndrome (ENS) due to the removal of Turbinate, its post operative causes, and its treatment.

## MATERIALS AND METHODS:-

The extensive study was made on empty nose syndrome by different authors and in the different regions of the world. Precisely the study involves a systematic review about the empty nose syndrome with reference of about 15 articles.

## DISCUSSION:

Empty nose syndrome (ENS) is a clinical entity without consensual definition; it is a rare complication of nose or sinus surgery, and of inferior turbinectomy in particular. Physiopathology remains unclear, but probably involves disorder caused by excessive nasal permeability affecting neurosensitive receptors and inhaled air humidification and conditioning functions. Neuropsychological involvement is suspected. Symptomatology is variable and changeable, the most common sign being paradoxical nasal obstruction. Diagnosis is founded on: (1) a range of symptoms that need to be precisely collated; (2) broad post-surgical nasal permeability. Management is problematic, deploying the full range of simple nasal cavity hygiene and humidification techniques, 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, and seeks (1) to check, before any surgery is envisaged, the reality of nasal dyspermeability resistant to medical treatment.

## PATHOPHYSIOLOGY :

The pathophysiology of ENS remains poorly elucidated, but several complementary hypotheses are to be found in the literature. It may result from loss of physiological nasal functions (humidification, warming and cleansing of inhaled air) due to reduced mucosal area inducing proportional loss of the sensory, tactile and thermal receptors needed for inhaled air treatment. Shiethauer [8] demonstrated that ENS was associated with decreased humidification, increased warming and reduced nasal airflow resistance. These functional losses were estimated at around 23% following turbinectomy [3].

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.

These changes underlie an alteration of pulmonary function. Nasal resistance plays a major role in opening peripheral bronchioles and optimizing alveolar ventilation. This in turn improves gas exchange, increases negative thoracic pressure and enhances cardiac and pulmonary venous return [4]. Thus, normal nasal resistance to expiration helps maintain pulmonary volume, indirectly determining arterial oxygenation.

The sensation of pharyngeal dryness sometimes reported is due to the flow of air insufficiently humidified by the nasal mucosa and drying the rhinopharyngeal mucosa.

Central involvement is currently under study. The paradox between subjective congestion and reduced nasal resistance could be due to alterations either in nasal permeability or in the valence of neural efferents from the nasal mucosa [5].

### Role of turbinectomy in ENS onset :

Atrophic rhinitis and ENS are late complications of turbinectomy. Large-scale resection (total or subtotal turbinectomy) incurs the greatest risk, but ENS has also been reported secondary to partial resection [12], mainly in partial inferior turbinectomy involving the anterior part or head of the turbinate which plays a major role in internal valve function.

Conservative surgery (turbinoplasty, radiofrequency surgery, etc.) is thus recommended after formal indication (nasal obstruction resistant to well-conducted medical treatment in patients with turbinal hypertrophy). The amount of mucosa resected is not necessarily implicated, and the risk of ENS cannot presently be predicted.

ENS subtypes distinguish ENS secondary to inferior turbinectomy (ENS- IT), to medial turbinectomy (ENS-MT) and to the association of both (ENS-both) [12].

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 [6].

#### **ENS and atrophic rhinitis :**

ENS was long assimilated to a iatrogenic form of atrophic rhinitis. Certain authors, however, detailed a distinction between the two [7]. The paradoxical sensation of obstruction, dryness and crusts found in both led to their being confused.

The risk of atrophic rhinitis following surgery including mucosal resection is due not only to the amount of mucosa removed but also to undetermined individual and environmental factors , with estimates in the literature ranging from 2 to 20% according to the type of turbinal surgery.

#### **Associated factors :**

ENS affects only a few patients who have undergone one or several endonasal procedures, which explains the present controversy as to whether any such organic pathology exists. The underlying factors are only partially understood. One point of contention concerns the frequent association with psychiatric disorder and possibly psychosomatic pathologies (fibromyalgia, functional colopathy, etc.) [3], [6] A possible role of psychological stress in certain patients, as suggested in tinnitus, has been raised [3]. A neurological component might also contribute to onset in the particular case of neuropathic patients .

#### **DIAGNOSIS :**

ENS is made more difficult to diagnose by the lack of consensual clinical definition, the variety of symptoms and the associated psychological and sometimes social distress. Diagnosis is clinical, founded on subjectively reported symptomatology and clinical examination based on nasal cavity endoscopy performed during consultation.

#### **CLINICAL DIAGNOSIS :**

##### **Subjective symptomatology :**

The characteristic-presenting symptom is a sensation of nasal obstruction [2], [3], [4], [6] , sometimes associated with sensations of suffocation, breathlessness or difficult breathing. Other symptoms such as pain, a sensation of empty nose or rhinopharyngeal dryness are also often reported. Symptom intensity varies, and may restrict everyday activity [2]. Patients with ENS symptomatology

may suffer loss of concentration (nasal aprosexia), fatigue, anxiety, irritability or depression.

Other frequently reported symptoms are [2],[4]:

- sensation of excessive airflow; •lack of sensation of nasal airflow;
- hypersensitivity to cold air;
- dyspnea (also paradoxical), breathlessness, hyperventilation; •nasal pain of variable, sometimes pseudoneuralgic, types; •headache;
- nasal and pharyngeal dryness;difficulty falling asleep

Physical examination :

Physical examination finds permeable nasal cavities enlarged by previous surgery, with turbinal structures missing or greatly reduced. The mucosa is generally pale and dry [3]. There may be crusts. Dryness, which is an almost constant subjective complaint, is easily confirmed on examination.

#### **Diagnostic test :**

One simple pre-therapeutic or diagnostic test is the cotton test [2] and [4]. A piece of moist cotton is placed in the nasal cavity, where an implant would be positioned, for 20 to 30 minutes. Alleviation of symptoms confirms diagnosis and indicates repair surgery.

#### **PARA CLINICAL EXAMINATIONS :**

##### **Imaging :**

Diagnosis is clinical, but variable non-pathognomic signs may still be found on imaging.

Sinus CT shows rhinosinus mucosal thickening and maxillary opacity in more than 50% of cases.

##### **Rhino manometry :**

Rhinomanometry is not useful for diagnosis [6], but generally confirms the absence of any obstacle, demonstrating normal or weak nasal resistance [4].

Treatment :

Prevention of ENS

Turbinate conservation during endonasal and sinus surgery and rhinoplasty is fundamental in minimizing risk of ENS [1]. Inferior turbinectomy is a common procedure for nasal obstruction in case of turbinal hypertrophy resistant to medical management. 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 favor conservative surgery.

The techniques currently recommended are:

- laser surgery and electrical cauterization;
- partial turbinectomy, conserving at least 50% of turbinate volume; •submucosal turbinoplasty, to manage nasal obstruction by reducing turbinate volume without resecting the mucosa needed for nasal function
- submucosal resection by micro-debrider, which also conserves the mucosal surface;
- radio-frequency surgery which avoids ENS-type complications. Indications for any turbinate surgery should be carefully considered, and functional exploration should be generalized.

**SURGICAL TREATMENT :**

The objectives of endonasal repair surgery are: to reduce nasal cavity volume so as to increase resistance to airflow, to reduce airflow so as to increase air humidity, and to 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 [2]].

**Endonasal microplasty**

Creating a neo-turbinate is one of the surgical solutions available in ENS. Techniques vary from team to team, but results have been very encouraging. This has been achieved by submucosal implantation of a turbinal or septal cartilage graft to restore inferior

turbinate volume [18]. The aim is to restore a mucosal area sufficient to ensure the physiological functions of warming, filtering and humidification of inhaled air. Exogenic materials (hydroxyapatite, goretex, teflon, plastipore) have also given satisfactory results in the small series that have been published; they do not seem to induce rejection, and enable lasting increase in turbinate volume [2] and [4]. Hyaluronic acid gel, an injectable composite, also seemed to improve symptoms without increasing complications .

The amount of volume restored by surgery and the durability of its efficacy remain under discussion [4] and [5].

**MEDICAL TREATMENT :**

Although non-codified, medical treatment is obviously indispensable and is the first-line attitude in all cases.

It can associate nasal lavage (physiological saline, sulfur derivatives), nasal hydration ointment, directed antibiotherapy, aerosols and local corticosteroids, although such treatments seem to be less effective in ENS than in atrophic rhinitis [3].

Adding menthol to the classical local treatments may provide benefit in terms of the nasal obstruction sensation [6].

Associated treatments :Follow-up should include psychological support for patients showing signs of depression, and algotherapy in case of serious pain.

ENS seems to us to be an entity that is not to be overlooked, especially as it can severely affect certain patients whose only presenting complaint was nasal obstruction. It might be suspected that this nasal obstruction was initially disproportionate in its psycho-affective and social impact compared to the objective and clinical observations, predisposing to ENS following turbinate surgery. Diagnosis and management remain to be codified, but the best attitude is preventive, preferring medical treatment and the least invasive surgery possible to deal with a nasal obstruction.

**CONCLUSION:-**

On observing about the clinical significance of ENS helps for the clinicians to diagnose and be precautions of attempting to the cause of ENS.As ENS mainly occurs due to several endonasal procedures being underwent by the patient.

ENS is physically , cognitively and emotionally debilitating condition as good nasal functions are crucial for proper Lung functions and breathing, cognitive functions and sense of well being.

So this review helps us to know about the ENS may serve as reference for the knowledge to understand about the ENS.

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