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Research Article

Importance of Turbinectomy in Modern Clinical Practice

Kara Babo[1], Jennifer Fuller[2], Natalie Niedzwiedz[3], Rex Moulton-Barrett[4*] and Jory Statner[5]

[1]*Saint Louis University School of Medicine, Missouri, USA*

[2]*Department of Otolaryngology Head and Neck Surgery, Harvard University, Massachusetts, USA*

[3]*University of California, Los Angeles, California, USA*

[4]*Alameda Hospital, California, USA*

[5]*McGill University, Montreal, Canada*

Abstract

A retrospective clinical case series was performed to determine the benefits versus complications of turbinectomy. Over a six-year period, 86 patients, who were unresponsive to medical therapy, underwent either inferior turbinectomy for persistent nasal obstruction and/or middle turbinectomy for persistent migranous symptoms. Ninety percent of patients who underwent bilateral inferior turbinectomy, 100% undergoing unilateral inferior turbinectomy, 75% of patients undergoing bilateral middle turbinectomy, 95% undergoing combined middle and inferior turbinectomy, showed marked improvement or resolution of symptoms. Six percent of patients, specifically in the group who underwent inferior turbinectomy, developed a major complication of bleeding, requiring repacking of the nose. Eight percent of patients following inferior turbinectomy experienced persistent nasal obstruction which was secondary to nasal valvular collapse and not Empty Nose Syndrome (ENS). We believe that turbinectomy is a safe procedure in patients with turbinate hypertrophy with nasal obstruction and/or sinus headaches, who have failed maximal medical therapy, and in this population turbinectomy was not found to be a cause of ENS.

***Corresponding author:** Rex Moulton-Barrett, Alameda Hospital, California, USA, Tel: +1 5105201810; E-mail: rex@moulton-barrett.com

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Introduction

The nasal turbinates create laminar flow and humidification during trans-nasal inspiration. This provides air contact for the greatest area of ciliated, climate controlling tissue within the nose. The turbinates therefore provide mucus transport, humidification, warmth and a sensation of airflow [1-4]. Problems may arise when this highly evolved structure is compromised. Not uncommonly, turbinates may become swollen and or diseased through allergy, infection or trauma [4]. When this occurs, the turbinates may lose their ability to efficiently channel air through the nasal cavity into the nasopharynx or even obstruct nasal breathing [5,6]. Partial inferior turbinectomy may be indicated when nasal obstruction becomes refractory to medical therapy.

However, removing turbinate tissue (usually in excess) can have an undesirable, negative effects [2,5,6]. One such undesirable complication has been Empty Nose Syndrome (ENS). The term ENS was first introduced by Dr. Eugene Kern in 1994, after overhearing a Swedish colleague (Dr. Stenqvist) remarking on the "empty" appearance of the nasal CT scans of postoperative patients with a set of specific complaints [7]. This set of complaints, or syndrome, is characterized by the sensation of the inability to breathe through the nose, coupled with the sensation of nasal dryness and may be associated with internal crusting, bleeding and local pain [8]. The paradoxical sensation of the inability to breathe through the nose is thought to be due to the inability to sense airflow through the nasal passage [6]. This is possibly due to the abnormal airflow pattern created (eddies rather than a laminar flow pattern), a partial or complete loss of the sense of smell may be a contributing factor [5-7,9]. These symptoms often become chronic and may cause clinical depression [6,7].

Chronic nasal obstruction which is secondary to inferior turbinate hypertrophy typically responds well to various forms of turbinectomy. Middle turbinate impaction on the nasal septum is an important cause of migraine sinus-type headaches. Middle turbinectomy for medically refractory migraine is an effective treatment for this problem [10]. Sinus related headaches, are commonly treated in error with classical migraine medications. Chronically swollen or hypertrophied turbinates may occur with allergy and may be associated with sinusitis [11], which may be acute, recurrent or chronic and may cause sinus headaches [5] in the frontal, retro-bulbar, malar and maxillary areas [12]. Acknowledging the above, the current paper is intended to re-evaluate the efficacy of turbinectomy in modern clinical practice and evaluate whether or not turbinectomy is a cause of empty nose syndrome in the above group of patients [3,4].

The concept that removal of turbinate tissue always leads to a permanent effect on mucociliary clearance which then results in nasal damage is based on older literature which was written at a time when hypertensive patients often received alpha blockers, the latter are a well accepted cause for dry nose secondary to reduced mucus secretory output [9]. The current study provides an evaluation of the utility of bilateral inferior and middle turbinectomy for the treatment of chronic nasal obstruction and sinus headache, respectively, specifically in patients with a 'crowded nasal airway'.

Patients and Methods

Eighty-six patients underwent either bilateral inferior turbinectomy, unilateral inferior turbinectomy, bilateral middle turbinectomy, or a combined bilateral inferior and middle turbinectomies. Inferior turbinectomy was performed for the symptom of refractory nasal obstruction and middle bilateral turbinectomy for refractory migrainous-sinus headache. Inclusion criteria included a) significant improvement in nasal obstruction with placement of a Q-tip containing 2% pontocaine and 1:75,000 epinephrine solution onto the inferior turbinate, b) improvement in frontal or a retro-orbital headache with placement of a Q-tip containing 2% pontocaine and 1:75,000 epinephrine solution onto the middle turbinate and c) failed maximal medical therapy as defined: a) no symptom improvement following the minimum of a 4 week trial of anti-allergy precautions including: Placement of zipper bag anti-allergic covers over the mattress, bedding covers and pillows, hot water washing of all sheets on a weekly basis, windows and doors to the bedroom open a minimum of 3 inches during the day and night and the use of intra-nasal steroids before each bedtime in the lateral recumbent position for at least 2 minutes without position change. Patients were not trialed on immunotherapy prior to surgery. Patients were excluded from the study if: a) there was active nasal or sinus infection, b) failure to respond to in office nasal decongestion as in the case of pre-existing nasal valvular collapse with nasal obstruction or in a patient with a pre-existing enlarged nasal cavity following prior extensive sinus surgery or c) failure to report a significant improvement in frontal or a retro-orbital headache with placement of a Q-tip containing 2% pontocaine and 1:75,000 epinephrine solution onto the middle turbinate. One surgeon performed all procedures over a six-year period at one of three hospitals within a 10-mile radius. All patient's agreed to participate in the study. Multiple postoperative examinations were performed by the same surgeon, all patients were interviewed and a questionnaire was completed specifically for: Age, sex, pre-operative symptoms and diagnosis, surgical indications, surgical procedure (s), post-operative symptoms/complications. Post-operative symptom analysis was determined using a Subjective Unit of Improvement Scale (SUIS) with 0 indicating no improvement and 100 indicating subjective resolution. SUIS scores were categorized into mild to no improvement for scores of 29 or less, moderate improvement for scores of 30-69 and marked to complete resolution for scores reaching greater than 70. The duration of post-operative benefit (numerated in numbers of months) and details regarding post-operative symptoms were obtained.

Surgical technique

All patients underwent surgery under general anesthesia and both the inferior and middle turbinates were visualized directly with 3x magnification loops, nasal speculum and LED head-light. The nose was cocainized using one pledget of 2mls of 4% cocaine per nares which was applied for 10 minutes, followed by an injection of 1ml of 1% lidocaine and 1:100,000 epinephrine, per turbinate. The inferior turbinate was then medialized with a freer elevator. Knight scissors were used to resect either: Partial, subtotal or total inferior turbinate tissue (depending on the extent of polypoid disease and obstruction). The middle turbinate was never fractured in view of the direct attachment to the cribriform plate, to avoid a cerebrospinal fluid leak. When, the head of the middle turbinate was found to impact onto the nasal septum, it was resected in a single downward and posterior motion using the knight scissors. Following resection, the raw edge of the turbinate tissue was then cauterized with a unipolar suction Bovey. The remaining inferior turbinate tissue was then out fractured and the nose was packed for 4 days with an antibiotic ointment coated Mericel expansive sponge which was then soaked with ½% Marcaine containing 1:200,000 epinephrine.

Results

Of 86 patients who underwent turbinectomy, 2 patients (2%) underwent unilateral inferior turbinectomy alone, 59 patients underwent bilateral inferior turbinectomy alone (69%), 4 patients underwent middle turbinectomy alone (5%), and 21 patients (24%) underwent combined inferior and middle turbinectomy procedures (Table 1).

Sixty of the 86 patients also underwent a partial submucous resection of the septum when septal deviation was deemed to contribute towards nasal obstruction in the presence of turbinate impaction onto the septum, specifically these patients were divided into sub-groups: Inferior versus middle or combined and unilateral versus bilateral turbinectomy (Table 2). The average SUIS for patients following septoplasty at the time of turbinectomy is shown in table 2.

Forty-two percent of patients who underwent inferior turbinectomy also had headaches which were not related to the middle turbinate but rather were non-allergic migrainous or simple tension type in nature.

In the combined inferior and middle turbinectomy group, inferior turbinectomy was performed for nasal obstruction in all patients and headache was the indication for middle turbinectomy in 75% of patients. 25% of patients underwent middle turbinectomy when polypoid changes to the middle turbinate were associated with nasal obstruction and not because of headache. Within the group who underwent bilateral inferior turbinectomy, 22 patients (37.3%) had total resection, 4 (6.8%) had subtotal resection and 33 patients (55.9%) underwent partial resection. Within the group who underwent bilateral inferior turbinectomy, 22 patients (37.3%) had partial resections. Two patients underwent isolated unilateral inferior turbinectomy by partial resection only.

Specific Procedure	N of Specific Procedures	N Undergoing Septoplasty at Time of Turbinectomy	Mild to No Improvement (SUIS 0-29)	% of Patients with Mild to No Improvement (<30%)	Moderate Improvement (SUIS 30-69)	Significant Improvement (SUIS 70-99)	Complete Resolution (SUIS 100)	% of Patients with Moderate to Complete Resolution (≥30%)
Bilateral inferior	59	41	6	10.2%	5	34	14	89.8%
Unilateral inferior	2	1	0	0.0%	0	2	0	100.0%
Bilateral middle	4	3	0	0.0%	1	1	2	75.0%
Combined, bilateral middle and inferior	21	15	1	4.8%	4	12	4	95.2%
Total	86	60	7	8.1%	10	49	20	91.8%

Table 1: Symptomatic improvement by procedure using symptom Subjective Unit of Improvement Score (SUIS).

Specific Procedure with Septoplasty	N Undergoing Septoplasty	Average SUIS
Bilateral inferior	41	74.5
Unilateral inferior	1	95
Bilateral middle	3	80
Combined, bilateral middle and inferior	15	77.9

Table 2: Average SUIS score for patients undergoing septoplasty at time of turbinectomy.

Patients undergoing bilateral middle turbinectomy included 3 patients (75%) partial resection and 1 (25%) with total resection. Within the combined group 7 (33%) underwent inferior and 10 (47.6%) middle turbinate total resections, 1 (4.8%) underwent subtotal middle turbinectomy. There were 8 inferior and 10 middle turbinectomy (non-combined surgery) patients who underwent partial resection. The average SUIS for patients undergoing varying surgical procedures for each group is outlined in table 3. Seventy-nine patients (89.9%) reported moderate to complete resolution of symptoms following inferior turbinectomy (Table 1). All patients who underwent bilateral middle turbinectomy and/or unilateral inferior turbinectomy reported moderate to complete resolution of symptoms. Twenty patients (95.2%) who underwent combined bilateral middle and inferior turbinectomy reported moderate to complete resolution. Six patients (10.2%) following bilateral inferior turbinectomy and 1 patient (4.85) following combined middle and inferior turbinectomy reported mild to no improvement (SUIS<30) of symptoms (Table 1).

Resection Classification	Bilateral Inferior (n)	Unilateral Inferior (n)	Bilateral Middle	Combined (n)
Total	85.5 (22)	N/A	80 (3)	67.3 (17)
Subtotal	93.7 (4)	N/A	N/A	92 (7)
Partial	74.1 (33)	92.5 (2)	100 (1)	84.3 (18)

Table 3: Average SUIS for each group undergoing differing surgical technique.

In 15 patients (19.89.8%) with less than moderate improvement or less (SUIS< 69) of nasal obstruction, internal or external nasal valvular collapse was found as a cause in all but one patient (93%). Complications, such as bleeding requiring repacking, occurred in 5 (6%) of the 86 patients and in all 5 patients bleeding was due to inferior turbinectomy. One patient reported persistent nasal obstruction without valvular collapse and was found to breath nasally during multiple office examinations and by family members at home, yet the patient described the sensation of loss of the sense of airflow. There were no intranasal findings to suggest crusting, dryness or an excessive size of the intranasal cavity.

Patient follow-up ranged from 12 months (1 year) to 78 months (6.5 years), with a mean of 42 months (3.5 years). Patient age ranged from 17 to 95 years of age, with a mean of age of 56 of which there were 47 males and 39 females.

Discussion

Our data indicates that most patients who undergo turbinectomy for the relief of nasal obstructive symptoms and/or for migrainous sinus headache derive substantial benefit. In our hands, the procedure was very well tolerated and had a low risk of major complications. Turbinectomy, either partial or subtotal, either inferior or middle, or combined inferior and middle turbinetcomy, resulted in a prolonged (greater than 12 month) benefit, during which time no patients developed ENS.

In the current case series, postoperative ENS did not occur despite a reported frequency of between 9 and 15 percent in the literature [13]. Patients who underwent bilateral inferior turbinectomy were at higher risk of ENS and were followed for up to 78 months (5.9 years, with an average of 42 weeks or 3.5 years) without evidence for evolving atrophic rhinitis or other symptoms of ENS. One large study reported a 7.1 year interval for symptoms of atrophic rhinitis to appear after turbinectomy underscoring the need for long term follow-up of these patients [12].

There was a consistent finding of nasal valvular collapse in patients who failed to respond to inferior turbinectomy in our series. Most often, the latter group of patients then underwent nasal valvular surgery using spreader grafts with correction of the persistent nasal obstruction.

Fear of developing post-operative ENS may lead clinicians to an under-utilization of turbinectomy in patients with 'crowded nasal airways' associated with nasal septal impaction of the inferior and or middle turbinate and nasal obstruction and/or sinus type headache, respectively.

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