

## Comparative Study between Partial Surgical Inferior Turbinectomy and Sub-mucosal Diathermy of Inferior Turbinate for Treatment of Inferior Turbinate Hypertrophy

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### Abstract

**Introduction:** One of the major causes of chronic nasal obstruction is diseases of inferior turbinate commonly inferior turbinate hypertrophy, which sometimes do not respond to medical treatment and need surgery. Different surgical methods have been achieved for inferior turbinate hypertrophy e.g.: linear cautery, laser cautery, silver nitrate cautery, submucosal diathermy and inferior turbinate trimming. The principle of surgery is diminishing of the inferior turbinate size to decrease the patient's complaint while preserving the function and anatomy of the nasal air passages.

**Aim of the work:** The current study aims to compare the results in respect of safety and efficacy of sub-mucosal diathermy (SMD) versus partial surgical inferior turbinectomy (PSIT) in terms of postoperative improvement of nasal obstruction, nasal pain, degree of intra-nasal crustations and degree of tissue healing.

**Patients and Methods:** fifty patients of different age groups and both sexes were involved in the study. Patients were divided in two groups (A and B), each group includes 25 patients. Group A had turbinate reduction through PSIT and group B had turbinate reduction through SMD. In both groups follow up was carried out after two weeks, one month and three months.

**Results and conclusion:** The current study revealed that SMD is better than PSIT regarding the postoperative nasal pain and degree of intra-nasal crustations after 2 weeks and after 1 month of follow-up, but there was no statistically significant difference between both groups regarding the degree of nasal obstruction and tissue healing throughout the 3 months post-operative follow up period.

**Keywords:** Inferior turbinate; Sub-mucous diathermy; Surgical turbinectomy

### Introduction

Chronic nasal obstruction resulting from inferior turbinate hypertrophy is a common subjective complaint encountered in the practice of rhinology. Allergic rhinitis, vasomotor rhinitis, idiopathic rhinitis and compensatory hypertrophy in septal deviation are the most common causes for the inferior turbinate hypertrophy [1]. Enlargement of the inferior turbinate is mainly due to swelling of the sub-mucosa and rarely due to enlargement of the bone itself. Hypertrophy of inferior turbinate caused by dilation of sub-mucosal venous sinusoids is the cause in intrinsic rhinitis, and responds to decongestant. Sometimes the inferior turbinate enlargement due to sub-mucosal fibrosis does not respond to decongestant [2]. The etiology of turbinate dysfunction is multi factorial. Because the turbinates have a very rich blood supply and are governed by the sympathetic and parasympathetic nervous systems, anything that affects either of these 2 systems affects the turbinates and, hence, the nose [3]. Hammad et al., revealed that turbinoplasty for hypertrophied inferior turbinate not only improve nasal obstruction but also may improve the chronic non-sinogenic headache [4]. The aim of the study was to compare the efficacy of sub-mucosal diathermy and partial surgical inferior turbinectomy in cases of chronic hypertrophic rhinitis regarding the improvement of nasal obstruction, degree of nasal pain, degree of intra-nasal crustations and the degree of tissue Healing and adhesions formation.

### Patients and Methods

Our study was approved from Research Ethics Committee of Minia faculty of medicine, Minia University and an informed consent was taken from all patients. The current study is a prospective comparative

study that done at the department of Otorhinolaryngology, Minia University hospital from July, 2013 to February, 2014 to evaluate the effects of Sub-mucosal diathermy) SMD (of inferior turbinate versus partial surgical inferior turbinectomy) PSIT (in patients with chronic hypertrophic rhinitis causing nasal obstruction. A total of fifty patients of different age groups and both sexes were involved in the study. Patients were divided in two groups (A and B), each group includes 25 patients. Patients were randomly divided into the two groups. Group (A) had turbinate reduction through PSIT of bone and soft tissue of inferior turbinate and group (B) had turbinate reduction through SMD of inferior turbinate.

### Inclusion criteria

We included in our study patients with bilateral nasal obstruction or stuffiness not responding to medical treatment, and all patients didn't have previous nasal surgery with normal nasopharyngeal examination. All the included patients completed their follow-up visits up to 3 months postoperatively.

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## Exclusion criteria

We excluded from the study any patient with the following exclusion criteria:

- 1-Patients with other causes of nasal obstruction like: marked deviated nasal septum, concha bullosa or nasal polyps.
- 2-Patients with hemoglobin less than 10 gm/dl.
- 3-Patients who lost their follow-up visits.

All patients were subjected to a detailed history of ear, nose and throat with special emphasis on nasal symptoms (nasal obstruction, nasal discharge, sneezing and snoring). Nasal endoscopy (2.7 mm and 4 mm diameter, 0°nasal endoscope, Karl Storz, Germany) was used the endoscope without the use of local decongestants to assess the actual turbinate size pre and postoperatively according to the grading system described. Computed Tomography (CT) was performed for each patient in coronal, axial and sagittal views with the use of local decongestants 10 minutes before the CT examination. Group A had turbinate reduction through partial resection of bone and soft tissue of inferior turbinate and group B had turbinate reduction through sub-mucosal diathermic coagulation of the inferior turbinate.

## Partial surgical inferior turbinectomy (PSIT)

The inferior turbinate was infiltrated with ephedrine (1:1000) up to the posterior end. The inferior turbinates were mediatized using a blunt freer type of turbinate elevator then mucosa was crushed at its attachment to lateral nasal wall using an intestinal clamp forceps. Using the turbinectomy scissors, the bulk of the anterior and mid-portion of the inferior turbinate was removed medial to the crush portion. Posterior end of the inferior turbinate was removed with a special scissor which crushes and then cuts the tissue [5].

## Sub-mucosa diathermic coagulation of hypertrophied inferior turbinate

Diathermic cautery was performed using an insulated needle electrode. The needle tip is pressed against the anterior end of the inferior turbinate and activated for a short period giving a devascularized zone to reduce bleeding. The needle is then introduced into the sub-mucosa through this zone to the posterior end of the turbinate with special care to stay close to the bone. The mono-polar power diathermy is then turned on whilst the needle is slowly withdrawn over a period of 5 seconds. Three to five such passes were performed for each inferior turbinate at a coagulation current of 70W. If the diathermy current is sufficient, the mucosa of the turbinate blanches and shrinks [6]. After both techniques of turbinate reduction, ribbon gauzes soaked in ephedrine (1:1000) were used to secure hemostasis during the procedure. Intra-nasal septal silastic splints were applied in both sides to prevent occurrence of adhesions between inferior turbinates and nasal septum. Final hemostasis was maintained by using a Merocel nasal pack (Medtronic, California, USA) which usually was removed after 48 hours. The septal splints were removed on the 10th postoperative day. All patients were received antibiotics in the form of cephalosporin (500 mg twice daily) and analgesics in the form of paracetamol (500 mg three times per day) for 7-10 days postoperatively, also patients were instructed to use local nasal decongestants and nasal douche with sodium bicarbonate for 2 weeks postoperatively.

## E-Postoperative Follow up

In each visit we compared the two groups regarding the following parameters:

1. Improvement of nasal obstruction.
2. Degree of nasal pain.
3. Extend of intranasal crustations.
4. Degree of tissue Healing and adhesions formation.

Nasal obstruction was analyzed according to VAS (Visual Analogue Score) system by asking the patients to score relief of nasal obstruction post-operatively from 1-10 and was categorized as follow [7]:

- No improvement: VAS (1-3).
- Partial improvement: VAS (4-7).
- Complete improvement: VAS (8-10).

Intranasal pain was also analyzed according to VAS by asking the patients to score the post-operative pain from 1-10 and was categorized as follow [8].

- Mild pain: 1-3
- Moderate pain: 4-7
- Severe pain: 8-10

Extend of intra-nasal crustations was analyzed according to endoscopic scoring of Lund and Kennedy [8], as follow:

- Grade 0: Absence of crustations.
- Grade 1: Mild crustations: partially filling the nasal cavity.
- Grade 2: Severe crustations: fully filling the nasal cavity.

Tissue healing was assessed also according to endoscopic scoring of Lund and Kennedy, as follow:

**Good healing:** Rapid mucosal re-epithelization, minimal crustations, no nasal synechiae, patient feel relief of nasal symptoms.

**Moderate healing:** Mucosal re-epithelization, mild to moderate crustations, with nasal synechiae, patient feel relief of nasal symptoms.

**Poor healing:** Delayed mucosal re-epithelization, severe crustations and nasal synechiae, persistent inflammations and infection and patient doesn't feel relief of his/her nasal symptoms.

In both groups Follow up was carried-out on Two weeks, One month and Three Months postoperatively to assess the previous parameters.

## Statistical analysis

The Statistical Program SPSS for Windows version 19 was used for data entry and analysis. Graphics were done by Excel Microsoft office 2013. Quantitative data were presented by mean and standard deviation, while qualitative data were presented by frequency distribution. Chi Square test was used to compare between two or more proportions. Student t-test was used to compare two means.

## Results

The study was done on fifty patients, 34 (68%) were females and 16 (32%) were males. Patients were in the age range of 16-43 years (mean age  $26.1 \pm 6.6$ ) with no significant difference between the 2 groups regarding their age and sex distribution (Table 1).

## Two weeks of postoperative follow-up: (Table 2)

**Nasal pain:** Table 2 compares between the 2 groups regarding the

	Partial inferior turbinectomy N=25	Submucosal diathermy N=25	
	Mean ± SD	Mean ± SD	P value
Age (year)	26.1 ± 6.6	26.1 ± 6.8	1.00
	N (%)	N (%)	P value
Sex :			1.00
· Female	17 (68%)	17 (68%)	
· Male	8 (32%)	8 (32%)	

Table 1: Socio-demographic characters of the study patients.

degree of post-operative nasal pain. There was a statistically significant difference (P=0.02) between the two groups regarding the sensation of mild pain, with a lower incidence in patients with PSIT, with no statistically significant difference regarding the sensation of moderate pain. However there was a statistically significant difference (P=0.01) between the two groups regarding the reporting of severe pain with lower incidence in patients with SMD.

**Extend of intra-nasal crustations:** Table 2 compares between the 2 groups regarding the extend of intra-nasal crustations. There was a statistically significant difference (P=0.02) between the two groups regarding the mild and moderate crustations (P=0.02 and P=0.07 respectively), with a lower incidence in patients with SMD.

**Improvement of nasal obstruction:** Table 2 compares between the 2 groups regarding the improvement of nasal obstruction with no statistically significant difference between the two groups.

### One month post-operatively: (Table 3)

**Nasal pain:** There was a complete absence of nasal pain in both groups after 1 month.

**Extend of intra-nasal crustations:** Table 3 compares between the 2 groups regarding the extend of intra-nasal crustations. There was a statistically significant difference (P=0.01) between the 2 groups regarding the presence of mild intra-nasal crustations after 1 month.

**Improvement of nasal obstruction:** Table 3 compares between the 2 groups regarding the improvement of nasal obstruction with no statistically significant difference between the 2 groups regarding the post-operative improvement of nasal obstruction after 1 month.

**Post-operative tissue healing:** Table 3 compares between the 2 groups regarding the degree of post-operative tissue healing. There was no statistically significant difference between the 2 groups regarding post-operative tissue healing after 1 month.

### Three months postoperatively: (Table 4)

**Nasal pain:** There was a complete absence of nasal pain in both groups after 3 months post-operatively.

**Extend of intra-nasal crustations:** Table 4 compares between the 2 groups regarding the extend of intra-nasal crustations. There was no statistically significant difference between the 2 groups regarding the post-operative intra-nasal crustations after 3 months.

**Improvement of nasal obstruction:** Table 4 compares between the 2 groups regarding the improvement of nasal obstruction. There was no statistically significant difference between two groups regarding the post-operative improvement of nasal obstruction after 3 months.

**Post-operative tissue healing:** Table 4 compares between the 2 groups regarding the degree of post-operative tissue healing. There was

no statistically significant difference between the 2 groups regarding post-operative tissue healing after 3 month.

## Discussions

Nasal obstruction is one of the commonest chronic symptoms encountered in otolaryngology. In most patients the cause is either septal deviation or inferior turbinate hypertrophy due to vasomotor

	Partial inferior turbinectomy N=25	Submucosal diathermy N=25	
	N (%)	N (%)	P value
<b>Nasal obstruction</b>			
· No improvement	0 (0%)	0 (0%)	1.00
· Partial improvement	2 (8%)	5 (20%)	0.4
· Complete improvement	23 (92%)	20 (80%)	0.4
<b>Pain</b>			
· Mild	5 (20%)	14 (56%)	0.02
· Moderate	12 (48%)	11 (44%)	1.00
· Severe	8 (32%)	0 (0%)	0.01
<b>Crustation</b>			
· Absence of crustations	0 (0%)	2 (8%)	0.5
· Mild crustations	20 (80%)	11 (44%)	0.02
· Severe crustations	5 (20%)	12 (48%)	0.07

Table 2: Comparison between both groups at 2 weeks of postoperatively.

	Partial inferior turbinectomy	Submucosal diathermy	P value
			(0.01)
<b>Crustation</b>			
· Absence of crustations	0 (0%)	5 (20%)	0.06
· Mild crustations			
· Severe crustations	22 (88%)	13 (52%)	0.01
	3 (12%)	7 (28%)	0.3
<b>Obstruction</b>			
· No improvement	0 (0%)	0 (0%)	-0.5
· Partial improvement	3 (12%)	6 (24%)	0.5
· Complete improvement	22 (88%)	19 (76%)	0.5
<b>Healing</b>			
· Good	12 (48%)	18 (72%)	(0.1)
· Moderate	13 (52%)	7 (28%)	0.1
· Poor	0 (0%)	0 (0%)	0.1

Table 3: Comparison between both groups at 1 month postoperatively.

	Partial inferior turbinectomy N=25	Submucosal diathermy N=25	P value
	N (%)	N (%)	
<b>Nasal obstruction</b>			
· No improvement	0 (0%)	0 (0%)	1
· Partial improvement	3 (12%)	3 (12%)	1
· Complete improvement	22 (88%)	22 (88%)	1
<b>Crustation</b>			
· Absence of crustations	21 (84%)	19 (76%)	0.7
· Mild crustations	4 (16%)	6 (24%)	0.7
· Severe crustations	0 (0%)	0 (0%)	1
<b>Healing</b>			
· Good	15 (60%)	21 (84%)	0.1
· Moderate	10 (40%)	4 (16%)	0.1
· Poor	0 (0%)	0 (0%)	1

Table 4: Comparison between both groups at 3 months postoperatively.

rhinitis or allergic rhinitis. The hypertrophy of the inferior turbinate is either due to increased thickness of the medial mucosal layer which could be attributed to the hypertrophy of the lamina propria that houses sub-epithelial inflammatory cells; venous sinusoids and sub-mucosal glands or it could be due to an increase in the size of the bony structure of the inferior turbinate. Surgical treatment is controversial, and variety of surgical procedures is performed for managing inferior turbinate hypertrophy, but there is no completely effective therapy [9]. Surgical reduction of the turbinate can be performed by several different techniques [10]. Partial inferior turbinectomy is a procedure directed at relieving nasal, There are various studies which had shown that partial inferior turbinectomy is as effective procedure in relieving nasal obstruction as total inferior turbinectomy with success rate ranging from 70 to 80% [11]. However partial inferior turbinectomy should be performed cautiously in order to protect anatomical structures and physiological functions of nose Monopolar diathermy is an old technique for the reduction of sub-mucosal tissue of the inferior turbinate, but still widely practiced [9]. The effect of Sub-mucous diathermy is achieved through coagulation of the venous sinusoids within the turbinate, leading to sub- mucosal fibrosis [9]. Although turbinate tissue volume reduction by various techniques leads to shrinkage of the turbinate size, however the epithelial changes of chronic hypertrophic turbinate remains more or less unaltered [9]. Our study results showed that subjective feeling of nasal obstruction was persisted for 2 weeks with no significant difference between the 2 groups. This non-significant difference was persisted for 3 months postoperatively. Our results were different from the results of that the subjective results of nasal obstruction is better in patients with PSIT than patients with SMD, however they also documented that the proper benefit of nasal airflow in SMD is achieved after 2 months, while the dramatic response is obtained within only 2 weeks postoperatively in patients who had inferior turbinectomy. Tables 5 and 6 compare our results with the published data regarding the degree of nasal obstruction. Salzano et al. reported in their study that 20% of SMD group had moderate pain and 80% had mild pain at the end of 2 weeks post-operatively [3]. In our study, 44% of our patients who had SMD had moderate pain while 56% of these patients had mild pain at 2 weeks post-operatively and moderate crustations were noticed in only 48% of SMD patients on the second week postoperatively [7]. Our study results also agree with Imad and Salzano [7,3] studies with 44% of their patients who had SMD complained of moderate degree of intra-nasal crustations. In Imad et al. [7], good nasal tissue healing was reported in 92% of SMD patients compared to 52% of PSIT patients at the end of first postoperative month. In our study, 72% of SMD patients had good healing compared to 48% of PIT patients who had good nasal tissue healing, this difference may be attributed to the fact that when the inferior turbinate transected, this usually expose the edge of the inferior turbinate bone resulting in continuing crusting until the bone is re-covered with a mucosal surface [6]. Our study showed that SMD is better than PSIT regarding nasal pain and intra-nasal crustations after two weeks, but both techniques are equal regarding the improvement of nasal obstruction and degree of tissue healing. Although our study

Study	Year	Method	Nationality	Results
Luczaj	2007	(by Acoustic Rhinometry).	Poland	98%
Fradis et al	2000		USA	76%
Warwick – Brown	1987		UK	60%
Our study	2014	by VAS	Egypt	88%

**Table 5:** Improvement of nasal airflow in patients with sub-mucous diathermy in different studies compared to our present study.

Study	Year	Method	Nationality	Results
Barbosa Ade et al	2005	(by Acoustic Rhinometry).	Brazil	98%
Fradis et al	2000		USA	96%
Rakover & Rosen	1996		USA	77%
Serrano	1996		France	81.70%
Elwany & Harrison	1990		Egypt	77%
Pollock & Rohrich	1984		USA	90%
Our study	2014	By VAS	Egypt	88%

**Table 6:** Improvement of nasal airflow in patients with partial inferior turbinectomy in different studies compared to our present study.

represents a relatively small sample of patients, with the use of only subjective assessment parameters, however this study may open a new era for multi-institutional study with more objective assessment parameters of nasal air flow and longer duration of follow up.

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