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ORIGINAL ARTICLE

ASSESSMENT OF SURGICAL TURBINOPLASTY VERSUS BIPOLAR CAUTERIZATION IN MANAGEMENT OF INFERIOR TURBINATE HYPERTROPHY

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ABSTRACT

Background: Several techniques for management of inferior turbinate hypertrophy have been described to date, but the turbinoplasty, outfracture, and bipolar cautery methods have been used frequently for the last three decades. This study aimed to study the effect of the turbinoplasty versus surface bipolar cauterization in management of inferior turbinate hypertrophy. **Patients and Methods:** This prospective cohort study included 20 patients with nasal obstruction due to hypertrophied inferior turbinates resistant to medical treatment for a period not less than six weeks. The study included 6 males and 14 females with a mean age of 22 (range 18-26 years). The study work was done in Otorhinolaryngology Department in Zagazig University Hospitals in the period from Aug 2018 to Aug 2019. The first group included 10 patients who underwent surface bipolar cauterization and the second group included 10 patients who underwent Surgical turbinoplasty for inferior turbinate. **Results:** The results of nasal symptoms score of the study showed that nasal obstruction and headache showed significant improvement in both groups post-operatively with higher improvement in the turbinoplasty group. In addition, there was a statistically significant difference in post-operative crusting between the two studied groups with better results in the turbinoplasty group. **Conclusions:** Inferior turbinate hypertrophy failing medical treatment can be improved by surface bipolar cauterization or endoscopic surgical turbinoplasty technique. Both techniques have many advantages and disadvantages. However, the turbinoplasty technique has a favour of less crusting and earlier improvement in nasal obstruction than the surface bipolar cauterization technique.

Keywords: inferior turbinate hypertrophy, turbinoplasty, surface bipolar cauterization, obstruction, headache.

INTRODUCTION

The most common cause of chronic nasal obstruction is septum deviation and lower turbinate pathologies [1]. Several techniques for management of inferior turbinate hypertrophy have been described to date: total or partial turbinectomy, submucosal resection (surgical or with a microdebrider), outfracture, electrocautery, radiofrequency application, argon plasma treatment, and cryosurgery[2]. None of the turbinate surgical techniques performed with

or without septoplasty are perfect. Short- and long-term complications, such as bleeding, bruising, and atrophy, are frequent [3]. Ideally, turbinate surgery should be done without damaging the mucosal surface. This ensures preservation of normal lower turbinate function, rapid healing, and inhibition of atrophic rhinitis[4]. Despite the increasing number of lower turbinate surgical procedures, turbinoplasty, outfracture, and bipolar cautery methods have been used frequently for the last three decades [5].

AIM OF THE WORK

This study is aimed to compare the postoperative outcome in patients who had undergone inferior turbinate turbinoplasty with those treated with surface bipolar cauterization.

PATIENTS AND METHODS

This prospective cohort study included 20 patients with nasal obstruction due to hypertrophied inferior turbinates resistant to medical treatment for a period not less than six week. The study included 6 males and 14 females with a mean age of 22 (range 18-26 years). The study work was done in Otorhinolaryngology Department in Zagazig University Hospitals in the period from Aug 2018 to Aug 2019. The first group include 10 patients underwent surface bipolar cauterization and second group include 10 patients underwent Surgical turbinoplasty for inferior turbinate

We considered the following Inclusion criteria: Adult patients with bilateral inferior turbinate hypertrophy who failed medical treatment and eligible for reduction surgery during the study period were included in the study, no contraindication for surgery.

Our exclusion criteria were: Patients with maxillofacial trauma, paranasal sinus tumors, nasal polyps, septal perforations, acute or chronic rhino sinusitis, S type nasal septum deviation, concha bullosa, or previous nasal or paranasal sinus surgery, smokers. Patients with severe medical comorbidities or contraindications to surgery were also be excluded; children and patients with a contraindication for G.A or bleeding disorders were excluded from the study.

Steps of performance before surgery:

All studied subjects were subjected to: Full history taking. Complete physical examination for all patients. Anterior rhinoscopy. Nasal endoscopic examination. Nasal visual analogue score to assess the severity of nasal obstruction. CT-PNS. Routine laboratory investigations .

Medical treatment:

Medical treatment was give to all patients before C.T scan in the form of : Antihistamines. Antibiotics, if there is suspected infection. Local steroid spray.

If patients did not improve after six weeks of medical treatment, we would use surgical treatment.

Surgical treatment: All surgeries were performed under general anesthesia with endotracheal tube. The patients were positioned in a standard nasal surgery position. All surgeries were done using 0-degree (straight) endoscope.

Bipolar cauterization (1st group):

Preparation of the turbinate with topical vasoconstrictor solution with oxymetazoline hydrochloride 0.1% half hour before operation.

Endoscopic evaluation of the inferior nasal turbinate was done then Linear cautery of inferior turbinate was done from posterior to anterior with 2 mm distance between two limb of bipolar cautery forceps. This was done along the upper and lower parts of the turbinate. a silastic nasal septal stent were fixed to the septum and left for at least 2 weeks. Mostly no packs were required for the 1st group.

Surgical Turbinoplasty (2nd group):

Preparation of the nose with topical vasoconstrictor solution with oxymetazoline hydrochloride 0,1% was done.

Endoscopic evaluation of the inferior nasal turbinate is done. Local infiltration of 1% lidocaine in 1 : 100,000 epinephrine was done. Incision with scalpel blade n°15 along of the anterior and inferior edge of inferior turbinate was done. A medial flap is elevated superiorly and posteriorly by dissection along the medial bony surface of inferior turbinate as for posteriorly as possible.

Then, partial resection of the inferior turbinate bone and lateral mucosal surface is done using scissors and thru-cutting forceps is done. Next, the medial flap was repositioned covering the bare surface. Any bleeding spot along the removed part was cauterized by bipolar cauterization before repositioning of the flap. Silastic nasal septal stent were fixed to the septum and left for at least 2 weeks

A small vazilenized gauze was insert along the floor of the nose to keep the mucosal flap in its position.

Postoperative medication:

Antibiotics, analgesics, systemic decongestant. Avoid manipulation of the nose and nasal blowing. Removal of nasal packs was done after 48hr's. Then nasal saline irrigation was prescribed for 2 months postoperatively. Silastic nasal septal stent were removed after 2 weeks.

Postoperative follow up:

Follow up weekly for the first month and biweekly for next 2 months. After 3 months, all patients underwent endoscopic examination and nasal visual analogue score to assess the improvement of nasal obstruction.

Ethical Clearance: Written Informed consent was taken from the patient to participate in the study. Approval for performing the study was obtained from Otorhinolaryngology Departments, Zagazig University Hospitals after taking Institutional Review Board (IRB) approval. The work has been carried out in accordance with the code of ethics of the world medical association (Declaration of Helsinki) for studies involving humans

Statistic analysis

Data were collected, coded, revised and entered to the Statistical Package for Social Science (IBM SPSS) version 20. The data were presented as number and percentages for

the qualitative data, mean, standard deviations and ranges for the quantitative data with parametric distribution and median with inter quartile range (IQR) for the quantitative data with non parametric distribution.

RESULTS

Regarding comparison between the two studied groups in the degree of pre-operative nasal obstruction, there was no statistically significant difference. Regarding comparison between two groups, there was statistically significant decrease in nasal obstruction post-operatively in both groups with higher decrease in the second group, Table (1).

Regarding headache, there was no statistically significant difference in pre-operative headache between the two groups. Regarding comparison between the post-operative headache in the two groups, there was statistically significant decrease in headache post-operatively in both groups with more decrease in the second group, Table (2).

In this table, there was statistically significant difference in post-operative crusting between the two studied groups with better results in the second group, Table (3).

In this table, regarding significant post-operative synechia, there was no statistically significant difference, Table (4).

Table (1): Comparison of pre-operative and post-operative nasal obstruction between the two studied groups:

Nasal obstruction	1 st group		2 nd group		χ^2	p-value
	No(10)	%	No(10)	%		
Preoperative						
No obstruction	0.0	(00.0%)	0.0	(00.0%)		
Mild obstruction	0.0	(00.0%)	0.0	(00.0%)		
Moderate intermittent Moderate persistent	0.0	(00.0%)	0.0	(00.0%)		
Severe intermittent Severe persistent	2	(20.0%)	2	(20.0%)		
	4	(40.0%)	3	(30.0%)	0.2	0.9
	4	(40.0%)	5	(50.0%)		
Post-operative						
No obstruction	2	(20.0%)	6	(60.0%)		
Mild obstruction	5	(50.0%)	4	(40.0%)		
Moderate intermittent Moderate persistent	3	(30.0%)	0.0	(00.0%)	15.2	0.002*
Severe intermittent Severe persistent	0.0	(00.0%)	0.0	(00.0%)		
	0.0	(00.0%)	0.0	(00.0%)		
	0.0	(00.0%)	0.0	(00.0%)		
p-value ^	0.003*		0.001**			

^p-value for comparing pre and post-operative.

** Statistically highly significant difference ($P \leq 0.001$).

Table (2): Comparison of pre-operative and post-operative headache between the two studied groups:

Headache	1 st group		2 nd group		χ^2	p-value
	No(10)	%	No(10)	%		
<i>Perioperative</i>						
<i>Absent</i>	0.0	(0.00%)	0.0	(0.00%)	0.00	1
<i>Present</i>	10	(100.0%)	10	(100.0%)		
<i>Postoperative</i>					FET	0.2
<i>Absent</i>	4	(40.0%)	7	(70.0%)		
<i>Present</i>	6	(60.0%)	3	(30.0%)		
<i>p-value</i> ^	0.02*		0.001**			

p-value for comparing pre and post-operative, FET= Fischer Exact test.

* Statistically significant difference ($P \leq 0.05$).

** Statistically highly significant difference ($P \leq 0.001$).

Table (3): Comparing post-operative crusting between the two studied groups:

Post-operative crusting	1 st group		2 nd group		χ^2	p-value
	No(10)	%	No(10)	%		
No	0.0	(0.00%)	3	(30.0%)	20.0	0.001**
After 1 week	10	(100.0%)	7	(70.0%)		
After 1 month	7	(70.0%)	0.0	(0.00%)		
After 3 months	2	(20.0%)	0.0	(0.00%)		

Table (4): Comparing post-operative synechia between the two studied groups:

Variables	1 st group		2 nd group		χ^2	p-value
	No(10)	%	No(10)	%		
Post-operative Synechia					FET	0.3
<i>Absent</i>	8	(80.0%)	9	(90.0%)		
<i>Present</i>	2	(20.0%)	1	(10.0%)		

DISCUSSION

The Turbinoplasty was developed in 1906 and revived by **House HP.** [6] who described the submucosal resection of the anterior third of the turbinate bone **Mabry RL.** [7] popularized the term "turbinoplasty" in 1982, and he included the inferior and lateral soft tissues (submucosa and mucosa) of the inferior turbinate in the resection. During the last decade, a number of techniques for turbinoplasty have been described. Since it was first reported by **Davis and Nishioka** [8] most authors prefer powered instruments **Van Delden** [9] and visualization by rigid endoscope **Friedman.** [10].

The extent of resection includes bone, submucosa, and lateral/inferior mucosa in most studies **Bielamowicz et al.** [11] however; some authors avoid mucosal

damage and only resect bone **Mori et al.** [12] or submucosa **Passali et al.** [13]. Regardless of these variations, all authors agree that turbinoplasty is a superior technique for the management of inferior turbinate hypertrophy, producing a lasting and adequate decrease in turbinate size with low morbidity.

The ideal turbinate reduction procedure removes the obstructive nonfunctional portions of the turbinate while preserving the medial physiological mucosal portion that is responsible for warming and humidification of inspired air. Techniques for turbinate reduction should reliably reduce nasal obstruction while maintaining normal mucosal function and limiting the propensity for complications such as bleeding and crusting [14].

The results of nasal symptoms score of the study showed that nasal obstruction

showed significant improvement in both groups post operatively with higher improvement in the turbinoplasty group. This result is similar to the study of **Joniau et al. [15]** which showed that submucosal cauterization produced a slower improvement in obstruction and turbinate scoring becoming apparent only after 3 weeks. This marked difference in onset of improved nasal breathing probably explained by the direct effect of tissue resection during turbinoplasty, whereas submucosal cauterization relies on scar formation to achieve benefit.

In this study, although we used surface bipolar cauterization which causes immediate shrinkage of the turbinate, the slower improvement can be explained by the presence of crusting in the early postoperatively period and the improvement becomes evident after completely disappearance of these crusts.

This fact was also demonstrated by **Ragab et al. [16]** when postoperative data were compared at 1 week. Nasal obstruction, discharge, crustations, and headache revealed significant improvement after turbinoplasty. Another factor that should be borne in mind is that submucosal cauterization decreases the size of the inferior turbinate, facilitating fibrosis, which may have a certain latency period. However, turbinoplasty directly removes the enlarged submucosal and bony tissue of the turbinate, causing instant relief of symptoms. From this point of view, turbinoplasty was better compared with submucosal cauterization [16].

Similarly, **Cavaliere et al. [17]** also showed that there is improvement in nasal obstruction in surgical turbinoplasty group in their study, which began at the end of first postoperative week.

Crusting is a well-known postoperative complication in turbinate surgery and is caused by direct mucosal damage [18],[13].

In our study, there was statistically significant difference in post-operative crusting between the two studied groups with better results in the turbinoplasty group. Crustations were present in 70% of patients at of end of first week and in 0% at the end of first month in turbinoplasty group. While,

crusting persisted for a period of 1 to 3 months in the surface bipolar cauterization group. After 3 months all patients of this group showed marked disappearance of crusts except for 2 patients who had very mild crust which disappear completely 2 weeks after.

The same results were observed in the surgical turbinoplasty group at the end of 1 week with complete disappearance of crusts at the end of first month **Cavaliere et al. [19]**. In the same way, postoperative data of **Ragab et al. [16]** gave the same results.

Vijayakumar et al, conducted a prospective study on 30 adult patients with symptomatic hypertrophy of inferior turbinate not responding to medical treatment. All patients underwent surgical turbinoplasty. Crustations were seen in 40% of the patients at the end of 1 week. On Follow up, at the end of first month, only three patients 10% had crusting and at 3 months none had crusting. He concluded that the time taken for the crusts to completely disappear is 1 to 3 months after surgical turbinoplasty [20].

Regarding postoperative synechiae between the two groups, there was no statistically significant difference, about 10% to 20% in both groups. In this work, we insist on keeping a silastic stent fixed to the septum for at least 2 weeks to prevent postoperative synechiae between septum and inferior turbinate and this significantly decreased postoperative synechiae in both groups. Synechiae formation was transiently seen in 3 patients, One of them resolved spontaneously, and the other two resolved rapidly after simple lysis during early postoperative follow-up [21].

In this study, we found statistically significant difference in operation time between the two studied groups with longer time in the turbinoplasty group with a mean time of (54.8 ± 8.8) and (30 ± 5.7) for the surface bipolar cauterization group.

In Elkady study, turbinoplasty took mean time of 37.32 ± 4.88 ranging from 30-48 minutes **Elkady et al. [22]**. For the turbinoplasty technique, we elected to use a surgical method using ordinary nasal instruments and not utilizing powered instruments due to availability and cost issues

and this can explain relatively longer time it requires.

CONCLUSION

Inferior turbinate hypertrophy failing medical treatment can be improved by surface bipolar cauterization or endoscopic surgical turbinoplasty technique. Both techniques have many advantages and disadvantages. However, the turbinoplasty technique has favour of less crusting and earlier improvement in nasal obstruction than the surface bipolar cauterization technique.

RECOMMENDATION

Studies with longer follow up are required to assure persistence of improvement with both techniques.

Declaration of interest

The authors report no conflicts of interest. The authors along are responsible for the content and writing of the paper.

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