Microdebrider Assisted Inferior Turbinoplasty: The Evaluation According to the Pathological Causes of Hypertrophied Turbinates

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Abstract

Background: Hypertrophied inferior turbinates are the frequent cause of nasal obstructions.Microdebridor is one of recent advances in technology used for reduction of hypertrophied turbinate to improve nasal breathing.

Objective: To evaluate and compare the effectiveness of microdedrider assisted inferior turbinoplasty on nasal breathing, turbinate size and complications according to the pathological causes.

Patients and Method: Aprospective case study of 45 patients with chronic nasal obstruction and hypertrophied inferior turbinates underwent microdebrider assisted tubinoplasty. At Salah-eldeen General Hospital and private practice in salah-eldeen governorate, Iraq. During the peroid from June 2016-June 2018. The patients were classified according to the cause of turbinate hypertophy and follow up at 1,3, and 12 months post operatievly for nasal bereathing and turbinate size.Results : The preoperative turbinate size was grade III (48.5%) and grade IV (51.5%). At 1,3,and 12 months post operatively, the grade I and II was (87%). (90%), and (84%) respectively better in compensatory hypertrophy. The subjective patient's satisfaction grade I(relieved) and II(improved)) at 1,3, and 12 month after surgery was (100%) (97%) and (89%) respectively more satisfaction with compensatory hypertrophy.

Conclusion: The therapeutic success of microdebrider turbinoplasty for improvement of nasal obstruction and turbinate size, according to the causes . In early postoperative period was almost equal,but long-term follow-up (one year) found it was greater in compensatory hypertrophy and chronic rhinosinusitis and less in allergic and nonallergic rhinitis. There is no significant association between the cause of turbinate hypertrophy and type of complications.

Keywords: *Nasal obstruction, Inferior turbinate hypertrophy, Inferior turbinoplasty, Microdebrider turbinoplasty.*

Introduction

The turbinates are the portion of nose that warm and moisten the inspired air. The most common turbinates that affect airflow are the inferior turbinates,where enlargement can obstruct nasal breathing, especially the anterior tip of the inferior turbinate is located in the nasal valve region and hypertrophy leads to impingement on the nasal valve, and increase nasal resistance . The enlarged turbinates are the second most frequent cause of nasal obstructions after nasal septal deviation[1] that compromise quality of life[2] .Turbinate hypertrophy can be treated medically or surgically depending on the size and response to medical management[3], and correction of the causes is important. There were at least 13 basic

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surgical techniques described to shrink the size of the inferior turbinates, but the ideal treatment method is currently undetermined [3]. Microdebridor which is one of more recent advances in technology for reduction of inferior turbinate volumeand was first reported by Davis and Nishioka[4] in 1996. The significant advantage of this method is removal of submucosal vascular stromal tissue, while preserving overlying respiratory mucosa[5].

The aim: To evaluate and compare the effectiveness of microdebrider assisted inferior turbinoplasty on nasal breathing, turbinate size and complications according to the pathological causes.

Patients and Method

Aprospective case study of 45 patients presented with chronic nasal obstruction and hypertrophied of inferior turbinates underwent Microdebrider assisted inferior tubinoplasty under general anesthesia during the peroid from June 2016-June 2018 at Salah eldeen General Hospital and private practice in salah-eldeen governorate,Iraq. Male were 24 patient (53%) and 21 (47%) were female. age ranging between 18-55 years,and the average 29 years.

A detailed history was taken regarding nasal obstruction,discharge,sneezing, itching, smell,and headache .Full ENT examination,nasal endoscopy,and CT-scan of the nose and paranasal sinuses when indicated. All patients did not respond to medical treatment. Mulberry posterior end of inferior turbinate was reduced by extraturbinate microderbrider was excluded from this study.

The patients were classified according to the cause of inferior turbinate hypertrophy in to the following

1. Patients with allergic rhinitis.
2. Patients with non-allergic rhinitis includes vasomotor rhinitis, hormonal, irritant.
3. Patients with compensatory hypertrophy due septal deviation.
4. Patients with chronic infective rhino sinusitis.

The size of inferior turbinate was graded according to **inferior turbinate classification system**[6], by measuring the horizontal percentage of total airway space from the anterior aspect of the inferior turbinate(lateral) to the nasal septum (medial) in to four grads. Grade 1 (0%–25% of total airway space), Grade 2 (26%–50%), Grade 3 (51%–75%), Grade 4 (76%–100%).

The subjective sensation of patient about his or her postoperative nasal breathing was assessed by using the questionnaire applied and divided patients in to four grades. Grade I=Relieved (cured) of nasal obstruction,Grade II=Improved nasal breathing,

III=Same as before surgery, IV=Worse .

For assessment of peroperative bleeding(during surgery), the patients were classified in to;

1. Patients with accustomed bleeding (means that the bleeding stopped spontaneously with sugicel).
2. Patients with prolonged bleeding (means that the bleeding continued and stopped using cauterization or suturing the incision or the accidental mucosal tear.).

The patients were followed about the size of inferior turbinate and nasal breathing at one,three,and twelve months postoperatively.

Surgical Procedure: Microdebrider inferior turbinoplasty was performed under general anesthesia.

It was carried out after completing the septoplasty, septorhinoplasty or FESS, when the operation has been accompany with it. The patient is prepared for a standard endonasal procedure using an 0° endoscope 4-mm diameter, injection of 1 % Lidocaine with 1: 100,000 Epinephrine into the anterior aspect of the inferior turbinate with xylomeatzoline 0.1% nasal spray. An incision made along the anterior tip of the turbinate at its lateral insertion. Create a submucosal tunnel with a Freer elevator along the medial conchal bone. The turbinate microdebrider blade is inserted into the pocket created and excise submucosa with or with bone excision out a of the inferior turbinate. The incision site can be cauterized or sutured if significant bleeding occurs from the mucosal edge or accidental mucosal tear. Silastic splint,and surgicel placed.

Results

Forty-five patients with inferior turbinate hypertrophy underwent microdebrider turbinoplasty . The compensatoryhypertrophy and hypertrophy due to chronic rhinosinusitis was common in male (72%) and (71%) respectively, but turbinate hypertrophy in allergic and non allergic rhinitis was common in female (72%) and (80%) respectively (Table 1). Microdebrider turbinoplasty was performed in combination with septoplasty with or without FESS for 33 patients (73%) and microdebrider turbinoplasty alone for 12 patients (27%).

Table 1: The causes and sex distribution of inferior turbinate hypertrophy .

Total (%)	Female (%)	Male (%)	Cause
18 (40%)	5(28%)	13(72%)	Septal deviation (Compensatory HT)
15 (33%)	10(67%)	5(33%)	Allergic rhinitis
7 (16%)	2(29%)	5(71%)	Chronic rhinosinusitis
5 (11%)	4(80%)	1(20%)	Non-allergic rhinitis
45 (100%)	21(47%)	24(53%)	Total

χ^2 = 22.6., d..f. = 3, P-value = <0.05, Correlation = 0.5. *Significant association between cause and sex.

The total number of inferior turbinates that underwent turbinoplasty in 45 patients with nasal obstruction was 68 turbinate, in patients with allergic rhinitis were 29 turbinate, compensatory hypertrophy were 20 turbinate, chronic rhinosinusitis were 11 turbinate, and in non-allergic rhinitis were 8 turbinate (Table 2).

Table 2. The causes and side of inferior turbinate hypertrophy.

Total Turbinate	Bilateral TH	Unilateral TH	Patient No.	Cause
29	14(93%)	1(7%)	15(33%)	Allergic rhinitis
20	2(11%)	16(89%)	18(40%)	Compensatory HT
11	4(57%)	3(43%)	7(16%)	Chronic rhinosinusitis
8	3(60%)	2(40%)	5(11%)	Non-allergic rhinitis
68	23(51%)	22(49%)	45(100%)	Total

*χ^2 = 22.4, d.f = 3, P-value = <0.05, correlation = 0.057., Strong (significant) association between causes and side of inferior turbinate hypertrophy.

The preoperative turbinate size was as follows grade III 33/68 turbinate (48.5%) and grade IV was 35/68 turbinate (51.5%).At month after surgery the turbinate size was grade I (28%), grade II (59%) then and grade III(13%). At 3 months post operatively grade I was (46%), grade II was (44%) then grade III(10%). In compensatory hypertrophy grade I and II were 20/20 (100%)and in allergic rhinitis were 25/29 (85%).

After one year, grade I was 22/68 (32%), grade II 35 (52%),and grade III 8 (12%). In compensatory hypertrophy Grade I and II were 18/20 (90%) and grade III was 2/20 (10%),which is better than In allergic rhinitis where Grade I and II were22/29 (76%), Grade III was (17%) and grade IV was(7%).(Figure 1).

Table 3: The complications of microdebrider turbinoplasty according to the causes.

Post operative*			Peroperative		Total (N=68)	Complications / Causes
Nasal dryness	Crustation	Secondary bleeding	Mucosal tear	Prolonged Bleeding		
0	3(10%)	0	2(7%)	2(7%)	29	Allergic rhinitis
3(15%)	1(5%)	0	1(5%)	2(10%)	20	Severe septal deviation
0	2(18%)	1(9%)	2(18%)	2(1%)	11	Chronic rhinosinusitis
1(12.5%)	1(12.5%)	1(12.5%)	1(12.5%)	1(12.5%)	8	Non-allergic rhinitis
4(6%)	7(10%)	2(3%)	6(9%)	7(10%)	68	Total

Synechia and Atrophic change had not been observed; χ^2 = 0.8, d.f.=3,P-value =<0.05, correlation =0.2., No significant association between causes and type of complications.

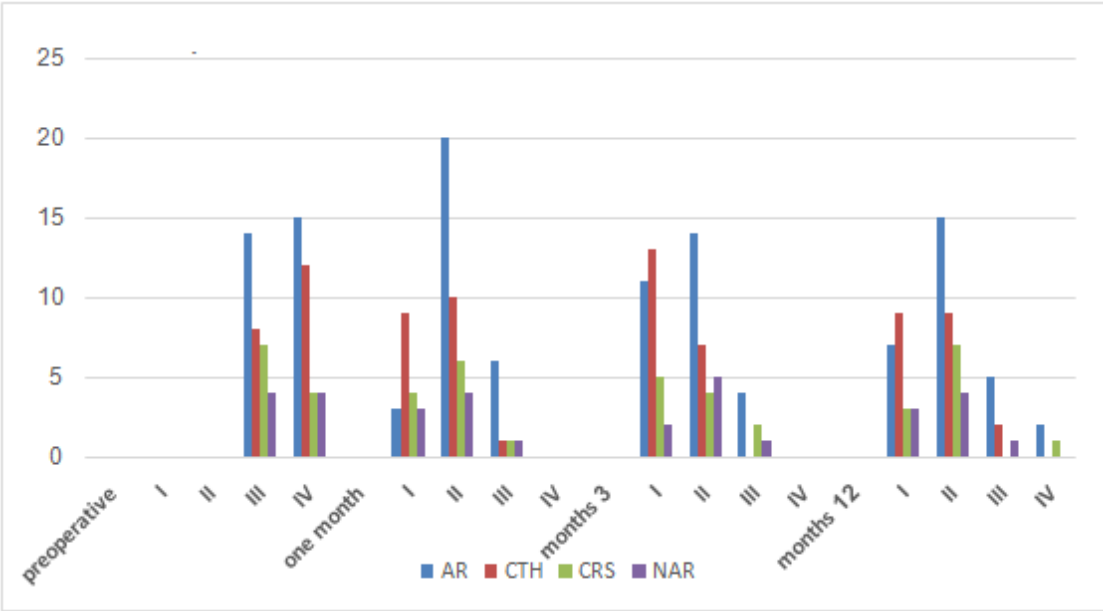

Figure (1): The relation between the causes of inferior turbinate hypertrophy and turbinate size after microdebrider turbinoplasty

Subjective improvement of nasal patency after the surgery was as follows: After one month grade I (relieved) was 29/45 patients (64%) and grade II (improved) was 16/45 (36%),no (grade III) nor (grade IV) were reported. After 3 months relieved was 30 (67%), improved was 13 (29%), and same was 2 (4%). After 12 months (49%) were relieved, (40%) were improved and (11%) were same. In compensatory hypertrophy the grade I and II at one month, 3 months, 12 months postoperatively were (100%), (100%),and (94.5%) respectively, more than allergic rhinitis that was (100%), (93%), and (80%) respectively.(Figure 2).

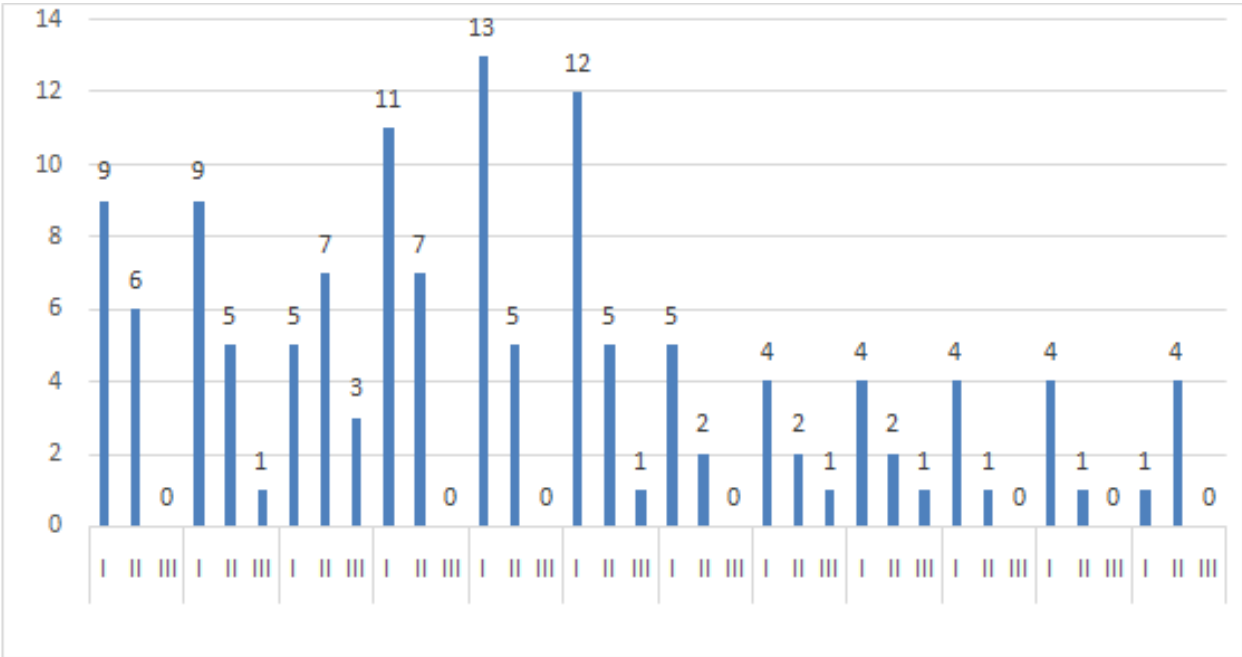

Figure 2: The relation between the causes of inferior turbinate hypertrophy and nasal breathing after microdebrider turbinoplasty.

Regarding the complications, the peroperative prolonged bleeding was 6/68(10%) common in patients with chronic rhino-sinusitis were 2/11(18%), then with non-allergic rhinitis 1/8(12.5%). Accidental mucosal tear in 6/68(9%) more in chronic rhinosinusitis was 2/11(18%). Postoperative complications includes secondary bleeding was 2/68(3%) more in non-allergic rhinitis 1/8(12.5%), nasal crustation 7/68(10%), nasal dryness was 4/68 (6%), no synechia or atrophic rhinitis reported (Table 3). No case of synechia and Atrophic change had been reported .

Discussion

The inferior turbinate hypertrophy is a common cause for nasal obstruction. It is prevalence in patients with severe nasal obstruction is (77%)[7]. Compensatory hypertrophy of inferior turbinate due to nasal septal deviation is a common cause of nasal obstruction[8]. Patients who had compensatory hypertrophy correction of nasal septum deviation (septoplasty) has been performed for all patients accompanied with microdebrider turbinoplasty.Septoplasty has an effect on reduction of turbinate size. There are several studies was found that septoplasty reduce the size of hypertrophied inferior turbinates even without turbinate surgery for size reduction[9,10]. (Chieh-Feng Lee,et al.2004) Found that there is excellent out comes in improving nasal patency when microdebrider turbinoplasty is adjunct to septoplasty and endoscopic sinus surgery which lasts for a long time [5], although in rhinomanometric assessment had been found that improvement was greater in turbinoplasty only than combined surgery, but the authors attributed this to undercorrction or residual deviation might exist [4]. In the current study found that patients with compensatory hypertrophy of the inferior turbinate had a good therapeutic success rate after 12 months period, regarding turbinate size Grade I and II was (90%) (Figure 1), and for nasal breathing the Grade I and II was (94.5%) (Figure 2).

Allergic and non-allergic rhinitis are the most common causes of inferior turbinate hypertrophy [11]. The study found that nasal breathing and turbinate size reduction in allergic and non allergic rhinitis after one year was (80%) which less than that for compensatory hypertrophy was (94.5%) . The reasons for this may be that the allergic and vasomotor rhinitis regarded as the most frequent causes of mucosal dysregulation that affect outcomes of turbinate reduction[12] . In addition,the method used in this research is intra-turbinate microdebrider inferior turbinoplasty where the submucosal vascular stromal tissue is removed with preservation of turbinate respiratory mucosa [13,4] these will affect the long-term relief of allergic symptoms.Several studies found that extra-turbinate microdebrider is more effective than intraturbinate microdebrider turbinoplasty in allergic rhinitis [14,8].

Previous studies have been conducted that majority of patients (90% -100%) gets subjective improvement of nasal obstruction after reduction of turbinate, but effectiveness often reduced over time [15]. A study found that the failure in turbinate surgery is due to persisting pathology for mucosal membrane dysregulation and less due to operating technique [12].For long term follow -up of patients with allergic rhinitis who underwent inferior turbinate reduction, one study found that the improvement of nasal obstruction after one year was (80%)[16]. other study found that improvement after 5 yearswas (70%)[17] .

The turbinate is very vascular structure as it composed of the an extensive plexus of venous capacity vessel (sinusoid)and respiratory mucosa [1].Current study found that peroperative bleeding (during surgery) was accustomed bleeding that it stopped spontaneously with sugicel, because the author used local infiltration of epinephrin with careful handling the shaver results in avoidance damage and protection the turbinate mucosa, all reduce the occurrence of accidental mucosal tear, bleeding and crustation . In this current study excessive primary bleeding was (9%) common in non-allergic rhinitis and infective rhinosinusitis due to hyperemic engorged turbinate that occurrence of accidental mucosal tear increased bleeding. Secondary bleeding was two patients (3%) one on the fifth and the second on seventh day after the operation,they are mostly as a result of infection, that leads to hyperemia and increased friability of the turbinate mucosa. postoperative bleeding has been reported with a frequency of(3.4%- 10%) in various studies [3,18] .one study has been reported post operative bleeding was (27%) [13]. Mucosal tear usually due to aggressive resection,it occurs in (9%) more in chronic rhinosinusitis was (18%) and in non allergic rhinitis (12.5%).Study by another author was found that occurrence of mucosal tear was 7.5% [19] . Crustation occur in (10%) with accidental mucosal tear all was resolved with use a saline nasal spray within 3 weeks postoperatively.Atrophic rhinitis were not observed because the mucosa and its neurovascular supply were preserved. Despite the differences in the incidence rate

of complications with the cause of turbinate hypertrophy (Table 3), but statistically there are no significant association.

Limitations that in this studythe turbinate reduction was accompanied by septoplasty .septorhinoplasty or FESS in (73%) of the patients,this makes difficult to accurately evaluate the effect of microdebrider turbinoplasty as an isolated procedure on nasal breathing and to accurately calculate the amount of blood loss from the procedure.

Conclusion

The study found that microdebrider assisted inferior turbinoplasty procedure is a safe and effective method for turbinate reduction. The therapeutic success rate for improvement of nasal breathing and turbinate size according to the cause was almost equal in early postoperative period (one and three months),but long-term follow-up(after one year) found that success rate was greater in compensatory hypertrophy and chronic rhinosinusitis and less in allergic and non-allergic rhinitis. There is no significant association between the cause of turbinate hypertrophy and type of complications.

Ethical Clearance: From research ethic committee in Tikrit university/college of medicine.

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Conflict of Interest: None

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