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ENT

INFERIOR TURBINOPLASTY- MICRODEBRIDER ASSISTED VS. RADIOFREQUENCY ASSISTED- A COMPARATIVE STUDY

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ABSTRACT **Introduction-** Inferior turbinate hypertrophy is a common finding in patients presented with nasal obstruction. There are various methods to reduce the size of inferior turbinates. **Objectives-** To ascertain the short term and long-term efficacy of microdebrider assisted turbinoplasty (DAT) and radiofrequency assisted turbinoplasty (RAT) for symptomatic inferior turbinate hypertrophy (ITH) patients. **Materials and method-** 60 inferior turbinates from 47 patients underwent turbinoplasty. All cases were followed up for 1, 6, 12 and 24 months. Patients were assessed symptomatically (nasal obstruction, nasal discharge, hyposmia and headache) by visual analogue score. Objectively, the distance between anterior end of inferior turbinate and septum was measured. Nasal inspiratory peak flow was measured before and after the procedures. Saccharin transit time was also measured. **Results-** Distance between the anterior end of inferior turbinate and septum increases after both procedures, but in RAT group, it decreases after 1-year period. Muco-ciliary clearance measured by Saccharin transit time improves by both procedures but decreases in RAT group after 1 year. Nasal inspiratory peak flow increases in two sets of patients but decreased in Radiofrequency group after 6 months of the procedure. DAT gives more symptomatic benefit than RAT, mostly in long term follow up. DAT group had significant improvement in relieving nasal obstruction in short term as well as long term follow up. Debrider assisted turbinoplasty relieves nasal obstruction starting from 1st week after surgery and persists even 2 year after follow-up; whereas radiofrequency assisted channeling relives symptom up to 3-6 months only to recur at 1 year. **Conclusion-** Debrider assisted turbinoplasty is better alternative among two methods of mucosa preserving turbinate reduction techniques.

KEYWORDS : Inferior Turbinate Hypertrophy; Inferior Turbinoplasty; Microdebrider; Radiofrequency

Introduction-

Nasal obstruction is one of the most common symptoms presented to an otorhinolaryngologist2. Deviated nasal septum, chronic rhinosinusitis with or without polyposis, allergic rhinitis are different causes of nasal obstruction. Inferior turbinate hypertrophy (ITH) causes significant reduction in nasal airway. Commonly, it is associated with allergic rhinitis, vasomotor rhinitis (12), chronic hypertrophic rhinitis (hypertrophy of the mucosal lining with fibrous tissue deposition in submucosal layer) or as a result of compensatory hypertrophy associated with deviated nasal septum or rarely is seen as isolated pathology. In case of deviated nasal septum, unilateral hypertrophy of inferior turbinate is seen, whereas in allergic rhinitis, nasal polyposis and denovo hypertrophy of turbinates, it is bilateral in nature. Medical therapy for hypertrophy of turbinates includes antihistaminics (12), decongestant nasal drops, nasal corticosteroids. Sometimes these hypertrophied turbinates do not shrink to these medical therapies or may be refractory to medical treatment. Surgical intervention is needed in those cases either in the form of complete or partial turbinectomy, submucosal therapy with electrocautery, cryotherapy or radiofrequency or debrider assisted turbinoplasty. In this study, we compare two methods of minimally invasive turbinoplasty namely radiofrequency assisted turbinoplasty (RAT) and microdebrider assisted turbinoplasty (DAT).

Materials and methods-

Total sixty turbinates from forty-seven patients were selected for this study from 2020 to 2022. Cases of chronic rhinosinusitis with polyposis, deviated nasal septum were excluded from the study. Only isolated hypertrophic turbinate was included in this study. Patients with previous history of septal or endoscopic surgery or nasal obstruction due to any other reasons were excluded from the study. After detailed physical examination, nasal endoscopic evaluation, Computer Tomography (CT) scan of paranasal sinuses was done in all patients (Fig 1).

Patients were randomly divided into two group comprising thirty turbinates each. One group underwent radiofrequency assisted turbinoplasty (Ellman; USA) and the other group had debrider assisted turbinoplasty (Medtronic; USA). All cases were performed by the first author to remove surgeon related bias. Written informed consent of patients was taken following a detailed explanation of the procedures. Ethical approval was obtained from the institutional ethics committee. Statistical analysis was done with SPSS software (version 17.0, IBM, USA).

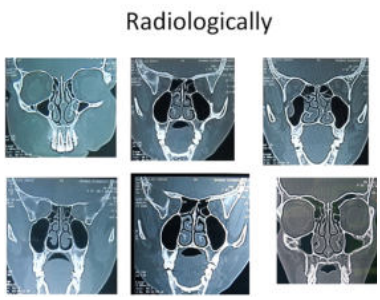

Fig 1. CT Scan of Paranasal Sinuses

Surgical procedure-

A) Radiofrequency assisted turbinoplasty (RAT) (Fig 2): In radiofrequency group, cases were done under local anaesthesia with sedation. Nasal cavities were prepared with nasal patties soaked in 4% Lignocaine with 1:1000 Adrenaline for 10 mins prior to surgery. Local infiltration with 2% Lignocaine and 1:200000 adrenaline 5 ml on each turbinate. Radiofrequency energy was given to anterior, middle, posterior part of turbinate for 10 seconds each. Only coagulation mode was used and energy level was set to 4. No nasal packs were used. Patients were followed for 3 hours in the recovery room for bleeding. Then they were discharged and followed up. Intraoperative bleeding, time taken for surgery, hospital stay was noted.

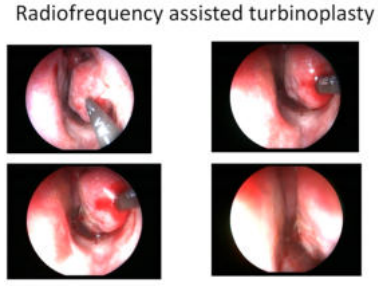

Fig 2. Radiofrequency assisted turbinoplasty (RAT)

B) Debrider assisted turbinoplasty (DAT) (Fig 3): General anaesthesia was used for microdebrider group. Nose was prepared as usual. First inferior turbinate was out fractured by putting a Freer's elevator in inferior meatus at midpoint of the turbinate, thus making a space for debrider blade in the undersurface of turbinate. Now, mucosa lateral to inferior turbinate bone is debrided away. Now, changing the mode to forward cutting the inferior turbinate bone is partially debrided. A small incision was made submucosally just medial to inferior turbinate bone and mucosa medial to inferior turbinate bone is elevated by Freer's elevator. Rest of the bone was removed and remnant mucosa was rolled back laterally. The anterior most end of inferior turbinate must be debrided away and the angle between inferior turbinate and lateral nasal wall should be well defined at the end of this procedure. Lastly remnant is pushed laterally and packed with Merocele packing. Patients were discharged on the next day. All patients were asked to douche their nasal cavities with alkaline solution for 2 months. Allergic rhinitis patients were given intranasal steroid nasal steroid and antiallergics.

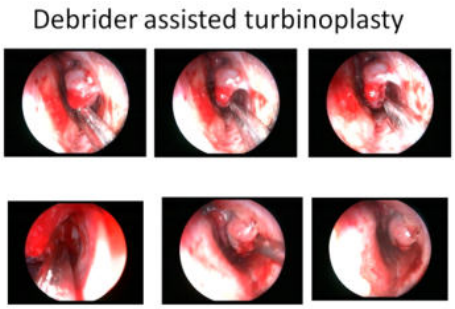

Fig 3. Debrider assisted turbinoplasty (DAT)

During follow-up, they were asked to fill up visual analogue score (0 denotes no symptoms, 10 denotes maximum symptoms) regarding severity of nasal obstruction, nasal discharge, hyposmia and headache at 1 month, 6 months,12 months and 24 months and documented.

Nasal inspiratory peak flow was measured before and after surgery in two sets of patients and compared by nasal inspiratory flowmetry Saccharin transit time was measured by putting a grain of saccharin at septum adjacent to anterior end of inferior turbinate in upright position and time taken to sweet taste to appear was calculated. It was measured preoperatively, 1 month, 6 months, 12 months and 24 months and compared between two groups and statistical significance was calculated.

Results-

Sixty (60) inferior turbinates from forty-seven (47) patients underwent turbinoplasty Subjective symptoms were documented by visual analogue score of 0 to 10 for nasal obstruction, nasal discharge, headache, anosmia/ hyposmia.

Symptomatic/subjective improvement (Table no.1) –
Nasal obstruction improved significantly in both groups but persisted till 2 years in DAT group but failed to show persistent improvement in RAT group at 1 year, 2-year follow-up. Other symptoms improved after both the procedures but not as significant as nasal obstruction

Table No 1. Symptomatic/subjective improvement

Symptoms		Pre-op	Post-op 1 month	Post-op 6 months	Post-op 1 year	Post-op 2 year
Nasal obstruction	RAT	8.85±0.2	2.53±o.65	3.54±0.22	8.04±1.35	8.30±1.36
	DAT	8.85±0.6	1.43±0.65	1.43±0.65	1.49±0.66	1.54±0.81
Nasal discharge	RAT	6.67±0.6	5.05±0.78	5.56±0.98	6.07±1.30	6.49±1.32
	DAT	6.97±0.96	4.45±0.98	4.0±0.65	3.65±0.89	2.68±0.88
Headache	RAT	5.55±0.98	5.06±0.88	5.00±0.76	5.05±0.66	5.45±0.56
	DAT	5.05±0.87	5.00±0.89	4.06±0.98	4.05±0.55	3.45±0.66
Hypo/Anosmia	RAT	6.55±0.88	5.55±0.65	4.78±0.98	5.05±0.88	5.55±0.98
	DAT	6.67±0.99	5.55±0.66	4.56±0.66	3.55±0.98	3.45±0.66

(Pre-op – Preoperative, Post-op – Postoperative, RAT - Radiofrequency assisted turbinoplasty, DAT - Debrider assisted turbinoplasty)

Objective improvement (Table no.2) –
Muco-ciliary clearance measured by Saccharin transit time improves by both procedures but decreases in RAT group after 1 year. Nasal inspiratory peak flow increases in two sets of patients but decreased in Radiofrequency group after 6 months of the procedure.

Table No 2. Objective improvement

Parameter		Pre-op	Post-op 1 month	Post-op 6 months	Post-op 1 year	Post-op 2 year
Saccharin transit time (in minutes)	RAT	21.33 ±7.23	14.34±6.45	15.56±8.45	19.55±6.43	20.45±7.34
	DAT	20.45 ±8.22	14.25±7.67	13.45±6.34	13.49±7.34	14.05±6.44
Distance between anterior end of inferior turbinate and nasal septum (in millimeter)	RAT	4±.06	6±.07	5±.04	4±.04	4±.04
	DAT	4±.06	9±.07	8±.06	8±.06	8±.06
Nasal inspiratory peak flow metry	RAT	40	80	70	70	60
	DAT	40	90	110	120	120

(Pre-op – Preoperative, Post-op – Postoperative, RAT - Radiofrequency assisted turbinoplasty, DAT - Debrider assisted turbinoplasty)

Both the methods were also compared for operative time, blood loss during the procedure, hospital stay, complications etc.

- Debrider assisted turbinoplasty (DAT) took more time (average 24 mins against 08 mins) than Radiofrequency assisted turbinoplasty (RAT) and associated with a little more bleeding than the later one (25 ml vs. 5 ml).
- Crusting at puncture site of inferior turbinate in RAT and early postoperative bleeding in DAT are rare but observed complications.

Discussion-

Surgical intervention of hypertrophied inferior turbinate started long back. Destructive procedures eg. Complete or partial turbinectomy, submucosal diathermy with electrocautery, cryotherapy started producing good resulting. But hypertrophy of turbinates tends to recur after 3 weeks to 3 months. Even after partial or total turbinectomy the sense of nasal blockage still persisted. The discovery of airway sensory receptors on the superior and medial aspect of inferior turbinate mucosa leads to mucosa preserving techniques. Thus, the concept of "Infra-turbinal turbinoplasty" was proposed (1). Some authors also proposed a bit more aggressive overlying mucosal resection (2). But the importance of air sensing receptors leads to more mucosa preserving techniques leading to "Submucosal turbinoplasty" (3,4). In this technique a small vertical incision is made on the anterior part of inferior turbinate. A specially designed debrider blade is introduced through the incision and it runs between inferior bone and the medial mucosa. The rotating debrider removes the submucosal tissue without injuring the overlying mucosa. Among different mucosa preserving techniques, Radiofrequency assisted channeling and Debrider assisted turbinoplasty remain the mainstay of treatments. In radiofrequency energy is directed to the submucosal plan that leads to tissue charring. Tissue remodeling sets in later on leads to fibrosis and thus reduction in size of turbinate.

Introduction of debrider has revolutionized the process. In the debrider assisted technique, the inferior turbinate bone is debrided away keeping the superior and lateral mucosa intact. In radiofrequency assisted technique there will be oedema and tissue swelling leading to

further nasal obstruction.

The debrider assisted turbinoplasty can be done either by extraturbinal or intraturbinal described by Friedman et al (3). In this study debrider assisted turbinoplasty (DAT) was performed extraturbinally with preservation of overlying mucosa. Ahmed Hasan et al in their preliminary report suggested that extraturbinal technique is equal or better than intraturbinal technique in terms of operating time, complications and postoperative results (5). Chances of damage to overlying mucosa is more in intraturbinal technique than extra turbinal one.

During review of world literature, we found different studies regarding inferior tubinate reduction- its efficacy, complications and results. Kizilkaya et al performed DAT in one nostril and RAT in another nostril, found both methods to be equally effective in improving airway without compromising nasal mucociliary function with no significant difference between two techniques(6). Lee JY et al found that debrider assisted turbinoplasty scores better than radiofrequency both subjectively and rhinomanometrically(7). They also concluded that there is no difference in operating time, crusting etc. between two groups.

Chen YL et al in their study involving 120 children found microdebrider assisted technique is better than radiofrequency assisted turbinoplasty but lack objective criteria(8). Cingi C et al in their landmark study inferred debriber assisted turbinoplasty improved airway starting from 1st week and lasts even after 2 years, whereas radiofrequency showed improvement after 1-2 months of surgery and failed to show significant benefit after 1 year of follow-up(9). They used rhinomanometry for objective analysis and also postulated prolonged latent oedema in radiofrequency group for poorer outcome in long term follow up.

Nasal expiratory peak flowmetry was performed for assessment of nasal airway patency. Different studies have proved that nasal inspiratory/ expiratory peak flowmetry is a reliable, reproducible method to measure nasal airflow and correlates with rhinomanometry (10,11). Saccharin test was also employed to know the condition of mucociliary clearance before and after the surgery (13).

Conclusion-

Clinical Significance-

1. Inferior turbinoplasty is a common surgical procedure for inferior turbinate hypertrophy.
2. Radiofrequency assisted turbinoplasty and microdebrider assisted turbinoplasty are the two minimally invasive turbinoplasty procedure.
3. Debrider assisted turbinoplasty is better alternative among two methods of mucosa preserving turbinate reduction techniques.

Both the methods were useful in improving the nasal airway, though there were subtle differences that we conclude from this study-

- Debrider assisted turbinoplasty (DAT) took more time (average 24 mins against 08 mins) than Radiofrequency assisted turbinoplasty (RAT) and associated with little more bleeding than the later one (25 ml vs 5 ml). In debrider assisted group extraturbinal technique was employed and found to be more effective and easier than intraturbinal method.
- Muco-ciliary clearance measured by Saccharin transit time improves by both procedures but decreases in RAT group after 1 year.
- Nasal inspiratory peak flow increases in two sets of patients but decreased in Radiofrequency group after 6 months of the procedure.
- Crusting at puncture site of inferior turbinate in RAT and early postoperative bleeding in DAT are rare but observed complications.
- DAT gives more symptomatic benefit than RAT, mostly in long term follow up.
- DAT group had statistically significant improvement in relieving nasal obstruction in short term as well as long term follow up.
- Debrider assisted turbinoplasty relieves nasal obstruction starting from 1st week after surgery and persists even 2 years after follow-up.
- Radiofrequency assisted channeling relives symptom upto 3-6 months only to recur at 1 year.

So, debrider assisted turbinoplasty is better alternative among two methods of mucosa preserving turbinate reduction techniques.

Conflict of interest and financial disclosure- None

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