



PROSPECTIVE AND COMPARATIVE STUDIES IN THE SURGICAL TREATMENT MODALITIES OF HYPERTROPHIED INFERIOR TURBINATE

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ABSTRACT

Inferior turbinate hypertrophy is one of the major causes of nasal airway obstruction. Medical treatment often produces insufficient improvement. In these cases, surgical reduction of inferior turbinate can be proposed. As there are new and effective techniques like electrocautery, cryotherapy and radiofrequency ablation are currently available. The aim of our study is to prospectively evaluate the effectiveness of these three techniques by comparing the response of patients to these three surgical modalities of turbinates in size reduction. A total of 90 patients presenting with nasal obstruction with or without allergic symptoms, fulfilling the inclusion and exclusion criteria and attending ENT OPD are included in the study. A prospective study was conducted on three groups of thirty patients with symptoms and signs of nasal obstruction associated with inferior turbinate hypertrophy of more than 3 months duration. Then the percentage of subjective improvement in nasal airway is assessed post surgical treatment outcomes after 1 week later on 1, 3, 6, 9 and 12 months. At the end of 12 months, 56.6% of patients treated with electrocautery and 56.6% of patients treated with cryotherapy showed 75% improvement in nasal obstruction whereas 59.99% of patients treated with radiofrequency ablation showed 100% improvement. No statistical difference in the amount of improvement in nasal obstruction was noted between the three treatment groups at the end of 12 months as the total sample size was 90 patients only. But clinically with radiofrequency treatment showed better subjective improvement in nasal obstruction when compared to cryotherapy and electrocautery.

KEYWORDS : Nasal obstruction, Inferior turbinate hypertrophy, Turbinate reduction

Introduction

Nose acts as the entrance to the respiratory system and its main function is as an airway. The study is mainly focused on nasal obstruction, as this is a common problem in ENT practice. It has been reported that up to 25% of the population suffer from non-allergic nasal obstruction [1]. Nasal airflow disturbance occurs in about 30% of the population causing nasal obstruction and the most common cause being hypertrophied inferior turbinate. Nasal obstruction is a result of submucosal or mucosal hypertrophy due to increased vascularity as the anterior end of the inferior turbinate is an erectile tissue [2]. This point highlights one of the well-described deficiencies in treating the nasal obstruction.

Usually the hypertrophied inferior turbinates are treated with drugs like antihistamines, local decongestants and steroids. When the conservative management is not able to relieve the nasal obstruction completely, the surgical treatment is indicated.

At least 13 surgical techniques have been used over the past 130 years to correct the hypertrophy of the inferior turbinate. These include simple turbinate out-fracture; turbinoplasty techniques such as extramucosal destruction, and submucosal tissue removal, electrocautery, chemical cautery and extramural turbinate resection (partial or complete), radiofrequency, cryosurgery, laser and many more. The purpose of surgically reducing inferior turbinate should be to relieve nasal obstruction and maintain a good nasal health.[2]

Aims and objectives:

1. To prospectively evaluate the effectiveness of three techniques i.e., electrocautery, cryotherapy and radiofrequency by comparing the response of patients to these three surgical modalities of turbinate reduction.

Materials and Methods

This is a prospective interventional and comparative study conducted on 90 patients with symptoms and signs of nasal obstruction associated with inferior turbinate hypertrophy and fulfilling inclusion and exclusion criteria of the study between the month of February 2017 to June 2017, in the Department of

Otorhinolaryngology, Malla Reddy hospital, of MRIMS, Suraram, Hyderabad, India.

Inclusion criteria are minimum 3 months duration of

1. Nasal obstruction
2. Clinical findings of a significant inferior turbinate hypertrophy
3. Deviated nasal septum.

Exclusion criteria are

1. Active nasal or sinus infection
2. Nasal polyps
3. Gross deviated nasal septum causing near total obstruction,
4. Septal perforation
5. Bleeding disorders.

Patients are divided into three groups of thirty each with minimum age 14 years to maximum age 60 years.

1. Patients in group A underwent electrocautery of both inferior turbinates,
2. Patients in group B patients underwent cryotherapy of both inferior turbinates
3. Patients in group C patients underwent radiofrequency volumetric tissue reduction.

The electrocautery we used was monopolar cautery. Then the percentage of subjective improvement in nasal airway is used to assess treatment outcomes 1 week, 1, 3, 6, 9 and 12 months after surgery.

American academy of otolaryngology commissioned a study to develop a disease-specific outcomes instrument for nasal obstruction, known as the nasal obstruction symptom evaluation (NOSE) scale [3]. The nasal obstruction symptom evaluation scale (NOSE scale) is a valid, reliable and responsive instrument that is brief and easy to complete and has potential use for outcomes studies in adults with nasal obstruction [3].

Basing on NOSE scale we graded nasal obstruction of patients into mild, moderate and severe preoperatively. Because of the scoring

algorithm for each item, the range of raw scores on the final instrument was from 0 to 20. The instrument was then scaled to a total score of 0 to 100 by multiplying the raw score by 5. Because of item wording, a score of 0 means no problem with nasal obstruction and a score of 100 means the worst possible problems with nasal obstruction.

Postoperatively, percentage of subjective improvement in nasal airway was evaluated 7 days, 1, 3, 6, 9 and 12 months after surgery and the results are tabulated.

Nasal Obstruction Symptom Evaluation (NOSE) Instrument

Sl.no	Symptom	Not a problem	Mild	Moderate	Severe
1	Nasal stuffiness	0	1	2	3
2	Nasal blockage or obstruction	0	1	2	3
3	Trouble in breathing through the nose	0	1	2	3
4	Trouble in sleeping	0	1	2	3
5	Not able to get enough air through the nose during exercise or exertion	0	1	2	3

Ethical considerations:

Institutional ethical committee clearance was obtained to go head with the study .The informed consent was obtained from all the patients under study Explanation of the research activity was made to understand by each patient.

Statistical Analysis

The data was entered in Microsoft Excel Work Sheet and analyzed using proportions, descriptive approaches were used to evaluate the age and gender distribution.

Results

In our study, the minimum age is 14 years and maximum is 60 years. The highest incidence was found to be in the age of 20–29 years (40 %) followed by 30–39 years (23.33 %). 59.99 % are males and 40 % are females. The male to female ratio in our study is 1.5:1. 6% of patients presented with nasal obstruction along with symptoms of allergic rhinitis i.e., sneezes and watering from nose. 44.44 % of patients presented with nasal obstruction alone. 94.44% of patients presented with moderate nasal obstruction. 5.55 % of patients presented with severe nasal obstruction. 67.77 % of patients presented with symptoms for less than 1 year. 17.77 % of patients presented with symptoms for 1–2 years. Rest of them presented with symptoms for 2–5 years.

Post operative complications with electrocautery included crusting of nasal cavities in 60 % of patients, synechiae formation in 20 % of patients, bleeding in 9.99 % of patients and changes of early atrophic rhinitis in 9.99 % of patients. Post operative complications with cryotherapy included rhinorrhoea for 1 week after treatment which later subsided on itself in 23.33 % of patients. 9.99 % of patients treated with radiofrequency showed bleeding postoperatively. No other complications are seen in patients treated with radiofrequency.

Post operative complications with electrocautery

Sl.no	Type of complication	Percentage of incidence
1	Crusting of nasal cavities	60%
2	Synechiae formation	20%
3	Bleeding	9.99%
4	Early atrophic rhinitis	9.99%

Post operative complications with cryotherapy

Sl.no	Type of complication	Percentage of incidence
1	Rhinorrhoea	23.33%(subsided after 1 week with treatment)

Post operative complications with Radiofrequency

Sl.no	Type of complication	Percentage of incidence
1	Bleeding	9.99%

Percentage of improvement in patients after 1 year

Sl.no	Type of surgical modality	Percentage of improvement
1	Electrocautery(in 56.6%of patients)	75%
2	Cryotherapy(in 56.6% of patients)	75%
3	Radiofrequency(in 59.99% of patients)	100%

At the end of 12 months, 56.6 % of patients treated with electrocautery and 56.6 % of patients treated with cryotherapy showed 75 % improvement in nasal obstruction whereas 59.99 % of patients treated with radiofrequency showed 100 % improvement.

Discussion

Successful surgical treatment of inferior turbinates require reduction of tissue volume with preservation of mucociliary function. If too little tissue is removed, the obstruction persists. If mucociliary function is impaired, patients report crusting. In electrocautery there is damage to the surface mucosa resulting in loss of mucociliary function and thereby causing crusting. Radiofrequency achieves both goals by inducing a localized submucosal injury, resulting in fibrosis and tissue contraction while preserving the structure and function of overlying mucosa [4].

Many studies were done regarding various methods of treating hypertrophied inferior turbinate but there are very few studies for comparison of various methods of turbinate reduction. Meredith [5] reported that 31 % of 81 patients treated with both surface electrocautery and out fracture subjectively noted recurrence of nasal obstruction when followed for more than 33 months. Similarly, Warwick Brown and Marks [6] evaluated 307 patients who underwent submucosal diathermy with or without out fracture and noted that patient satisfaction with the procedure declined from 82 % at 1 month postoperatively to 41 % at 1 year. Edema and crusting after surface electrocautery has been shown to occur up to 3–6 weeks after treatment [5]. Avoidance of bony injury with appropriate needle placement is also important in preventing bone necrosis and sequestration.

Although cryotherapy is considered to have relatively low associated morbidity, the duration of results is variable and usually temporary, thus requiring repeated applications. Smith et al. [7] evaluated radiofrequency turbinate reduction for inferior turbinate hypertrophy with patients followed for 1 year. Improvement at 1 year was reported; however, the small sample size and the lack of stratification for confounding factors such as smoking and allergies have limited its acceptance. In this study of patients without confounding factors, radiofrequency provided sustained benefit with significant improvement in frequency of obstruction, severity of obstruction, and overall ability to breathe at 2 years. Radiofrequency turbinate reduction has similar, if not better, long term symptom relief than other common surgical treatments such as turbinectomy, submucosal turbinectomy, microdebrider, submucosal resection, cryotherapy, submucous electrocautery and laser treatment [8, 9].

Complications of treatment for inferior turbinate hypertrophy are common. For inferior turbinectomy, infection, crusting, bleeding, adhesions and perforation have been reported to occur up to 75 % of the time [10]. For submucosal resection using a microdebrider, bleeding, synechiae and mucosal tears occurred in 62 % of the patients reported [8]. Laser treatment resulted in crusting in upto 74 %, where as electrocautery was complicated by crusting and synechiae 63 % of times [9]. Submucosal resection had the lowest complication rate and highest subjective rating. However, the complication rate for this was still as high as 14 %, the most common problem being bleeding.

Radiofrequency turbinate reduction offers an efficient, gentle and function maintaining alternative to turbinoplasty. Though immediate relief of symptoms is generally very good with a good side effect profile, the long term improvement is poorer with turbinoplasty. Also symptoms of rhinorrhoea often persist because the procedure leaves a large amount of mucus producing tissue. There is chance of postoperative bleeding, pain and synechiae formation with turbinoplasty. There is also chance of over resection of the intratubal tissue, with insufficient turbinate left to humidify and warm the inspired air.

Radiofrequency turbinate reduction is an atraumatic method of cutting and coagulating soft tissue, without the post-op pain and tissue destruction of electrocautery. The cutting effect, known as electrosection, is performed without manual pressure or crushing tissue cells. It results from heat generated by the resistance the tissues offer to the passage of radiofrequency wave, which is applied with a fine wire called a surgical electrode. The heat disintegrates and volatilizes the cells in the path of the waves.

There are several transient side effects seen with radiofrequency turbinate reduction, including post procedural obstruction, which generally resolves with in the first week. Mild pain controlled with over the counter analgesics has also been reported (12 %). Numbness of the maxillary teeth is another reported transient side effect of radiofrequency turbinate reduction [11], but was not seen in our study.

All the three techniques i.e., electrocautery, cryotherapy and radiofrequency can be performed in an office based setting with minimal discomfort and reduced cost. But radiofrequency has decreased thermal insult to tissues and decreased post operative crusting when compared to electrocautery and laser techniques where temperatures of 800 °C are used. In radiofrequency we use temperatures around 60–90 °C. Lastly, a strong objective measure of successful treatment of inferior turbinate hypertrophy has not been defined.

Conclusion

Radiofrequency turbinate reduction is the best method of treatment when compared to electrocautery and cryotherapy because it most effectively maintains satisfactory nasal physiologic integrity without damaging nasal mucosa or underlying nerves. Hence we conclude that radiofrequency turbinate reduction is an effective treatment option in patients with nasal obstruction caused by inferior turbinate hypertrophy. Radiofrequency turbinate reduction for inferior turbinate hypertrophy results in greater symptom reduction as well as fewer complications than other surgical techniques i.e., electrocautery and cryotherapy and thus may be considered a new standard of care.

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