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Original Research Article

Inferior turbinectomy - outcome of various surgical modalities: a prospective study

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ABSTRACT

Background: Inferior turbinate hypertrophy is one of the major causes of nasal airway obstruction. Medical treatment often produces insufficient improvement. In these circumstances, surgical reduction of inferior turbinate can be proposed. Many different techniques are currently available. The aim of our study is to prospectively evaluate the effectiveness of three techniques i.e., electrocautery, cryotherapy and radio frequency by comparing the response of patients to these surgical modalities of turbinate reduction.
Methods: A total of 90 patients presenting with nasal obstruction with or without allergic symptoms, fulfilling the inclusion and exclusion criteria, 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 used to assess treatment outcomes 1 week, 1, 3, 6, 9 and 12 months after surgery.
Results: 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 radio frequency 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 because of relatively small sample size.
Conclusions: On this basis it is evident that clinically radio frequency 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 airway. Measurements of the nasal airway function have 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] The aetiology of nasal obstruction is diverse and not always intuitive. Although up to 42% of population may have some form of a septal deviation and compensatory turbinate hypertrophy, only a quarter of these patients may report symptoms of nasal obstruction.[2] This point highlights one of the well described deficiencies in treating nasal obstruction.

Chronic nasal airway obstruction is a common complaint that is often the result of hypertrophy of inferior turbinates. Treatment, either medical or surgical of the inferior turbinate is required in cases of turbinate hypertrophy where the goal of therapy is to maximise the nasal airway, to preserve nasal mucosal function and to minimize complications. Medical management includes antihistamines, sympathomimetics, anticholinergics and steroids. These medications provide symptomatic relief but no permanent cure. When optimal medical

management has been unsatisfactory in the relief of nasal obstruction, surgical intervention is warranted. Surgical turbinate reduction is either performed alone or as an adjunctive procedure during sinus surgery, septoplasty or rhinoplasty.

Turbinate surgery can be performed as an office procedure under local anaesthesia or in the operating room under general anaesthesia. There are multiple techniques of turbinate reduction like total or partial turbinate resection, out fracturing of inferior turbinate, electrocautery, submucous resection, cryosurgery, radio frequency turbinate reduction and laser surgery. Each has its own advantages, disadvantages and complications. In our study we have tried to prospectively assess the efficacy and compare the subjective outcomes of inferior turbinate reduction by three surgical techniques namely electrocautery, cryosurgery and radiofrequency.

METHODS

This is a prospective 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. Inclusion criteria are minimum 3 months duration of nasal obstruction combined with clinical findings of a significant inferior turbinate hypertrophy and mild deviated nasal septum is also included. Exclusion criteria are active nasal or sinus infection, nasal polyps, gross deviated nasal septum causing near total obstruction, septal perforation and bleeding disorders. Patients are divided in three groups of thirty each. Patients in group A underwent electrocautery of both inferior turbinates, group B patients underwent cryotherapy of both inferior turbinates and 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 of 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 outcome 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 scored 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 are tabulated (Table1).

Table 1: NOSE scale.

Symptom	Not a Problem	Mild problem	Moderate problem	Severe problem
Nasal stiffiness	0	1	2	3
Nasal blockage or obstruction	0	1	2	3
Trouble breathing through my nose	0	1	2	3
Trouble sleeping	0	1	2	3
Unable to get enough air during work	0	1	2	3

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 to 29 years (40%) followed by 30 to 39 years (23.33%) (Table 2). 59.99% are males and 40% are females. The male to female ratio in our study was found to be 1.5:1. 55.55% of patients presented with nasal obstruction along with symptoms of allergic rhinitis. 44.44% of patients presented with nasal obstruction alone.

Postoperative complications with electrocautery included crusting of nasal cavities in 60% of patients, synechiae formation in 20% of patients, bleeding in 9.9% of patients. No other complications were seen in patients treated with radio frequency.

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 59.99% of patients treated with radiofrequency showed 100% improvement (Table 3).

Table 2: Incidence of inferior turbinate hypertrophy according to age in the study participants.

Age group	Incidence (%)
20-29 years	40
30-39 years	23.33

Table 3: Mode of treatment (n =90).

Mode of treatment	Percentage of patients	Improvement in nasal obstruction
Electrocautery	56.6%	75%
Cryotherapy	56.6%	75%
Radiofrequency	75%	100%

DISCUSSION

Successful surgical treatment of inferior turbinates requires 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 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.[5] Similarly, Warwick Brown and Marks 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.[6] Edema and crusting after surface electrocautery has been shown to occur up to 3 to 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 evaluated radio frequency turbinate reduction for inferior turbinate hypertrophy with patients followed for 1 year.[7] Improvement at one 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, sub mucous electrosurgery and laser treatment.[8,9]

Complications of treatment for inferior turbinate hypertrophy are common (Table 4). For inferior turbinectomy, infection, crusting, bleeding, adhesions and perforation have been reported to occur 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%, whereas 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 tis was still as high as 14%, the most common problem being bleeding.

Table 4: Complications of treatment for inferior turbinate hypertrophy.

Procedure	Complication	Frequency (%)
Inferior turbinectomy	Infection, crusting, bleeding, adhesions and perforations	75
Turbinectomy with microdebrider	Bleeding, synechiae, mucosal tears	62
Electrocautery	Crusting and synechiae	63
Radiofrequency	Mild pain	12

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 also chance of over resection of the intraturbinal tissue, with insufficient turbinate left to humidify and warm the inspired air.

Radiofrequencly 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 tissue offer to the passage of radio frequency wave, which is applied with a fine wire called surgical electrode. The heat disintegrates and volatilises 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]

All the three techniques i.e. electrocautery, cryotherapy and radio frequency can be performed in an office based

setting with minimal discomfort and reduced cost. But radio frequency has decreased thermal insult to tissues and decreased postoperative crusting when compared to electrocautery and laser techniques where temperatures of 800 degree celsius are used. In radiofrequency we use temperatures around 60-90 degree celsius. 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 radio frequency turbinate reduction is an effective treatment option in patients with nasal obstruction caused by inferior turbinate hypertrophy. Radio frequency 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 as a new standard of care.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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