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ORIGINAL RESEARCH

Comparative study of coblation and partial turbinectomy in inferior turbinate reduction

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Abstract
The present study was being undertaken to evaluate and compare efficacy of coblation and partial turbinectomy. The present study included 50 patients with complaint of nasal obstruction with inferior turbinate hypertrophy on examination. Patients recruited in this study were divided into two groups of 25 patients each in both groups:

1. The patients who underwent coblation of inferior turbinate.
2. The patients who underwent partial turbinectomy of inferior turbinate.

The patients who underwent coblation of inferior turbinate were discharged on the day of the surgery. Patients who underwent partial turbinectomy of inferior turbinate were discharged usually after 48 hours. Patients were advised antibiotics and analgesics in both cases. Patients were then regularly evaluated at one week, one month, two month and three months after the procedure had been done.
Each group of patients were evaluated and compared both objectively and subjectively. In this study, better results in relieving the nasal obstruction is shown with Partial inferior turbinectomy than in coblation but subjectively patients improvement was same in both the groups after three months of follow up. So coblation being daycare surgery, fewer complication rate and also less postoperative care needed may be considered as better option the partial turbinectomy.
Keywords: coblation, partial turbinectomy, septal deformities.

Introduction

Nasal obstruction is one of the most common complaints an Otolaryngologist encounters during his/her medical practice. Chronic nasal obstruction impairs normal breathing, forcing patients to breathe through the mouth and thus often affects their daily activities. Possible causes are septal deformities, nasal valve pathologies or mucosal diseases such as allergic rhinitis, vasomotor rhinitis and other specific and nonspecific chronic rhino-sinusitis. One of the commonest reasons as a result of above pathologies leading to nasal obstruction is the enlarged inferior turbinate.
Hypertrophy of the inferior turbinate thus leads to an exponential increase in airway resistance and is one of the major causes of chronic nasal obstruction.[1]However, persistent inflammation, allergic reactions and exposure to various irritants may lead to chronic swelling of turbinates as a result of collagen deposition and mucous gland hyperplasia

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resulting in turbinate hypertrophy.[2] Nasal airway resistance studies have shown that selective decongestion of the inferior turbinate decreases airway resistance by up to two-third.[3]

Medical treatments in the form of topical nasal steroid sprays, systemic antihistamines, vasoconstrictors are usually the first line of treatment in these cases. [1] Some patients become unresponsive to the medical treatment because of atonic submucosal venous sinusoids or submucosal fibrosis and in such cases surgery is indicated for symptomatic relief.[2] The principle of surgery should be to decrease the patient complaint while preserving the function and anatomy of nasal passage.[4]

Various techniques have been described to reduce volume of mucosal and bony parts of inferior turbinate. Radiofrequency or high frequency tissue ablation, electrocaurty are new techniques for treatment of turbinate hypertrophy. These are electrosurgical techniques that use electricity to damage turbinate tissue, but they differ in control and delivery of energy.[5],[6],[7]

An ideal turbinate reduction procedure should have minimal discomfort or adverse effects and should be able to preserve the physiologic function of the turbinate such as regulation of humidification and temperature of inspired air.[8]

Radiofrequency volumetric reduction is a safe surgical procedure (Li et al, 1998). Most of electrosurgical products use heat driven processes to cut tissue but coblation based device use radiofrequency energy and operates at low temperature[9].

This technique yields significant improvement in nasal obstruction, low complication rates and is well tolerated by patient. Coblation shrinks submucosal tissue. The mucous membrane on surface of turbinate important for filtering and purifying air remains intact. For more severe case of hypertrophy of inferior turbinate, partial turbinectomy can be quite effective procedure. This will remove the mucosa from the anterior end and the bone with overlying mucosa from the accessible posterior end. To avoid post-operative roomy nasal cavity sufficient bulk is to be left.[10]

The present study was being undertaken to evaluate and compare efficacy of coblation and partial turbinectomy.

Material and methods

The present study included 50 patients with complaint of nasal obstruction with inferior turbinate hypertrophy on examination. The patient selection was done randomly. The patients were recruited in the study after an informed consent based on following inclusion and exclusion criteria and approval of ethical committee was taken.

Inferior turbinate hypertrophy was graded on anterior rhinoscopy and nasal endoscopy according to the Friedman grading system.

Grade I: The turbinate was defined as mild enlargement with no obvious obstruction.

Grade II: The turbinate was in between grade I and grade III.

Grade III: The turbinate completely occluded nasal cavity.

Study criteria

Inclusion

1. Age 18 to 50 years.
2. Either sex.
3. Patients who presented with symptoms of nasal obstruction due to inferior turbinate hypertrophy.
4. Patient having grade II-III inferior turbinate hypertrophy (Friedman classification).

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Exclusion

1. History of previous nasal surgery.
2. Nasal polyps and sinusitis.
3. Patients with systemic diseases like hypertension and/or diabetes.
4. Gross septal abnormality.
5. Patient having grade I inferior turbinate hypertrophy (Friedman classification).

Patients recruited in this study were divided into two groups of 25 patients each in both groups:

3. The patients who underwent coblation of inferior turbinate.
4. The patients who underwent partial turbinectomy of inferior turbinate.

The patients who underwent coblation of inferior turbinate were discharged on the day of the surgery. Patients who underwent partial turbinectomy of inferior turbinate were discharged usually after 48 hours. Patients were advised antibiotics and analgesics in both cases. Patients were then regularly evaluated at one week, one month, two month and three months after the procedure had been done.

Each group of patients were evaluated and compared both objectively and subjectively.

Nasal patency

The nasal patency was measured by the plate method (**Gertner et al**, **1984**)[11] pre-operatively and at follow ups of 1 week, 1 month, 2month and 3 months after the procedure. It was an objective method to measure nasal patency. The plate used was a chromium plated metallic plate 10 cm x 12 cm in size with a parting line dividing in two halves of 10 cm x 6 cm each. Concentric semicircles with a gap of 1 cm apart were present over the plate.

The plate was held horizontally beneath the nostril adjacent to columella. The patient was asked to breathe out through the nose quietly. The difference in temperature between expired air and plate led to condensation of vapours on cold metal plate. This caused fogging. The fogged area was calculated by the formula:

$$S = \pi \times \frac{\text{horizontal distance in cm}}{2} \times \frac{\text{vertical distance in cm}}{2}$$

Where S = fogged area

Preoperatively, the fogged area for right and left side was denoted as S_{xR} abd S_{xL} respectively, whereas, the total fogged area for both sides was denoted as S_x

Where $S_x = S_{xR} + S_{xL}$

The percentage improvement was also calculated from this data as under:

$$\frac{S_n - S_x}{S_x} \times 100$$

Where S_n is the total fogged area for both sides at each follow up at 1 week, 1 month, 2 months and 3 months postoperatively.

For each group the patients were reviewed for symptom scores by using Visual Analogue Scale (VAS). Subjective decrease in complaints (nasal obstruction, sneezing, rhinorrhoea, and headache) after the treatment, were calculated and compared.

The four main nasal symptoms i.e. nasal obstruction, sneezing, and rhinorrhoea, headache were assessed on a subjective VAS (Visual analogue scale) score as stated by the patient.

Visual analogue scale (VAS) was first of all described by Band and Pilonsky for post operative assessment of pain. This is 10 cm self rating scale. The scale stretches from 0 to 10 where 0 indicate worse symptom and 10 indicates complete freedom of symptoms. In this scale there are indefinite numbers of points between extremes thereby making assessment more corrective on subjective basis. On visual analogue scale symptoms are defined mild as

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0-3, moderate as >3-7 and severe as >7-10. It is regarded to be the most sensitive method for subjective assessment of symptoms.

Observations

In this study, the two techniques of inferior turbinate reduction in relieving the nasal obstruction were assessed and found most numbers of patients in age group of 21 – 30 years (42%) followed by 31 – 40 years (26%) (table 1) and males contributes to 74% and females 26% (fig 1).

In our observation, 46% of patients presented with duration of symptoms between 1 and 3 years whereas 10% of patients had duration < 1 year. All the patients taken up in this study had complaint of nasal obstruction (100%) out of which 23 (46%) cases have bilateral whereas 27 (54%) cases have unilateral nasal obstruction. Olfactory disturbance (hyposmia) was one of the presenting symptoms in 5 (10%) cases (fig 2).

In our report, The mean percentage improvement in area of vapor condensation in coblation (group I) at each follow-up was 29.87%, 33.08%, 36.92% and 31.41% respectively where as in partial turbinectomy, the mean area of vapor condensation had improved fairly well at first follow ups and also increased gradually through the rest of the post-operative follow-ups (fig 3).

According to our study, in group I (coblation), VAS mean rank value pre-operatively for nasal obstruction was 6.92 and mean rank value for nasal obstruction at each follow up was 4.68, 2.68, 1.68, and 1.44 at 1week, 1 month, 2 month and 3 months respectively. The percentage improvement in mean rank for nasal obstruction at each follow-up was 47.86%, 61.27%, 75.72% and 79.19% .

In group II (partial turbinectomy), VAS mean rank for nasal obstruction was 7.08 and mean rank value for nasal obstruction at each follow up was 3.44, 1.92, 1.24, .80 at 1week, 1 month, 2 months and 3 months respectively. The percentage improvement in mean rank at each follow-up was 51.41%, 72.88%, 82.48% and 88.70% respectively. As is obvious from table X, percentage improvement in mean rank was more in group II (partial turbinectomy) (table 2).

According to our study, in partial turbinectomy (groupII), intra-operative haemorrhage was seen in 3 cases and post-operative haemorrhage was seen in 2 cases. In all these cases, tight anterior nasal packing was sufficient to control bleeding. The anterior nasal packs were removed after 72 hours. Three patients had synechiae formation. This was excised and gel foam was kept, subsequently it healed without any further intervention. Four patients had complaint of crusting for which nasal douching was adviced.

In the patients operated for coblation (group I), intraoperative haemorrhage was seen in only one case. Tight anterior nasal packing had controlled the bleeding. Packs were removed after 72 hours. Synechiae and crusting was not seen in any of the patients.

Discussion

Nasal obstruction is probably the most common chronic presenting symptom encountered by otolaryngologists. The management of chronic nasal obstruction caused by inferior turbinate hypertrophy is far challenging.[12] Enlarged nasal turbinates can be result of either mucosal or bony hypertrophy, where surgery is usually reserved for bony abnormalities..[1]

Age Incidence

Age incidence in our analysis was higher in age group of 21-30 years (42%), followed by 26% were in age group of 31-40 years in concordance with Sharmila dhulipalla (2014) who had most of cases in age group in 20 – 40 years (63.33%)[13] and Shaib khan et al (2016) who had maximum number of cases in age group 17 – 35 years.[14].

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Gender incidence

In our review males (74%) as compared to females (26%) which was similar to Businco et al(2010) study who observed 67% males and 33% females [15] and Sajad Alhelo(2016) whose study showed 71.88% males and 28.13% females.[16]

Duration of Illness

According to our study, maximum patients (46%) presenting with duration between 1-3 years and 24% of patients had duration of disease more than 6 years where as 20% of patients presented with duration between 4-6 years and only 10% of patients had duration < 1 year.

Presenting Symptoms

In our study, all the patients complained of nasal obstruction followed by Postnasal discharge which was reported in 23 (46%) patients whereas irritation in nose was seen in 17 (34%) cases and hyposmia was one of the presenting symptoms in 5 (10%) patients (Table 3). Meredith GM (1988) reported nasal obstruction in 99% of cases, headache in 61% of cases, nasal discharge in 35% cases.[17]

Various Signs

In our study, inferior turbinate was hypertrophied whether unilateral or bilateral in all the cases. On anterior rhinoscopy, 23 (46%) patients had bilateral inferior turbinate hypertrophy while 27 (54%) patients had unilateral inferior turbinate hypertrophy.Nasal discharge was primarily clear in 38 (76%) while no nasal discharge present in 12 (24%) cases.

Group I (Coblation): The mean percentage in objective improvement in nasal patency in group I at 1 week, 1 month, 2 months and 3 months post-operatively comes out to be 29.87%, 33.08%, 36.92%, 31.41% respectively.

The mean rank percentage in subjective improvement in nasal patency in group I at 1 week, 1 month, 2 months and 3 months post-operatively comes out to be 47.86%, 61.27%, 75.72%, 79.19 respectively.

Lin HC et al (2003) analyzed the effect of radiofrequency on turbinate with 1 year follow up. The degree of nasal obstruction had changed on the visual analogue scale improvement of 63.9%.[18]

Bhattacharyya N et al (2003) determined the safety and clinical effectiveness of coblation inferior turbinate reduction for turbinate hypertrophy. At the 3-month interval, nasal obstruction was significantly decreased. These decreases remained statistically significant and slightly larger in magnitude at 6 months.[19]

SEJ Farmer et al (2009) determined post-operative visual analogue scales scores for nasal obstruction decreased significantly, both two weeks and three months after inferior turbinate coblation when compared to pre-operative values.[20]

Roje Z et al (2011) evaluated nasal breathing was significantly improved in all patients, decreasing VAS from median of 7 to 1.[21]

Group II (Partial Inferior Turbinectomy): The mean percentage objective improvement in nasal patency in group I at 1 week, 1 month,2 months and 3 months post-operatively comes out to be 44.5%, 48.47%, 57.67%, 58.47% respectively.

The mean rank percentage in subjective improvement in nasal patency in group I at 1 week, 1 month, 2 months and 3 months post-operatively comes out to be 51.41%, 72.88%, 82.48%, 88.70% respectively. .

It shows that in partial inferior turbinectomy, good number of cases had increased nasal patency at early follow ups and there was some increase in nasal patency in some of the cases at further follow ups.

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John Mathai (2004) analysed results of turbinectomy patients and found 98% of patients improved after surgery.[22]
Francesco-antonio salzano et al (2009) compared radiofrequency, high-frequency, electrocautery treatments vs partial Inferior turbinotomy .According to VAS score, partial turbinotomy patients experienced the most rapid and intense symptom relief. After only 1 week, these patients reported significant symptom improvement. Mean VAS score at 1 week for partial turbinotomy was 4.3 as compared to our study that was 3.44.[23]
Rai S et al (2013) found improvement in 94% cases at 1 month and 100% cases at 3 month in nasal obstruction after conventional partial turbinectomy.[24]
Vinay s bhat et al (2016) studied efficacy of partial turbinectomy in treatment of inferior turbinate hypertrophy found 80% improvement after surgery.[25]
The percentage improvement in mean area of vapour condensation on Gertner plate at 3 months in Coblation was 31.41% and Partial turbinectomy was 58.47%.The percentage improvement in VAS score mean rank in relief of nasal obstruction at 3 months with two surgical techniques was as follows: Coblation 79.19% and Partial turbinectomy 88.70%.
The efficacy in relieving nasal obstruction is better in Partial turbinectomy than in Coblation.

Complications

Complications like intra-operative and post-operative haemorrhage, synechiae formation and crusting reported on follow up of patients. In coblation intra-operative and post-operative haemorrhage occurs in 4% cases. In partial turbinectomy intra-operative haemorrhage in 12% cases and postoperative haemorrhage occurs in 8% cases. Synechiae and crusting reported only in partial turbinectomy in 12% and 16% patients respectively.
Bhattacharyya N et al (2003) studied clinical effectiveness of coblation in inferior turbinate reduction for inferior turbinate reduction and found post-operative epistaxis occurred in 2 of 24 (8.3%) of patients.[19]
Vinay S Bhat et al (2016) evaluated efficacy of partial inferior turbinectomy in the treatment of inferior turbinate hypertrophy found haemorrhage in 19% of patients, custing in 14% and synechaie in 16% of patients.[25]

Conclusions

In this study, better results in relieving the nasal obstruction is shown with Partial inferior turbinectomy than in coblation but subjectively patients improvement was same in both the groups after three months of follow up. So coblation being daycare surgery, fewer complication rate and also less postoperative care needed may be considered as better option the partial turbinectomy.

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