

Managing turbinate hypertrophy: coblation vs. radiofrequency treatment

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Abstract The role of inferior turbinate hypertrophy in the reduction of nasal airflow is well established. Although chronic nasal obstruction is not life-threatening, it significantly impairs patients' quality of life, affecting many aspects of daily activities; therefore, patients seek medical intervention. 40 patients were selected (27 males and 13 females) between 27 and 64 years of age with a symptom of nasal obstruction. The patients were divided in two groups: Group 1: coblation, 25 patients (18 males and 7 females); Group 2: radiofrequency, 15 patients (7 males and 6 females). These 40 patients were followed for 3 years. Patients were analyzed using both subjective and objective methods. The visual analog scale (VAS) subjective data and objective data including both active anterior rhinomanometry and acoustic rhinometry were recorded and analyzed. Data were collected pre-operatively and at 1 and 3 years post-operatively. According to our data, both coblation and radiofrequency turbinate reduction benefit patients with good results. The complications, found during the follow-up, are limited to minimal bleeding and crusting. Coblation and radiofrequency were significantly less painful than others procedures during the early post-operative period. In our study, both coblation and radiofrequency provide an improvement in nasal airflow with a reduction in nasal obstructive symptoms in the short term, but their efficacy tended to decrease within 3 years.

Keywords Coblation · Radiofrequency · Anterior active rhinomanometry · Acoustic rhinometry · Turbinate hypertrophy

Introduction

The role of inferior turbinate hypertrophy in causing a reduction of nasal airflow is well established. Although chronic nasal obstruction is not life-threatening, it impairs patients' quality of life in a significant way, affecting many aspects of their daily social and working activities [1, 2].

Perennial allergic rhinitis and non-allergic rhinitis are the most common non-infectious causes of inferior turbinate mucosal swelling, leading to a transient reduction of nasal airway patency. Many of these patients respond positively to medical treatment with a relief of symptoms. In some patients however, these nasal inflammatory processes result in chronic nasal airway obstruction due to dilatation of venous sinusoids or fibrosis, and as a consequence, medical therapy is not sufficient. In these cases, a surgical approach for the treatment of the enlarged inferior and, sometimes, middle turbinates become necessary [3]. In this study, we compared the long-term efficacy of 2 surgical techniques for turbinate reduction: coblation [4] and radiofrequency [5].

Materials and methods

We identified 40 patients (27 males and 13 females) between 27 and 64 years of age with the symptom of nasal airway obstruction.

A written consent approved by ethical committee was taken from each patient for diagnostic and therapeutic procedures.

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Each patient underwent a diagnostic protocol consisting of clinical history-taking, physical examination and ENT objective examination, including both anterior active rhinomanometry and acoustic rhinometry.

The exclusion criteria included the following: presence of infectious rhinitis, marked septal deviation, previous nasal surgery, nasal polyps or sinusitis contributing to the nasal airway obstruction, and other major nasal diseases.

We excluded patients with severe signs of nasal blockage, evaluated with $RAA > 1.5 \text{ Pa/cm}^3/\text{s}$ and/or $RA < 3 \text{ cm}^3$ [6].

The patients were divided in 2 groups:

- Group 1: coblation therapy, with 25 patients (18 males and 7 females).
- Group 2: radiofrequency therapy, with 15 patients (7 males and 6 females).

The 40 patients enrolled in the trial were followed for 3 years.

Patients were analyzed using both subjective and objective methods. The visual analog scale (VAS) subjective data and objective data including both Active Anterior Rhinomanometry and Acoustic Rhinometry were recorded and analyzed. Data were collected pre-operatively and at 1 and 3 years post-operatively.

The VAS was the average of three scores that each patient assigned to themselves which included values for three symptom parameters:

1. nasal airways obstruction
2. postnasal drip
3. rhinorrhea.

For every symptom parameter a patient could score ranging from 1 to 10.

For each symptom parameter data were collected pre-operatively and at 1 and 3 years post-operatively.

Post-operative complications such as crusting or bleeding were also recorded.

All patients were seen and treated at the ENT Department of the University Hospital of Siena, Italy. Both surgical procedures, Coblation and Radiofrequency were performed under local anesthesia.

The Coblation surgery was performed in accordance with a same operating procedure, performed by the same senior surgeon.

The patient was positioned supine with 30° of head elevation on the operating table. The topical anesthesia was administered by placing bupicain and adrenalin soaked gauze into each inferior meatus followed by three injection of 1 ml of 2 % lidocaine without adrenaline; the first into the head of the inferior turbinate, the second into its middle portion and the third one into the posterior portion.

The surgery was performed using a Coblator II surgery system and a ReFlex Ultra TM 45 wand (ArthroCare) set at power level four. The wand was activated and the anterior end of the inferior turbinate was pierced with the wand tip. The wand was then advanced submucosally, while still activated, to the second or third marker on the wand depending on the size of the turbinate, to create a tissue channel. Then second periods of activation were performed at each marker depth to create a series of 2 or 3 lesions, depending on the depth of insertion. A further one or 2 channels were created, depending on the size of the inferior turbinate [5].

Radio frequency surgery was performed with the same topical anesthesia used for coblation surgery. The total radio frequency dosage ranged between 1500 ± 200 Joules (300–359 Joules in each step) [4].

Results

The visual analog score (VAS), active anterior rhinomanometry and acoustic rhinometry pre- and post-operative values are presented in Tables 1, 2 and 3 and graphed in Figs. 1, 2 and 3.

Post-operative complications are recorded in Table 4.

Discussion

Surgical treatment for inferior turbinate hypertrophy is based on the assumption that by reducing the size of the inferior turbinate will result in an increase in nasal airway air flow volumes. Increased nasal air flow volumes result in an improvement (reduction) of the patients' symptoms.

Our Group 1 (coblations) and Group 2 (radio frequency) data demonstrate that the inferior turbinate size can be reduced successfully (reduction in patient's symptoms) with both therapeutic methods.

Compared to traditional methods utilization of either Coblation or radio frequency is less invasive. In fact, an "over aggressive" approach, such as turbinectomy although able to improve airway problems, may interfere with nasal physiology.

Table 1 VAS values

Treatment	Pre-operative	1 year	3 years
VAS			
Coblation	6.6	3.4	4.0
Radiofrequency	6.8	2.6	4.6

Table 2 Active anterior rhinomanometry values

Treatment	Pre-operative (Pa/cm ³ /s)	1 year (Pa/cm ³ /s)	3 years (Pa/cm ³ /s)
Active anterior rhinomanometry			
Coblation	1.23	0.41	0.55
Radiofrequency	1.21	0.38	0.56

Table 3 Acoustic rhinometry values

Treatment	Pre-operative (cm ³)	1 year (cm ³)	3 years (cm ³)
Acoustic rhinometry			
Coblation	3.8	7.7	5.6
Radiofrequency	4.1	7.9	6.2

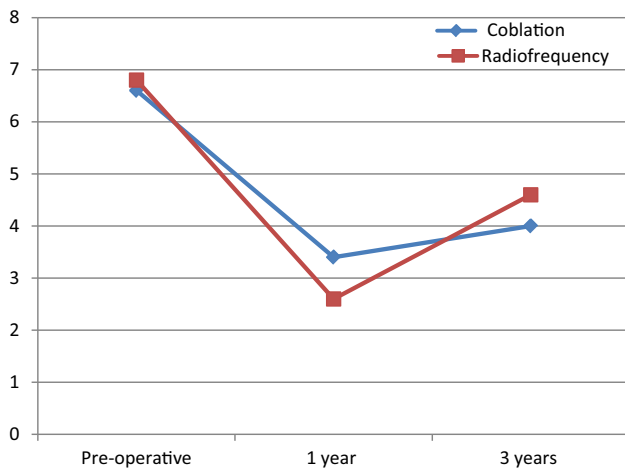


Fig. 1 VAS graphic representation

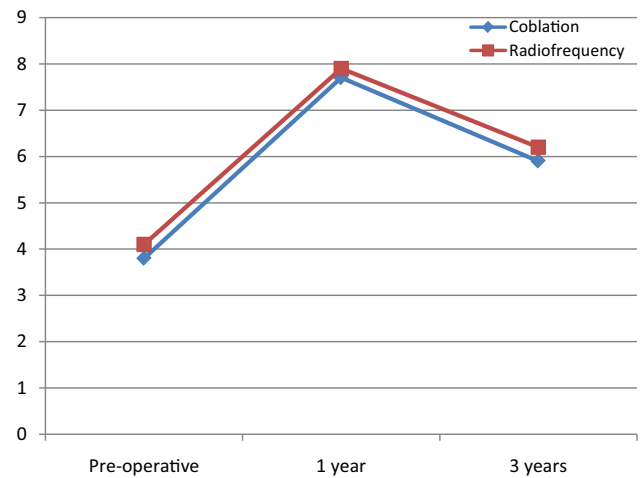


Fig. 3 Acoustic rhinometry values graphic representation

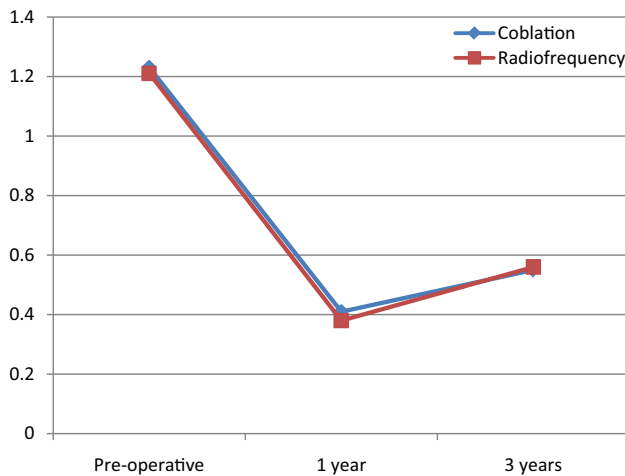


Fig. 2 Active anterior rhinomanometry values graphic representation

Table 4 Complications

Treatment	Crusting	Bleeding
Complications		
Coblation	1	1
Radiofrequency	1	2

operatively in only one patient which was returned to operation room to manage the bleeding by cauterization.

Both coblation and radio frequency provided only short-term benefits in both nasal resistance and nasal volume.

After 3 years of follow-up we recorded a decrease in nasal pressure of 45 % in Group 1 (coblation) and 47 % in Group 2 (radio frequency) compared to pre-operative levels measured by Active Anterior Rhinomanometry.

In addition, Acoustic Rhinometry demonstrated an increase of airway volume at 3 years follow-up of 47 % in Group 1 (coblation) and 51 % in the Group 2 (radio frequency) but it decreased with respect the 1 year of follow-up.

The complications, that occurred during the follow-up, are limited to bleeding (3 patients), and crusting (2 patients). Just an important bleeding occurred post-

We compared the results of this our current study using Coblation and Radiotherapy to reduce the inferior turbinate size to methods we used previously including:

1. Complete turbinectomy
2. Laser cauterly
3. Electrocauterly
4. Cryotherapy
5. Submucosal resection
6. Submucosal resection with lateral displacement

We noted that the VAS value at 1 year post-operatively in our current study is 3.4 for Group 1 (coblation) and 2.6 for Group 2 (radio frequency) while it varied between 1.7 (Submucosal resection and Submucosal resection with lateral displacement) and 3.5 (turbinectomy and laser cauterly) using the other methods. At the third post-operative year the VAS is 4 for Group 1 (coblation) and 4.6 for Group 2 (radio frequency), while the VAS varied between 1.7 (submucosal resection with lateral displacement) and 4.5 (cryotherapy) using the other methods.

The value of Active Anterior Rhinomanometry at first post-operative year in our study is 0.41 Pa/cm³/s for Group 1 (coblation) and 0.38 for Group 2 (radio frequency) while the Active Anterior Rhinomanometry ranged from 0.3 Pa/cm³/s (turbinectomy) to 0.8 Pa/cm³/s (electrocauterly) using the other methods. At the third year the Active Anterior rhinomanometry was 0.55 Pa/cm³/s for Group 1 (coblation) and 0.56 Pa/cm³/s Group 2 (radio frequency) while it varied between 0.45 Pa/cm³/s (turbinectomy and submucosal resection with lateral displacement) and 1.2 Pa/cm³/s (electrocauterly) using the other methods.

The value of acoustic rhinometry at the first year post-operatively in our study is 7.7 cm³ for Group 1 (coblation) and 7.9 cm³ Group 2 (radio frequency) and ranged between 8.5 cm³(electrocauterly) 12.5 cm³ (turbinectomy) using the other methods. At the third year acoustic rhinometry is 5.6 cm³ for Group 1 (coblation) 6.2 cm³, Group 2 (radio frequency) while it varied between 5.5 cm³ (electrocauterly) and 11.7 cm³ (turbinectomy) using the other methods.

All these values are summarized in Tables 5, 6 and 7 and graphed in Figs. 4, 5 and 6.

Conclusions

These findings allow to conclude that the surgical approach to inferior turbinate hypertrophy should be limited to the erectile submucosal tissue. We think that the surgical maneuvers performed in the turbinate submucosal tissues will create scars that are able to minimize the submucosal engorgement in patients with allergic rhinitis. The preservation of the nasal mucosa will minimize interference with

Table 5 VAS values

Treatment	1st year	3rd year
Turbinectomy	3.5	3.7
Laser cauterly	3.5	3
Electrocauterly	3.3	4.3
Cryotherapy	3.3	4.5
Submucosal resection	1.7	2
Submucosal resection with lateral displacement	1.7	1.7
Coblation	3.4	4
Radiofrequency	2.6	4.6

Table 6 Values of active anterior rhinomanometry (Pa/cm³/s)

Treatment	1st year	3rd year
Turbinectomy	0.30	0.45
Laser cauterly	0.50	0.50
Electrocauterly	0.80	1.20
Cryotherapy	0.60	0.90
Submucosal resection	0.45	0.50
Submucosal resection with lateral displacement	0.45	0.45
Coblation	0.41	0.55
Radiofrequency	0.38	0.56

Table 7 Values of acoustic rhinometry (cm³)

Treatment	1st year	3rd year
Turbinectomy	12.5	11.7
Laser cauterly	10.4	8.1
Electrocauterly	8.5	5.5
Cryotherapy	9.3	5.7
Submucosal resection	12.4	11.3
Submucosal resection with lateral displacement	11.5	11.1
Coblation	7.7	5.6
Radiofrequency	7.9	6.2

the respiratory, olfactory and defensive physiological activities of the nose.

In our current study both coblation and radiotherapy provided improvement (decreased) in obstructive nasal airway symptoms and nasal airflow improved in the short term at 1 year but with the passage of time at 3 years after surgery there was a progressive decline (Figs. 4, 5, 6).

Probably 6 years after surgery functional results will change as already happen using other techniques [3]. Other studies [7–9] indicated that submucosal resection with

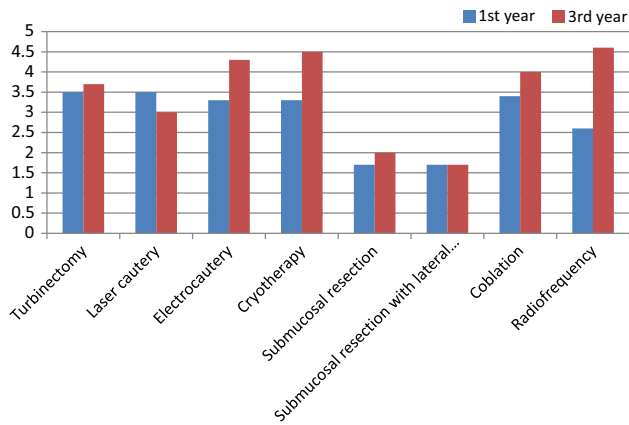


Fig. 4 VAS graphic representation

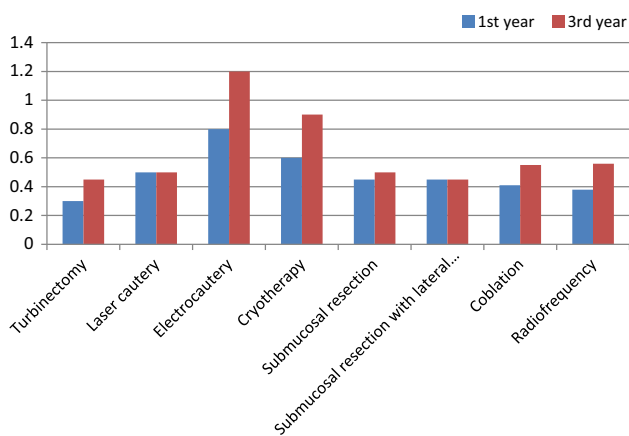


Fig. 5 Graphic representation of active anterior rhinomanometry values (Pa/cm³/s)

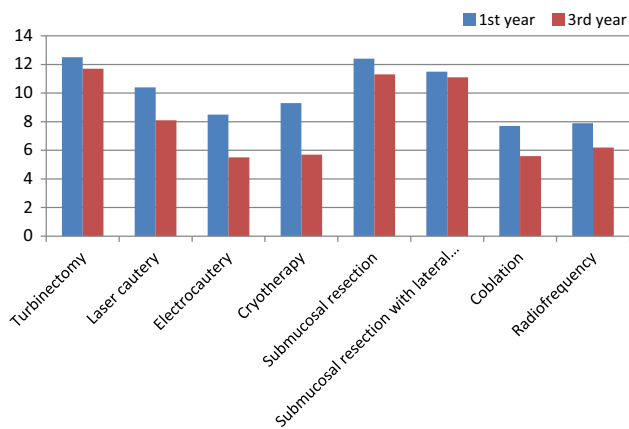


Fig. 6 Graphic representation of acoustic rhinometry values (cm³)

lateral displacement of the inferior turbinate results in the greatest increases in airflow with improvement of nasal respiratory function.

It is clear from our experience with all of the various surgical procedures that Group 1 (coblation) and Group 2 (radio frequency) were significantly less painful than others procedure during the early post-operative period. Cobaltion and radio frequency were technically easier to perform but their benefits tend to decrease within 3 years of the initial procedure.

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