Clinical effectiveness of coblation inferior turbinate reduction

NEIL BHATTACHARYYA, MD, and LYNN J. KEPNES, RNP, Boston, Massachusetts

OBJECTIVE: We sought to determine the safety and clinical effectiveness of coblation (short for "cold ablation") inferior turbinate reduction for turbinate hypertrophy.

METHODS: A consecutive series of adult patients with inferior turbinate hypertrophy were treated with the coblation technique in the office setting. Subjective symptoms were assessed prior to treatment and at the 3- and 6-month intervals after treatment with the Rhinosinusitis Symptom Inventory (RSI) and a short nasal symptom questionnaire.

RESULTS: Twenty-four of 26 treated patients completed the protocol. At the 3-month follow-up, statistically significant decreases in the nasal and overall symptom domains of the RSI were noted (changes of −10.5 and −8.7, with $P = 0.018$ and $P = 0.015$, respectively). These improvements were also significant at the 6-month follow-up (−20.1 and −15.8 with, $P < 0.001$ and $P < 0.001$, respectively). At the 3-month interval, nasal obstruction and amount of time with nasal obstruction were significantly decreased ($P = 0.006$ and $P = 0.011$, respectively). These decreases remained statistically significant and slightly larger in magnitude at 6 months ($P = 0.001$ and $P = 0.006$, respectively). Postoperative epistaxis occurred in 2 of 24 (8.3%) of patients.

CONCLUSION: Coblation inferior turbinate reduction is an effective procedure for inferior turbinate hypertrophy. The clinical benefit persists at 6 months after the procedure. (Otolaryngol Head Neck Surg 2003;129:365-71.)

From the Division of Otolaryngology, Brigham and Women's Hospital, and the Department of Otology and Laryngology, Harvard Medical School.

This study was funded by an unrestricted grant from Arthrocare Corp and the Brigham Surgical Group Foundation. The study design, conduct, and reporting are independent of funding sources. The authors have no financial relationships with the makers of the Coblation system.

Reprint requests: Neil Bhattacharyya, MD, FACS, Division of Otolaryngology, 333 Longwood Ave, Boston, MA 02115; e-mail, neiloy@massmed.org.

0194-5998/2003/$30.00 + 0
doi:10.1016/S0194-5998(03)00634-X

Chronic rhinitis is an extremely common clinical condition, affecting an estimated 20 million Americans. Medical expenses for the treatment of chronic rhinitis approximate more than $2 billion annually.[1] One of the most symptomatic manifestations of chronic rhinitis is inferior turbinate hypertrophy leading to nasal congestion and nasal obstruction. Often, these obstructive symptoms are among the most bothersome symptoms for patients with chronic rhinitis.

Traditional conservative therapy for turbinate hypertrophy includes topical nasal steroid sprays, oral antihistamines, and systemic decongestants. When these conservative measures fail to provide adequate relief, surgical reduction of the inferior turbinates may be considered. Many methods exist for turbinate reduction, including submucosal cautery, laser turbinate reduction, radiofrequency turbinate reduction, and turbinate excision. We report 6-month results for a relatively new method of office-based inferior turbinate reduction with respect to its technique, complications, and clinical outcomes.

METHODS

A consecutive series of adult patients (aged ≥18 years) with medically refractory nasal obstruction due to soft tissue (as opposed to bony) inferior turbinate hypertrophy was prospectively evaluated in this clinical trial. The diagnosis of nasal obstruction due to inferior turbinate hypertrophy was based on the clinical symptoms and endoscopic findings; radiographic and rhinometric diagnoses were not pursued. All patients had previously undergone medical therapy with one or more antihistamines, topical nasal steroids, and/or systemic decongestants. Patients were excluded if there was evidence of concurrent chronic rhinosinusitis, sinonasal polyposis, or substantial septal deviation. This study was approved by our hospital's institutional review board, and informed consent was obtained from each patient before enrollment.

Name _____ Date of birth _____

Today's date _____

Please rate the following individual items based on your AVERAGE symptoms over the previous 12 WEEKS. Symptoms that are not present or have been present for less than 12 weeks should be scored as 0. Please circle the appropriate number.

	Absent	Very Mild	Mild	Moderate	Severe	Very Severe
Facial pain/pressure	0	1	2	3	4	5
Facial congestion/fullness	0	1	2	3	4	5
Nasal obstruction/blockage	0	1	2	3	4	5
Discolored or pus nasal discharge or post nasal drip	0	1	2	3	4	5
Decreased sense of smell	0	1	2	3	4	5
Headache	0	1	2	3	4	5
Fevers	0	1	2	3	4	5
Halitosis (bad breath)	0	1	2	3	4	5
Fatigue (tiredness)	0	1	2	3	4	5
Dental pain	0	1	2	3	4	5
Cough	0	1	2	3	4	5
Ear pain/pressure/fullness	0	1	2	3	4	5

Please estimate your medication use as indicated below based on your care for the last 12 months

Nasal Steroid Sprays (Vancenase, Beconase, Nasonex, Nasacort, Flonase, etc)

I currently use these medications Y N

I used these medications for a total of [ ] weeks in the last 12 months

Anti-histamines (Allegra, Claritin, Zyrtec, etc)

I currently use these medications Y N

I used these medications for a total of [ ] weeks in the last 12 months

Antibiotics

Number of courses in last 12 months [ ] courses

I spent a total of [ ] weeks on antibiotics in the last 12 months

My longest course of antibiotics lasted [ ] days

Please comment on how the nasal problem has affected your recent work and social status as listed below

In the last 12 months, I missed a total of [ ] days of work/school due to nasal problems

In the last 12 months, I did not leave home for [ ] days due to my nasal problems

In the last 12 months, I visited a doctor or nurse [ ] times for my nasal problems

In the last 12 months, I had [ ] acute infections of my nose/sinuses

Rhinosinusitis Symptom Inventory form (©1999, Neil Bhattacharyya, M.D.)

Fig 1. The Rhinosinusitis Symptom Inventory (RSI).

Before treatment, each patient completed the Rhinosinusitis Symptom Inventory (RSI), which catalogs sinonasal symptoms, medication use, and economic impact of nasal disorders[2] (Fig 1). In addition, patients completed a short-form nasal symptom questionnaire measuring nasal obstruction, amount of time with nasal obstruction, nasal stuffiness, excess mucus production, postnasal

	Question Item (Circle response)	Absent	Mild	Moderate	Severe	Very Severe
1	I would rate my degree of nasal obstruction as:	1	2	3	4	5
2	I would rate the amount of time that my nose is obstructed/blocked as:	1	2	3	4	5
3	I would rate my nasal stuffiness/congestion as:	1	2	3	4	5
4	The amount of mucus that drains from the front of my nose is:	1	2	3	4	5
5	My postnasal drip is:	1	2	3	4	5
6	When sleeping, my snoring is characterized as	1	2	3	4	5
7	Overall, my nasal symptoms would be characterized as:	1	2	3	4	5

Fig 2. Short form nasal questionnaire.

drip, scoring, and overall nasal symptoms with a 5-point Likert scale (Fig 2). These served as baseline measures of nasal symptomatology.

Each patient then underwent office-based cold ablation inferior turbinate reduction, as previously described.[3] Briefly, the anterior nasal cavity was topically anesthetized with cotton pledgets soaked with Cetacaine spray. Each anterior inferior turbinate was infiltrated with 2.5 mL of 1% lidocaine followed by left and right piriform aperture infiltrations with 2.0 mL of 1% lidocaine. The bipolar cold ablation wand was coated with electrolyte gel, and under direct vision, 2 or 3 passes were made into the anterior third of each inferior turbinate. The number and depth of passes were determined by the preoperative turbinate size and visual shrinkage during the procedure. Any persistent bleeding was handled with the placement of thin cotton pledgets. Patients were discharged home with instructions and acetaminophen with codeine for pain. Follow-up visits were conducted at 2 weeks, 3 months, and 6 months. At the 2-week appointment, debridement of the inferior turbinate was performed, if necessary. In addition, complications occurring during the first 2 weeks after the procedure such as excessive nasal crusting, nasal cavity dryness, or epistaxis were also assessed. At the 3- and 6-month visits, patients again completed the RSI and the short-form nasal questionnaire to determine the subjective response to therapy.

Statistical analysis was then performed. Survey data for both the RSI and the short nasal questionnaire were tabulated in spreadsheet format. Symptom domains for the RSI were computed as previously reported.[2] The facial symptom domain is computed from a simple average of scores for facial pain/pressure, facial congestion/fullness, and headache symptoms, scaled from 0 to 100. The nasal symptom domain (nasal obstruction/blockage, nasal discharge, and decreased sense of smell), oropharyngeal symptom domain (halitosis, dental pain, cough, and ear pain), and systemic symptom domain (fever and fatigue) are calculated similarly. Data were imported into SPSS version 10.0 (Chicago, IL). Comparisons for the 3- and 6-month scores to the baseline scores were conducted with the Wilcoxon signed rank test with significance set at $P = 0.05$.

RESULTS

Twenty-six adult patients (10 men and 16 women) with a mean age of 45.5 years (range, 18 to 73 years) were prospectively enrolled in this trial. One patient was lost to follow-up, and 1 patient declined to complete the 3- and 6-month follow-up questionnaires and was excluded. Therefore, 24 adult patients completed the study protocol. The baseline symptom scores for the domains of the RSI and for the short-form nasal questionnaire are depicted in Table 1.

Otolaryngology–
Head and Neck Surgery
October 2003

Table 1. Symptom score changes at 3 and 6 months after inferior turbinate reduction

Variable	Baseline mean	Change at 3 mo	P‡	Change at 6 mo	P
RSI domains*					
Facial	30.4	−11.2	0.063	−17.2	**<0.001**
Nasal	40.3	−10.5	**0.018**	−20.1	**<0.001**
Oropharyngeal	22.5	−4.3	0.332	−12.2	**0.004**
Systemic	22.5	−7.3	**0.031**	−12.6	**0.001**
Overall	28.5	−8.7	**0.015**	−15.8	**<0.001**
Nasal questionnaire†					
Nasal obstruction	3.4	−1.1	**0.006**	−1.5	**0.001**
Amount of time obstructed	3.5	−1.1	**0.011**	−1.2	**0.006**
Nasal stuffiness	3.0	−0.6	0.103	−0.8	**0.011**
Mucus production	2.1	−0.2	0.318	−0.3	0.279
Postnasal discharge	2.3	−0.4	0.143	−0.5	0.178
Snoring	2.8	−0.4	0.187	−0.5	0.122
Overall nasal symptoms	3.5	**−1.1**	**0.004**	−1.2	**0.004**

*Domain scores range from 0 (no symptoms) to 100 (maximum symptoms)
†Likert scale from 1 (no symptom) to 5 (severe or maximum symptom)
‡Boldface indicates statistical significance at $P < 0.05$.

Patients tolerated the procedure well. Sixteen patients did not use any pain medication at all, 3 patients used acetaminophen or nonsteroidal drugs alone, and 5 patients used acetaminophen with codeine or oxycodone for pain. Two (8.3%) patients reported significant epistaxis after the procedure, with 1 requiring 24 hours of anterior nasal packing. Crusting was noted in 4 patients (16.7%) at the 2-week follow-up visit and was confined to the head of the inferior turbinate. No patients had crusting at the 3- or 6-month follow-up visits.

On average, patients reported significant benefit from the coblation (short for "cold ablation") inferior turbinate reduction procedure. At the 3-month follow-up interval, significant reductions in RSI symptom domains (Table 1) were reported, and these were statistically significant for nasal symptoms, systemic symptoms, and overall sinonasal symptoms. With respect to individual nasal symptoms, statistically significant reductions in nasal obstruction and amount of time with nasal obstruction were observed. Overall nasal symptoms were also reduced at the 3-month interval with coblation.

At the 6-month time interval after treatment, further reductions in RSI symptom domains scores were observed (Table 1). Statistically significant reductions in all of the RSI symptom domains were noted. With respect to individual nasal symptoms, decreases in nasal obstruction and amount of time with nasal obstruction remained statistically significant. Additional statistically significant decreases in nasal stuffiness and overall nasal symptoms were observed. We failed to find any statistically significant improvement in mucus production, postnasal discharge, or snoring at the 6-month interval. Figures 2 and 3 graphically display the response to treatment at the 3- and 6-month time intervals for the RSI domains and individual nasal symptoms. In terms of overall success in the reduction of nasal obstruction, at 3 months, 75% of patients reported improvement in nasal breathing, whereas at 6 months, 85% of patients reported improvement in nasal breathing.

DISCUSSION

The ideal method of inferior turbinate reduction would be performed in the office setting under local anesthesia, would require minimal postoperative care, would preserve the mucosal and glandular architecture of the turbinate, and would be clinically effective. Additional desirable features include repeatability if turbinate hypertrophy recurs and the option of performing the procedure in the operating room setting, if necessary. Many methods of turbinate reduction have been proponed over the years. There is a general consensus in the literature that submucosal techniques have advantages in terms of preserving overall nasal

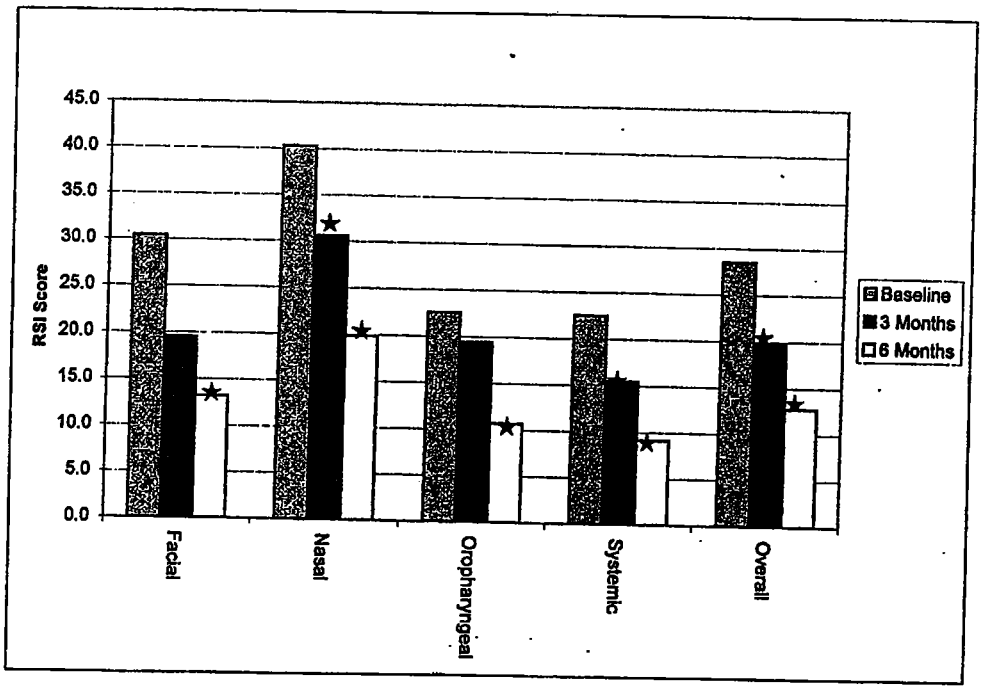

Fig 3. Rhinosinusitis symptom domains before and after inferior turbinate coblation.

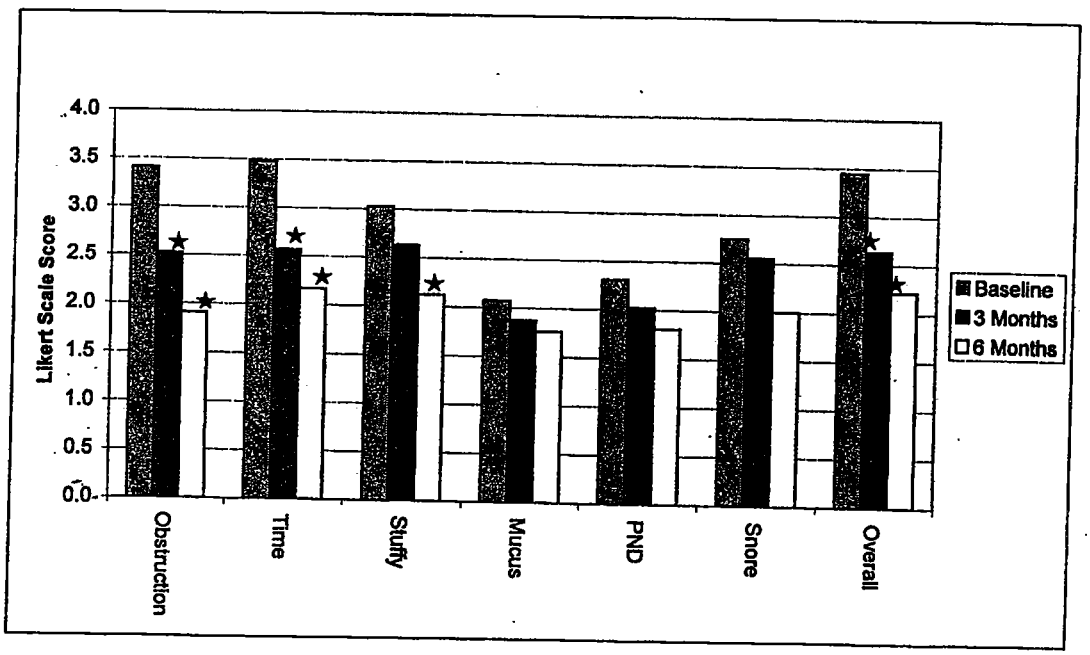

Fig 4. Individual nasal symptoms before and after inferior turbinate coblation. (PND, postnasal discharge)

physiology and thus are preferred to turbinectomy or surface techniques.[4,5]

Coblation (short for "cold ablation") uses a plasma field created by radiofrequency current generated between bipolar electrodes to ablate soft tissues. In addition, after some of the tissue has been vaporized, a thermal lesion remains. This thermal lesion produces additional soft tissue attenuation and contracture that progress with time. As this technique only serves to

decrease soft tissue volumes, it is not appropriate for patients with primarily bony turbinate hypertrophy; such patients may be better served by formal submucous resection of the turbinate. One disadvantage of the coblation technique is that patients occasionally feel the thermal effect during deeper or more posterior turbinate reductions; anesthesia into the piriform aperture has lessened this undesired consequence. Patients with extremely narrow piriform apertures may also be practically difficult to treat with this technique. One notable advantage of the coblation technique is the brevity of the procedure. After adequate anesthesia, the aggregate series of passes for the coblation probe into the turbinate take only a total of 20 to 30 seconds to complete per side. We believe that this lessens the patients' anxiety during the procedure.

The clinical effectiveness of temperature-controlled radiofrequency inferior turbinate reduction has been well studied. Li and associates[6] reported excellent results with this technique in a series of 22 patients with inferior turbinate hypertrophy. Substantial decreases in the degree of nasal obstruction and time with nasal obstruction were noted; snoring scores also seemed to decrease substantially with this technique. However, follow-up in that pilot study was limited to 8 weeks. Utley et al[7] also reported excellent results in 10 patients with 8-week follow-up for radiofrequency inferior turbinate reduction using 2 lesions per turbinate and a longer needle. Friedman and associates[8] reported on a large series of patients treated with submucous resection of the inferior turbinates with the microdebrider and found it to be a safe and effective alternative technique for inferior turbinate reduction.

Unfortunately, much of the data on surgical outcomes for inferior turbinate reduction are limited to 4- to 8-week follow-up periods.[8-10] In general, patients are more likely to ascribe a treatment effect to a procedure the closer the follow-up assessment is to the procedure. Furthermore, short follow-up periods do not take into account seasonal variability in rhinitis symptoms and may fail to identify patients with recurrent turbinate hypertrophy after an initially good short-term response to the procedure. Hence, it is important to assess longer-term outcomes for any turbinate reduction procedure.

The current study was specifically designed to examine 3- and 6-month response to therapy to determine if the coblation procedure produced durable outcomes for improvement in nasal symptoms. We believe that that use of 3- and 6-month follow-up assessments provides a more realistic standard with which to determine treatment effectiveness for procedures for inferior turbinate hypertrophy. Patients expect a long-term response to treatment that lasts through several changes of seasons and are often disappointed when their nasal obstructive symptoms recur. Other authors have examined the long-term success of argon beam inferior turbinate reduction and identified a persistent, long-lasting benefit from argon beam inferior turbinate reduction at a mean follow-up of 12 months.[11] Our results also indicate that benefits from successful inferior turbinate reduction are likely to be durable for 6 months for many patients with the coblation technique. As further refinements with this technique occur, we believe that it will be a very suitable method for office-based inferior turbinate reduction.

CONCLUSIONS

The coblation technique for inferior turbinate reduction yields good clinical results that persist several months after treatment. Postoperative epistaxis occurred in 8% of patients. Our results indicate that the coblation technique is safe and effective for office-based inferior turbinate reduction.

REFERENCES

1. Ray NF, Baraniak JN, Thamer M, et al. Direct expenditures for the treatment of allergic rhinoconjunctivitis in 1996, including the contributions of related airway illnesses. J Allergy Clin Immunol 1999;103:401-7.
2. Bhattacharyya N. The economic burden and symptom manifestations of chronic rhinosinusitis. Am J Rhinol 2003;17:27-32.
3. Bhattacharyya N, Kepnes LJ. Bipolar radiofrequency cold coblation turbinate reduction for obstructive inferior turbinate hypertrophy. Otolaryngol Head Neck Surg.
4. Hol MK, Huizing EH. Treatment of inferior turbinate pathology: a review and critical evaluation of the different techniques. Rhinology 2000;38:157-66.
5. Passali D, Lauriello M, Anselmi M, et al. Treatment of hypertrophy of the inferior turbinate: long-term results in 382 patients randomly assigned to therapy. Ann Otol Rhinol Laryngol 1999;108:569-75.

6. Li KK, Powell NB, Riley RW, et al. Radiofrequency volumetric tissue reduction for treatment of turbinate hypertrophy: a pilot study. Otolaryngol Head Neck Surg 1998;119:569-73.
7. Utley DS, Goode RL, Hakim I. Radiofrequency energy tissue ablation for the treatment of nasal obstruction secondary to turbinate hypertrophy. Laryngoscope 1999; 109:683-6.
8. Friedman M, Tanyeri H, Lim J, et al. A safe, alternative technique for inferior turbinate reduction. Laryngoscope 1999;109:1834-7.
9. Powell NB, Zonato AI, Weaver EM, et al. Radiofrequency treatment of turbinate hypertrophy in subjects using continuous positive airway pressure: a randomized, double-blind, placebo-controlled clinical pilot trial. Laryngoscope 2001;111:1783-90.
10. Rhee CS, Kim DY, Won TB, et al. Changes of nasal function after temperature-controlled radiofrequency tissue volume reduction for the turbinate. Laryngoscope 2001;111:153-8.
11. Bergler WF, Sadick H, Hammerschmitt N, et al. Long-term results of inferior turbinate reduction with argon plasma coagulation. Laryngoscope 2001;111: 1593-8.