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Bilateral inferior turbinoplasty in chronic nasal obstruction*

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SUMMARY

Bilateral inferior turbinoplasty was performed in cases of chronic nasal obstruction, in which conservative treatment had failed. Forty-five patients without significant septal deviation and with chronic nasal obstruction were objectively evaluated by acoustic rhinometry (AR) before and 3-6 months after turbinoplasty, in order to assess the changes of the dimensions of the nasal cavity obtained. Mucosal turbinate hypertrophy (defined objectively by AR) was present in 76% of the cases. Satisfactory subjective nasal patency was achieved in 93% of patients. Turbinoplasty resulted in an increase of 22% at the minimum cross-sectional area, 37% at the cross-sectional area 3.3 cm from the nostrils, and 47% at the cross-sectional area 4.0 cm from the nostrils. The increase was not related to the subjective result of the operation. Tendency to crusting and to vasomotor symptoms were related to unsatisfactory results. No crusting or bleeding were observed.

Key words: turbinates, nasal obstruction, turbinoplasty, acoustic rhinometry

INTRODUCTION

Hypertrophy of the turbinates may be a compensatory change due to long-standing pronounced septal deviation (Grymer et al., 1993). It may be caused by concha bullosa or polypoid mucosal transformation, or it may follow long-standing allergic or vasomotor rhinitis. Frequently, no single cause for the condition can be demonstrated, or there is a combination of several factors, e.g. a co-existing slight septal deviation or a slightly collapsing ala nasi. In these cases, local steroids are the first choice of treatment. Nevertheless, the effect of conservative treatment is variable (Scadding et al., 1992) and reduction of the inferior turbinates may be the next step of treatment. There are different surgical techniques for reduction of the inferior turbinates. One of them, inferior turbinoplasty, has been used by our group for several years. It was originally introduced by Freer (1911), and later Mabry (1982, 1988) showed its consistent long-term results and lack of adverse effects. However, no studies have been done to demonstrate objectively the effect of turbinate reduction.

In this study we objectify, by acoustic rhinometry, the effect of inferior turbinoplasty upon the dimensions of the nasal cavity and analyze the some of the factors of importance for the success or failure of turbinoplasty.

MATERIAL AND METHODS

Forty-five patients, 33 males and 12 females, aged between 18 and 74 years (mean: 38 years) were included in the study. All patients complained of chronic nasal obstruction. They had all been treated by local steroids and 12 patients had received cryosurgery or electro-cauterization of the inferior turbinates before, without satisfactory result.

The nasal symptoms were recorded by a questionnaire preoperatively and 3–6 months after the operation. Rhinoscopy was done in order to establish septal problems, the appearance of the turbinates, and to examine the middle meatus.

Acoustic rhinometry (Hilberg et al., 1989) was performed after the patient had been seated for 30 min. The examination was done before and at least 10 min after decongestion of the nose with xylometazoline spray. The single-impulse method was used with cylindrical nose adaptors of two different sizes. Three alternating measurements from each side were done before and after decongestion. The minimum cross-sectional area (MCA), the cross-sectional areas at 3.3 cm (CA-3.3) and 4.0 cm (CA-4.0) from the nostrils were determined.

The difference between the cross-sectional area before and after decongestion at the same distance from the nostril – which represent the gain in nasal space obtained by the decongestion – was considered to reflect the reactivity to decongestion of the nasal mucosa. Mucosal inferior turbinate hypertrophy was

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defined as present, if decongestion increased either one of the above-mentioned cross-sectional areas by more than 100%, relatively to the non-decongested value (in comparison, the increase in non-symptomatic, normal subjects is 60% [Grymer et al., 1991]). Inferior turbinoplasty was done in all cases by the same surgeons (LFG, PI). After submucous separation of the medial aspect of the mucosa, the skeleton and the lateral mucosa of the anterior 2 cm of the inferior turbinate were removed and the medial mucosa flap was approximated to the lateral wall (Figure 1).

Hydrocortisone/Terramycine ointment gauze was used to pack the nasal cavity, for less than two days in 10 patients and for 3–5 days in 35 patients.

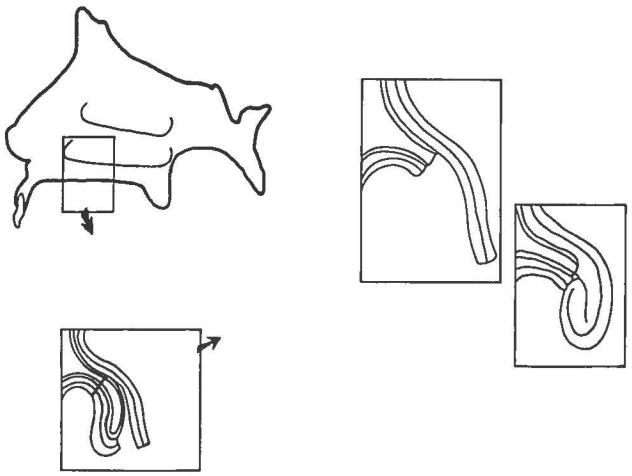

Figure 1. Anterior inferior turbinoplasty. After submucous separation of the medial aspect of the mucosa, the skeleton and lateral mucosa of the anterior (2 cm) inferior turbinate is removed.

Statistical analysis

The Chi-square test was used to test differences in the answers from the questionnaire. Student's t-test was used for comparison. The values of significance were applied as follows: $p < 0.1$: tendency; $p < 0.05$: significant; $p < 0.001$: highly significant.

RESULTS

All patients had nasal obstruction, in 39 cases as the primary symptom (Table 1). Snoring was found in 26 cases, and in five cases it was the main problem. Fifty per cent were smokers. Five patients had allergic rhinitis symptoms, 23 had vasomotor non-allergic rhinitis, and nasal obstruction was the only symptom in 11 cases. Slight alar collapse judged by rhinoscopy was found in the elderly group, with no relation to the post-operative result.

Hypertrophy of the inferior turbinates (following the AR definition) was found in 76% of the noses, bilaterally in 12 and unilaterally in 22. Eleven patients did not have turbinate hypertrophy by AR definition.

Turbinoplasty resulted in an improved nasal patency in 42 (93%) of the patients. Twenty-six patients were completely satisfied, even though seven of them continued to have some feeling of nasal obstruction. Sixteen cases were partially satisfied. In this group a persistent feeling of obstruction was still found in 11 cases and there was a tendency to crusting pre-operatively and to vasomotor symptoms. Three patients were not satisfied, two cases due to obstruction, and one case because of snoring.

Table 1. Primary and secondary symptoms before and after bilateral inferior turbinoplasty in 45 patients.

	primary		secondary		total	
symptoms	pre-op.	post-op.	pre-op.	post-op.	pre-op.	post-op.
obstruction	39	13	6	3	45	16
secretion	-	2	6	1	6	3
crusting	-	3	10	5	10	8
infections	-	-	4	-	4	-
headache	1	1	1	-	2	1
snoring	5	6	21	7	26	13

Snoring was present in 58% (26 cases) pre-operatively, and was reduced to 28% (13 cases) after turbinoplasty. There was no pre- or post-operative bleeding, independent of the length of packing (1–2 days or 3–5 days).

Ten patients had crusting pre-operatively, and eight after turbinoplasty. The tendency to crusting following operation was significantly dependent on the pre-operative crusting.

The pre- and post-operative total dimensions of the nose, the TMCA, TCA-3.3 and TCA-4.0 (which are the calculated sum of MCA, CA-3.3 and CA-4.0 from both sides) are shown in Table 2. They show a significant increase following turbinoplasty. TMCA increased by 22%, TCA-3.3 by 37%, and TCA-4.0 by 47%. The total nasal volume increased by 22%. As expected there were no significant changes in the posterior areas of the nose. There was a non-significant trend to wider dimensions pre- and post-operatively in the group of 25 cases (eight cases without and 17 cases with definition AR-hypertrophy) with complete normalization of the nasal patency. Post-operatively, the TMCA (but not CA-3.3 and CA-4.0) was significantly wider in the group without definition AR-hypertrophy.

Table 2. Total minimum cross-sectional area (TMCA), cross-sectional areas at 3.3 (TCA-3.3) and 4.0 cm (TCA-4.0) from nostrils, before and after turbinoplasty in 45 patients. Pre- and post-operative, decongested and non-decongested values.

	TMCA	sem	TCA-3.3	sem	TCA-4.0	sem
pre-operative non-decongested	1.07	0.04	1.85 ***	0.13	2.79 ***	0.16
post-operative non-decongested	1.30	0.06	2.54	0.14	4.09	0.18
pre-operative decongested	1.47	0.05	3.31	0.18	4.89	0.23
post-operative decongested	1.50	0.06	3.42	0.14	5.28	0.24

*** significance between pre- and post-operative non-decongested values

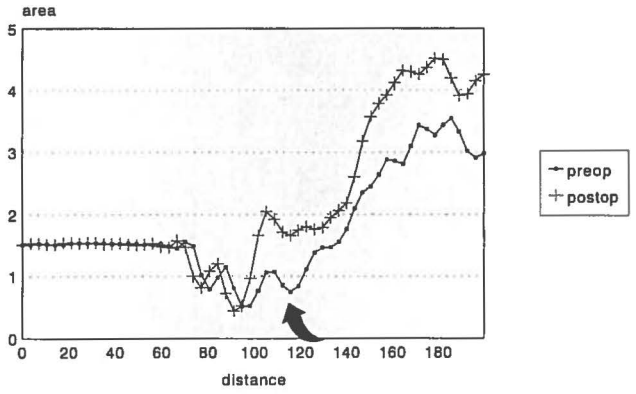

Figure 2. Effect of anterior inferior turbinoplasty represented by acoustic rhinometry (change shown by arrow). Non-decongested, right nasal cavity.

Table 3. The reactivty of the nasal mucosa before and after turbinoplasty, expressed as difference between the cross-sectional area before and after decongestion at the same distance from the nostril. The figures for patients with post-operatively normal (25 patients) and with impaired nasal patency (20 patients) are shown. Highly significant reduction in reactivity is found after the operation in both groups with no differences between groups.

Reactivity to decongestion at the level of	TMCA	sem	TCA-3.3	sem	TCA-4.0	sem
normal patency pre-operatively	0.39	0.05	1.27	0.14	1.97	0.22
normal patency post-operatively	0.22	0.03	0.91	0.15	1.40	0.18
impaired patency pre-operatively	0.39	0.04	1.64	0.19	2.17	0.19
impaired patency post-operatively	0.17	0.04	0.82	0.18	0.84	0.26

After turbinoplasty there was a decrease in the calculated reactivity to decongestion of the nasal mucosa of 51% at the area of the TMCA, 59% at 3.3 cm and 54% at 4.0 cm from the nostril, as compared to the pre-operative state (Figure 2). Post-operative feeling of nasal patency was not dependent on the amount of mucosa after operation (Table 3).

Compared to the dimensions of the noses of a normal material, patients with chronic nasal obstruction and turbinate hypertrophy had smaller cross-sectional areas in the anterior parts of the nose.

DISCUSSION

The technique of inferior turbinoplasty intends to preserve as much as possible of the mucosa of the turbinate and to seal the wound, in order to avoid bleeding, and it was shown to be a reliable technique without complications. In this study there was scarce bleeding during the operation, and no post-operative bleeding occurred. We found no difference in the results between the 1-2 and 3-5 days of packing, and the time of packing may be reduced to 1-2 days. Complaints of crusting seemed to be related to the pre-operative tendency of crusting rather than to the turbinoplasty. These patients should rinse the nose with saline water daily for a longer period.

No definition of turbinate hypertrophy in patients with nasal obstruction has ever been published, and the evaluation of the conditions of the turbinates by the rhinologist is highly subjective. Both the indications to turbinectomy and turbinoplasty and the results of the operation reported in the literature are highly diversified. A need for objective measurements of the nasal spatial conditions and the air passage in cases of turbinate hypertrophy is obvious. AR offers excellent possibilities for a thorough analysis of the spatial conditions of the nose, and an estimation of the reactivity of the nasal mucosa can be calculated. We have tried to divide our material into two groups according to the reactivity of the nasal mucosa. No differences, however, with respect to the subjective evaluation of the condition pre- or post-operatively were present, and although our definition of turbinate hypertrophy by AR represents an attempt to establish some objective criterion to the entity, the validity of this definition which is based on normal values (Grymer et al., 1991), should be discussed.

An improvement rate of 93% is better than the results reported for other operations applied to relieve nasal obstruction (Grymer, 1993). On the other hand, it is unsatisfactory that the expectations of up to 42% of the patients were not fulfilled by the operation. Consequently, it is important to specify the main symptom, for which the patient expects treatment. Snoring is more frequent in patients with nasal obstruction than in normal persons, and frequently they focus mainly on snoring as an indicator of the success of the operation. Although turbinoplasty was found quite effective upon snoring (58% were snorers before and 28% after turbinoplasty), there were six patients who were unsatisfied with the result because of snoring, even though the nasal patency was improved.

Vasomotor rhinitis symptoms were present significantly more often among the non-satisfied patients. We did not use local steroids systematically after turbinoplasty and no study has examined this problem. Nevertheless, it seems logical to prescribe local steroids for a period after turbinoplasty, as microscopy of the removed part of the turbinate demonstrated eosinophilia, which related significantly to impaired nasal patency after operation.

A slightly collapsing and thick ala nasi was found in seven cases, especially in the middle-aged and elderly group, but there was no relation between ala nasi and post-operative nasal obstruction.

The overall conclusion is that careful pre-operative questionnaires, clinical examination, objective evaluation and discussion of the problem and expectancies with the patient are necessary for selection of patients to obtain a high rate of success in bilateral inferior turbinoplasty.

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