Turbinate Reduction During Septoplasty; To Do it or Not? Clinical and Radiological Study

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Abstract

Objectives/Hypothesis: The objective was to determine whether during septoplasty, turbinate reduction procedure should be done in every case of compensatory turbinate hypertrophy (CTH), or not.

Study Design: It is a prospective randomised study.

Methods: 86 patients with septal deviation and compensatory turbinate hypertrophy were divided randomly into 2 equal groups; group A for whom septoplasty was done alone and group B for whom coblation-assisted turbinate reduction for CTH was done in addition. Both groups were compared as regard patient symptoms and CT measurements of the turbinate 9 months after surgery.

Results: 34.9% of group A complained of nasal obstruction in the side of CTH, compared to only 6.9% in group B. While turbinate reduction as measured by CT was significant in group A (p<0.05); it was highly significant in group B (p<0.0001). It was also found that there was a highly significant statistical difference between the postoperative results in the both groups in favour of group B (p<0.0001).

Conclusion: During septoplasty, turbinate reduction should be done in every case of CTH, as it improves patient symptoms and does not add to the complications.

Key Words: Septoplasty – Compensatory turbinate hypertrophy.

Introduction

SURGERIES to correct nasal obstruction are commonly done by the E.N.T. surgeons. As much as 75% of the general population is estimated to have some type of anatomical nasal deformity, most commonly deviated nasal septum [1].

When the nasal septum deviates to one side, the increased space of the contralateral nasal cavity is filled with the inferior turbinate [2]. It is assumed that this counterbalanced mechanism characterized by compensatory hypertrophy originates to protect the more patent nasal side from excess air flow with its drying and crusting effects [3]. Accordingly, turbinate surgery may be performed in conjunction with septoplasty in patients with nasal obstruction and septal deviation. However, inferior turbinate surgery as an adjunct to septoplasty may be associated with increased morbidity; primarily haemorrhage, intranasal adhesions and atrophic rhinitis [4].

Advocates of concomitant turbinate surgery during septoplasty claimed that hypertrophy involves both mucosal elements and conchal bone, so changes are not spontaneously reversible during septal surgery and should be corrected to avoid obstruction on the opposite side of septal deviation after septal correction [5]. On the other hand, some authors claimed that after septoplasty inferior turbinate hypertrophy may reverse especially in the medial side mucosa, so no turbinate surgery should be done, to avoid additional complications [4].

Material and Methods

This is a prospective study conducted between January 2004 and October 2007. The study included 86 patients (45 males and 41 females), aged between 18 and 56 years. They complained of nasal obstruction as the main symptom and this was proven by examination to be due to septal deviation. Allergic patients were excluded from the study. All patients gave informed written consent.

Patients were subdivided into to equal groups. Group A patients were subjected to septoplasty alone while group B patients were subjected to both septoplasty and turbinate reduction.

The programme of this work consisted of the following steps:

- Questionnaire concerning side, type and duration of nasal obstruction were completed by the pa-
tients preoperatively and 3, 6, 9 months postoperatively with special emphasis on obstruction in the deviated side and the contra lateral side.

- Rigid nasal endoscopy was performed preoperatively and 3, 6 and 9 months postoperatively to accurately detect and follow-up the site or sites of septal deviation, contralateral turbinate hypertrophy and exclude adenoid hypertrophy especially in younger patients.

- 5mm thick high resolution coronal CT sections were done to all the patients preoperatively and 9 months postoperatively. Inferior turbinate measurements were made at the anterior, middle and posterior thirds of the turbinate in the concave side to measure turbinate average thickness. For standardization, anterior measurement was made on the first image in which the entire inferior turbinate could be identified, the middle measurement was performed on the section in which the uncinate process is visualized and the posterior measurement was performed on the last image in which the entire inferior turbinate bone was seen.

In group A patients (43 patients), septoplasty alone was done without any turbinate reduction and with no postoperative therapy other than saline irrigation and systemic antibiotics for 10 days.

On the other hand, group B patients (43 patients) were subjected to septoplasty in addition to coblation-assisted turbinate reduction for the inferior turbinate on the contralateral side of the septal deviation. Coblation was done using the coblator machine (Arthrocare-Sunnyvale, CA) and the operating microscope. Controller power level was adjusted to 7-10W. Postoperative intranasal saline irrigation and systemic antibiotics were prescribed for 10 days just like the first group.

Follow-up visits were scheduled 3, 6 and 9 months after surgery. During each visit the questionnaire were completed by the patients and diagnostic nasal examination by rigid nasal endoscopy was performed. Follow-up CT was done 9 months postoperatively. Patients who still complained of nasal obstruction on the contra lateral side which proved to be due to turbinate hypertrophy (by CT and nasal endoscopy) were subjected to turbinate reduction procedure.

Comparison of quantitative variables between pre-operative and post-operative data within the study groups was done using Paired $t$ test when data were normally distributed and Wilcoxon signed rank test for paired (matched) samples when data were not normal. For comparing categorical data, Chi square ($X^2$) test was performed. A probability value ($p$ value) less than 0.05 was considered statistically significant. All statistical calculations were done using computer programs Microsoft Excel version 7 (Microsoft Corporation, NY and USA) and SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) version 15 for Microsoft Windows.

**Results**

This study included 86 patients, 45 males (52.3%) and 41 females (47.7%) with age ranging from 18 to 56 years (mean, 35.5). In group A out of 43 patients and after 3 months of follow-up, 35 (81.4%) experienced total relief of obstruction on the convex side of the previously deviated septum that was corrected by septoplasty (ipsilateral blockage), while partial improvement was found in 5 cases (11.6%) due to poor correction in 2 cases and turbinate hypertrophy in 3 cases. 3 cases (6.9%) still complained of ipsilateral obstruction due to poor correction in 2 cases and unexplained in 1 case. After 9 months of follow-up, 36 patients (83.7%) had total relief of the ipsilateral obstruction, 4 (9.3%) had partial relief and 3 (6.9%) still had blockage (Table 1).

<table>
<thead>
<tr>
<th>Table (1): Results of questionnaire of group A patients.</th>
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<tbody>
<tr>
<td>Patient symptoms</td>
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<td>------------------</td>
</tr>
<tr>
<td>Ipsilateral obstruction (IO)</td>
</tr>
<tr>
<td>Total relief of IO</td>
</tr>
<tr>
<td>Partial relief of IO</td>
</tr>
<tr>
<td>Total number</td>
</tr>
<tr>
<td>Contra lateral obstruction</td>
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</tbody>
</table>

The striking symptom was the contralateral nasal obstruction that was found to be due to CTH; experienced in about 41.9% of cases (18 cases) 3 months postoperatively that was reduced to 34.9% (15 cases) 9 months postoperatively (Table 1). This means that septoplasty did not reverse CTH in all case (Figs. 1,2).
On the other hand, 9 months after surgery, the 43 patients who had septoplasty in addition to turbinate reduction (group B) showed total relief of obstruction on the convex side in 34 cases (79%), partial relief in 6 cases (13.9%) due to perforation in 1 case, poor correction in 2 cases, turbinate hypertrophy in 1 case and adhesions in 2 cases. Persistent obstruction was found in 3 cases (6.9%); 1 due to poor correction, 1 due to turbinate hypertrophy and 1 case due to adhesions (Table 2).

A striking difference was found between the 2 groups in the contralateral obstruction that was detected in group B in 3 patients only (6.9%); 1 due to perforation and 2 due to inferior turbinate hypertrophy.

Table (2): Results of questionnaire of group B patients.

<table>
<thead>
<tr>
<th>Patient symptoms</th>
<th>Pre-operative</th>
<th>3 months post-operative</th>
<th>6 months post-operative</th>
<th>9 months post-operative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ipsilateral obstruction (IO)</td>
<td>43</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Total relief of IO</td>
<td>–</td>
<td>33</td>
<td>33</td>
<td>34</td>
</tr>
<tr>
<td>Partial relief of IO</td>
<td>–</td>
<td>6</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Total number</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>Contra lateral obstruction</td>
<td>–</td>
<td>5</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

As regards complications in group A, there was one case of septal haematoma that was managed successfully and one case of septal perforation. In group B, there were no cases of septal haematoma, one case with septal perforation, 3 cases of adhesions and 1 case with secondary haemorrhage that was managed by repacking.

CT measurements of the turbinate thickness (mucosa and bone) both pre and 9 months post-operative were documented in each group. Measurement of the thickness of the inferior turbinate was calculated by taking the average of anterior, middle, and posterior measurements. Pre and post-operative thickness measured by CT were diagrammatically represented in both groups in Fig. (3).
The preoperative thickness of the inferior turbinate ranged between 9 to 12mm in group A patients with the mean ± standard deviation (mean ± SD) = 10.77±1.02 and the preoperative thickness of the inferior turbinate in group B ranged from 9 to 12mm with a mean ± SD of 10.77±0.9. Comparing the preoperative values in both group by Mann-Whitney U test, it was found that there was no statistically significant difference between them (p=0.8886).

The 9 months postoperative thickness in group A patients ranged between 8 to 12mm, with the mean ± SD of 10.4±1.05, compared to 5 to 12mm thickness in group B and the mean ± SD of 7.44±1.55. It was found that there was a highly significant statistical difference between the postoperative results in the both groups in favour of group B (p<0.0001).

The difference between pre and 9 months postoperative thickness of the turbinate ranged between 0 to 2mm with mean ± SD of 0.37±0.54 in group A and 0 to 6mm with mean ± SD of 3.33±1.39 in group B. Using Wilcoxon’s signed ranks test, it was found that in group A there was a statistically significant difference (p<0.05) and in group B, a highly significant statistical difference between the pre and 9 months postoperative thickness of the turbinate (p<0.0001).

**Discussion**

Despite that compensatory turbinate hypertrophy is a common clinical finding in patients with septal deviation, yet aetiology, pathology and ideal management are not truly established.

In addition to the common concept that hypertrophy of the turbinate is compensatory to nasal septal deflection to prevent atrophic changes, there is an alternative explanation that refers to a primary unilateral growth of the turbinate bone that is either genetically determined or originates from an early life trauma [6]. This may exerts pressure on the growing nasal septum and eventually causes it to bend toward the other side of the nose.

Pathology of turbinate hypertrophy is also a matter of debate, trying to detect whether the hypertrophy is mainly bony, mucosal, or both. Many studies were conducted: Egeli et al. [6], Uzun et al. [7] and Akoglu et al. [8], in addition to our study demonstrated that hypertrophy is both bony and mucosal depending on CT measures.

Berger et al., was nearly the only group who demonstrated that the growth is mainly bony in his histopathological evaluation of the hypertrophic inferior turbinate [3], however this may be due to difficulty in evaluating mucosal hypertrophy following specimen preservation. Many histopathological studies and studies using acoustic rhinometry to evaluate the relative participation of bone and mucosa to turbinate hypertrophy and the cross-sectional area of the nasal cavity have been published [3,9,10,11].

Attempts to eliminate the effect of the nasal cycle during acoustic rhinometry by using a decongestant has led to shrinkage of the mucosal hypertrophy of the turbinate. For this reason, it is more reliable to use a control group rather than to use a decongestant.

The degree of septal deviation could not be correlated to turbinate mucosal hypertrophy [9]. A hypertrophic inferior turbinate can be managed with different therapeutic procedures including: Steroids injection, lateral out-fracture, partial or complete turbinectomy, submucosal resection, cryotherapy, laser, electrocautery, radiofrequency, and coblation [12,13,14].

Assuming that hypertrophy is mainly mucosal, some authors proposed only septoplasty in treatment of compensatory turbinate hypertrophy expecting reversibility of this mucosal hypertrophy and turbinate shrinkage, but if the hypertrophy is also bony, turbinate reduction will be a must during septoplasty.

Assessment of turbinate hypertrophy and complaints of patients were made by many ways in the literature depending on: Histopathology, CT [4], rhinomanometric studies [9,15], questionnaire, and endoscopic examination.

Using acoustic rhinometry to measure the cross-sectional areas at 3.3 and 4cm from the nostrils, Grymer et al. (1997) reported that with severe septal deviation adding turbinectomy to the septoplasty increases the cross-section of the nasal cavity in the wider side, while it decreased in non-turbinectomy group [9]. Berger et al. (2000) concluded that the significant bone expansion and the relative minor role played by the mucosal hypertrophy in cases of compensatory turbinate hypertrophy would support the decision to excise the inferior turbinate bone at the time of septoplasty [2]. On the other hand, the work of Illum (1997) proved that addition of compensatory turbinate reduction to septoplasty did not play a detectable influence on the outcome evaluated by patients questionnaire and acoustic rhinometry [18]. Kim et al. (2008) reported that both the thickness of turbinate mucosa and the cross sectional areas of the inferior turbinate (measured by the CT) on the concave side were significantly decreased by septoplasty. The thickness of the mucosa decreased...
by 1mm and the mean dimensions of the inferior turbinate decreased by 18mm² [4].

In our study, we depended on questionnaire to assess symptoms of the patients supported by endoscopic examination, while CT was used to assess turbinate thickness. Marked improvement in obstruction was reported in the present work in the previously deviated side in both groups in 81.4% and 79% respectively, but when we come to the contralateral obstruction, we found that only 6.9% in group B compared to 34.9% in group A complained of contralateral nasal obstruction at the end of the follow-up period.

Statistical review of the CT measurements showed that there was no statistically significant difference between the preoperative thickness of the turbinate in both groups and this makes the comparison between the postoperative values very conclusive. In group A there was a statistically significant difference (p<0.05) and in group B, a highly significant statistical difference between the pre and 9 months postoperative thickness of the turbinate (p<0.0001). It was found that there was a highly significant statistical difference between the postoperative results in both groups in favour of group B (p<0.0001).

Adding coblation turbinate reduction to the procedure of septoplasty did not add much to the complications. In group A, 2 patients had complications: 1 had hematoma and the other had perforation, while in group B, 5 patients had complications: 1 patient had perforation, 3 adhesions and 1 had a secondary haemorrhage.

The important issue was that in group A, the patients who still complained of contralateral nasal obstruction due to compensatory turbinate hypertrophy were subjected to another surgery for turbinate reduction to relief their symptoms.

Limitations:

Further studies should be conducted to determine the relative participation of both bone and mucosa in turbinate hypertrophy; also more studies are required to correlate patient symptoms.

Objective assessment of nasal obstruction (e.g. acoustic rhinometry) would be beneficial and complementary to our work.

Effects of the nasal cycle should be eliminated or reduced during measurement of turbinate thickness by CT.

Conclusion:

Both mucosa and bone contribute to compensatory turbinate hypertrophy. In cases of septal deviation, septoplasty alone cannot reverse compensatory turbinate hypertrophy or relieve the patient complaint of obstruction on the opposite side of deviation, so a turbinate reduction procedure should be done during septoplasty for CTH.

References