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ORIGINAL ARTICLE

Intraturbinal versus extraturbinal microdebrider-assisted inferior turbinoplasty: Preliminary results

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KEYWORDS

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Abstract *Objective:* To compare the intraturbinal use of the microdebrider with the extraturbinal one for inferior turbinate reduction based on subjective and objective parameters.

Design: Prospective single blinded randomized trial.

Setting: Private Hospital (Magrabi Eye and Ear Centre).

Methods: Forty patients with nasal obstruction due to bilateral hypertrophied inferior turbinates were included in this study. History taking, clinical assessment and CT scan of the paranasal sinuses were done for all patients. All patients underwent microdebrider-assisted inferior turbinoplasty, the microdebrider was used intraturbinally on one side of the nose and extraturbinally on the other side in alternate manner. The patients were blinded to the technique used.

Main outcome measures: Operative time, blood loss, subjective improvement of the nasal obstruction, endoscopic grading of the inferior turbinate, nasal mucociliary clearance (NMCC) and post operative complications.

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Results: Ten patients were lost to follow up. The operative time and operative blood loss were less in the extraturbinal group ($p < 0.05$). At 1 month post operatively, the nasal obstruction VAS score showed significant improvement on the intraturbinal sides only ($p < 0.05$), at 3 and 6 months post operatively, the VAS score showed significant improvement on both sides with no difference between the 2 groups (p value = 0.064 and 0.728 respectively). Nasal endoscopy revealed grade 2 turbinates in 30% and grade 3 in the remaining 70% of the intraturbinal group with almost similar findings in the extraturbinal group. At 6 months post operatively, significant improvement of the turbinate size was detected on both sides. The NMCC showed significant improvement on the intraturbinal sides at 1 month with significant worsening on the extraturbinal sides. At 3 months, both sides showed significant improvement of the NMCC. No complications were reported in either group.

Conclusions: Extraturbinal microdebrider-assisted inferior turbinoplasty is as effective and safe as the intraturbinal one with shorter operative time and less blood loss with similar morbidity, so the extraturbinal microdebrider-assisted inferior turbinoplasty could be a good option for all cases of inferior turbinate hypertrophy reserving the intraturbinal technique for patients with possible delay of mucosal regeneration e.g. diabetics and old age and patients not accepting the relative delay of improvement of their symptoms.

1. Introduction

Nasal obstruction is a very frequent symptom in the ear, nose and throat field. Hypertrophy of the inferior turbinate is the most frequent cause and may be related to allergy, pseudoallergy, nonallergic rhinitis with eosinophilia syndrome, and iatrogenic rhinopathy.[1,2]

Many techniques of turbinate reduction have been performed, including partial or total turbinate resection, cauterization, cryotherapy, laser therapy, and radiofrequency ablation.[3–7] The variety of surgical techniques available indicates the lack of consensus on the optimal technique.[8]

A relatively new method for reducing the inferior turbinate with the use of a microdebrider to remove submucosal tissue was introduced. The common complications of standard submucosal resection of the inferior turbinates (e.g. excessive resection, post operative bleeding and crusting) were largely avoided. In addition, this technique of turbinate reduction has been shown to be reliable, safe.[9–11]

Many authors used the microdebrider intraturbinally, few others used it extraturbinally, the aim of this study was to compare both techniques based on subjective and objective parameters. To the best of our knowledge, such comparison has not been previously conducted.

2. Material and methods

This prospective randomized study was conducted at Magrabi Eye and Ear Hospital, Muscat; Oman during the period between January 2011 and December 2012.The study was approved by the local ethics committee after taking informed consents from the patients.

This study included 40 patients (18–52 years) complaining of bilateral nasal obstruction due to inferior turbinate hypertrophy, showing no response to medical treatment (oral antihistamines and topical corticosteroids for 2 months). Exclusion criteria included patients with chronic sinusitis, deviated nasal septum and nasal polyps and those with a history of previous turbinate surgery.

The patients were subjected to a complete workup including a thorough medical history, nasal endoscopy, and CT scan of the paranasal sinuses.

All patients underwent microdebrider-assisted partial inferior turbinectomy, the microdebrider was used intraturbinally on one side of the nose and extraturbinally on the other side in alternate manner. The patients were blinded to the technique used.

The surgeries were performed under general hypotensive controlled anesthesia with the patients positioned in the 15 degrees head up position. Preoperative nasal decongestion for 10 min was done using cottonoids soaked in 1:10,000 epinephrine. Rigid 4 mm Hopkin Rod lens endoscopes of different angles [0° and 30°] were used on both sides.

On the extraturbinal sides, bone and hypertrophied mucosa of the inferior turbinate were trimmed with the Osseouno shaver system, Bien Air surgey (Switzerland) 4 mm cutting blade at a speed of 3000 rpm in the oscillate mode.

On the intraturbinal sides, the technique described by Friedman et al.[10] was applied, in which 0.5 cm incision was made with a number 15 blade in a vertical manner in the anterior aspect of the inferior turbinate. A submucosal pocket was created with sharp dissection on the medial surface of the bony turbinate. The straight microdebrider 4 mm tip was applied through the incision. Inferior aspect of the bony turbinate and some of the submucosal tissue were debrided at 3000 rpm in the oscillating mode in a verticocaudal manner.

Intraoperative parameters recorded were operative time and blood loss. The time in minutes was recorded for each side. Precise blood loss was calculated by recording the exact amount of irrigation used and the exact volume of blood and irrigation in the suction canister.

For hemostasis, Merocel nasal pack (Urban and Fischer Verlag, Munich, Germany) was inserted, which was removed after 48 h. The patients were encouraged to rinse the nasal cavity with normal saline several times daily for 2 weeks.

The patients were followed up weekly for 4 weeks then monthly for 6 months.

2.1. Outcome measures

Baseline and follow up evaluations were obtained at 1, 3 and 6 month intervals; a visual anolog scale questionnaire (VAS) was used to determine the severity of nasal obstruction pre and post operatively where 0 indicates no symptoms and 10 indicates the most severe symptoms.

Nasal endoscopy was used to assess the turbinate size pre operatively and 6 months post operatively according to the grading system described by Yanez and Mora[12] where

Grade 1: inferior turbinate fully retracted
Grade 2: inferior turbinate engorgement filling half of the nasal fossa
Grade 3: inferior turbinate engorgement reaching the nasal septum.

Nasal mucociliary clearance was evaluated pre operatively, 1 and 3 months post operatively using the saccharin test in which 15 mg of 2% sodium saccharin was deposited on the inferior turbinate mucosa, the patients were instructed to swallow every 30 s, and the time required for the patients to experience sweet taste was determined.

2.2. Statistical analysis

Data were statistically described in terms of mean, standard deviation (±SD), frequencies (number of cases) and relative frequencies (percentages) when appropriate. Comparison of quantitative variables between different groups in the present study was done using Mann Whitney *U* test for independent samples. For comparing categorical data, Chi square (χ^2) test was performed. Yates correction was used instead when the expected frequency is less than 5. 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, USA) and SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) statistical program.

3. Results

Forty patients were included in this study, 10 were lost to follow up so we were left with 30 patients. The mean age was 31 years (range from 20–49 years), 17 of our patients were males (56.7%).

The operative time and operative blood loss were less on the extraturbinal sides (8 vs 15 min and 40 vs 50 ml respectively), the difference was statistically significant ($p < 0.05$).

The mean pre operative nasal obstruction VAS score was 8.2 on the intraturbinal sides and 8.1 on the extraturbinal sides ($p = 0.67$). At 1 month post operatively, the VAS score showed significant improvement on the intraturbinal sides only ($p < 0.05$), at 3 and 6 months post operatively, the VAS score showed significant improvement on both sides with no difference between the 2 groups (*p* value = 0.064 and 0.728 respectively) Fig. 1.

Nasal endoscopy revealed grade 2 turbinates in 30% and grade 3 in the remaining 70% of the intraturbinal sides with almost similar findings on the extraturbinal sides. At 6 months post operatively, significant improvement was detected on both sides (Table 1). There were no significant difference between the 2 groups preoperatively ($p = 0.774$) and post operatively ($p = 1.000$).

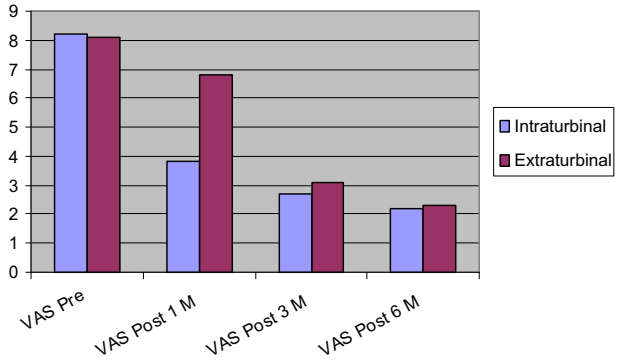

Figure 1 Nasal obstruction VAS score on the intraturbinal and the extraturbinal sides.

Table 1 Endoscopic grading of the turbinates in both groups.

Turbinate grade	Intraturbinal sides *n* (%)		Extraturbinal sides *n* (%)	
	Pre	Post	Pre	Post
1	0 (0)	26 (86.7)	0 (0)	25 (83.3)
2	9 (30)	4 (13.3)	8 (26.7)	5 (16.7)
3	21 (70)	0 (0)	22 (73.3)	0 (0)

Table 2 NMCC of both groups.

NMCC	Intraturbinal sides (min)	Extraturbinal sides (min)	*p* Value
Pre operative	9.4	9.3	0.810
Post operative (1 month)	6.9	10.96	0.000
Post operative (3 months)	6.6	7.26	0.07

The mean preoperative NMCC was 9.4 min on the intraturbinal sides versus 9.3 min on the extraturbinal sides with no significant difference between the 2 sides. At 1 month, the NMCC was significantly improved on the intraturbinal sides reaching 6.9 min (*p* value = 0.000), on the other hand, significant worsening was reported on the extraturbinal sides reaching 10.96 min (*p* value = 0.000). At 3 months, both sides showed significant improvement reaching 6.6 and 7.26 min respectively with no difference between the 2 groups (*p* value < 0.05) (Table 2).

We did not encounter any post operative bleeding, excessive crustations, synechia or atrophic changes in either group up to 6 months post operatively.

4. Discussion

In evaluating the various methods of turbinate reduction, we must consider the function of the turbinate. All methods should be judged by two basic criteria: the efficacy of the technique in alleviating breathing obstruction and the side effects that occur in the short and long term.[8]

The use of a microdebrider for the surgical treatment of hypertrophic turbinates was first reported by Davis and Nishioka[13] in 1996, since that time, several studies were conducted to assess its efficacy and safety, these studies were either studying the microdebrider only[9–16] or comparing it with other modalities e.g. radiofrequency[17–21] submucosal resection,[22–24] laser[25,26] and submucous cauetry.[27] Most of these studies reported success rate ranging from 90% to 100%.[9,10,12,14,19–21,26]

Most of the authors used the microdebrider intraturbinally with the exception of few others who used it extraturbinally[11,13,16,21] but none compared both techniques. We believe that most of the authors used either technique merely on personal preference, so we tried in this study to use objective parameters for recommending either of them.

Performing both techniques in the same patient by blinding the patient to the technique used is considered a point of strength of our study.

The prolonged operative time on the intraturbinal sides (7 min more than the extraturbinal sides) could be attributed to the time taken for dissection of the flap with great care to preserve the mucosa. Obstruction of the microdebrider tip (2 mm) with resected tissue was suggested by Lee and Lee[21] as a cause for the prolonged operation time, which was not the case in our study as we used 4 mm tip.

Though the difference in the operative blood loss was statistically significant, yet we consider the 10 cc difference as clinically non significant.

At 1 month post operatively, improvement of the VAS score of nasal obstruction was observed in both groups, but this difference was significant only on the intraturbinal sides. This relative advantage of the intraturbinal technique could be overcome by proper pre operative counseling of the patients making them accepting the relative delay of improvement of their symptoms.

At 3 and 6 months post operatively, both groups reported significant improvement of their nasal obstruction.

We used the endoscopic grading system described by Yañez and Mora[12] as an objective measure for assessing our results. We reported significant improvement of the turbinate size on both groups 6 months post operatively. Similar results were reported by Kassab et al.[26] in their study of 10 patients comparing microdebrider turbinoplasty with the 980 nm diode laser.

The saccharin test is a useful method to evaluate the effectiveness of nasal mucociliary clearance due to the technique's relative simplicity and reproducibility.[28] In our study, the NMCC showed significant improvement on the intraturbinal sides at 1 and 3 months post operatively which was similarly reported by Liu et al.[19]

Though the NMCC on the extraturbinal sides showed initial worsening at 1 month, it showed significant improvement at 3 months, this initial worsening could be due to damage of the mucosa on the extraturbinal sides which usually need about 3 months to regenerate.

We should have expected more complications on the extraturbinal sides due to damage of the mucosal surface, yet in our study, no complications were reported in both groups. Van delden et al.[16] using the microdebrider extraturbinally, reported complications such as bleeding, crust formation and synechia in 17 patients, but they were only temporary with no permanent complications.

This study was not concerned with the type of turbinate hypertrophy whether bony or mucosal, as the microdebrider has been shown by Lee and Kim[25] to be effective in both mucosal and bony hypertrophy in their study comparing the microdebrider with laser assisted turbinate reduction.

In reviewing all previous reports on microdebrider assisted turbinoplasty, we did not find any mention of any rationale behind selecting either the intraturbinal or the extraturbinal technique but based on the results of our study, we feel that extraturbinal microdebrider turbinectomy is ideal in all patients except those with possible delayed mucosal healing especially diabetics and old age and those who do not accept relative delayed improvement of their symptoms. To confirm such a new conclusion, more studies on larger number of patients for longer follow up periods are required.

We should have focused more on post-operative crustations which are very important predictors of success of either technique.

5. Conclusions

Extraturbinal microdebrider-assisted inferior turbinoplasty is as effective and safe as the intraturbinal one with shorter operative time and less blood loss with similar morbidity, so the extraturbinal microdebrider-assisted inferior turbinoplasty could be a good option for all cases of inferior turbinate hypertrophy reserving the intraturbinal technique for patients with possible delay of mucosal regeneration e.g. diabetics and old age and patients not accepting the relative delay of improvement of their symptoms.

Conflict of interest

None declared.

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