ABSTRACT

OBJECTIVE Turbinate reduction via microdebrider assisted turbinoplasty (MATT) or radiofrequency assisted (RFA) turbinoplasty fails to address nasal obstruction caused by bony deformities of the inferior turbinate. Procedures such as Mabry’s turbinoplasty, although effective, are challenging to perform. Other procedures such as partial or total turbinectomies may result in prolonged crusting and atrophic rhinitis. We demonstrate the safety and efficacy of inferior turbinate bone removal with an ultrasonic bone aspirator.

METHODS The SONOPET ultrasonic bone aspirator (MIWATEC CO., Ltd.) utilizes ultrasonic waves to emulsify bone while concurrent irrigation and microsuction of bone particles produces a clean surgical field. This enables precise, graded removal of the inferior turbinate bone under direct visualization without thermal or mechanical trauma to the surrounding soft tissue or mucosa. We describe the first application of this technology to turbinoplasty.

RESULTS No individuals experienced delayed healing, infection, scarring or other complications. Improvements in nasal obstruction varied depending upon the procedures performed such as septoplasty, functional endoscopic sinus surgery, nasal valve repair and rhinoplasty.

CONCLUSIONS Ultrasonic bone aspiration turbinoplasty is a safe and effective addition to the techniques employed for inferior turbinate reduction. Moreover, this technique addresses actual deformities in the turbinates which cannot be effectively treated through microdebrider or radiofrequency-assisted turbinoplasty. The technique is simpler than conventional turbinoplasty and avoids the complications associated with turbinate resection.

INTRODUCTION

Nasal obstruction is a common complaint and inferior turbinate hypertrophy (ITH) is one of the many possible etiologies. The underlying cause may be due to soft tissue engorgement, bony enlargement or a mixture of both. There are numerous techniques that have been developed to manage ITH. Early descriptions employed procedures from simple out-fracture to partial or total turbinectomy. Mabry also described the inferior turbination which involved “…removal of the major portion of the conchal bone, the attached inferior and lateral wedge of turbinate stroma and mucosa, and the posterior turbinate tip.” More recently, microdebrider-assisted inferior turbinate (MAIT) and radiofrequency-assisted (RFA) turbinoplasty were developed to address ITH while preserving overlying mucosa. While effective, these techniques fail to address nasal obstruction caused by bony deformities of the inferior turbinate.

The SONOPET ultrasonic bone aspirator (MIWATEC CO., Ltd.) utilizes ultrasonic waves to emulsify bone with concurrent irrigation and microsuction of bone particles producing a clean surgical field. This enables precise, graded removal of the inferior turbinate bone under direct visualization without thermal or mechanical trauma to the surrounding soft tissue or mucosa. We describe the initial application of this technology to inferior turbinate bone reduction.

SURGICAL TECHNIQUE

Topical vasoconstriction was achieved utilizing 0.05% oxymetazoline, and the turbinates were infiltrated using 1% lidocaine with epinephrine 1:100,000.

The inferior turbinate was medialized using a nasal speculum and a Cottle freer. An incision was made in the anterior portion of the turbinate down to the bone and submucosal dissection of the overlying mucosa was performed.

The ultrasonic bone aspirator was utilized to remove the conchal bone (Figure 2). The turbinate was then lateralized using the nasal speculum and patency confirmed.

RESULTS

Eighty-one eligible patients underwent ultrasonic bone aspiration turbinoplasty. The mean patient age was 52.8 years (age range, 18-72). Of these patients, 55 (68%) were women and 26 (32%) were men. All procedures were bilateral. The breakdown of simultaneous nasal procedures was as follows: rhinoplasty, 47 (58%); septoplasty/valsalve valve repair, 13 (16.5%); functional endoscopic sinus surgery, 14 (17.3%) and the remaining 5 (6.2%) were 3 endoscopic transoral decompromisations and 2 dacycystoanastomoses.

Seven patients completed a pre-operative and post-operative Nasal Obstruction Symptom Evaluation (NOSE) form with the Visual Analog Scale (VAS) to assess improvement of nasal obstruction. The NOSE score is scored from 0 to 100, with higher scores indicating more severe nasal obstruction. The NOSE score showed statistically significant improvement of nasal obstruction (51 to 25, p<0.03), but the VAS did not show statistical significance in improvement (5 to 3) (Table 1).

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<th>Gender</th>
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<th>Postop NOSE</th>
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Table 1. Scores on NOSE scale and VAS Pre-operatively and Post-operatively

*P<0.05 Abbreviations: NOSE, Nasal Obstruction Symptom Evaluation; VAS, Visual Analog Scale; SMRT, Submucous Resection of Turbinates; CI, 95% confidence interval; NA, Not applicable

DISCUSSION

There were no patients who experienced post-operative hemorrhage, synchia, prolonged crusting, or bone necrosis as a result of turbinate reduction using the ultrasonic bone aspirator. No revision procedures were performed. The procedure can be safely performed under direct loup visualization or using a 0 degree endoscope. Elevation of a submucosal tunnel allows for insertion of the SONOPET handpiece for precise removal of all conchal bone. Simultaneous irrigation and suction preserves a clean surgical field. This technique addresses the bony deformity in turbinoplasty hypertrophy.

Limitations of this technique include difficulty with the removal of bone in the most distal aspect of the turbinate. However, because the bone aspirator does not destroy soft tissue, blind removal of bone can be achieved without destroying turbinate mucosa. In patients with minimal contribution of the bone, the bone aspirator can be utilized as an adjunct to other procedures that address the soft tissue such as laser assisted turbinectomy or radiofrequency ablation (RFA).

Preliminary prospective data cannot demonstrate an improvement of nasal obstruction in patients undergoing this procedure due to insufficient subject enrollment. More studies are needed to confirm the efficacy of this technique and future studies can include histological analysis as well as pre and post-operative computed tomograph (CT) imaging for comparison.

CONCLUSIONS

Ultrasonic bone aspiration turbinoplasty is a safe and potentially effective addition to the techniques employed for inferior turbinate reduction.

This technique addresses actual deformities in the turbinate bone which cannot be effectively treated through traditional turbinoplasty or microdebrider or radiofrequency-assisted turbinoplasty.

The technique is simpler than conventional turbinoplasty and avoids the complications associated with turbinate resection.

REFERENCES