

Patency of the Nasolacrimal Drainage System after Power-Assisted Medial Flap Turbinoplasty

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Objective: Turbinoplasty is a common procedure for the management of nasal blockage resulting from inferior turbinate hypertrophy. There are many ways to perform turbinoplasty; however, power-assisted medial flap turbinoplasty provides reliable reduction and long-lasting results compared to other techniques. The aim of this study was to assess the patency of the nasolacrimal drainage system after power-assisted medial flap turbinoplasty and to investigate the safety of this procedure with regard to drainage of the nasolacrimal ducts.

Methods: This prospective study included 31 patients (62 turbinates) who underwent power-assisted medial flap turbinoplasty in the period between January 2017 and December 2017 and had a normal nasolacrimal drainage system as confirmed by endoscopic fluorescein dye test preoperatively. The test was repeated 3 months postoperatively to test for patency.

Results: All the patients showed normal drainage of the fluorescein dye from the inferior meatus preoperatively and postoperatively as well. No other major complications resulting from the power-assisted medial flap turbinoplasty procedure were reported.

Conclusion: Power-assisted medial flap turbinoplasty is a safe and effective procedure. There was no nasolacrimal duct injury among our patients and we did not observe any major complications.

Key Words: Inferior turbinate, nasolacrimal drainage, turbinoplasty.

Level of Evidence: IIb

INTRODUCTION

Nasal obstruction is the most common complaint among patients presenting to otolaryngologists; the condition disturbs the quality of life of the patient. The anterior end of the inferior turbinate is in the narrowest part of the nasal airway, enlargement of which causes significant nasal obstruction.¹ Techniques for inferior turbinate reduction vary from complete turbinectomy to limited cauterization or tissue ablation.² Most of the techniques described involve treatment of the submucous tissue with sacrifice of the mucosa for access to the target area.

Power-assisted medial flap turbinoplasty (PAMFT) was described by Joniau et al.³ This technique is not conservative but provides a robust and reliable reduction and recontouring of the inferior turbinate. A previous study showed that this technique produces a superior overall success rate at 12 and 60 months, and there was good correlation between examiner and patient findings when compared with submucosal electrocautery and submucosal powered turbinoplasty technique.⁴

Numerous surgical procedures including isolated uncinectomy, maxillary antrostomy, external or endoscopic medial maxillectomy, inferior turbinectomy, and repair of maxillary fractures have been reported to cause injury to the nasolacrimal duct (NLD).⁵ The fact of NLD being draining to the inferior meatus putting it in a risk of injury during performing PAMFT.

In this prospective study, we evaluated patients who had undergone turbinoplasty with PAMFT for patency of the nasolacrimal drainage system.

MATERIALS AND METHODS

Inclusion Criteria

All patients undergoing PAMFT with/without septoplasty during the period between January 2017 and December 2017 and having a normal nasolacrimal drainage system, as confirmed by the endoscopic fluorescein dye test preoperatively, were included in the study.

Exclusion Criteria

Patients previously diagnosed with nasolacrimal duct obstruction, and patients who were operated using a technique other than endoscopic PAMFT were excluded.

Study Design

The study was carried out in patients operated during the period between January 2017 and December 2017 at Qatif Central Hospital. Informed written consent was obtained from all patients involved in the study. The study was approved by the scientific committee of Qatif Central Hospital.

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Editor's Note: This Manuscript was accepted for publication 27 December 2018.

No conflicts of interest or financial disclosures.

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DOI: 10.1002/liv.2.248

All patients between the ages of 18 and 55 years were examined at the outpatient clinic. Diagnosis was made based on the patient's symptoms and endoscopic examination of the nose. Patients were asked if they would participate in the study when there was an indication for turbinoplasty of the inferior turbinate. All the patients who needed turbinoplasty and fulfilled the criteria for the study were tested for lacrimal drainage system patency before surgery. In order to assess the effects of PAMFT on the nasolacrimal drainage system, patency of the nasolacrimal drainage system was tested in all patients included in the study both preoperatively and 3 months postoperatively using the endoscopic fluorescein dye test.

To measure the clinical outcomes of PAMFT, we have used the Sino-Nasal Outcome (SNOT)-22 test. The SNOT-22, an extensively studied quality of life metric, is a 22-item survey that records patient responses on a six-item Likert scale, ranging from 0 to 5 for each question.⁶

Nasolacrimal Drainage Test Technique (Endoscopic Fluorescein Dye Test)

One drop of 2% fluorescein was instilled into the inferior conjunctival fornix on both sides. The nasal cavity of the patient was examined with a rigid 0-degree endoscope after 5 minutes. Observations were made with regard to whether the entire fluorescein dye drained out normally (indicating patency) or if there was retention of the dye (indicating a block in the lacrimal drainage system).

Surgical Technique of Power-assisted Medial Flap Turbinoplasty

Local anesthesia was administered using 2% xylocaine with 1/80,000 adrenaline. Under endoscopic guidance, the needle was inserted through the anterior end of the inferior turbinate on the upper surface of the turbinate until the posterior region of the turbinate was reached. After that, the turbinate was fractured medially with a Freer's elevator, allowing space for both an endoscope (0 degree) and a powered microdebrider to access the lateral surface of the inferior turbinate.

A microdebrider with a straight blade was used in oscillating mode to remove the soft tissue from the lateral aspect of the vertical portion of the inferior turbinate. The turbinate bone was then dissected from the medial flap and removed, with care taken to preserve the soft tissue medial to the bony lamella.

After all the lateral mucosa and bone were removed, a piece of Surgical (Ethicon, Somerville, New Jersey, U.S.A.) was used in the inferior meatus, following which, the remaining mucosa was rolled on itself using a Freer's elevator to cover all the raw surfaces (Fig. 1).

RESULTS

Thirty-one patients (62 turbinates) were included in the study; there were 21 male and 10 female patients. The average age was 33 years. Thirteen patients underwent turbinoplasty alone, and the rest underwent septoturbinoplasty.

Normal drainage of the fluorescein dye from the inferior meatus was observed in all the cases postoperatively (Fig. 2). No other major complications resulting from the PAMFT procedure were observed.

Generally, the postoperative results of the patients included in the study were excellent. There was a

significant reduction in the average score of SNOT-22 from 37.5 preoperatively to 16 postoperatively ($P = .016$).

DISCUSSION

This study investigated the safety of the PAMFT procedure with regard to drainage of the nasolacrimal ducts. There was no nasolacrimal duct injury or any major complications in our patients after PAMFT.

Many techniques for performing turbinate surgery have been described in literature for treatment of inferior turbinate hypertrophy.⁷ The ideal turbinate surgery is one that is easy to perform, has a low morbidity rate, and has a long-lasting effect.

Powered turbinoplasty has been shown to be associated with decreased patient morbidity during the postoperative healing period and better long-term results when compared with submucosal cauterization.³ Techniques such as partial or total inferior turbinectomy, cryosurgery, electrocautery, and laser surgery destroy the mucosa, and thereby interfere with the nasal physiology. Frequent sequelae of exposed bone include prolonged crusting with foul odor, and sometimes, bleeding.⁴ The PAMFT technique lends itself to precise tissue removal with satisfactory reduction of tissues. Bleeding is a rare complication. Preservation of mucosa leads to early healing and absence of crusting and exposed bone.³

The NLD is an inferior extension of the lacrimal sac into the inferior meatus and has an interosseous portion and an intrameatal portion. The bony nasolacrimal canal is inclined posteriorly and laterally toward the first molar tooth. Hence, the course of the NLD is directed downward, posteriorly, and laterally, which is important with regard to the lateral wall topography. Knowledge of the location and trajectory of the intranasal portion of the NLD is of utmost importance while operating on, and proximal to, the lateral nasal wall to avoid injury. This is particularly important in patients with dehiscent bony NLD, which has been reported to be as high as 20% in some studies.⁵

Tears drain through the nasolacrimal drainage system to the inferior meatus. The location and size of the nasolacrimal duct opening and the lacrimal fold (Hasner's valve) are variable. In one study, it was seen that the distance between the opening of the NLD and the attachment of the inferior nasal concha was 5.0 ± 2.4 mm.⁸ These features have clinical importance in nasal surgery because of the difficulty in determining location.

Injury to the nasolacrimal duct is a known complication of endoscopic sinus surgery. However, only few reports have been published describing this issue. The rate of nasolacrimal duct injury varies from 1.7% to 15%; this is most likely related to the level of experience of the surgeon.^{9,10} Ali et al. published the largest series providing information on the incidence of NLD injury following surgery.¹¹ The study reported the incidence of preoperative and postoperative NLD dehiscence using computed tomography scan images. Of the 118 patients included in their study, eight patients had preexisting NLD dehiscence, while four patients showed new evidence of dehiscence postoperatively.

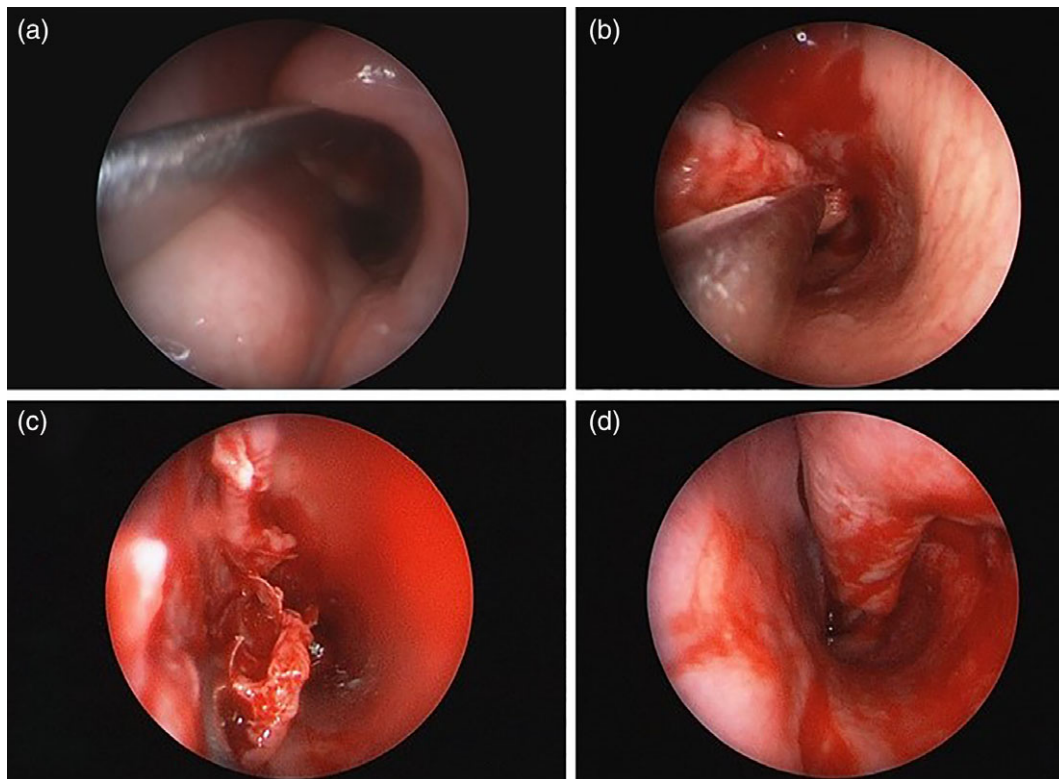


Fig. 1. Steps of endoscopic power-assisted medial flap turbinoplasty. (a) Outfracture of the inferior turbinate. (b) Shaving of all the mucosa of the lateral surface of the inferior turbinate using a microdebrider. (c) Dissection and removal of the conchal bone. (d) Rolling the remaining mucosa on itself using a Freer's elevator.

To the best of our knowledge, this is the first study demonstrating normal postoperative nasolacrimal flow after PAMFT surgery. In this study, we tested the safety of the PAMFT technique. There was no evidence of NLD injury in any patient, as confirmed by the endoscopic fluorescein dye test. Bearing in mind the fact that the Hasner's valve is located on the lateral wall of inferior meatus, all our procedures were performed without

testing the location of the Hasner's valve. This study has small sample size, further studies need to be conducted with a larger sample and to compare the safety of different turbinoplasty techniques in regards NLD drainage.

CONCLUSION

PAMFT is a simple, easy to learn procedure with low morbidity and excellent long-lasting results. It is a very safe procedure with regard to the lacrimal drainage system; we did not observe any evidence of nasolacrimal duct injury in the 62 cases of turbinoplasty performed.

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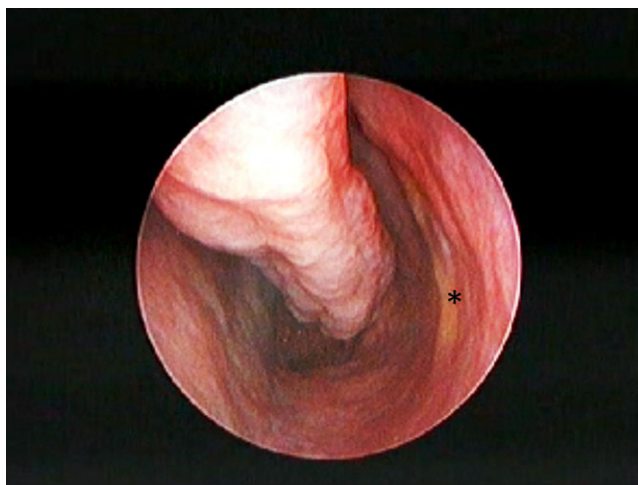


Fig. 2. Normal drainage of the fluorescein dye from the inferior meatus postoperatively (*).

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