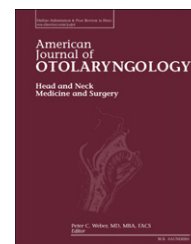


Available online at www.sciencedirect.com

SciVerse ScienceDirect

www.elsevier.com/locate/amjoto

The Draf III septal flap technique: A preliminary report[☆]

Samimiardestani Seyedhadi, MD^a, Mohammadi Ardehali Mojtaba^a,
Bastaninejad Shahin^{b,*}, Kasaefar Hoseinali^c

^a Otolaryngology and Head and Neck Surgery, Tehran University of Medical Sciences, Amir'Alam Hospital, Iran

^b Otorhinolaryngology Research Center, Tehran University of Medical Sciences, Amir'Alam Hospital, Tehran, Iran

^c Otolaryngology and Head and Neck Surgery, Amir'Alam Hospital, Iran

ARTICLE INFO

Article history:

Received 27 December 2012

ABSTRACT

Aim: The most prevalent complication of Draf III surgery is recurrence of frontal recess stenosis. The aim of this study is to introduce a method to prevent closure of the recess.

Type of the Study and Setting: This is a retrospective study that was conducted in Ear, Nose and Throat Referral Center, Amir'Alam Hospital, Tehran.

Methods and Materials: We introduced a new technique for reconstructing frontal recess mucosa and prevention of restenosis following Draf III operation; we covered the posterior wall of the common recess with a vascular mucosal flap from nasal septum.

Results: During a 6-month period we used septal flaps based on anterior ethmoidal artery on four patients who had undergone endoscopic Draf III operation. During a 3-month follow-up period, frontal recess stenosis did recur in any of the patients.

Conclusion: Applying a precise and astute surgical method along with reconstructing common recess mucosa will improve the outcomes of endoscopic frontal sinus drill-out. We strongly recommend application of septal mucosal flap based on the anterior ethmoidal artery during Draf III operation to decrease the incidence of scar and recurrence of common frontal recess stenosis.

© 2013 Elsevier Inc. All rights reserved.

1. Introduction

Performing endoscopic frontal sinus operations in patients with fibrosis and massive ossifications in frontal sinus area is difficult and challenging. Generally the most complicated part of endoscopic nasal operations is approaching the frontal sinus. The obscure location of the recess, along with its anatomical variations and perilous adjacent structures could dissuade the surgeon from performing a comprehensive operation on this area which might necessitate further revisions and inevitably development of major complications [1]. Since the year 1991 when Professor Draf introduced approaches of endoscopic

operations on frontal sinus there has been several modifications in this field [2,3]. Draf III is the latest and the most comprehensive approach in patients with ossified frontal sinus. To form the common recess by this method, frontal recess floor is completely opened from one lamina papyracea to the other one and even the upper part of the nasal septum is resected. Incidence of recess restenosis has been reported to be 4% to 33% in different studies [4–7]. Development of recess restenosis does not necessarily impose secondary surgery. A need for a secondary surgery in the study of Shirazi and colleagues [8] in the year 2007 on 97 patients during an 8-year follow-up period was 23% but others have reported lower figures.

[☆] Declarations: All authors have contributed to, read and approved this manuscript. None of the authors have any conflict of interest, financial or otherwise.

* Corresponding author.

E-mail address: Dr_shahinbastani@yahoo.com (B. Shahin).

2. Methods and materials

During a 6-month period we performed endoscopic Draf III operation and used septal flap based on the anterior ethmoidal artery to reconstruct the mucosa of the posterior part of common frontal duct in patients with extensive adhesions in frontal recess or bony stenosis of frontal recess due to refractory sinusitis, mucocele or other causes of chronic inflammation or trauma. We had four patients with aforementioned conditions during that period which underwent mucosal reconstruction by the flap.

2.1. Surgical technique

Under general anesthesia we performed stereotactic computerized navigation-guided endoscopic nasal operation. We used local decongestion of nasal cavity by application of phenylephrine-soaked mesh as well as injection of 1:100,000 epinephrine to mucosa adjacent to the location of attachment of the middle concha and concha itself, nasal septum and anterior to uncinate process. Firstly according to the patients' pathology, routine anterior-posterior operation is performed. After elimination of the pathology in other sinuses and before Draf III approach to frontal recess, a septal flap is formed based on the anterior ethmoidal artery. At the side which the nasal septum is more concave the flap with an anterior-posterior base which is based on the possible location of anterior ethmoidal artery entrance to cribriform plate is made. The part of the nasal septum between recesses and anterior to middle conchas of both sides is resected and then parts of frontal recess floor between two recesses are resected by drill, microdebrider and punch. Drilling is performed on the frontal beak as possible. After that the postero-inferior part of the posterior wall of common recess is thinned to form "frontal T" (junction of the perpendicular plate of ethmoid bone and posterior margin of frontal sinus floor). Length of bare area of the posterior part of common recess is estimated with frontal curette and by adding 25% increment to that, septal flap length is revised. During this phase of the surgery, the location of the anterior ethmoidal artery is visible so the base of the flap is narrowed (Fig. 1). After washing, the septal flap is pulled on the posterior drilled area (Fig. 2) and is packed with gel foam. The gel foam is supported by nasal mesh and the operation ends. Patients were discharged 2 days after the surgery with prescription of Co-Amoxiclav (amoxicillin/clavulanic acid) and the nasal mesh was removed 4 days later. Nasal cavity rinsing was started on the fourth day. Two to 3 weeks after the surgery, endoscopy was performed to remove the crusts and corticosteroid spray was prescribed. Figs. 1 and 2 depict Draf III operation on a patient with CSF leakage in the upper part of the right frontal recess and severe bilateral frontal recess stenosis which was reconstructed with septal flap based on the anterior ethmoidal artery (Figs. 3, 4, and 5).

3. Results

During the operation on four patients no major complication occurred. We did not notice significant adhesions or stenosis

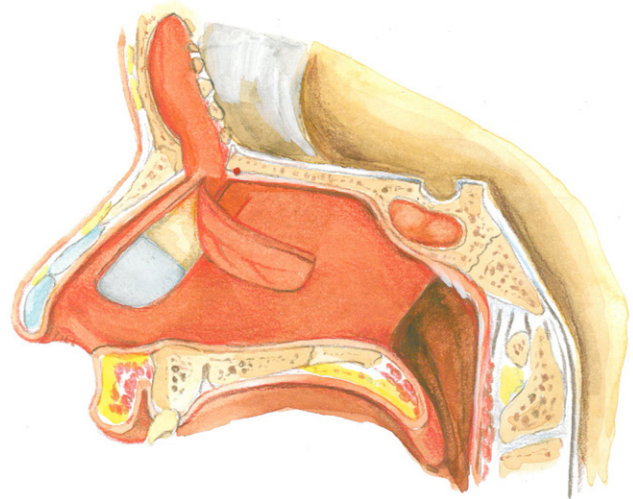


Fig. 1 – Forming septal flap based on the anterior ethmoidal artery in a patient with bilateral frontal recess stenosis and multiple fractures posterior to frontal sinus due to trauma.

of common recess during the 3-month follow-up. We recognized stenosis when the section surface area of common recess was reduced to 50% or less than that at the end of the surgery. It was estimated by means of the curve suction's tip.

4. Discussion

There are several issues about frontal recess stenosis including issues about surgical tools, the amount of common recess mucosa to be preserved, and application of frontal stents. An animal study in the year 2004 showed that drilling could lead to neo-osteogenesis and recess stenosis [9]. On the other hand, Professor Moriyama and his colleagues [10] demonstrated that the mucosa which grows on bare bone is not normal and in most cases without cilia. Thus some experts suggest that surgeons should not use drilling in operations on frontal recess and only application of cutting punches is acceptable [2].

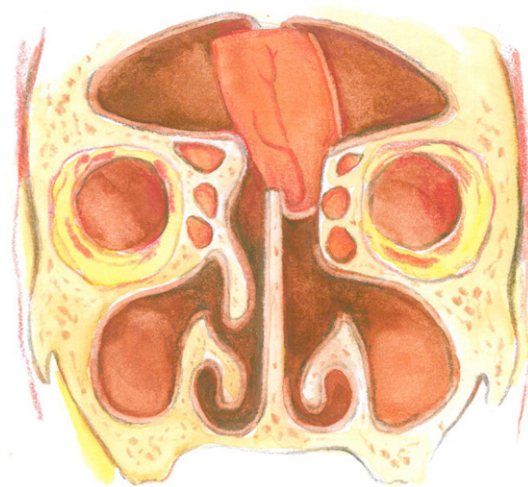


Fig. 2 – Position of the flap at the end of Draf III.

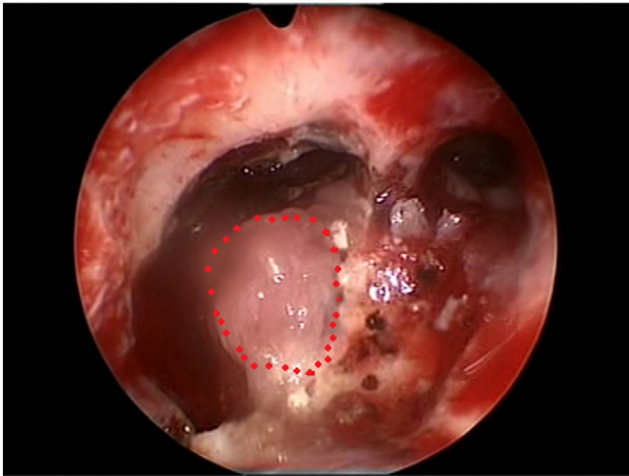


Fig. 3 – Image of the upper part of the common frontal recess at the end of Draf III operation in a patient with traumatic stenosis of frontal recess and CSF leakage due to trauma. Location of the leakage is packed with temporal muscle and fascia at the dotted area.

The amount of preservation of common recess mucosa is controversial, however most experts suggest preserving the mucosa in lateral and posterior parts of common recess [11–15]. Professors Draf and Minovi [7] in a study published in year 2006, drilled posterior wall of the recess to form the landmark—frontal T—to increase the anterior–posterior diameter of common recess and to improve drainage through medial frontal recess. Posterior drilling was carried out till the first olfactory fibers in both sides and also junction of the perpendicular plate of ethmoid bone and posterior margin of frontal sinus floor (frontal T) were observed. Recess restenosis was less frequent following that technique compared to common Draf III technique (success rate of 96% vs 91.5%).

The most common complication of endoscopic modified Lothrop operation is frontal recess restenosis which is defined

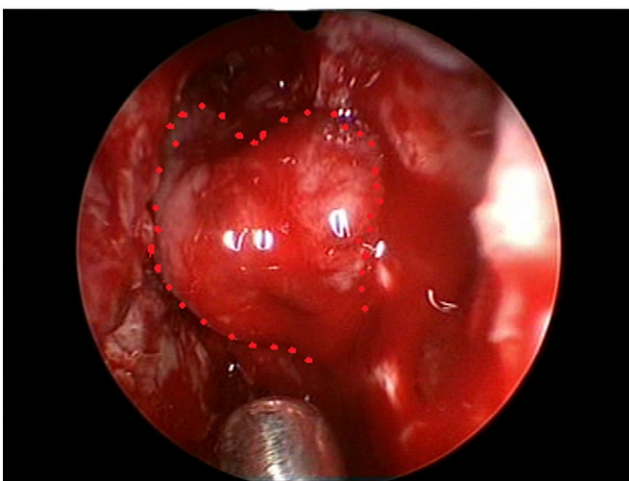


Fig. 4 – At the end of the surgery the posterior part of the common frontal recess is covered with septal flap at the dotted area.

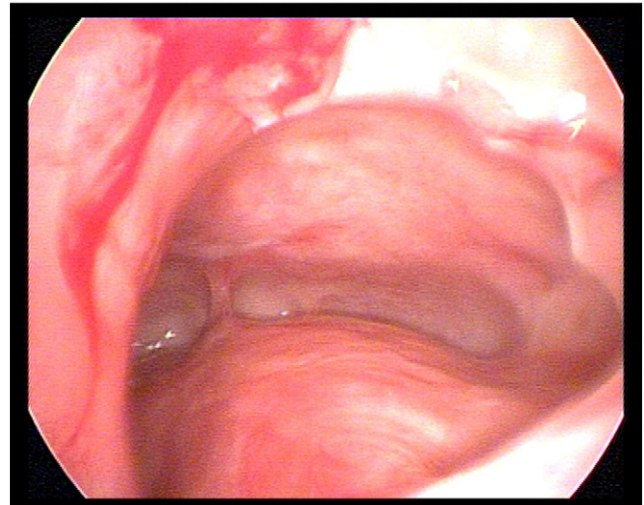


Fig. 5 – Six-month postoperative view of the same patient.

as more than 50% reduction in the section surface area of the recess compared to that at the end of the surgery [2,4,11]. In a study, prevalence of recess restenosis was reported to be 33% during at least 1-year follow-up [5] but only 11% required secondary surgeries.

Nasoseptal flap based on the posterior nasoseptal artery was first used in extensive skull base operations in the year 2006 (Hadad et al.) [16–21] and endonasal vascular reconstruction was quickly became workhorse.

Minimum follow-up period of the patients has been brought up to be 1 year in which most failures occur [8,14]. Our study is indeed a preliminary report about a technique for reconstructing common recess following Draf III operation. This technique has been successfully used in four patients but their 1-year follow-up period has not been elapsed. One patient has been followed for 6 months and has not had any complication till now. The others have not had complications too but their follow-up periods are not complete yet.

Conger and his colleagues [22] evaluated free mucosal grafting in patients who had undergone frontal Draf operation. Recess restenosis was not detected in any of the patients during the follow-up period.

It should be noted that in the year 2011, Professor Castelnuovo and his colleagues [23] used septal flap based on the anterior ethmoidal artery for reconstructing septal perforations for the first time.

5. Conclusion

Applying a precise and astute surgical method along with reconstructing common recess mucosa will improve the outcomes of endoscopic frontal sinus drill-out. We strongly recommend application of septal mucosal flap based on the anterior ethmoidal artery during Draf III operation to decrease the incidence of scar and common frontal recess restenosis. This flap is also beneficial for blocking CSF leakage in the anterior areas of anterior crania fossa. This study was a report of a technique used for reconstructing common frontal recess following Draf III operation. Extending the follow-up period up

to 1 year and enrolling more patients are necessary to confirm these results.

Acknowledgment

We would like to thank Miss Azade Dadvarbalochi, for her generous assistance in preparing our medical pictures (Figs. 1 and 2).

REFERENCES

- [1] Friedman M, Bliznikas D, Vidyasagar R, et al. Frontal sinus surgery 2004: update of clinical anatomy and surgical techniques. *Operative techniques in otolaryngology-head and neck surgery* 2004;15:23-31.
- [2] Dubin MG, Kuhn FA. Endoscopic modified Lothrop (Draf III) with frontal sinus punches. *Laryngoscope* 2005;115:1702-3.
- [3] Draf W. Endonasal micro-endoscopic frontal sinus surgery: the Fulda concept. *Oper Tech Otolaryngol Head Neck Surg* 1991;2:234-40.
- [4] Wormald PJ. Salvage frontal sinus surgery: the endoscopic modified Lothrop procedure. *Laryngoscope* 2003;113:276-83.
- [5] Tran KN, Beule AG, Singal D, et al. Frontal ostium restenosis after the endoscopic modified Lothrop procedure. *Laryngoscope* 2007;117:1457-62.
- [6] Batra PS, Cannady SB, Lanza DC. Surgical outcomes of Drillout procedures for complex frontal sinus pathology. *Laryngoscope* 2007;117:927-31.
- [7] Draf W, Minovi A. The "Frontal T" in the refinement of endonasal frontal sinus type III drainage. *Operative Techniques in Otolaryngology* 2006;17:121-5.
- [8] Shirazi MA, Silver AL, Stankiewicz JA. Surgical outcomes following the endoscopic modified Lothrop procedure. *Laryngoscope* 2007;117:765-9.
- [9] Rajapaksa SP, Ananda A, Cain TM, et al. Frontal ostium neo-osteogenesis and restenosis after modified endoscopic Lothrop procedure in an animal model. *Clin Otolaryngol* 2004;29:386-8.
- [10] Moriyama H, Yanagi K, Ohtori N, et al. Healing process of sinus mucosa after endoscopic sinus surgery. *Am J Rhinol* 1996;10:61-6.
- [11] Farhat FT, Kountakis SE. Endoscopic modified Lothrop procedure. *Operative techniques in otolaryngology-head and neck surgery* 2004;15:4-7.
- [12] Gross WE, Gross CW, Becker D, et al. Modified transnasal endoscopic Lothrop procedure as an alternative to frontal sinus obliteration. *Otolaryngol Head Neck Surg* 1995;113:427-34.
- [13] Weber R, Draf W, Kratzsch B, et al. Modern concepts of frontal sinus surgery. *Laryngoscope* 2001;111:137-46.
- [14] Gross CW, Schlosser RJ. The modified Lothrop procedure: lessons learned. *Laryngoscope* 2001;111:1302-5.
- [15] Schlosser RJ, Zachmann G, Harrison S, et al. The endoscopic modified Lothrop: long-term follow-up on 44 patients. *Am J Rhinol* 2002;16:103-8.
- [16] Bhatki AM, Pant H, Synderman CH, et al. Reconstruction of the cranial base following endonasal skull base surgery: regional tissue flaps. *Operative techniques in otolaryngology* 2010;21:83-90.
- [17] Hadad G, Bassagasteguy L, Carrau RL, et al. A novel reconstructive technique after endoscopic expanded endonasal approaches: vascular pedicle nasoseptal flap. *Laryngoscope* 2006;116:1882-6.
- [18] Bhatki AM, Pant H, Synderman CH, et al. Reconstruction of the cranial base after endonasal skull base surgery: local tissue flaps. *Operative Techniques in otolaryngology* 2010;21:74-82.
- [19] Parmar P, Harvey RJ. Reconstructive options for endoscopic skull base surgery. *Otolaryngol Clin N Am* 2011;14:1201-22.
- [20] MacCoul ED, Schwartz TH, Anand VK. Vascularized reconstruction of endoscopic skull base defects. *Operative techniques in otolaryngology* 2011;22:232-6.
- [21] El-Sayed IH, Roediger FC, Goldberg AN, et al. Endoscopic reconstruction of skull base defects with the nasal septal flap. *Skull base* 2008;18:385-94.
- [22] Conger BT, Riley K, Woodworth BA. The Draf III mucosal grafting technique: a prospective study. *Otolaryngol Head Neck Surg* 2012;146:664-8.
- [23] Castelnovo P, Ferrel F, Khodaei I, et al. Anterior ethmoidal artery septal flap for the management of septal perforation. *Arch Facial Plast Surg* 2011;13:411-4.