Outcomes After Frontal Sinus Surgery

An Evidence-Based Review

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KEYWORDS

• Draf IIa • Draf III • Endoscopic frontal sinusotomy • Endoscopic modified Lothrop • Frontal sinusitis • Frontal sinus obliteration • Endoscopic sinus surgery • Frontal sinus drillout

KEY POINTS

- Frontal sinusotomy via Draf IIa is effective for most patients with medically refractory frontal sinusitis based on reported case series.
- Endoscopic postoperative patency rates of Draf IIa surgery is significantly higher in patients who intraoperatively achieved diameter no smaller than 4.5 mm.
- Frontal sinus closure by either cicatricial stenosis or polypoid edema is associated with persistent symptoms after Draf IIa.
- Draf III is an effective salvage operation for patients that avoids some of the morbidities associated with frontal sinus obliteration.
- Short-term (2-year) neo-ostial patency rates are high and are associated with high rates of symptom control.

INTRODUCTION

Chronic rhinosinusitis (CRS) is a common disease that carries significant impairment of patient quality of life (QOL)[1] and patient productivity.[2] CRS can frequently be treated successfully with medical therapy, but patients that have persistent bothersome

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symptoms despite maximal medical therapy can elect to undergo surgical treatment of the sinuses. The primary goal of endoscopic sinus surgery (ESS) is to provide improvement in the QOL of patients that have failed medical therapy.[3,4]

ESS is thought to deliver improvements in QOL through improved control of the underlying inflammatory process. Since its inception, ESS has been predicated on creation of durable openings into the sinuses that allow for efficient drainage of sinus secretions.[5] Understanding of the underlying pathophysiology of CRS has broadened, and a secondary goal of sinus surgery is control of the intrinsic mucosal inflammation of the sinuses through delivery of topical therapies.[6] Patent sinusotomies, therefore, are thought to be a critical goal in control of the underlying inflammatory process.

Surgical interventions of the frontal sinus offer a unique surgical challenge because of the idiosyncrasies of the frontal sinus outflow tract anatomy. The frontal sinuses rest above the frontal beak in the frontal bone with an outflow tract nestled between the orbits laterally and skull base medially. These fundamental limits of dissection provide what are frequently the most narrow sinusotomy and the highest risk for major complications and stenosis. Historical approaches to the frontal sinuses, including the Lynch and Lothrop procedures, had high short-term patency rates, but over time developed 30% failure rates in the long-term.[7] These failure rates elevated the osteoplastic flap with frontal sinus obliteration to the putative gold standard[7]; however, the osteoplastic flap is associated with significant morbidity including supraorbital neuralgia, frontal bossing, abdominal fat donor site complications, and difficulty with surveillance of the sinus.[8]

With the advent of ESS reasonable surgical alternatives to the open approaches were developed. Draf[9] described a range of potential interventions from merely performing a total ethmoidectomy without any intervention on the frontal recess (Draf I), to complete clearing of the frontal recess (Draf IIA), and finally an extended sinusotomy that marsupializes the bilateral frontal sinuses through a transeptal removal of the frontal sinus floors and intersinus septum (Draf III) (**Table 1**). A variety of modifications of these techniques exist, but the critical difference between the various techniques is whether the sinusotomy can be performed with hand instrumentation or requires a drill. Use of a drill requires stripped mucosa, which has been associated with high rates of restenosis[7] and higher rates of complications on prior surgeries. Therefore, for the purposes of this article, these two types of endoscopic frontal sinus surgery are evaluated separately.

This article summarizes the evidence underpinning surgical intervention of the frontal sinus. Special attention is given to the impact of frontal sinus surgery on

Table 1
Description and terminology of frontal sinusotomies

Frontal Sinusotomies	Description
Draf I	Total ethmoidectomy with no instrumentation of the narrowest part of the frontal recess
Draf IIa	Mucosal-sparing clearance of the frontal recess of tissue
Draf IIb	Removal of the superior anterior attachment of the head of the middle to the septum turbinate and the floor of the frontal sinus
Extended Draf IIB/unilateral drillout	A Draf IIb that includes unilateral drilling away of the frontal beak
Draf III	Removal of the frontal intersinus septum, the frontal beak, and the superior septum