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Optimizing Outcomes in Draf IIB: The Role of Mucosal Flaps

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Abstract

Background: There has been a well-defined endoscopic approach for the surgical treatment of complex frontal sinus disease called Draf IIB frontal sinusotomy. Although the excellent results in terms of frontal sinus drainage have been reported with this technique, postoperative stenosis and neo-ostium restenosis are still considerable problems. Mucosal preservation techniques, in addition to the use of vascularized mucosal flaps, have been utilized to enhance healing and maintain patency of the frontal sinuses. **Aim:** We review the existing evidence regarding the role of mucosal flap techniques to optimize outcomes following Draf IIB frontal sinusotomy. **Methods:** A narrative review of the literature on studies reporting mucosal conservation and flap reconstruction in endoscopic frontal sinus surgery specifically in Draf IIB techniques was performed. We reviewed articles focusing on surgical procedures, postoperative outcomes and complications. **Results:** Various mucosal flap techniques created to enhance mucosal coverage of uncovered bone, minimize postoperative scarring. Types of flaps that are frequently described include: septal mucosal flap; middle turbinate-based flaps; and lateral nasal wall flaps. These techniques aim to facilitate mucosal healing, minimize granulation tissue development and lower the risk of restenosis at the frontal sinus ostium. Multiple studies suggest higher frontal sinus patency rates and improved postoperative healing when mucosal flaps are used. **Conclusions:** Mucosal flaps are a significant adjunct in the Draf type IIB frontal sinusotomy. Optimal results in endoscopic frontal sinus surgery can be attributed to mucosal preservation and careful flap selection.

Keywords: Endoscopic Sinus Surgery, Neo-Ostium, Patency.

1. Introduction

The most common frontal sinus disease offers significant challenges in otolaryngology because of the complex frontal recess anatomy and the narrow, extraordinarily variable drainage path (Wormald, 1989; Wiebel et al., 2013). Surgical techniques for the frontal sinus have developed dramatically over the last few decades, with Draf IIB frontal sinusotomy commonly utilized for unilateral frontal sinus pathology, especially in complex or revision cases (Turner et al., 2016). This is designed to improve ventilation and promote long-term disease control by establishing a wide frontal sinus outflow tract. Despite some advancements, the postoperative neo-ostium remains a key limiting factor and leading cause

of surgical failure (Eloy & Setzen, 2016). Restenosis is a complex process mediated by mucosal injury, exposed bone, impaired mucociliary clearance, and fibrosis during the healing response (Crocetta et al., 2021). As a result, maintaining mucosal integrity and promoting rapid re-epithelialization have emerged as the guiding principles of modern endoscopic sinus surgery. In recent years, vascularized mucosal flaps have received increasing interest as an adjunct to frontal sinus surgery. These techniques are used to provide rapid mucosal coverage of denuded bone, stimulate granulation tissue formation, address cicatricial stenosis, and promote healing (Ye et al., 2023). Different types of flaps have been

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described, such as septal mucosal flaps, middle turbinate-based flaps and lateral nasal wall flaps with an array of indications and technical nuances (Bleier et al., 2011).

While some new evidence indicates that mucosal flaps may improve frontal sinus patency and decrease re-stenosis (DeConde & Smith, 2016), the current literature on the topic is still heterogeneous in terms of study design, patient populations, surgical methods and outcome measurement. There remains no definitive agreement concerning selection or presence of flaps in routine use during frontal sinusotomy Draf IIB.

In this systematic review, we intend to assess the reported evidence relating to mucosal flap techniques in Draf IIB frontal sinusotomy with emphasis on indications, surgical approaches, as well as their role in affecting postoperative healing and frontal sinus patency. This review aims to consolidate existing data to elucidate the impact of mucosal flaps on surgical outcomes and identify gaps in the literature and even the concept of mucosal reconstruction, describing harvesting a medially based mucoperiosteal flap to preserve the frontal recess during open frontal sinus surgery (Sewall, 1953; Baron et al., 1973). This approach was adapted when the endoscopic procedures were introduced (Lein et al., 2025).

Mucosal flaps are free grafts (dependent on secondary revascularization) or pedicled (maintaining blood supply) and derived from NSA, LNW, or turbinates (Leventi et al., 2024). Although a non-significant observation, the long-term patency of the neo-ostium may improve with periosteal coverage from mucosal reconstruction, which both protects underlying exposed bone and promotes reepithelialization at those sites (Lv et al., 2024). Preserving olfactory fibers may improve patient-reported olfactory function by preserving mucosal function (Wong et al., 2019).

Nasal vascularized local flap operations are carried out from tissues as part of the nasal cavity that remain attached to the donor base (pedicle) and are mobilized by translocation and rotation into adjacent sites. An ideal flap should thus have a relatively small arc of rotation, be easy to design and perform, be able to withstand some level of ischemic injury while produced with little or no morbidity and provide an adequate surface area (Russo et al., 2023).

Types of flaps:

1- Types of Mucosal Flaps Used in Draf IIB frontal sinusotomy

1. Septal Mucosal Flap

A vascularized flap derived from the nasal septum is reported to cover exposed large

areas of bony defects in the frontal recess. It has demonstrated superior vascularity and accelerated mucosal healing, especially in revisions and high-risk restenosis (Crocetta et al., 2021; Ye et al., 2023; Bleier et al., 2011).

2. Middle Turbinate Flap

Using a flap from the mucosa of the middle turbinate. It is technically straightforward, and indicated for moderate defects with preserved middle turbinate anatomy. It assists in minimizing granulation tissue formation and subsequent postoperative adhesions (Ye et al., 2023; Bleier et al., 2011).

3. Lateral Nasal Wall Flap

This flap is taken from the mucosa of the lateral nasal wall and is typically appropriate for localized frontal recess defects. This is advantageous for accessibility and supports the epithelialization of bone surfaces (Ye et al., 2023 & 2022).

4. Inferior Turbinate Flap

A scapular flap fed from inferior turbinatus mucosa. It provides sufficient soft tissue coverage and may be used in cases where septal or middle turbinate mucosa is not available (Ye et al., 2022; Harvey et al., 2009).

5. Posterior Pedicled Flap

A postero-based flap that is a line from the post nasal septum or lateral wall. It is especially beneficial for posterior frontal recess defects and anatomically difficult cases (Bleier et al., 2011; Ye et al., 2022).

6. Pericranial Flap

An externally dissected vascularized flap from the pericranium. This is primarily used for reconstruction of major defects, revision surgery, or conditions involving skull base involvement due to its rich vascularity and large surface area coverage (Patel et al., 2010; Zanation et al., 2009).

7. Free Mucosal Graft

A non-vascularized mucosal graft taken from the septum or turbinate. It is often applied to small, bare areas; however, it displays lower success rates than vascularized flaps due to delayed revascularization (Crocetta et al., 2021; Lund & Kennedy., 1997).

8. Nasoseptal Flap

A pedicled flap on the posterior septal artery. While more commonly applied to skull base reconstruction mechanisms, it may also be employed in select frontal sinus cases indicating large mucosal surface area efforts (Patel et al., 2010; Zanation et al., 2009).

9. Composite Flaps

These flaps consist of a mucosa associated with additional layers of supportive tissue and are an option for complex reconstructive cases where greater structural

support is desirable (Bleier et al., 2011; Patel et al., 2010).

Summary of Mucosal Flaps in Draf IIb Frontal Sinusotomy

Flap Type	Source / Design	Indications	Advantages	Limitations	Reported Outcomes	Patency rate (%)	Key References
Septal Mucosal Flap	Nasal septum (vascularized)	-Large exposed bone - revision cases	-Highly vascular. -excellent coverage.	-Can affect septum.	↓ restenosis ↑ patency	85–95%	(Crocetta et al., 2021), (Ye et al., 2023), (Bleier et al., 2011)
Middle Turbinate Flap	Middle turbinate mucosa	Moderate defects.	-Easy to close frontal recess.	limited size	-↓ granulation -improves healing	80–90%	(Ye et al., 2023), (Bleier et al., 2011)
Lateral Nasal Wall Flap	Lateral nasal wall	Frontal recess coverage.	good accessibility.	limited reach.	better epithelialization.	78–88%	(Ye et al., 2023 & 2022)
Pericranial Flap	External pericranial flap	Complex/revision cases	large + robust vascularity	invasive	-high success in complicated cases..	90–98%	(Patel et al., 2010), (Zanation et al., 2009)
Free Mucosal Graft	Septum / turbinate (non-vascularized)	Small defects	simple	less survival.	variable outcomes	65–80%	(Crocetta et al., 2021), (Lund & Kennedy., 1997)
Inferior Turbinate Flap	Inferior turbinate	Selected cases	good size	possible nasal morbidity	promising results	80–90%	(Ye et al., 2022), (Harvey et al., 2009)
Posterior Pedicled Flaps	Posterior septal / lateral wall	Posterior defects	good reach	technically demanding	good in chosen cases	82–92%	(Bleier et al., 2011), (Ye et al., 2022)

Various flap types have been used to achieve high neo-ostium patency rates after mucosal reconstruction and numerous single arm studies over the past decade report successful outcomes (Conger et al., 2012). Mucosal reconstruction after Draf III was investigated in a single randomized-controlled study published in 2019 by Wang et al. that demonstrated decreased rates of stenosis with flap use (Wang et al., 2019).

Interestingly, past data have shown no significant effect of mucosal flaps or grafting in Draf IIb and Draf III according to previous

meta-analyses and systematic reviews (Hirayama et al., 2025). However, previous studies were limited by mucosal reconstruction being treated as a subgroup and the inability to control for heterogeneity in study design, patient selection, and surgical indication (Haddad et al., 2021). Consequently, a comprehensive methodological evaluation of the existing empirical data on the effects of mucosal flaps and grafts on neo-ostium patency is still missing (Yin & Douglas., 2021).

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Author	Draf	Flap	Flap design	Flap vs no flap	Definition of failure
Fischer, 2022	III	flap	LPF	Flap vs no flap	Total closure
Leventi, (2022).	III	Pedicled flap or mucosal grafts	STF/LNSF/MG	Flap vs no flap	Total closure
Wang (2019).	III	Pedicled flap + mucosal grafts	MG+APF	Flap vs no flap	If revision surgery is required
Ye, (2023).	III	Pedicled flap	LPF+LNSF+SF	Flap vs no flap	If revision surgery is required
Fiorini, (2016).	IIB-III	Pedicled flap	STF	Flap	If revision surgery is required
He,2022	IIB	Pedicled flap	LIPF	Flap	Total closure or need for revision
Hildenbr and (2021).	III	Mucosal graft	MG	Flap	If revision surgery is required
Illing, (2016).	III	Mucosal graft or pedicled flap	MG/SF	Flap	A-P reduction>50%+need for reoperation secondary to stenosis
Omura, (2018).	Ia-IIB-III	Pedicled flap	LPF	Flap	Total closure

” APF: anterior pedicled flap. LIPF: lateral inferior pedicle flap. LNSF: lateral nasoseptal flap. LPF: lateral pedicled flap. MG: mucosal

graft. SF: septal flap. LAP: superior lateral anterior pedicle flap. STF: septoturbinal flap” .

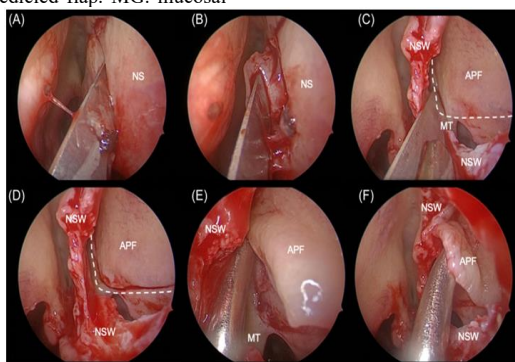


Fig 1 Anterior pedicled flap (APF) procedure (Wag et al., 2019).

Across all nine studies, the patency rate in the flap cohort was 96.1 percent (± 5.2 percent) compared to an 88 percent chance of patency (± 4.7 percent) in the no-flap cohort

1-Patency rates:

The most important result of this meta-analysis is the highly significant improvement in neostomium patency achieved with a mucosal flap or graft. The patency rate of neostomium was significantly higher in our study (96.1%) than that previously reported for Draf III operations (83%) (Abuzeid et al., 2018) when all flap cohorts were combined. Use of flaps was not studied, however. Draf II b, a method for pre-oral synechia distraction, was

used by Haddad et al. (2021), who reported a cumulative patency rate of 87.85%.

Flaps and grafts too had a 93.5% patency rate; however, this was not of clinical significance by authors' own admission. In a more recent meta-analysis comparing Draf IIB with Draf III procedures, mucosal flaps did not significantly improve neostomium patency (odds ratio (Hirayama et al., 2025; Bastianelli et al., 2022).

2-Neo-ostium size

In addition, the closure of the neostomium size was decreased 20% in the flap cohort. History shows a strong association between the size of the left neo-ostium and long-term outcome (Ting et al., 2014). Conversely,

Naidoo et al. (2014) found that patency rates were 95% and the mean neo-ostium size was nearly three times larger than 300 mm² (Naidoo et al., 2014). Naidoo et al. (2013) and (2014) speculate that larger ostia facilitate topical medication delivery and may tolerate more postoperative scarring.

In the flap and no-flap groups, the areas of neo-ostia 5 months after surgery were reduced by an average of 25% and 45%, respectively. Tran et al., wherein a mean area loss of 25% at 29.2 months follow-up was reported (Tran et al., 2007). Also in this context, Naidoo et al. Over the 1st 2 years post-surgery, there is a 30% decrease (Naidoo et al., 2013 & 2014; Lein et al., 2025).

3- Reduction of Inflammation

Some suggest that the variability of results across patients may be mitigated by factors such as neo-ostium size and the local inflammatory condition (Ye et al., 2014). Animal studies demonstrated that mucosal flaps reduce histological indicators of inflammation, suggesting a possible healing process (Lv et al., 2024). However, direct measurements of both inflammatory markers have been conducted in only a single study, indicating that definitive conclusions cannot be drawn.

4-Flap Design

The risk of dislodgement of free mucosal grafts is elevated if they are not adequately anchored to the neo-ostium. Nasal irrigation shortly following surgery is believed to dislocate the graft, potentially compromising stable integration and diminishing patency. However, this theoretical risk lacked empirical support; the two studies documenting patency rates following free mucosal flaps indicated exceptional rates of 94% (Hildenbrand et al. 2012) and 100% (Wang et al. 2019). Both trials postponed irrigation and nasal occlusion using tape for two weeks postoperatively, which likely facilitated graft adherence and the healing of the mucosal lining. Conversely, Leventi et al. enhanced patency rate may be attributed to the efficacy of immediate postoperative nasal irrigation and free mucosal grafts, which could indicate a reduced NLR (Leventi et al., 2024).

5-Olfaction Outcome

Restenosis is a major contributor to clinical failure; yet, from the patient's perspective, clinically relevant goals such as olfaction or symptoms are of utmost importance. Consequently, the retention of the superior septum and/or the lateral nasal wall is crucial for maintaining rudimentary olfactory function. This study identified that just one

investigation assessed olfactory function (Wang et al., 2019). Significantly, we observed no disparity between patients receiving repair with flap and those in the non-flap category. Harvey & al. similarly observed a comparable outcome for olfactory function in patients with and without flap reconstruction, as measured by SNOT22 (Harvey et al., 2015).

6- Dual flaps:

Cadaveric investigations using Draf III techniques have previously detailed the utilization of posterior and lateral pedicled nasoseptal flaps, which encompass nearly the entirety of the underlying exposed osseous structure. Although these flaps overlap on the septal side, we cannot elevate both during a Draf IIb procedure. Mucosal closure in the frontal sinus: A novel technique employing two local mucoperiosteal flaps to entirely cover bone borders following Draf IIb frontal sinusotomy was implemented. A pterional craniotomy was executed to elevate the posterior findings (PSTF) for the protection of the posterior edge of the sinusotomy. Additionally, a lateral pedicle nasoseptal flap (LNSF) was raised on the ipsilateral side to encompass the anterior rim (Khoueir et al., 2018).

The bony margins of the sinusotomy are most exposed during the Draf IIb and III surgical procedures. DeConde et al. were the inaugural authors to delineate the exposure of osseous tissue during a Draf III procedure resulting from the elevation of a mucoperiosteal flap. In cadaveric experiments conducted by DeConde et al. (2012), a limited clinical series has been published demonstrating its application (Seyedhadi et al., 2013). Fiorini and colleagues (2016) documented a one-year frontal sinus patency rate of 93.5% following Draf IIb601 utilizing a mucoperiosteal flap.

All previous investigations utilized flap covering over the posterior sinusotomy boundary. A significant flaw in these initial research is the neglect of preserving the anterior sinusotomy bone boundary. Al Qahtani et al. devised a flap technique including bilateral double coverage to completely encase the bone margins of an anteriorly enlarged cavity (AlQahtani et al., 2014). However, these flaps are interdigitated, preventing both from being elevated on the same side, as they were developed during a single step of a unilateral Draf IIb procedure. Khoueir et al. (2018) identified a fourth form of flap originating from a single nasal cavity in Draf IIb.

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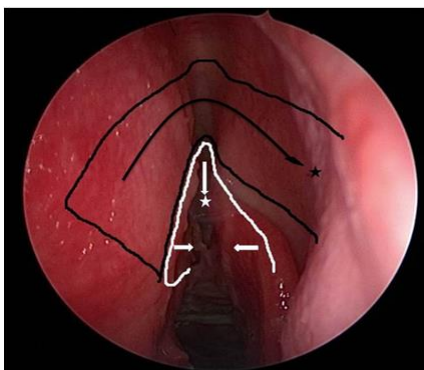


Fig (2): Illustration of the incision for the mucoperiosteal flaps on the left side:

- Posterior septoturbinal flap: white line. -the
- Nasoseptal flap :the black line.

These flaps do not intersect.

The white arrow: posterior rotation of the septoturbinal flap towards its pedicle, marked by the white star.

The black arrow: lateral rotation of the nasoseptal flap towards its pedicle, indicated by the black star. (Khoueir et al., 2018).

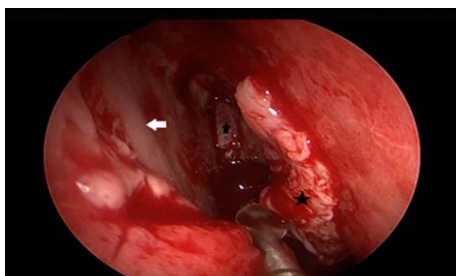


Fig 3 The posterior septoturbinal flap is positioned within the olfactory fossa (indicated by the black arrow).

The lateral nasoseptal flap (marked by the black star) is detached and subsequently positioned medially to the inferior turbinate.

The cartilage of the nasal septum is revealed medially (as shown by the white arrow). (Khoueir et al., 2018).

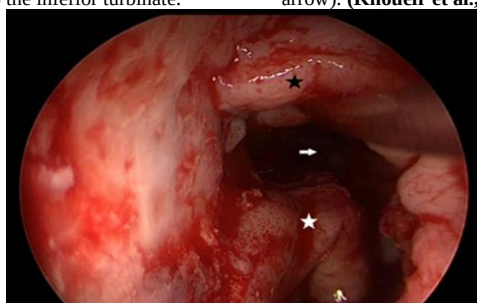


Fig 4 The margins of the Draf IIB sinusotomy (indicated by the white arrow) are covered with flaps: posterior margin is shielded with the posterior septoturbinal flap (white star), while the anterior margin is protected by the lateral nasoseptal flap (a black star). (Khoueir et al., 2018)

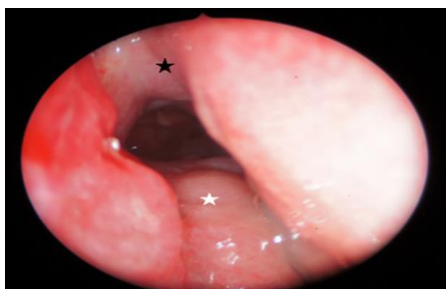


Fig 5 A left nasal endoscopy conducted at the 6-month follow-up revealed a patent Draf IIb cavity with flaps that are well-integrated. (Khoueir et al., 2018)

Septoturbinial flap:

Cadaveric research have characterized a septoturbinial mucosal flap (STF) reliant on the anterior ethmoidal artery (AEA), which can be utilized alongside both Draf IIb and Draf III operations (DeConde et al., 2012). In summary, local flaps yield superior results for Draf III surgeries (Conger et al., 2012). An ultimate bilobed incision was executed through the skin covering the median nasal region, extending to the medial boundary and axilla of the middle turbinate. Subsequently ascended into the lacrimal fossa, across its ceiling and then transversely to intersect with the opposing septum. The flap is excised through a

subperiosteal dissection from the caudal inverted U incision until it reaches the site of the robot's initial entry into the olfactory fibers and the first penetrations of the anterior skull base. A horizontal incision was made at the first penetrations of the skull base, continuing tangentially from the tips of both sides of an inverted U incision, so creating a posterolaterally based pedicled flap. The flap was then elevated and fixed to the front of the olfactory cleft. The STF was positioned above the drilled posteromedial wall of the frontal neo-ostium to maximize coverage of the exposed bone post-surgery (Fiorini et al., 2016).

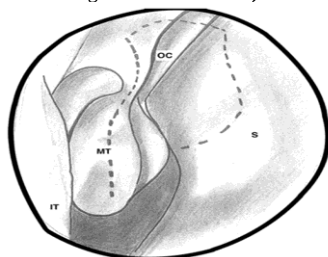


Fig 6 U-shaped incision (right nasal fossa). IT : inferior turbinate; MT : middle turbinate; OC : olfactory cleft; S : septum (Fiorini et al, 2016).

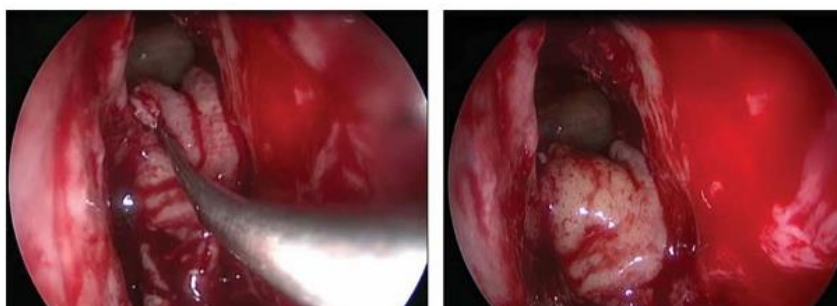


Fig 7 Septoturbinial flap Harvesting (Fiorini et al., 2016).

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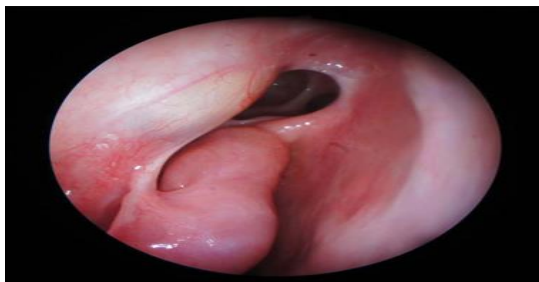


Fig 8 A 2-year postoperative endoscopic view of the frontal sinus after Draf IIB with septoturbinal flap (Fiorini et al., 2016).

STF stabilizes the patency of the neofrontal canal. This is mostly due to two reasons: 1) Flap flipped backwards at the end of surgery >180 degrees around neo-ostium circumference and

2) Elevation allows identification and division of first neurovascular bundle (Fiorini et al., 2016).

Pediced flaps:

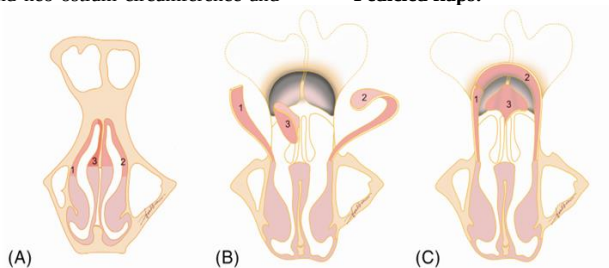


Fig 9 A-C Three varieties of pedicled mucosal flaps are the lateral nasal wall flap (LNWF), the lateral nasoseptal flap (LNSF), and the septal flap (SF) (Ye et al., 2023).

This picture shows the starting positions of the lateral nasal wall flap (LNWF, 1), the lateral nasoseptal flap (LNSF, 2), and the septal flap

(SF, 3). All mucosal flaps have been resected, and the common frontal drainage conduit has been created.

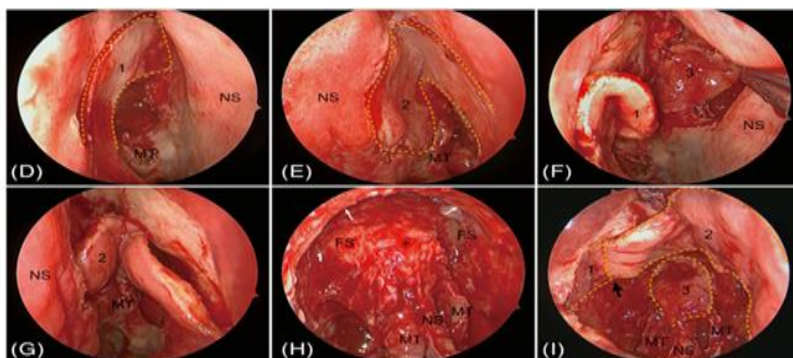


Fig 10 D-I LNWF was obtained from the roof of the nasal cavity, extending to the dorsum of the inferior turbinate (dotted line (D: Rt nasal cavity). LNSF signifies the extension of the LNWF through the nasal vault towards the septum (E: left nasal cavity: dotted line). SF was obtained from the nasal septum near the LNWF to reconstruct the posterior wall of the frontal outflow tract (F). The LNSF has been collected. The anterior and lateral bone of the frontal ostium (white arrow), as well as the posterior bony wall of the ostium (*), have been resected to augment the frontal neo-ostium (Ye et al., 2023).

Draf IIB cases:

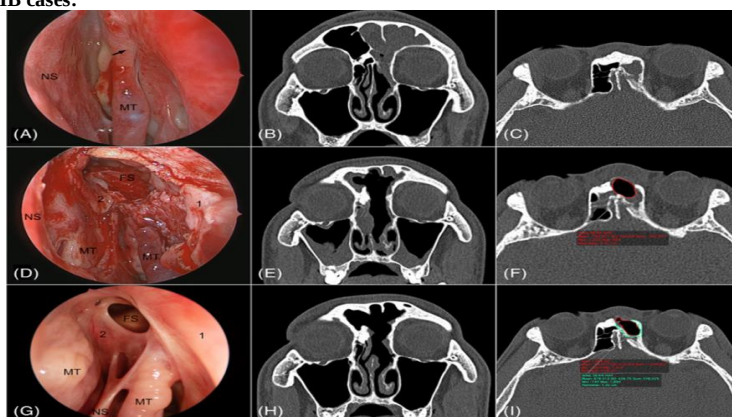


Fig 11 A preoperative picture of the left frontal recess demonstrates stenosis of the frontal ostium due to scarring. Preoperative coronal computed tomography image. Preoperative cross-sectional image of the frontal ostium. Intraoperative picture following the application of LNSF (1) and a contralateral septal flap (2) to the exposed bone.

Endoscopic evaluation at 12 months post-surgery. Coronal CT scan obtained 12 months post-operation. Diagram depicting the measurement of the frontal neo-ostium region (denoted by the red circle) and the bone area (denoted by the green circle). This cross-sectional picture was acquired 12 months after surgery. CT signifies computed tomography; FS identifies frontal sinus; LNSF refers to lateral nasoseptal flap; MT represents middle turbinate; NS indicates nasal septum. (Ye et al., 2023)

The choice of mucosal flaps was determined by the extent of exposed bone. LNSF and LNWF, beside an extended Draft II b, just LNSF. The SF was employed for the excision of the inverted posterior wall mucosa. It was utilized in instances of papilloma or osteoma resection, or when excision of a recalcitrant frontal T bone was required to attain maximal anteroposterior diameter (Ye et al., 2023).

Superior Lateral Anterior Pedicle Flap for Draf Procedures:

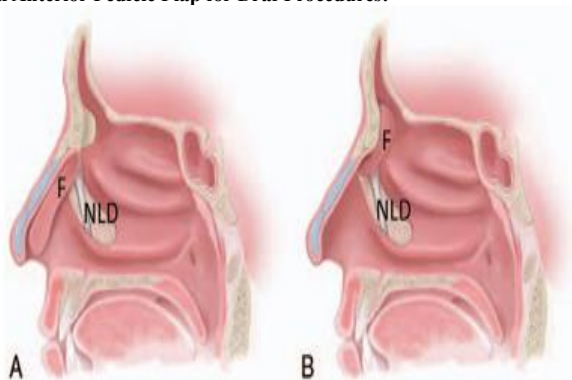


Fig 12 Illustration of the SLAP flap. A. The SLAP flap is lifted before drilling and positioned at the anterior-superior region of the nasal cavity to prevent interference with the procedure. The lacrimal sac is fully observable. B. The flap is then twisted to obscure the anteriorly exposed bone (Omura et al., 2018).

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Lateral inferior pedicled flap:

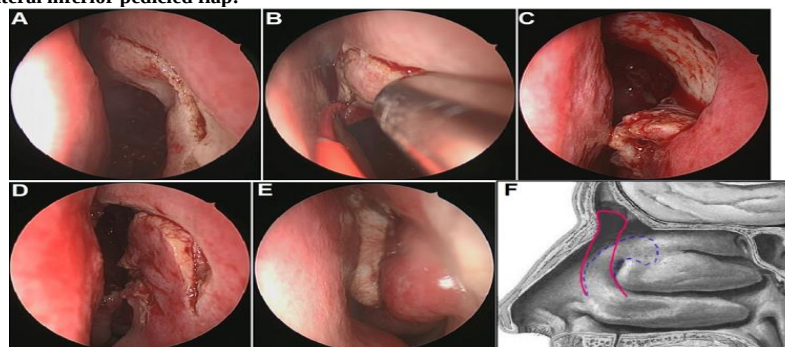


Fig 13 Endoscopic observations of the LIPF technique conducted in the left nasal cavity, both intraoperatively and postoperatively. A vertical incision was executed approximately 10 millimeters anterior to the axilla of the middle turbinate. The incision encircled the agger nasi and traversed the axilla. The flap was raised to the surface of the inferior turbinate. The blue dotted line denotes the incision, while the red solid line signifies the flap that safeguards the exposed bone (He, C et al., 2022)

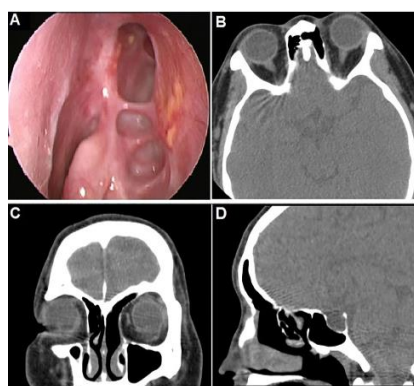


Fig 14 (A) Endoscopic views, (B) Axial, (C) coronal, and (D) sagittal CT images showing the neo-ostium at 12 months after surgery (He, C et al., 2022).

The reported 100% patency rate and clinical success for CRS may not align with a recent systematic review (Patel et al., 2018), which indicates that the postoperative patency of Draf IIb with flaps/grafts achieved 93.5%. Nonetheless, a prior investigation by Omura et al. documented a 100% overall patency in that group, aligning with our results (Omura et al., 2018). Furthermore, budesonide nasal nebulization inhalation for chronic rhinosinusitis may provide substantial advantages when utilized in conjunction with the LIPF approach (Zhen et al., 2007; Zheng et al., 2020). A greater sample size and extended follow-up duration may alter the outcomes. This study, despite its limitations, demonstrates that LIPF, when combined with the Draf IIb method, is a straightforward and

efficacious treatment for unilateral recurrent frontal lesions.

In Draft III, the authors suggested use grafts or flaps to cover exposed bone, yielding positive results (AlQahtani et al., 2014; Wang et al., 2019; Hildenbrand et al., 2012; Illing et al., 2016; Seyedhadi et al., 2013).

Recently, various flap methods have demonstrated markedly improved outcomes in Draf IIb procedures. Grayson et al. (2017) conducted Draf IIb procedures for frontal sinus fractures in 37 patients who underwent NSF or free grafts, observing patency of all sinuses during the final evaluation (mean follow-up = 38 months). In a study involving Draf IIb operations utilizing a septoturbinal flap (STF), postoperative stenosis of the neo-ostium was observed in one out of 46 patients, constituting

level 4 evidence (Fiorini et al., 2016). A cohort of eight patients underwent a double-flap technique utilizing a superior turbinate flap (STF) in conjunction with a laterally based nasoseptal flap (LNSF) to include the posterior and anterolateral margins of the Draf IIb neo-ostium, resulting in no observed restenosis at a mean follow-up of three months (level 4 evidence) (Khoueir et al., 2018). Eight of these surgeries were conducted utilizing the SLAP flap in conjunction with Draf IIb techniques (level 4 evidence) (Omura et al., 2018). All patients had a patent neo-ostium and no sequelae, such as synechiae or orbital damage. Nonetheless, the systematic review conducted by Haddad et al. (2021) utilizing the PubMed (NML) and Scopus databases did not reveal statistically significant differences. However, higher patency rates following Draf IIb surgery were observed when flaps or grafts were employed, achieving 93.5% compared to 86.7% when no flaps or grafts were utilized, in conjunction with two flap elevation and Complex Snead Portion with Endoscope-assisted Midfacial debridement procedures. LIPF arises from the dorsum of the inferior turbinate and is primarily sustained by branches from the facial artery and the lateral posterior nasal artery. This study employed LIPF in all Draf IIb procedures, resulting in rapid re-epithelialization and robust integration with adjacent tissues.

Conclusion

Current data support a tailored flap selection contingent on surgical anatomy, mucosal availability, and disease extent. Although numerous studies indicate positive clinical outcomes, the variability of the data and the lack of comparative studies hinder the formulation of robust recommendations for optimal flap design.

Mucosal flaps are a crucial instrument for enhancing postoperative results following a Draf IIb frontal sinusotomy. Future research employing a prospective design, consistent assessment techniques, and extended follow-up is essential to develop evidence-based guidelines for flap selection and postoperative treatment in frontal sinus surgery.

Authors' Contributions

All authors contributed to the conception and design of the review, literature search, data interpretation, manuscript drafting, and critical revision of the article. All authors read and approved the final manuscript.

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Conflict of Interest

The authors declare that they have no conflicts of interest.

Ethical Approval

Not applicable. This review article is based solely on previously published literature and does not involve human participants, animals, or identifiable personal data.

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