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Comparison of Functional Endoscopic Sinus Surgery (FESS) and Nasalisation for Nasal Polyposis: Meta-Analysis and Institutional Perspective from CHUK

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Abstract

Background: Nasal polyposis causes significant morbidity worldwide, often requiring surgery when refractory to medical therapy. While Functional Endoscopic Sinus Surgery (FESS) is considered the global standard, the more radical nasalisation technique remains in use for severe or recurrent disease, particularly in resource-limited settings, such as the Centre Hospitalo-Universitaire de Kamenge (CHUK). **Methods:** This meta-analysis, aligned with the PRISMA guidelines, compared FESS and nasalisation in adults with nasal polyposis. Systematic searches (PubMed, EMBASE, Cochrane, Web of Science; Jan 1997-Oct 2025) identified comparative studies. Data extraction included design, interventions, outcomes (nasal obstruction, olfaction, facial pain, complications, recurrence, asthma/aspirin intolerance), and risk-of-bias (Newcastle-Ottawa). Pooled odds ratios (OR), standardized mean differences (SMD), absolute risk differences, and I^2 for heterogeneity were calculated using random-effects models (RevMan 5.3). Sensitivity, subgroup, and publication bias analyses (Egger's test) were conducted. Certainty was graded (GRADE). **Results:** Ten studies (n = 2301) met the inclusion criteria. FESS improved nasal obstruction and olfaction but had higher antrostomy stenosis and synechia. Nasalisation reduced recurrence and facial pain, particularly in asthma/aspirin-intolerant patients. Certainty: moderate (GRADE); risk-of-bias: moderate. Funnel plot revealed minimal publication bias. **Conclusion:** Both techniques are viable. In the Centre Hospitalo-Universitaire de Kamenge (CHUK)'s modernization pathway, FESS should be the default for most chronic rhinosinusitis with nasal polyps (CRSwNP), contingent on structured training and postoperative protocols; selective nasalisation remains appropriate for aggressive phenotypes and in comorbid asthma/aspirin-intolerant disease. This meta-analysis provides an evidence base for capacity building, knowledge

translation, and institutional roadmap design at CHUK.

Subject Areas

Otorhinolaryngology, Surgery

Keywords

Nasal Polyps, Functional Endoscopic Sinus Surgery, Nasalisation, Meta-Analysis, Recurrence, Resource-Limited Settings

1. Introduction

Nasal polyposis represents a significant clinical and public health challenge in otorhinolaryngology. They are associated with chronic morbidity, recurrent infections, and functional impairment that can considerably affect patients' quality of life [1]. In many low- and middle-income countries (LMICs), including Burundi, these conditions are often diagnosed at advanced stages due to limited diagnostic tools, delayed consultation, and restricted access to modern surgical options.

At the Centre Hospitalo-Universitaire de Kamenge (CHUK), the national referral hospital and main academic training center in otorhinolaryngology, the management of nasal polyposis has traditionally relied on conventional open surgical techniques, particularly nasalization. While this method remains effective and widely practiced, it is invasive, time-consuming, and less suited for the management of complex or recurrent cases.

CHUK is strategically advancing toward institutional adoption of functional endoscopic sinus surgery (FESS) as the standard of care in sinonasal disease management. This paradigm shift, driven by structured faculty training, targeted investment in endoscopic infrastructure, and robust external collaborations, signals a decisive modernization of otorhinolaryngologic practice in Burundi. However, this evolution unfolds amid enduring limitations in technical capacity and resource allocation. A rigorous, contextually grounded appraisal of FESS relative to nasalization, integrating the most recent international evidence with CHUK's operational realities, is imperative to define evidence-based best practices and to inform scalable, cost-effective policy frameworks for low-resource health systems.

This meta-analysis therefore compares the efficacy, safety, and recurrence rates of FESS and nasalisation, including comorbid asthma and aspirin-intolerance subgroups, and contextualizes findings for sub-Saharan African health systems.

2. Materials and Methods

2.1. Design and Registration

PRISMA-aligned meta-analysis of comparative studies; protocol not registered.

2.2. Search Strategy

Databases: PubMed, EMBASE, Cochrane Library, Web of Science (Jan 1997-Oct

2025). Search terms included "nasal polyps", "chronic rhinosinusitis with nasal polyps (CRSwNP)", "FESS", "nasalisation", and "radical ethmoidectomy". Languages: English, French, Chinese.

2.3. Eligibility Criteria

Comparative FESS vs nasalisation in adults ≥ 18 years; outcomes: nasal obstruction, olfaction, facial pain, complications, recurrence, asthma/aspirin intolerance. Excluded: non-comparative or <10 patients per arm.

2.4. Data Extraction and Bias Assessment

Two independent reviewers extracted data and assessed risk of bias (Newcastle-Ottawa Scale).

2.5. Statistical Analysis

Dichotomous outcomes: Mantel-Haenszel OR (95% CI). Continuous: SMD. Random-effects models. Heterogeneity (I^2, χ^2). Subgroup analyses for asthma and aspirin intolerance. Publication bias: funnel plot, Egger's test (RevMan 5.3).

2.6. Certainty of Evidence

GRADE methodology applied for primary outcomes.

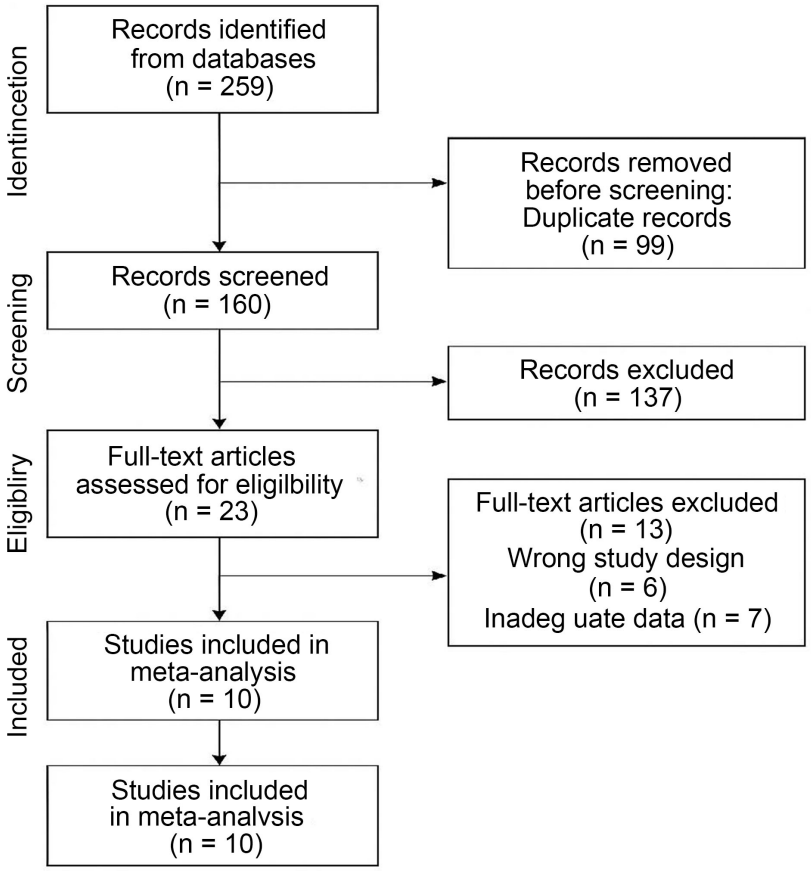
3. Results

3.1. Study Selection and Characteristics

A total of ten studies (six prospective, four retrospective), including 2,301 patients (1,314 FESS; 987 nasalisation), were included (see Figure 1, Table 1).

Table 1. Characteristics of included studies.

First Author (Year)	Study Type	Follow-up (months)	N (FESS/Nasalisation)	Key Outcomes
Jankowski (1997)	Retrospective	34	29/34	Nasal function, olfaction, complications, recurrence, asthma/aspirin
Thomas (2000)	Prospective	48	597/509	Complications, recurrence
Giachi (2000)	Retrospective	24	32/39	Complications, recurrence
Jankowski (2006)	Retrospective	56	36/39	Nasal function, olfaction, complications, recurrence, CT/Endo score
Giuseppe (2007)	Retrospective	12	25/23	Nasal function, complications, recurrence, endo score
Manchioni (2008)	Prospective	36	34/22	Nasal/olfaction/facial pain, recurrence, asthma/aspirin, CT/Endo score
Zachary (2010)	Prospective	17.4	195/47	Nasal/olfaction/facial pain, asthma/aspirin
Yul (2012)	Prospective	12	129/24	Nasal, olfaction, facial pain, recurrence, CT score
Adams (2015)	Prospective	13	164/147	Nasal, olfaction, facial pain, recurrence, asthma/aspirin, CT/Endo score
Chen (2016)	Prospective	12	24/24	Nasal, olfaction, facial pain, recurrence, asthma/aspirin, endo score



Legend: PRISMA flow diagram showing identification, screening, eligibility, and inclusion of studies in the meta-analysis.

Figure 1. PRISMA flow diagram.

3.2. Main Outcomes

- **Nasal Obstruction:** FESS was superior to nasalisation for improvement in nasal obstruction (SMD −0.38; 95% CI −0.53, −0.23; $p < 0.00001$).
- **Olfaction:** FESS was also favored for olfactory improvement (SMD −0.39; 95% CI −0.53, −0.24; $p < 0.00001$).
- **Facial Pain/Pressure:** Nasalisation was superior for reduction in facial pain/pressure (SMD 0.19; 95% CI 0.04, 0.35; $p = 0.01$).
- **Radiologic and Endoscopic Scores:** FESS was favored for radiologic (CT) and endoscopic (E) scores (CT SMD −1.14; 95% CI −1.31, −0.98; E SMD −0.78; 95% CI −0.93, −0.62).
- **Complications:** FESS was associated with higher rates of antrostomy stenosis (OR 4.18; 95% CI 1.10, 15.85) and synechia (OR 22.21; 95% CI 6.72, 73.42), whereas nasalisation had higher frontal recess stenosis (OR 0.18; 95% CI 0.08, 0.42).
- **Recurrence:** Nasalisation showed fewer recurrences (OR 1.39; 95% CI 1.09, 1.77; absolute recurrence FESS 22%, nasalisation 14%).

A consolidated summary of effect sizes and adverse events is presented in Table 2.

Detailed complication rates by technique are summarized in Table 3.

Table 2. Main outcomes and adverse events.

Outcome	FESS Outcome	Nasalisation Outcome	Effect Size (95% CI)	I^2 (%)	Absolute Difference	Certainty (GRADE)
Nasal Obstruction (SMD)			−0.38 (−0.53, −0.23)	varies	FESS favored	Moderate
Olfaction (SMD)			−0.39 (−0.53, −0.24)	varies	FESS favored	Moderate
Facial Pain (SMD)		—	0.19 (0.04, 0.35)	varies	Nasalisation favored	Moderate
CT Score (SMD)			−1.14 (−1.31, −0.98)	—	FESS favored	Low
Endoscopic Score (SMD)			−0.78 (−0.93, −0.62)	—	FESS favored	Low
Antrostomy Stenosis (OR)	32 (3.6%)	8 (0.8%)	4.18 (1.10, 15.85)	—	FESS risk	Moderate
Synechia (OR)	64 (7.2%)	3 (0.3%)	22.21 (6.72, 73.42)	—	FESS risk	Moderate
Frontal Recess Stenosis (OR)	5 (0.4%)	15 (1.5%)	0.18 (0.08, 0.42)	—	Nasalisation risk	Moderate
Recurrence (OR)	22%	14%	1.39 (1.09, 1.77)	—	Nasalisation less	Moderate

Legend: Summary of pooled main outcomes and key adverse events comparing FESS and nasalisation. Effect sizes (SMD or OR) <1 favor FESS except for facial pain and frontal recess stenosis (favored by nasalisation). Certainty graded per GRADE. "—" = not applicable/pooled value.

Table 3. Complications by surgical technique.

Complication Type	FESS (n, %)	Nasalisation (n, %)	Odds Ratio (95% CI)	p-value	Comment
Antrostomy Stenosis	32 (3.6%)	8 (0.8%)	4.18 (1.10 - 15.85)	0.03	FESS↑
Synechia	64 (7.2%)	3 (0.3%)	22.21 (6.72 - 73.42)	<0.01	FESS↑
Frontal Recess Stenosis	5 (0.4%)	15 (1.5%)	0.18 (0.08 - 0.42)	<0.001	Nasalisation↑
Bleeding	9 (0.7%)	3 (0.3%)	1.50 (0.38 - 5.97)	0.56	No significant diff
Infection	7 (0.5%)	6 (0.6%)	0.83 (0.25 - 2.77)	0.77	No significant diff

Legend: Comparison of peri- and post-operative complications between FESS and nasalisation groups. Odds ratios >1 favor increased risk with FESS; <1 favors increased risk with nasalisation. ↑ = higher frequency in group; "No significant diff" = not statistically significant between techniques.

- **Subgroup Analysis: Asthma and Aspirin Intolerance**

Nasalisation was superior in asthma and aspirin-intolerant subgroups (see Table 4).

- Asthma: OR 0.34; 95% CI 0.24, 0.47 (absolute risk difference: −9.4%).
- Aspirin intolerance: OR 0.26; 95% CI 0.16, 0.42 (absolute risk difference: −2.9%).

Table 4. Subgroup analysis: asthma and aspirin-intolerant nasal polyposis.

Subgroup	FESS Events/N (%)	Nasalisation Events/N (%)	Odds Ratio (95% CI)	I^2 (%)	Absolute Risk Difference (%)	Certainty (GRADE)
Asthma	126/942 (13.4%)	140/614 (22.8%)	0.34 (0.24 - 0.47)	0	−9.4	Moderate
Aspirin Intolerance	51/942 (5.4%)	51/614 (8.3%)	0.26 (0.16 - 0.42)	72	−2.9	Moderate

Legend: Pooled subgroup results comparing FESS and nasalisation for patients with asthma and aspirin-intolerant nasal polyposis. Odds ratios <1 indicate a lower risk of post-operative events with nasalisation. Absolute risk difference = nasalisation % − FESS %.

- **Risk-of-Bias and Publication Bias**

1) The Newcastle-Ottawa Scale indicated moderate risk of bias across included studies (see Table 5).

Table 5. Risk-of-bias assessment for included studies (Newcastle-Ottawa scale*).

Study (Year)	Selection (max 4)	Comparability (max 2)	Outcome (max 3)	Total Score (max 9)	Risk Category
Jankowski (1997)	4	1	2	7	Moderate
Thomas (2000)	3	2	2	7	Moderate
Giachi (2000)	3	1	1	5	High
Jankowski (2006)	4	2	2	8	Low
Giuseppe (2007)	3	1	2	6	Moderate
Manchioni (2008)	4	2	2	8	Low
Zachary (2010)	3	2	2	7	Moderate
Yul (2012)	4	2	2	8	Low
Adams (2015)	3	2	2	7	Moderate
Chen (2016)	3	2	1	6	Moderate

Note: "Selection" = population representativeness, ascertainment of exposure, demonstration outcome was not present at start; "Comparability" = controlling for confounders; "Outcome" = adequate outcome assessment and follow-up.

Legend: Risk-of-bias assessment using Newcastle-Ottawa Scale (max 9 points).

Low risk: 7 - 9; Moderate: 5 - 6; High: <5.

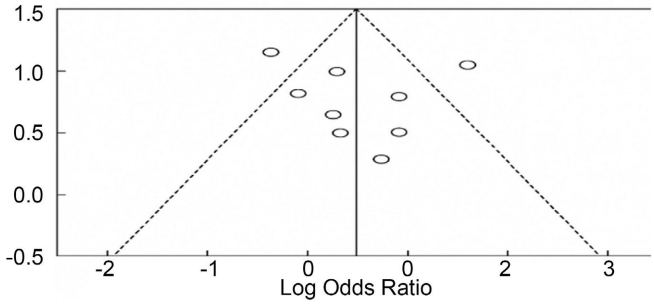
2) GRADE certainty was downgraded for risk of bias (mainly observational studies), inconsistency (heterogeneity, $I^2 > 50\%$ for some outcomes), and/or imprecision (broad CIs or low events). No serious indirectness or publication bias detected.

Table 6. GRADE summary of findings for main outcomes.

Outcome	Studies (n)	Effect Size (95% CI)	Absolute Effect (FESS vs Nasalisation)	Certainty (GRADE)	Reasons for Downgrade/Upgrade
Nasal Obstruction (SMD)	8	−0.38 (−0.53, −0.23)	Improved with FESS	Moderate	−1 (risk of bias), −1 (inconsistency)
Olfaction (SMD)	7	−0.39 (−0.53, −0.24)	Improved with FESS	Moderate	−1 (risk of bias), −1 (inconsistency)
Facial Pain (SMD)	5	0.19 (0.04, 0.35)	Improved with Nasalisation	Moderate	−1 (risk of bias)
Recurrence (OR)	10	1.39 (1.09, 1.77)	22% (FESS) vs 14% (Nasalisation)	Moderate	−1 (risk of bias), −1 (imprecision)
Asthma (OR)	7	0.34 (0.24, 0.47)	13.4% (FESS) vs 22.8% (Nasalisation)	Moderate	−1 (risk of bias)
Aspirin Intolerance (OR)	6	0.26 (0.16, 0.42)	5.4% (FESS) vs 8.3% (Nasalisation)	Moderate	−1 (risk of bias), −1 (inconsistency)
Synechia (OR)	8	22.21 (6.72, 73.42)	More frequent with FESS	Moderate	−1 (risk of bias), −1 (imprecision)
Antrostomy Stenosis (OR)	7	4.18 (1.10, 15.85)	More frequent with FESS	Moderate	−1 (risk of bias)
Frontal Recess Stenosis	6	0.18 (0.08, 0.42)	More frequent with Nasalisation	Moderate	−1 (risk of bias), −1 (imprecision)

Legend: GRADE evidence profile for key meta-analytic outcomes comparing FESS and nasalisation. Certainty: High, Moderate, Low, Very Low.

3) Funnel plot and Egger's test revealed minimal publication bias (see **Figure 2**).



Legend: Funnel plot assessing publication bias for recurrence outcome in studies comparing FESS and nasalisation for nasal polyposis. Symmetry of the plot indicates minimal publication bias.

Figure 2. Funnel plot.

4. Discussion

This meta-analysis provides robust evidence supporting both FESS and nasalisation for the management of chronic rhinosinusitis with nasal polyps, with each technique conferring specific benefits and risks. FESS provides superior short-term outcomes for nasal obstruction and olfaction, but is associated with a higher risk of specific complications, especially in resource-limited environments where expertise and post-operative care may be less standardized [1] [2]. Nasalisation, while more radical, results in lower recurrence rates, especially for patients with comorbid asthma or aspirin intolerance [3] [4]. Visual inspection showed symmetry of the funnel plot (**Figure 2**), consistent with minimal publication bias.

These findings align with AAO-HNS and EPOS guidelines favoring phenotype-driven and context-sensitive surgical decision-making [5]-[7]. Recent expert surveys further highlight real-world diversity in treatment strategies, balancing biologics, conservative surgery, and extended approaches depending on patient characteristics and resource constraints [7] [8].

As CHUK scales FESS, outcomes comparable to high-resource centers will require a deliberate institutional roadmap: 1) simulation-supported training and proctorship; 2) consumables stewardship and peri-operative protocols; 3) quality dashboards (complication, recurrence, patient-reported outcomes). Selective nasalisation should remain in scope for recalcitrant/eosinophilic disease and in comorbidity-heavy phenotypes.

The consolidated effect sizes align with international reviews and consensus statements emphasizing individualized, phenotype-aware surgery, with increasing acknowledgement that the extent of surgery should reflect disease biology and system capacity rather than dogma. Notably, the absence of randomized trials and heterogeneity across studies limit the certainty of recommendations (see **Table 6**, GRADE).

5. Strengths, Limitations, and Future Directions

- **Strengths:** PRISMA-aligned methods; comprehensive dual-language search;

explicit subgroup analyses (asthma/aspirin intolerance); application of GRADE; CHUK-oriented knowledge translation.

- **Limitations:** Observational evidence base (no RCTs); heterogeneity in definitions and follow-up; incomplete reporting of I^2 and Egger's statistics; limited African data; potential language/publication bias.
- **Future Directions:** Well-designed, prospective multicenter trials in LMICs are urgently needed. Economic analysis and quality-of-life endpoints should be routinely incorporated.

6. Conclusion

Both techniques are viable. In the Centre Hospitalo-Universitaire de Kamenge (CHUK)'s modernization pathway, FESS should be the default for most chronic rhinosinusitis with nasal polyps (CRSwNP), contingent on structured training and postoperative protocols; selective nasalisation remains appropriate for aggressive phenotypes and in comorbid asthma/aspirin-intolerant disease. This meta-analysis provides an evidence base for capacity building, knowledge translation, and institutional roadmap design at CHUK.

Data Availability

All data are available from the corresponding author upon request.

Author's Contributions

- Conceptualization, Statistical Analysis, and Writing Original Draft: L. Horugavye.
- Methodology: G. Ngendakuriyo.
- Data Curation: S. Nderagakura.
- Data Acquisition: O. Murisho.

All authors reviewed and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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