Review Article

Effectiveness and Outcomes of Endoscopic Sinus Surgery for Nasal Polyps: A Systematic Review

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ABSTRACT

Aim: This study aimed to investigate the effectiveness and outcomes of endoscopic sinus surgery (ESS) in patients with nasal polyps.

Method: A thorough search was conducted for pertinent literature using PubMed, SCOPUS, Web of Science, Science Direct, and Wiley Library. Rayyan QRCI was used throughout this extensive procedure. All of the included patients underwent ESS for chronic rhinosinusitis with nasal polyps (CRSwNP).

Results: Our results included nine studies with a total of 780 patients, 490 (62.8%) patients were males. The follow-up duration ranged from 4 months to 24 months. Patients with CRSwNP and refractory CRSwNP reported better self-evaluated olfactory function after using ESS, experienced a higher reduction in polyp load, and better quality of life. Patients with CRSwNP reported significant improvements in quality of life and major symptoms when using ESS. The quality of the available data, as established in this evaluation, is low enough to make firm recommendations for the best course of surgical therapy.

Conclusion: From a precision medicine perspective, high-quality studies are needed to phenotype these patients in order to identify which ones will benefit most from each type of medicinal and surgical therapy, including a combination of both, with long-term efficiency being a crucial result.

Keyword: Endoscopic sinus surgery, Chronic sinusitis, Nasal polyps, Surgical outcomes, Systematic review.

Introduction

Persistent rhinosinusitis is a chronic illness that affects the paranasal sinuses and nose. Chronic rhinosinusitis (CRS) affects 4% to 11% of people worldwide. The diagnostic criteria for CRS necessitate the presence Of observable abnormalities such swelling, discharge, or polyps in the nose (nasal endoscopy) or sinus opacification (imaging) along with symptoms that have lasted for a minimum of 12 weeks.

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(Obstacles in the nose and/or rhinorrhea, along with a lack of smell, pressure or discomfort in the face, or both). This implies that CRS is a general word that encompasses a variety of diseases by definition. CRS was previously classified as either chronic rhinosinusitis with nasal polyps CRSwNP (CRSwNP) or CRS deprived of nasal growths. This division was made based on the presence of nasal polyps [1]. The first line of treatment consists of intranasal steroids and nasal rinses. Systemic corticosteroids are saved for severe cases and are referred to as appropriate medical treatment (AMT) [2, 3]. When AMT is not enough to treat symptoms, endoscopic sinus surgery (ESS) has been suggested as a good substitute [4]. Polyp recurrences continue to be a major drawback of this therapeutic approach, and opinions about the best surgical technique for CRSwNP are divided [5]. Furthermore, given the dynamic nature of guidelines on the therapy of CRSwNP, surgery has emerged as a crucial factor for determining the most recent treatment option involving biological medicines [6]. ESS utilizes advanced endoscopic technology, allowing surgeons to navigate and treat the intricate sinus anatomy through the nostrils without the need for external incisions. This technique not only provides a clear and detailed view of the affected areas but also minimizes trauma to surrounding tissues, leading to quicker recovery times and reduced postoperative discomfort [4]. In this introductory exploration of ESS for nasal polyps, we will delve into the key effectiveness and outcomes. As we navigate through the intricacies of ESS, it becomes evident that this approach represents a significant advancement in the management of nasal polyps, offering patients a path towards improved quality of life and long-term relief from the burdensome symptoms associated with this condition. This thorough review's primary goal is to investigate how ESS affects people who have nasal polyps.

Methods

In compliance with PRISMA's (In systematic assessments and meta-analyses, specified reporting items are used) recommendations, this rigorous review was underwent [7].

Study Plan and Length: The start of this systematic study took place in February 2024 till 30th June 2024.

Method of Searching: We searched five primary databases: PubMed, SciDirect, SCOPUS, Web of Science, and Wiley Library, focusing exclusively on English-language publications. Search terms included "Nasal polyps," "Chronic sinusitis," "Endoscopic sinus surgery," "Effectiveness," and "Outcomes," utilizing Boolean operators ("OR," "AND," "NOT") for precise results. Only full-text articles with human subjects and available for free download were included.

Qualification Standards

Qualifications for inclusion

- Articles examining how ESS affected people with nasal polyps.
- Adults (>18 years).
- Studies conducted between 1st January 2022 to 30th May 2024.
- Any research design that addresses the necessary results.
- Just human participants.
- The English language only.

Exclusion criteria

- Case reports were not a part of our assessment procedure, unpublished information, insufficient information, reviews, correspondence, and conference abstracts. After the investigators have finished evaluating eligibility, the writers examined and addressed any differences.

Data extraction: Rayyan (QCRI) [8] was used to verify the search results twice. Reviewers evaluated titles and abstracts against the established inclusion and exclusion criteria. Each qualifying paper underwent a thorough review, with conflicts resolved through discussion. A pre-designed data extraction form was employed to upload the study data, including authors, titles, year, country, participants, follow-up, intervention, patient condition, and key outcomes. Additionally, a separate assessment of potential bias was conducted.

Method for Synthesizing Information: the tables of overview, created with data based on pertinent research, offer a qualitative evaluation of the study's conclusions and its component elements. After gathering the data for the systematic review, the most effective method for utilizing the information from the included study articles was selected.

Assessment of The Danger of Bias: A Joanna Briggs Institutes (JBI) evaluation was used to determine the study's quality [9]; major evaluation standards for research providing data on prevalence. Nine questions were employed in this method of evaluating research. If the response was in the positive, the question received a score of 1. Any answer that was no, ambiguous, or not relevant was given a score of zero. Ratings of or less than four, five to seven, and equals or more than eight were considered poor, moderate, and excellent, respectively, for overall quality.

Academics evaluated the quality of their own study, and differences were resolved through debate.

Results

Search Outcomes: Number of research papers that located after a comprehensive search was 184; 59 duplicates were removed. 101 papers were excluded after the titles and abstracts of 125 studies were examined. There were just two reports that could not be located. 22 publications were screened to see the whole text evaluation; the study's incorrect findings led to the rejection of 10; 2 as a result of the improper population type and 1 article was an editor's letter. Nine legitimate research publications were covered by this comprehensive review. An overview of the procedure for selecting research may be found in (Figure 1). Features of the Studies That Were Included The gathered research articles' sociodemographic information is displayed in (Table 1). Of the 780 patients in nine trials that made up our results, 490 (62.8%) were men. Eight of the included studies were prospective in nature [10-13, 15-18], and only one was retrospective in nature [14]. There were two research carried out in the USA [13, 14], two in Germany [15, 16], a Chinese one [10], one in Italy [11], one in the Netherlands [12], one in Thailand [17], and one in Egypt [18]. (Table 2) displays the clinical features of the patients. Four months [16] to twenty-four months [15] was the range of follow-up periods. All of the included patients underwent ESS for CRSwNP [10-18]. Patients with CRSwNP and refractory CRSwNP reported better self-evaluated olfactory function after using ESS [10, 13, 15-18], experienced a higher reduction in polyp load [14], and better quality of life [16, 18]. Su et al. (2022) [10] and Hintschich et al. (2022) [16] indicate that patients with refractory CRSwNP can achieve substantial improvements in both olfactory function and overall quality of life following surgical intervention. Notably, the vital role of preoperative evaluations in predicting surgical outcomes is emphasized in Hintschich et al.'s work, which underscores the necessity of tailored approaches based on the degree of olfactory impairment. Furthermore, the comparative studies involving dupilumab, as seen in the works of Orlando et al. (2023) [11] and Dharmarajan et al. (2022) [14], reveal that while both dupilumab and ESS effectively reduce inflammation, their mechanisms and efficacy differ based on patient demographics and surgical history. Patients with contraindications or previous surgeries appear to benefit more from dupilumab, while those naïve to surgery may find ESS more advantageous.

Discussion

A significant percentage of people worldwide suffer from persistent rhinosinusitis along with nasal polyps, it affects around 4% [19] to 11% of people globally [1]. When nasal polyps become fully developed, they will prevent natural airflow and sinus apertures, this can cause rhinorrhea, anosmia, facial pain, and nasal congestion. Nasal sprays with glucocorticoids, short-term nasal vessels, antibiotics, and phlegm boosters are the main medications that can be used to treat tiny and early-stage nasal polyps associated with rhinosinusitis. [20]. the medications listed above can aid in the regular saline rinse of the nasal cavity, encourage secretory discharge, and aid in the mucosa's functional recuperation. When drug therapy is not functioning well or there are significant nasal polyps present, surgery is the most effective treatment for rhinosinusitis. In order to successfully avoid recurrence, nasal endoscopy is necessary for the surgical procedure, and many follow-up appointments and nasal medicines are also necessary [21]. This systematic review studied the outcomes of ESS in 780 patients with CRSwNP. We found that patients with CRSwNP and refractory CRSwNP reported better self-evaluated olfactory function after using ESS [10, 13, 15- 18], experienced a higher reduction in polyp load [14], and better quality of life [16, 18]. Chen et al. [23] reported that comparable improvements in symptoms and quality of life were observed with ESS in comparison to Omalizumab, Mepolizumab, and Benralizumab. In several things, dupilumab appears to be more successful than ESS; nonetheless, in order to compare their efficacy, head-to-head trials and real-world investigations are urgently needed Zheng et al. [24] also found that when treating children with chronic sinusitis and nasal polyps, endoscopic sinus surgery showed great curative benefits and safety. It could also lessen postoperative recurrence and suffering for patients. According to a recent meta-analysis, CRSwNP patients treated with biologics had a similar rate of adverse events and a lower risk of asthma exacerbations than placebo groups, indicating a high level of safety and tolerability [25]. Sadly, biological medications are still not a "curative" treatment for CRSwNP, which means that ongoing biological treatment is still necessary to maintain the disease's therapeutic benefits. It is critical that future research examine the direct and indirect expenses associated with biologics and ESS. Benefits, risks, and costs should all be taken into account when selecting the best treatment modalities in a patient-centered manner in actual clinical settings [25]. These results

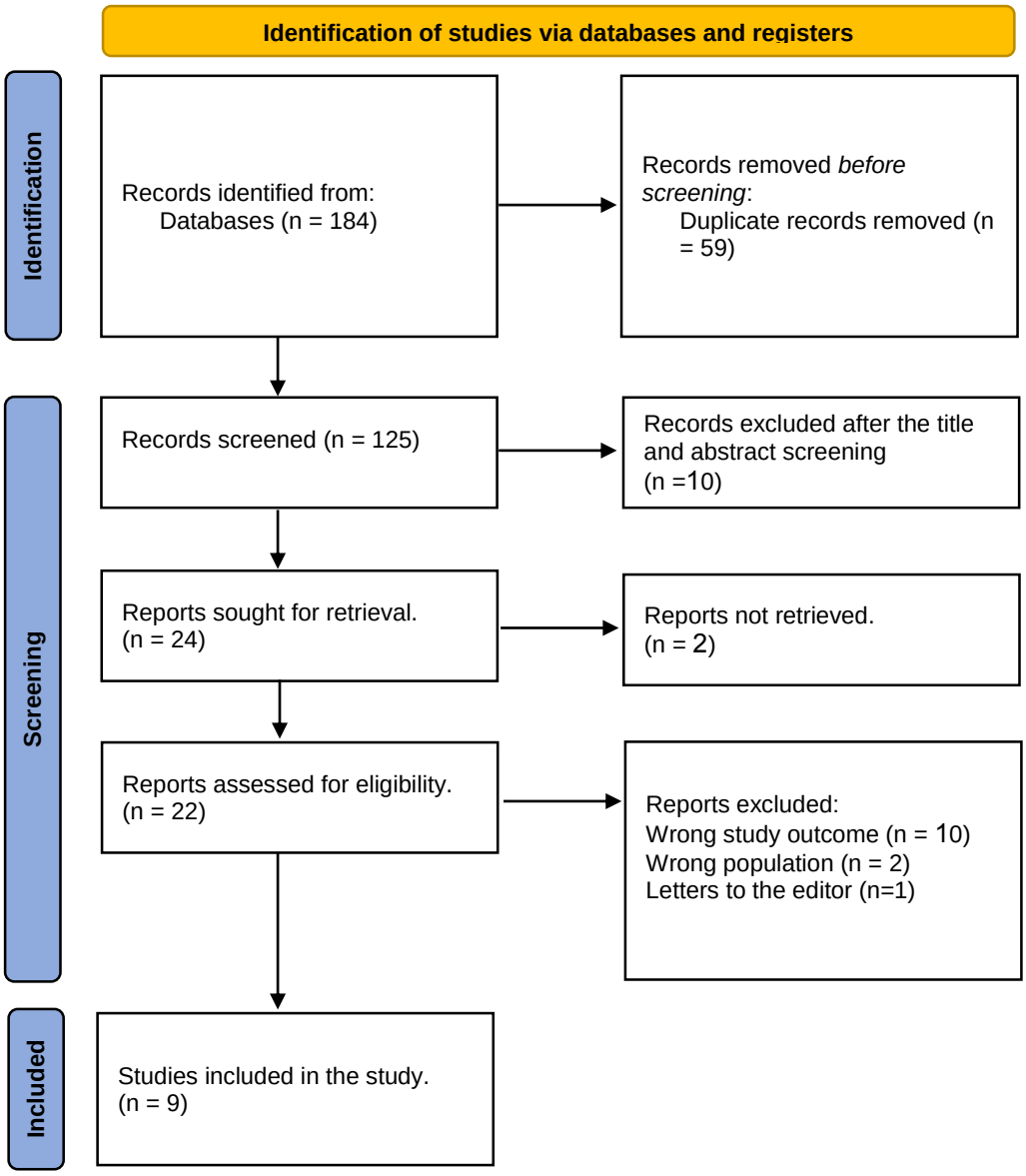

Figure 1: Study selection is summed up in a PRISMA flowchart.

Table 1: Sociodemographic characteristics of the included participants.

Study	Study design	Country	Participants	Mean age years	Males (%)
Su et al., 2022 [10]	Prospective case-control	China	Observation group (50) and control group (42)	34.9 ± 5.2	60 (65.2%)
Orlando et al., 2023 [11]	Prospective case-control	Italy	ESS (n=21) and Dupilumab (n=26)	53.9	35 (74.5%)
Lourijsen et al., 2022 [12]	Prospective RCT	The Netherlands	ESS plus medical therapy (n=121) or medical therapy (n=117)	50·4 ± 12·7	142 (61%)
Ye et al., 2022 [13]	Prospective cohort	USA	(n = 5) normosmia, (n = 13) mild impairment, (n = 13) moderate impairment, and (n = 25) complete anosmia.	47.4 ± 11.1	41 (73.2%)
Dharmarajan et al., 2022 [14]	Retrospective cohort	USA	Dupilumab (n=54) and FESS (n=54)	53.3 ± 13.9	57 (52.8%)
Hernandez et al., 2023 [15]	Prospective cohort	Germany	61	50 ± 12.33	53 (87%)
Hintschich et al., 2022 [16]	Prospective cohort	Germany	Anosmic (n=44), hyposmic (n=34), and normosmic (n=10)	51 ± 14	37 (58%)
Naruekon et al., 2022 [17]	Prospective cohort	Thailand	46	48.2±16.2	29 (63%)
Mohamed & El-Ghonemy 2023 [18]	Prospective cohort	Egypt	Anosmic (N = 26), hyposmic, (N = 16), and normosmic (N = 6)	36 ± 10	36 (75%)

Table 2: Clinical characteristics and outcomes of the included studies.

Study	Follow-up duration (months)	Intervention	Diagnostic tools	Main outcomes	JBI*
Su et al., 2022 [10]	6	Modified ESS** + middle urbinate resection	Refractory CRSwNP	Patients with refractory CRSwNP*** can benefit from modified ESS in conjunction with middle turbinate resection, which can also significantly improve patients' olfactory function and lessen their perioperative stress reaction.	Moderate
Orlando et al., 2023 [11]	12	ESS vs dupilumab	CRSwNP	Dupilumab and ESS both worked well to lessen CRSwNP-induced inflammation burning. Olfactory cleft blockage is not the only cause of CRSwNP smell impairment; additional processes can also be at play. Dupilumab has a weak connection with NPS and operates in a systemic manner. Currently, it seems that older individuals with anesthesia contraindications and/or a history of surgeries would benefit more from dupilumab, whereas patients who have never had surgery before could benefit more from ESS.	NA#

Lourijsen et al., 2022 [12]	12	ESS + medical therapy	CRSwNP	In individuals with CRSwNP, ESS + medical therapy is more effective than medical therapy alone; however, there was not a minimally significant difference.	High
Ye P et al., 2022 [13]	12	ESS	CRSwNP	Patients with CRSwNP reported better self-evaluated olfactory function after using ESS. On the other hand, poor olfactory prognosis was associated with a longer disease course, higher blood eosinophilia, lower Lund-Mackay scores, and peripheral distribution of CT opacification.	Moderate
Dharmarajan et al., 2022 [14]	17.9	ESS vs dupilumab	CRSwNP	Patients with CRSwNP experience a reduction in symptoms with both therapies. Compared to patients treated with functional ESS, those treated with dupilumab reported better olfaction and less cough, postnasal drainage, and thick nasal discharge; however, patients treated with functional ESS experienced a higher reduction in polyp load.	Moderate
Hernandez et al., 2023 [15]	24	ESS	CRSwNP	Patients with CRSwNP who have less baseline olfactory function or more serious conditions (advanced rhinorrhoea, concomitant allergic rhinitis, or frequent occurrences of acute sinusitis on top of chronic rhinosinusitis) might profit more from ESS with regard to olfactory function.	Moderate
Hintschich et al., 2022 [16]	120 ± 49 d	ESS	CRSwNP	Olfaction and disease-specific quality of life both significantly improve when functional ESS is present in CRSwNP. Additionally, a preoperative psychophysical evaluation of the degree of olfactory impairment can aid in the objective evaluation of potential risks and anticipated advantages of the procedure with regard to quality of life and olfaction.	High
Naruekon et al., 2022 [17]	6	ESS	CRSwNP	Patients with nasal polyposis who received ESS treatment saw a significant improvement in acoustic perception and nasometry, which improved hyponasality to normal nasality from the first month to the sixth month of follow-up.	High
Mohamed & El-Ghonemy 2023 [18]	2	ESS	CRSwNP	Following surgery, all symptoms, including olfaction and life quality, improved in patients with CRSwNP. Smell impairment prior to surgery may serve as a predictor of outcome after surgery.	Moderate

*JBI= A Joanna Briggs Institutes (JBI), **ESS=Endoscopic sinus surgery, ***CRSwNP= Chronic rhinosinusitis with nasal polyps, #NA=Not applicable

Emphasize the function of various surgical procedures, suggesting that, independent of comorbidities, surgical extension may play a major role in attaining better clinical and quality-of-life outcomes [5, 25]. So, for the treatment of chronic rhinosinusitis, endoscopic sinus surgery has been developed for many years, and its safety has been established [26].

Conclusion

Patients with CRSwNP reported significant improvements in quality of life and major symptoms when using ESS. The quality of the available data, as established in this evaluation, is low enough to make firm recommendations for the best course of surgical therapy. From a precision medicine perspective, high-quality studies are needed to phenotype these patients in order to identify which ones will benefit most from each type of medicinal and surgical therapy, including a combination of both, with long-term efficiency being a crucial result.

Conflict of Interest

None

Funding

None

Declaration of Patient consent

The authors certify that they have obtained all appropriate patient consent forms.

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