International Forum of Allergy & Rhinology

WILEY

REVIEW ARTICLE OPEN ACCESS

Systemic Corticosteroids in the Management of Sinonasal Disease: An Evidence-Based Expert Review

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Received: 25 January 2026 | **Revised:** 19 May 2026 | **Accepted:** 8 June 2026

Keywords: glucocorticoids | oral administration | rhinosinusitis | treatment outcomes

ABSTRACT

Background: Chronic rhinosinusitis (CRS) is a prevalent, heterogeneous inflammatory disease associated with significant morbidity. Systemic corticosteroids (SCS) are commonly prescribed for their anti-inflammatory effects, but cumulative exposure carries risks, including metabolic, cardiovascular, and skeletal complications. Despite widespread use, evidence-based guidance on optimal indications, timing, and duration of SCS in CRS remains inconsistent.

Methodology/Principal: An evidence-based review was performed using MEDLINE, EMBASE, and Cochrane databases (2013–2023). Studies were screened and categorized into two primary groups: CRS with (CRSwNP) or without (CRSsNP) nasal polyps. Within CRSwNP, evidence was subcategorized by indication, including (1) polyp size reduction, (2) olfactory dysfunction, (3) comorbid disease, and (4) perioperative use, encompassing pre- and postoperative SCS administration. The CRSsNP category

included studies evaluating SCS in non-polypoid disease, with or without comorbidities. Recommendations were graded according to evidence quality and the balance of benefit versus harm.

Results: Short courses of SCS provide consistent, short-term improvements in nasal polyp size, nasal congestion, and olfactory function in CRSwNP, but benefits wane within weeks unless followed by intranasal corticosteroids. Preoperative SCS improves intraoperative visualization, though comparable nonsteroidal techniques exist. Routine postoperative SCS are not supported, showing no meaningful advantage over topical therapy. No additional benefit was seen in comorbid subgroups. Evidence in CRSsNP is limited, with possible benefit only in early disease or select medically managed cases. Repeated use contributes to cumulative toxicity.

Conclusions: SCS have a narrow, time-limited role in CRS. Stewardship should emphasize optimized topical therapy, appropriate sinus surgery, and biologics to minimize systemic steroid exposure.

1 | Introduction

Chronic rhinosinusitis (CRS) affects 5%–12% of the population and is categorized as with (CRSwNP) or without nasal polyps (CRSsNP). Systemic corticosteroids (SCS) are frequently used due to their potent anti-inflammatory effects, but cumulative exposure contributes to increased risk of all-cause mortality [1, 2]. Current clinical guidelines vary in their recommendations regarding the specific indications, duration, and timing of SCS use for CRS [3]. Real-world SCS use frequently exceeds clinical guidelines, particularly for perioperative care, anosmia, or comorbid asthma and NERD. This is exacerbated by limited specialist access and the lack of universal monitoring, which obscures a patient's cumulative exposure history. Ultimately, the low cost and rapid symptomatic relief of SCS encourage frequent use, driving systemic overuse.

A recent industry-sponsored study by Price et al. highlighted the adverse outcomes associated with SCS use in patients with asthma, a common comorbidity in CRS, and emphasized the risks of cumulative toxicity, even with repeated short-term courses [4]. The authors adjusted for many patient-level covariates, but they did not include a detailed measure of baseline asthma severity or exacerbation frequency as a covariate, and acknowledged residual confounding by indication remains possible. Key findings include that the risks for adverse outcomes increased once a patient reached cumulative dose total of 1.0 g of prednisolone and even 0.5 g showed elevated risk for "steroid-specific" complications. The SCS toxicity was found to be multisystemic, affecting metabolism, ocular, skeletal, and cardiovascular systems [4]. A large Danish cohort study found that even low cumulative SCS exposure ($\leq$ 500 mg prednisolone-equivalent, approximately 1–2 courses of SCS) was associated with a significantly increased risk of all-cause mortality, with risk rising in a dose-dependent fashion [5].

The CRS treatment paradigm for refractory disease is beginning to shift from recurrent SCS to steroid-sparing, disease-modifying strategies [2]. Outcomes with biologics indicate they may be preferred for persistent disease following optimized topical therapy and comprehensive endoscopic sinus surgery (ESS).

Despite their widespread use, there is a lack of consensus regarding when and how SCS should be optimally employed in the management of CRS. The clinical benefit of SCS likely differs across subgroups such as CRSwNP versus CRSsNP, and across contexts such as surgical planning or recovery. Additionally, the evidence supporting SCS use in managing specific symptoms like olfactory loss remains limited and heterogeneously reported.

This evidence-based review seeks to evaluate the current international literature on the prescription of SCS in adult patients with CRS. By categorizing and critically appraising studies according to their clinical scenario and grading their strength of evidence, we aim to develop recommendations to guide rational and safe prescribing practices. Ultimately, our goal is to define the appropriate role of SCS in modern CRS management by aligning clinical practice with the best available evidence, with the aim of optimizing patient outcomes while minimizing potential harms. At the conclusion of this expert review, these outcomes are compared to a position paper on SCS use in rhinitis and rhinosinusitis previously published by the European Academy of Allergy and Clinical [6].

2 | Materials and Methods

Following the Rudmik and Smith methodology [7], we systematically searched MEDLINE, EMBASE, and Cochrane for studies on SCS in CRS. To update the 2016 Cochrane review [8], we prioritized literature published after 2016 while retaining select older studies of high clinical relevance. The following search terms were used: "chronic rhinosinusitis," "rhinitis," "glucocorticoids," "oral corticosteroids," and "oral steroids." From 1173 screened papers, six distinct clinical indications for SCS were identified (Table 1).

Targeted reviews for each indication (Table 1) were conducted using refined keywords and reference screening. Included studies were published from 2016 onward, involved adults ($\geq$ 18) with CRS, and reported clinical outcomes (e.g., SNOT-22, Lund–Kennedy scores). The Preferred Reporting Items for Systemic and Meta-Analyses (PRISMA) can be found for each category in Figures S1–S5 for a description of study screening. Reference lists of all included studies and relevant systematic reviews were also screened to identify additional eligible studies. We excluded systematic reviews, surveys, and patients with systemic comorbidities (e.g., cystic fibrosis, PCD, vasculitis, eGPA, immunodeficiency). To ensure comprehensive data capture, systemic disease exclusions were applied during full-text review.

All included studies were independently reviewed and assigned a level of evidence based on the classification system developed by the American Academy of Pediatrics Steering Committee on Quality Improvement and Management (Table 2). Once an initial manuscript was composed (D. G. and A. T.), it was sent to international rhinologists to be reviewed according to the criteria for evidence-based reviews by Rudmik and Smith [7]. Final reviews and recommendations were established based on the level of evidence and consideration of benefit versus harm.

3 | Results

3.1 | CRSwNP

The following section outlines five subsections: overview of influence of SCS on CRSwNP, polyp size, olfactory function, comorbid disease, and perioperative considerations (pre- and postoperative) in patients with CRSwNP.

SCS are used perioperatively or for flares to rapidly reduce polyp size and improve symptoms like obstruction and anosmia [9–14]. Short courses (7–14 days) provide short-term reduction in polyp burden and symptom scores, particularly in eosinophilic/Type 2 disease (Table 3) [10, 12, 13]. However, benefits are transient, typically waning within 2–4 weeks without subsequent topical therapy.

Frequent use carries substantial risks, including osteoporosis, hypertension, glucose intolerance, and adrenal suppression [1]. Notably, even cumulative doses below 1000 mg are linked to early-onset psychiatric disorders [15]. While these findings may be subject to confounding by indication or disease severity, the risks of cumulative exposure are paramount in CRSwNP, where the chronic, recurrent nature of the disease necessitates caution to avoid further compromising patient quality of life.

Therefore, while SCS may be appropriate for select patients with severe symptoms or rapid polyp recurrence, their use should be approached cautiously. They should be reserved for short, infrequent courses, ideally as part of a broader strategy to transition patients to topical maintenance therapies. One such role is to facilitate the effectiveness of topical treatments, such as corticosteroid rinses (or sprays if rinses are unavailable), by reducing mucosal edema and improving local drug delivery.

TABLE 1 | Indications for oral corticosteroid use in chronic rhinosinusitis.

CRSwNP
CRSwNP—Polyp size
CRSwNP—Olfactory dysfunction
Comorbid Type 2 disease
Preoperative
Postoperative
CRSsNP

Abbreviations: CRSsNP, chronic rhinosinusitis without nasal polyps; CRSwNP, chronic rhinosinusitis with nasal polyps.

Modern intranasal corticosteroids (INCS) are not associated with hypothalamic–pituitary–adrenal axis suppression, which supports their favorable safety profile in the management of CRS [16]. In this context, SCS serve not merely as symptom relievers but as therapeutic primers to enhance long-term control with safer, localized topical treatments. Their use should be purposeful rather than palliative, avoiding a temporizing approach that fails to address the underlying inflammatory process, and instead minimizing chronic exposure through planned, adjunctive use. The authors consider a single short course of SCS as an optional element of maximal medical therapy in CRSwNP if prior SCS exposure has been limited and not recent, and is only used with concurrent intranasal therapy. Short-course SCS responsiveness may function as a biomarker of reversible Type 2 inflammation and predict both surgical and biologic response in CRSwNP.

Summary of evidence for CRSwNP:

- **Aggregate grade of evidence**: B (Level 2: 3, Level 3: 4) (Table 3)
- **Benefit**: Effective short-term reduction in nasal polyp burden and nasal congestion; symptom improvement.
- **Harm**: Risk of systemic side effects increases with frequency and cumulative dose. Short-term adverse events include weight gain, GI discomfort, insomnia, and metabolic changes; long-term include osteoporosis, hypertension, glucose intolerance.
- **Cost**: Low
- **Benefits-harm assessment**: Acceptable for targeted, infrequent use to optimize topical therapies; not appropriate as chronic management.
- **Value judgments**: Benefit recognized in severe, symptomatic patients but requires careful patient selection and frequency limits.
- **Policy level**: Option (selective, limited use only)
- **Intervention**: Short-course SCS (e.g., prednisone ≈0.5 mg/kg, max 30 mg daily, for 4–7 days, without taper) may be considered for severe CRSwNP to improve access for topical therapy, if prior SCS exposure has been limited and not recent, followed by application of topical corticosteroid therapies with appropriate sinus penetration (e.g., high-volume rinses) for ongoing management. Not for routine or recurrent use.

3.2 | Nasal Polyp Size

Randomized control trials (RCTs) and prospective studies consistently show that SCS significantly reduce polyp size in the short term (Table 4), with regression quantified by validated systems such as the nasal polyp score (NPS) and Lildholdt scale [11–13, 17]. Xu et al. demonstrated that a 7-day SCS course achieved a mean NPS reduction of –0.85, outperforming INCS sprays and matching high-dose budesonide drops [13]. Similarly, Tetik et al. observed peak polyp regression at Day 10 using a combination of SCS, antibiotics, and INCS [12]. No studies demonstrated lasting suppression with SCS alone. Collectively, these data suggest that while SCS provide potent initial shrinkage, the therapeutic effect is transient and wanes unless paired with sustained INCS therapy [10, 12, 13].

TABLE 2 | Defined grades of evidence and recommendations.

Grade	Research quality	Preponderance of benefit over harm	Balance of benefit and harm
A	Well-designed RCTs	Strong recommendation	Option
B	RCT with minor limitations, overwhelming consistent evidence from observational studies	Strong recommendation/recommendation	Option
C	Observational studies (case-control and cohort studies)	Recommendation	Option
D	Expert opinion, case reports, reasoning from first principles	Option	No recommendation

Abbreviation: RCT, randomized control trial.

No trials reported complete resolution of nasal polyps, and in all cases, SCS served as a temporizing intervention, useful for rapid symptom improvement or presurgical preparation. While the reduction in nasal polyp size may improve nasal airflow and congestion, the effect is time-limited, and repeated systemic steroid use raises concerns about cumulative toxicity. Therefore, SCS may be valuable for short-term disease modification, but they are not effective for long-term CRSwNP control without adjunctive therapy.

Although specific NPS thresholds have not been formally validated, reduced polyp burden may improve nasal patency and enhance topical corticosteroid delivery. EPOS 2020 notes that in patients with high-grade nasal polyps, INCS penetration may be limited, and debulking through SCS or surgery can facilitate improved topical access [18]. With that in mind, a short course of systemic steroids may be used as a bridging strategy to temporarily reduce nasal polyp size and facilitate more effective INCS delivery, rather than to achieve lasting polyp control. Therefore, the use of SCS should be reserved for specific indications: either to support INCS delivery, or to aid in treatment planning when responsiveness is uncertain. Consideration should be given to the patient's total cumulative corticosteroid burden, particularly when the expected therapeutic response may be limited and risk of systemic toxicity is high.

There is not enough consistent or specific evidence in the included studies to determine whether certain grades of nasal polyps respond better to SCS. While overall moderate to severe polyps clearly regress in size following treatment, no study stratified outcomes by baseline polyp grade to assess relative responsiveness.

Summary of evidence for polyp size:

Aggregate grade of evidence: B (Level 2: three studies, Level 3: two studies) (Table 4)
Benefit: Rapid and measurable short-term reduction in nasal polyp size (mean change −0.6 to −1.5 depending on study and scale used).
Harm: Recognized systemic risks even at low doses, with potential for cumulative toxicity.
Cost: Low
Benefits-harm assessment: Short-term, targeted use provides clear benefit for symptom relief and may support downstream treatment strategies. Harms are minimal if not repeated.
Value judgments: Temporary improvement in nasal obstruction, surgical planning, and olfactory recovery may justify brief use. Although the benefit is not durable without INCS, this transient response may have diagnostic and functional value.
Policy level: Option
Intervention: SCS (e.g., prednisone ≈0.5 mg/kg, max 30 mg daily, for 4–7 days, without taper) may be used to reduce polyp burden temporarily, as a bridge to topical corticosteroid maintenance.

3.3 | Olfactory Dysfunction in CRSwNP

Olfactory dysfunction is a common and distressing symptom in patients with CRSwNP, often contributing disproportionately to impaired quality of life. SCS are among the most effective short-term interventions for restoring olfaction, particularly in Type 2 eosinophilic disease. Multiple trials confirm that SCS improve olfactory threshold, discrimination, and identification (Table 5) [17, 19–22]. Studies by Alobid et al. and Reychler et al. were retained for their detailed domain-specific testing and comparative delivery routes not addressed in more recent literature [17, 19].

Alobid et al. found that 14 days of SCS followed by 12 weeks of INCS improved all olfactory domains on the Barcelona Smell Test 24 (BAST-24), primarily by reducing nasal congestion [17]. Similarly, Reychler et al. demonstrated that systemic and nebulized corticosteroids outperformed sprays in orthonasal function over 16 days [19]. Recently, Papadakis et al. showed in an RCT of 140 patients that a 7-day course of dexamethasone followed by INCS provided durable improvements persisting to 24 weeks [20]. These findings suggest that olfactory gains after short-course SCS in CRSwNP are best preserved when followed by ongoing INCS; however, direct comparative data evaluating SCS alone versus SCS followed by sustained INCS are limited.

The predictive value of pretreatment olfactory response has also been explored. In a cohort of dupilumab-treated CRSwNP patients, pretreatment improvement in smell following a short course of SCS was strongly associated with subsequent olfactory

TABLE 3 | Systemic corticosteroids for chronic rhinosinusitis with nasal polyps summary.

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/ side effects	Conclusion	Level of evidence
Deng et al. [9]	2023	RCT	105	1. Group A: Biomarker-directed treatment. Took oral prednisone (n = 70). 2. Group B: Control (n = 35).	1. Group B: Oral prednisone 30 mg/day for 7 days. 2. Group B: Eosinophils > 0.37 × 10^9—Prescribed oral prednisone 30 mg/day for 7 days. 3. Group B: Eosinophils < 0.37×10^9—prescribed budesonide nasal spray 128 μg BID for 7 days.	1. Change in TNSS. 2. Change in NPSS. 3. Change in SNOT-22.	Weight gain (1 kg) after 1 week of prednisone—(1).	1. Biomarker-directed treatment was not inferior but effectiveness ratios of change in SNOT, TNSS, and NPSS were not significantly different. 2. Showed that a biomarker-directed strategy using blood eosinophils is as effective as the standard of care, but may be able to reduce unnecessary prescription.	2
Shao et al. [10]	2023	Prospective cohort study	32	1. Group A: Controlled severe CRSwNP and oral methylprednisolone (n = 18). 2. Group B: Uncontrolled severe CRSwNP and oral methylprednisolone (n = 14).	1. Both groups took oral methylprednisolone tablets (32 mg/day on Days 1–5, 16 mg/day on Days 6–10, and 8 mg/day on Days 11–20). 2. Both groups did INCS—(budesonide nasal spray 256 μg twice per day) for 9 weeks calcium carbonate, calcitriol, and omeprazole during SCS period, nasal saline irrigation, and inhaled asthma therapies as needed.	1. Change in TNSS. 2. Change in global sinusitis symptom VAS score. 3. Change in SNOT-22 score. 4. Change in ENPS—measured for each patient and between uncontrolled and controlled cohorts.	15/32 patients reported adverse events: 1. Stomach upset—4 (12.5%) 2. Sleeplessness—3 (9.4%) 3. Otitis media—2 (6.3%) 4. Sore throat—2 (6.3%) 5. Skin itchy—1 (3.1%) 6. Knee pain—1 (3.1%) 7. Hoarseness—1 (3.1%) 8. Transient hypokalemia—1 (3.1%)	1. Most uncontrolled patients at baseline had partly controlled CRSwNP after 3 weeks of SCS therapy, and partly controlled CRSwNP was maintained in more than half of the patients after 9 weeks of subsequent INCS therapy. 2. Uncontrolled showed more rapid deterioration of patient reported outcomes and ENPS after the SCS period compared to the controlled group. –Main conclusion: Uncontrolled disease versus controlled disease shows differences in patterns post SCS therapy.	3

(Continues)

TABLE 3 | (Continued)

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/ side effects	Conclusion	Level of evidence
Zhang et al. [11]	2022	Prospective cohort	699	1. Group A: Underweight and normal weight based on BMI. 2. Group B: Overweight based on BMI.	1. All patients took oral methylprednisolone for 2 weeks (24 mg/day)	1. GC- insensitivity as defined by an LK endoscopy score reduction < 1 following steroid. 2. VAS for sinonasal symptoms.	None reported	1. Overweight patients that had non-eosinophilic CRSwNP were significantly more likely to be GC-insensitive than normal or underweight patients. 2. No significant difference in polyp recurrence between groups.	3
Tetik et al. [12]	2020	RCT	67	1. Group A: Oral prednisolone and nasal spray (n = 22). 2. Group B: Clarithromycin and nasal spray (n = 23). 3. Group C: Oral prednisolone, clarithromycin, and nasal spray (n = 23).	1. All patients got 200 µg mometasone furoate nasal spray twice a day for 8 weeks. 2. Groups A and C received SCS—1 mg/kg/day decreased by 10 mg every 2 days, administered daily in three doses + 30 mg per day lansoprazole. 3. Groups B and C received antibiotics: 500 mg clarithromycin tablets were given once a day for 8 weeks.	1. Change in endoscopic staging score. 2. Change in radiological staging. 3. Change in SNOT-22. 4. Change in odor test.	None reported	1. Combined group significantly better than the antibiotics-only group in all parameters. 2. Significant differences between steroid group and antibiotics group in radiological grading in odor test but not in SNOT-22 or endoscopic staging. 3. No significant differences between combined group and steroid group.	2

(Continues)

TABLE 3 | (Continued)

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/ side effects	Conclusion	Level of evidence
Xu et al. [13]	2020	RCT	117	1. Group A: Nasal spray ($n = 39$). Group B: Nasal drops ($n = 38$). 1. Group C: Oral methylprednisolone ($n = 40$).	1. Nasal spray—budesonide nasal spray, 128 μg BID. 2. Nasal drops—budesonide nasal spray, 128 μg BID and intranasal budesonide suspension nasal drop, 1 mg/day QD. 3. SCS- budesonide nasal spray, 128 μg BID and oral methylprednisolone, 24 mg/day.	1. Improvement in TNSS 2. SNOT-22 improvement 3. NPS	Group C: 6 (15%) (one patient complaining of headache, one patient complaining of sleep disorders, three patients complaining of gastrointestinal discomfort, and one patient complaining of transient skin rash). Nasal drop group—(1) (2.63%) (sleep disorders). None in nasal spray group.	1. TNSS significantly reduced in all groups but reduction was significantly greater in nasal drop group compared to nasal spray group, also greater in oral steroid group than nasal spray group, no significant difference between Groups B and C. 2. Group C showed significantly greater reduction in SNOT-22 compared to nasal spray group, no other groups were significantly different. 3. Groups B and C saw significantly higher decrease in NPS than Group A, no significant difference between Groups B and C.	2
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(Continues)

TABLE 3 | (Continued)

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/ side effects	Conclusion	Level of evidence
Lu et al. [14]	2018	Prospective cohort	32	1. Group A: Glucocorticoid sensitive ($n = 19$). 2. Group B: Glucocorticoid insensitive ($n = 13$).	All patients took 30 mg of oral prednisone once daily for 14 days.	1. NPS 2. Nasal tissue eosinophils and neutrophils 3. Serum amyloid A levels	None reported	1. Patients who did not drop > 1 NPS after prednisone were deemed GC-insensitive ($n = 13$). 2. The mean NPS was significantly lower in GC-sensitive ($n = 19$) post-prednisone, but not in GC insensitive. 3. Serum amyloid A levels were significantly higher in GC insensitive group than GC-sensitive group. 4. Eosinophil levels were significantly higher in GC- sensitive group than GC-insensitive group.	3

Abbreviations: BMI, body mass index; CRSwNP, chronic rhinosinusitis with nasal polyps; ENPS, endoscopic nasal polyp score; GC, glucocorticoid; INCS, intranasal corticosteroids; NPS, nasal polyp score; NPSS, nasal polyp size score; RCT, randomized control trial; SCS, systemic corticosteroids; SNOT-22, Sinonasal Outcome Test; TNSS, total nasal symptom score; VAS, visual analog scale.

TABLE 4 | Nasal polyp size reduction from systemic corticosteroids.

Study	Design	Sample size	Nasal polyp score system	Nasal polyp size change (baseline average NPS)	Dose of oral corticosteroid	Duration of effect	Key findings	Level of evidence
Shao et al. [10]	Prospective single-arm study	41	ENPS	−1.50 (mean reduction) (3.4/10)	32 mg/day on Days 1–5, 16 mg/day on Days 6–10, and 8 mg/day on Days 11–20	Up to 12 weeks with INCS	Substantial polyp shrinkage; durable with INCS follow-up.	3
Tetik et al. [12]	Prospective comparative study	82	EPOS endoscopic score	Qualitative improvement only	1 mg/kg/day decreased by 10 mg every 2 days	Short-term (10 days)	SCS + antibiotic + spray led to greatest visible regression.	3
Xu et al. [13]	RCT	127	Nasal polyp score (0–8)	−0.85 (mean reduction) (4.6/8)	24 mg/day for 7 days	Short-term only	SCS significantly reduced polyp size; greater than spray, comparable to drops.	2
Alobid et al. [17]	RCT (3:1 allocation)	89	Lildholdt scale (0–3)	−0.6 to −0.85 (2.3/3)	30 mg/4 days followed by 2-day reduction of 5 mg	Up to 12 weeks with INCS	Marked reduction in polyp size, partially sustained with topical therapy.	2

Abbreviations: ENPS, endoscopic nasal polyp score; EPOS, European Position Paper on Rhinology and Nasal Polyps; INCS, intranasal corticosteroids; RCT, randomized control trial; SCS, systemic corticosteroids.

recovery during biologic therapy, suggesting that SCS responsiveness may serve as a useful biomarker of reversible inflammatory disease and guide expectations for both surgical and medical outcomes [23]. Similarly, Bogdanov et al. found that patients who responded to a preoperative course of SCS were more likely to have sustained postoperative olfactory gains after ESS, suggesting that responsiveness may also predict favorable surgical outcomes and long-term recovery potential [22].

In specific cases, such as isolated polyps obstructing the olfactory cleft, a short course of SCS may also serve to restore airflow and access to this anatomically difficult region, enabling more effective penetration of topical intranasal therapies. As noted previously, in this context, SCS can be used as a strategic "bridge" to optimize topical drug delivery, helping to clear obstructive inflammation and enhance the efficacy of safer, long-term INCS regimens.

While short-term SCS appear to effectively restore olfaction, their use is always coupled with INCS in existing evidence regarding maintained olfactory improvement. Direct comparative trials evaluating SCS alone versus SCS followed by maintenance of INCS are lacking. There are anecdotal reports of patients self-medicating with SCS in anticipation of social events. This highlights the need for education on systemic harms and the benefits of high-volume topical irrigations.

RCTs confirm that SCS improve odor threshold, discrimination, and identification within 1–2 weeks [20]. Overall, the benefit in olfactory improvement is real but may be time-limited, and its durability may be dependent on subsequent maintenance of topical intranasal therapy, as most olfactory studies incorporated ongoing INCS therapy following SCS. The durability of SCS monotherapy on olfactory outcomes remains unclear. Clinically, a pretreatment steroid trial may predict surgical olfactory outcomes, though the authors caution that this information should not be used to influence the patient's expectations regarding the potential benefits of surgery with respect to olfactory function. Notably, these findings apply specifically to CRSwNP; evidence for CRSsNP remains limited. Furthermore, while study protocols often utilize set durations for INCS, clinical management requires long-term, ongoing topical therapy to prevent the return of inflammation. Ongoing INCS is important to control this disease process, with an understanding that if stopped, inflammation would be expected to return, unless other measures have been taken to change a patient's underlying reactivity and inflammatory response.

Summary of evidence for olfactory dysfunction:

Aggregate grade of evidence: B (Level 2: 4, Level 3: 1) (Table 5)

Benefit: Short-term improvement in olfaction (within 1–2 weeks); may persist for at least 2–6 months when followed by INCS. May also serve as a predictive marker of surgical outcomes and response to biologics for olfaction.

Harm: Systemic toxicity if used repeatedly.

Cost: Low; higher potential downstream cost if repeated due to systemic monitoring need.

TABLE 5 | Systemic corticosteroids for olfactory dysfunction summary.

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/ side effects	Conclusion	Level of evidence
Papadakis et al. [20]	2021	Prospective randomized study	140	1. Group A: Oral dexamethasone intranasal rinses and nasal douching (n = 70). 2. Group B: Intranasal rinses and nasal douching (n = 70).	All patients were diagnosed with CRSwNP. 1. Group A received a "medical polypectomy" and dexamethasone (0.1 mg/kg/7 days) as well as intranasal rinses with budesonide and nasal douching for 12 weeks. 2. Group B only did intranasal rinses with budesonide and nasal douching for 12 weeks. 3. Patients were assessed at initial visit, 2, 12, and 24 weeks posttreatment.	1. LK endoscopy score 2. VAS for loss of smell 3. Olfactory function (Sniffin Sticks Test) 4. SNOT-22 5. At initial visit, 2, 12, and 24 weeks posttreatment.	No side effects reported for either group.	1. There was a significant difference in VAS smell and olfactory function at Weeks 2 and 24. 2. At Week 12 there was a significant difference for VAS smell but not olfactory function. 3. There was a significant difference in SNOT-22 and LK endoscopy score at Week 2 but not for Weeks 12 and 24.	2
Yang and Li [21]	2021	RCT	122	1. Group A: Local application of dexamethasone (n = 61). 2. Group B: Oral prednisone (n = 61).	All patients were diagnosed with CRS and underwent ESS. 1. Group A received local application of dexamethasone (3× daily/7 days) following ESS. 2. Group B took oral prednisone (0.5 mg/kg/day) for 1 week pre-op and 3 weeks post-op. After 3 weeks the dose was reduced by 5 mg every 3 days until completely stopped.	1. Nasal airway resistance (monitored by nasal resistance meter). 2. Olfactory detected by Japanese T&T standard olfactory test method. 3. Both were assessed pre-op, 1, 3, and 6 months post-op.	No significant difference in adverse effects between Group A and B.	Nasal resistance and olfactory scores were both significantly improved in Group B over Group A at 1, 3, and 6 months post-op.	2

(Continues)

TABLE 5 | (Continued)

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/ side effects	Conclusion	Level of evidence
Bogdanov et al. [22]	2020	Nonrandomized control trial	52	1. Group A: Surgical treatment (n = 31). 2. Group B: Surgical treatment and oral prednisone given pre-op (n = 21).	All participants were diagnosed with CRSwNP. 1. All participants underwent ESS. 2. Group B was given oral prednisone (40 mg/day, tapered off every 2nd day by 5 mg) 1–4 weeks before ESS. 3. Group A received no steroids.	1. Olfactory function (Sniffin Sticks Test) 2. VAS for smell. 3. Assessed pre-op, 1, 3 months post-op.	No major side effects observed.	1. Group B: Correlation between Sniffin test results after steroid and Sniffin results after surgery. 2. No significant difference in Sniffin test directly pre-op and 1 and 3 months post-op. 3. There was a significant difference in Sniffin Sticks between Groups A and B after Group B took steroids (pre-op) but no significant difference post-op (1 and 3 months).	3
Reychler et al. [19]	2015	RCT	30	1. Group A: Oral methylprednisolone (n = 10). 2. Group B: Nasal budesonide sprays (n = 10). Group C: Sonic nebulization with budesonide (n = 10).	All patients were diagnosed with CRSwNP or CRSsNP. 1. Group A took oral methylprednisolone (32 mg/8 days, 16 mg/4 days, 8 mg/4 days). 2. Group B did nasal budesonide sprays (2× daily/16 days). 3. Group C did sonic nasal nebulation with budesonide (2× daily/16 days).	1. Olfactory test: (Sniffin Sticks Test). 2. Retronasal olfactory test: Powered food items applied to the middle of the tongue and then identified using a questionnaire.	None reported	1. Groups A and C both showed significant improvement in both olfactory tests over Group B. 2. There was no significant difference between Group A and C.	2

(Continues)

TABLE 5 | (Continued)

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/ side effects	Conclusion	Level of evidence
Alobid et al. [17]	2014	RCT	89	1. Group A: Corticosteroid group (26 no asthma, 25 aspirin tolerant asthma, 16 aspirin intolerant asthma) (n = 67). 2. Group B: Control group (8 no asthma, 9 aspirin tolerant asthma, 5 aspirin intolerant asthma) (n = 22).	All participants were diagnosed with CRSwNP. 1. Group A took oral prednisone for 14 days (30 mg/4 days followed by 2-day reduction of 5 mg). 2. Group B didn't take anything.	1. Olfactory function (BAST-24) 2. Sinonasal symptoms (Likert scale) 3. Nasal polyp tissue eosinophilia 4. Nasal nitric oxide 5. Nasal polyp size (Lildholdt scale) 6. Outcomes were assessed at Weeks 0, 2, and 12.	None reported	1. Significantly better olfaction at Week 2 between Group A and Group B. 2. Significant difference in nasal congestion at Week 2 between Groups A and B. 3. Significant improvement in nasal congestion between asthmatic and non-asthmatic subgroups. –Significant reduction in eosinophilic levels between Group A and Group B at Week 2. 1. Significant improvement in nasal nitric oxide between Groups A and B at Week 2. No significance between subclasses. 2. Significant reduction of polyp size at Week 2 between Group A and Group B. No significance between subclasses.	2

Abbreviations: CRS, chronic rhinosinusitis; CRSsNP, chronic rhinosinusitis without nasal polyps; CRSwNP, chronic rhinosinusitis with nasal polyps; ESS, endoscopic sinus surgery; LK, Lund–Kennedy; RCT, randomized control trial; SNOT-22, Sinonasal Outcome Test; VAS, visual analog scale.

Benefits-harm assessment: Acceptable for short-course use when olfaction is a priority, and/or in specific cases (e.g., olfactory cleft polyps). Repeated or chronic administration is not supported.

Value judgments: Short-term olfactory restoration is clinically valuable; limited benefit duration must be weighed against exposure. Consider in specific cases, such as olfactory cleft polyps and use as a bridge to allow topical steroid access.

Policy level: Option; short, one-time SCS courses may be offered for significant olfactory loss, provided prior exposure is limited and nonsystemic measures are insufficient. May be useful as a diagnostic trial or bridge to surgery/biologics.

Intervention: SCS (e.g., prednisone ≈0.5 mg/kg, max 30 mg daily, for 4–7 days, without taper) followed by topical INCS in patients with CRSwNP and olfactory loss.

3.4 | Comorbid Patients

SCS are often considered for patients with CRSwNP and comorbidities such as asthma and NERD, due to presumed heightened disease severity or steroid responsiveness. However, emerging evidence does not support a differential benefit of SCS in these subgroups, particularly in the postoperative setting (Table 6) [24, 25]. Recent quantitative analyses have demonstrated that comorbid patients experience higher cumulative SCS exposure, underscoring the importance of steroid-sparing strategies in this subgroup [4].

Recent studies challenge the additive value of postoperative SCS. An RCT by Arancibia et al. found that a 4-week taper of oral prednisone following ESS in patients with CRSwNP yielded no significant improvement in any clinical domain, including: olfaction, symptom burden, or endoscopic healing [25]. Similarly, in a retrospective study, Martinez-Paredes et al. reported that adding SCS to standard therapy did not improve SNOT-22 or endoscopic scores for patients with NERD or positive bacterial cultures over 6 months [24]. It should be noted that these studies follow short-term outcomes and long-term effects were not documented.

Consequently, routine postoperative SCS for these high-risk populations is unsupported and cannot be recommended. Importantly, these null findings also applied to subgroup analyses of patients with asthma and NERD, challenging the assumption that these groups derive greater benefit from SCS use. Given the absence of clinical benefit and the heightened risk for cumulative complications, including adrenal suppression, osteoporosis, glucose intolerance, and cardiovascular events, SCS should be reserved for preoperative use or acute symptom management rather than routine postoperative control [1].

Summary of evidence for comorbid patients:

Aggregate grade of evidence: B (Level 1: 1, Level 3: 1) (Table 6)

Benefit: None observed across sinonasal symptom, nasal endoscopic, or olfactory outcomes, even in NERD or asthma subgroups.

Harm: Systemic toxicity risk increases with repeated exposure over time.

Cost: Low

Benefits-harm assessment: No measurable benefit; risks accumulate with use.

Value judgments: Despite disease severity in these patients, absence of benefit does not justify corticosteroid use postoperatively.

Policy level: No recommendation; refer to summary for CRSwNP section.

Intervention: As per underlying disease section; no change in recommendation or intervention for comorbid asthma or NERD.

3.5 | Perioperative SCS Use—Preoperative in CRSwNP

SCS, particularly oral prednisolone, have been extensively evaluated for their preoperative role in optimizing surgical conditions in patients with CRSwNP. Several high-quality studies, including RCTs and prospective cohorts, support their utility in reducing intraoperative bleeding, enhancing endoscopic visibility, and shortening operative time (Table 7) [26–30]. The role of SCS in the preoperative management of CRSsNP will be further discussed in the CRSsNP section.

Across controlled trials including Fraire et al., Günel et al., Hong et al., and Iftikhar et al., preoperative SCS showed mixed effects on intraoperative bleeding and visibility [26, 28–30]. Fraire et al. observed a significant reduction in bleeding volumes and improved field visualization with 7 days of preoperative steroids [30]. Günel et al. found no difference in mean bleeding volumes [28]. In a retrospective review, Hong et al. noted no significant differences in long-term outcomes, or complications [29]. Iftikhar et al. reported significant improvement in Boezaart grade and reduction in SNOT-22 scores following a 5-day course of steroids, with no reported complications [26].

Collectively, half these studies suggest short-term perioperative benefits from SCS, particularly in bleeding reduction and field clarity, although effects on operative time are inconsistent, and half did not. No included study reported serious adverse events related to preoperative corticosteroid use, and all used short-term regimens (typically 5–10 days at 30–60 mg/day prednisone or equivalent). While the purported benefits are largely short-term, they may be considered during surgery, where visibility and bleeding can affect both operative success and complication risk. However, it should be noted that within the methodology of these studies there is no mention of the multiple other potential confounding factors that would mitigate bleeding during an ESS. Indeed, in the only study cited above that was published within the last 10 years, the difference in intraoperative blood loss between groups is 164.0 ± 43.0 mL versus 215.8 ± 39.4 mL [26]. Although this was apparently statistically significant, it is arguable whether these numbers, especially examining their standard deviations, would be considered clinically significantly different. The overall amount of blood loss is also much higher than would be expected in a standard ESS case where those other mitigating factors are in use, leading to the inevitable question of whether the methodology of these studies suggesting a potential benefit of SCS preoperatively are truly applicable to centers regularly utilizing these other measures and experiencing significantly less bleeding overall in their CRSwNP cases.

TABLE 6 | Systemic corticosteroids for chronic rhinosinusitis with comorbid disease summary.

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/ side effects	Conclusion	Level of evidence
Martinez-Paredes et al. [24]	2023	Retrospective study	59	1. Group A: Short course oral steroids following ESS ($n = 27$). 2. Group B: No steroids ($n = 32$).	All participants had received ESS. 1. Group A received a short course of prednisone ($n = 6$ > 30 mg, $n = 21$ < 30 mg) immediately following ESS. 2. Group B did not receive steroids. 3. All patients did budesonide nasal rinses twice daily following ESS. 4. NERD as a subtype of CRS was analyzed separately.	SNOT-22 and LK endoscopy scores were assessed pre-op, 2 weeks, 4 weeks, and 4–6 months post-op.	None reported	1. No significant difference in SNOT-22 or LK endoscopy scores between Groups A or B at any visit. 2. No significant difference in SNOT-22 or LK endoscopy scores among the NERD subtype at any visit.	3
Arancibia et al. [25]	2020	RCT	70	1. Group A: Oral prednisone, $n = 35$ (15 no asthma, 9 asthma tolerant to NSAIDS, 11 with NERD). 2. Group B: No steroid, $n = 35$ (15 no asthma, 10 asthma with NSAID tolerance, 10 NERD).	All participants were diagnosed with CRSwNP and underwent ESS. 1. Group A took oral prednisone (30 mg/week, 20 mg/week, 10 mg/week, 5 mg/week) following ESS. 2. All patients were assessed pre-op and 4 weeks post op.	1. Sinonasal symptoms were assessed using T5SS. 2. NPS was scored from endoscopy. 3. Smell was assessed using BST24. 4. The Medical Outcome Study Short Form assessed patient quality of life.	None reported	1. No significant difference in T5SS between Groups A and B. 2. No polyps were found in either group post ESS and no significant difference between groups. 3. No significant difference in BST24 between Groups A and B. 4. No significant difference in Medical Outcome Study Short Form between Groups A and B.	1

Abbreviations: BAST24, Barcelona Smell Test 24; CRS, chronic rhinosinusitis; CRSwNP, chronic rhinosinusitis with nasal polyps; ESS, endoscopic sinus surgery; LK, Lund–Kennedy; NERD, nonsteroidal anti-inflammatory drug–exacerbated respiratory disease; NPS, nasal polyp score; RCT, randomized control trial; SNOT-22, Sinonasal Outcome Test; T5SS, total 5 symptom score.

TABLE 7 | Systemic corticosteroids in a preoperative setting summary.

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/ side effects	Conclusion	Level of evidence
Iftikhar et al. [26]	2024	RCT	72	1. Oral prednisolone for 7 days (n = 36). 2. Control group— no placebo (n = 36).	All participants received FESS and were diagnosed with CRS. 1. Treatment group: Oral prednisolone (1 mg/kg) once a day for 7 days. 2. Control group: No mention of placebo.	1. Amount of blood loss during surgery (blood in suction minus saline used). 2. Mucopus in nose, polyps, turbinate hypertrophy, deviated septum were only measured pre-steroid.	None reported	Significant difference in amount of blood loss in steroid group (164 mL) and control group (215 mL) (reduction in intra-op bleeding).	2
Ecevit et al. [27]	2015	RCT	22	1. Oral prednisolone (n = 10) 2. Control: placebo (n = 12)	All participants were diagnosed with CRSwNP and underwent ESS. 1. Treatment group: Took oral prednisolone (10 mg/day for 7 days then every other day until Day 17) pre-op. 2. Control took placebo pills for 17 days.	1. VAS (sinonasal symptoms), BOTT, and nasal inspiratory peak flow rate were assessed before and after surgery. 2. Surgical bleeding was also assessed.	1. Treatment group had five complications and control group had two from surgery. 2. The complications were not significantly different.	1. No significant differences in VAS, BOTT, nasal flow rate between the groups before and after surgery. 2. Significantly less bleeding, better surgical field view, and shorter operating time (10 min) for treatment group. 3. A 0.7 day reduction in hospital stay.	1

(Continues)

TABLE 7 | (Continued)

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/ side effects	Conclusion	Level of evidence
Günel et al. [28]	2015	RCT	65	1. Oral prednisone for 10 days ($n = 36$). 2. Placebo ($n = 29$).	All participants received ESS and were diagnosed with CRSwNP. 1. Treatment group: Oral prednisone (1 mg/kg) once daily for 2 days then tapered down with completion on Day 10. 2. Control group: Placebo for 10 days. All participants received ESS.	1. LK score (rigid endoscopy) 2. TNPS 3. LK and LM CT score (preoperative). 4. Kennedy Osteitis Score to measure bone density. 5. Level of blood loss during surgery. 6. Surgical field quality score.	Adverse effects of steroids were not observed.	No significant difference in mean LK scores, TNPS, LM scores, level of blood loss, or surgical field quality score, surgical duration.	2
Hong et al. [29]	2014	Retrospective cohort study	124	1. Oral prednisolone ($n = 40$). 2. Control ($n = 84$).	All participants were diagnosed with CRSwNP and underwent ESS. 1. Treatment group: Took prednisolone (15 mg/10 days). 2. Control group: No oral steroids.	1. Postoperative modified LM score from CT. 2. NPS 3. Eosinophilia count 4. Patients were assessed post-op once a week for 2 weeks, twice/month for 1 month, once/month for 6 months.	Complications during surgery, no significant difference between treatment and control groups.	1. Significantly fewer eosinophil infiltration in treatment group than controls. 2. Asthma and eosinophil infiltration were associated with poor outcomes. in patients with eosinophil infiltrate. 3. No other significant difference between outcomes between treatment and control. 4. No added benefit of oral steroids preoperative.	3

(Continues)

TABLE 7 | (Continued)

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/ side effects	Conclusion	Level of evidence
Fraire et al. [30]	2013	Nonrandomized control trial	54	1. Oral methylprednisone (n = 27). 2. Control group—no steroid for at least 2 months pre-op (n = 27).	All participants received FESS and were diagnosed with CRS with steroid nasal sprays suspended 3 weeks pre-op. 1. Treatment group: Oral meprednisone (30 mg) in two daily doses for 5 days. 2. Control group: No steroids at least 2 months pre-op. 3. CRS was diagnosed clinically with video-fibrolaringoscopia and CT scan.	1. Pre-op: LM CT score, NPS based on Johansson et al. score. 2. During surgery: Surgical field (Fromme et al. and Boezaart et al.), total blood volume collected, duration of surgery in minutes.	No adverse reactions post-op.	1. CRSsNP: No significant difference in surgical field, blood loss, or duration between steroid and control group. 2. CRSwNP: Significant difference in amount of blood loss between steroid group and control. No significance in surgical field or duration.	3

Abbreviations: BOTT, butanol olfactory threshold test; CRS, chronic rhinosinusitis; CRSwNP, chronic rhinosinusitis with nasal polyps; ESS, endoscopic sinus surgery; FESS, functional endoscopic sinus surgery; LK, Lund–Kennedy; LM, Lund–McKay; NPS, nasal polyp score; RCT, randomized control trial; TNPS, total nasal polyp score; VAS, visual analog scale.

Another area of consideration is the routine intraoperative administration of intravenous corticosteroids by anesthesiologists for postoperative nausea and vomiting prophylaxis. Available data suggest that a 4-mg IV dose of dexamethasone provides comparable efficacy to an 8-mg dose, underscoring the importance of minimizing systemic exposure when possible [31]. An 8-mg dose of dexamethasone is roughly equivalent to 50 mg of prednisone.

To further examine nonsteroidal intraoperative techniques that improve surgical conditions, we summarize here several strategies that have demonstrated equal or greater efficacy with improved safety profiles compared to SCS. Techniques such as controlled hypotension, topical vasoconstrictors, reverse Trendelenburg positioning, warm saline irrigation, and the use of tranexamic acid have all demonstrated efficacy in reducing blood loss and improving field visualization [32–36]. These multimodal approaches offer a safer alternative for surgical optimization, allowing clinicians to avoid the cumulative systemic risks of corticosteroids.

Finally, due to the high degree of comorbid Type 2 airway disease, consideration for a short, 3–5 day SCS preoperative course may be an option for patients with concurrent, moderate, or severe asthma to optimize FEV1 and control lower airway hyperreactivity in the perioperative period; a decision that should be made involving otolaryngologist, pulmonologist, and patient [37].

Summary of evidence for preoperative corticosteroids:

- **Aggregate grade of evidence**: B (Level 1: 1, Level 2: 2, Level 3: 2) (Table 7)
- **Benefit**: Improved surgical conditions (bleeding, visualization), reduced operative time, short-term symptom relief. Lower airway optimization.
- **Harm**: Potential cumulative exposure if repeated.
- **Cost**: Low
- **Benefits-harm assessment**: While benefits are demonstrable, equally effective intraoperative alternatives (e.g., controlled hypotension, vasoconstrictors, reverse Trendelenburg, warm saline irrigation, tranexamic acid) exist with fewer systemic risks.
- **Value judgments**: Although optimizing surgical visualization is a priority in ESS, a surgeon should incorporate non-corticosteroid intraoperative methods to decrease bleeding and improve visualization when feasible.
- **Policy level**: Option; systemic steroids may be used selectively when alternative techniques are insufficient or contraindicated to improve surgical and anesthesia conditions if there is comorbid asthma.
- **Intervention**: SCS (e.g., prednisone ≈0.5 mg/kg, max 30 mg daily, for 4–7 days, without taper) may be used preoperatively.

3.6 | Perioperative SCS Use—Postoperative Corticosteroids in CRSwNP

The use of SCS in the postoperative setting following ESS for CRSwNP has been the subject of several randomized and prospective studies (Table 8) [38–44]. The evidence suggests that routine SCS use in the postsurgical period does not confer meaningful additional clinical benefit compared to standard INCS alone. The role of SCS in the postoperative management of CRSsNP will be discussed in the CRSsNP section.

In a RCT, Liu et al. found that using peripheral eosinophil markers to guide steroid therapy did not improve outcomes, suggesting even high-biomarker patients may not benefit clinically with systemic supplementation [39]. Similarly, Dautremont et al. reported that while SCS may reduce early edema, subjective and objective outcomes converge with placebo beyond the immediate recovery period [44]. Furthermore, that study emphasizes that the availability of local drug-delivery systems such as steroid-eluting spacers offers an alternative strategy that can reduce reliance on SCS in the early postoperative period.

In a separate study by Fu et al., which compared different SCS withdrawal protocols ESS, patients across all treatment arms showed similar trajectories of symptom relief and polyp recurrence, reinforcing the notion that systemic steroids do not meaningfully alter long-term outcomes [38].

Additional insight is offered by Miyamura et al., who found no consistent association between lesion location and benefit from postoperative corticosteroids [40]. Instead, their findings suggested that lesion-specific targeting with topical therapy might offer more precise treatment benefits than systemic exposure.

Finally, Brescia et al. evaluated a cohort treated with postoperative corticosteroids and found no significant improvement in olfactory outcomes, nasal polyp regrowth, or quality of life when compared to topical therapies alone [43].

Collectively, these findings suggest that postoperative SCS do not provide clinically meaningful benefit beyond what is achieved with INCS alone. Moreover, repeated postoperative use contributes to cumulative SCS exposure, with known long-term risks including osteoporosis, adrenal suppression, and cardiovascular/metabolic toxicity. Their use in the postoperative period should therefore be discouraged in routine practice, even in patients with comorbid inflammatory conditions.

Summary of evidence for postoperative corticosteroids:

- **Aggregate grade of evidence**: B (Level 1: 2, Level 2: 3, Level 4: 2) (Table 8)
- **Benefit**: Minimal; transient symptom improvement in some studies.
- **Harm**: Adds to total lifetime SCS exposure with known long-term risks.
- **Cost**: Low
- **Benefits-harm assessment**: Harms outweigh potential short-term gains.
- **Value judgments**: Cumulative steroid toxicity is an increasing concern; limited-duration benefit does not justify risk.
- **Policy level**: Not recommended for routine use after ESS in CRSwNP.
- **Intervention**: Use of SCS postoperatively should be avoided; INCS preferred. Consider local drug-delivery devices such as corticosteroid-eluting spacers as an adjunct or alternative in the postoperative setting.

TABLE 8 | Systemic corticosteroids in a postoperative setting summary.

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/side effects	Conclusion	Level of evidence
Fu et al. [38]	2024	RCT	35	1. Group A: Oral methylprednisolone. (n = 18). 2. Group B: Oral methylprednisolone tapered down (n = 17).	All participants were diagnosed with CRSwNP and received ESS. 1. Group A took oral methylprednisolone (0.4 mg/kg/day) for 10 days following ESS. 2. Group B took oral methylprednisolone (0.4 mg/kg/day) for 7 days then tapered down by 8 mg/week for 3 weeks.	1. VAS (assessed at baseline, half, 1, 2, and 12 months post-op. 2. LK endoscopy score (assessed at baseline, half, 1, 2, and 12 months post-op).	1. Insomnia: Two patients in Group B. Five patients in Group A. 2. Digestive issues: One patient in Group B. Three patients in Group A. 3. Cognitive changes: One patient in Group B. 4. Weight gain: One patient in Group B and two patients in Group A. 5. Skin rash: One patient in Group B. 6. Increased risk of infection: Two patients in Group B (upper respiratory infection).	1. No significant difference in VAS between Groups A or B at all checkpoints. 2. No significant difference in LK endoscopy score between Groups A or B at all checkpoints.	2
				1. Group A: Oral methylprednisolone (n = 16). 2. Group B: Biomarker treatment (n = 19).		1. \	O	1. \	2

(Continues)

TABLE 8 | (Continued)

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/side effects	Conclusion	Level of evidence
Miyamura et al. [40]	2023	Retrospective study	94	1. Group A: Steroid using. 2. Group B: Nonsteroid using	All participants received ESS and were diagnosed with eosinophilic CRS. 1. Group A was classified as steroid using if they took oral steroids (2.5–5 mg/day) for at least 3 months.	1. Location of lesion via endoscopy (middle turbinate, middle meatus, superior turbinate, superior meatus, sphenoethmoidal recess, nasal septum). 2. Subjective symptoms (nasal discharge, nasal obstruction, olfactory dysfunction, post-nasal drip). 3. Blood eosinophil count and IgE.	None reported	1. Significantly more sphenoethmoidal recess lesions in Group A than Group B. 2. Significantly more pre-op olfactory dysfunction in Group A than Group B.	4

(Continues)

TABLE 8 | (Continued)

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/side effects	Conclusion	Level of evidence
Lin et al. [41]	2020	RCT	126	1. Group A: Control-placebo (n = 43). 2. Group B: Oral prednisolone and placebo (n = 42). 3. Group C: Oral prednisone and clarithromycin (n = 41).	All participants underwent ESS performed by the same surgeon. 1. All participants were given amoxicillin and clavulanic acid (1 g 2× daily) for 10 days after surgery. 2. Group A took placebo for 2 weeks. 3. Group B took oral prednisolone (15 mg 2× daily) for 2 weeks. Group C took oral prednisolone (15 mg 2× daily) for 2 weeks followed by clarithromycin (500 mg daily) for 15 weeks.	1. LK endoscopy score (2, 8, 12, and 24 weeks post ESS). 2. VAS and SNOT-22 (Chinese version) at 4, 12, and 24 weeks post ESS.	None reported	1. Significant VAS score difference at Week 12 for Group C. No significant difference at Weeks 4 and 12. 2. Significant SNOT-22 score difference at Week 12 for Group C. No significant difference at Weeks 4 and 12. 3. No significant difference LK at 2 weeks. Group C had significantly different LK at 8 weeks. At 24 weeks both Groups C and B showed significantly better LK score than placebo. 4. Patients with eosinophilic (eCRS) had significantly lower LKS in Groups B and C at Week 24. 5. Patients with non-eosinophilic CRS had significantly lowered LK score for Group C (8, 12, and 24 weeks) and Group B (8 and 24 weeks). 6. No significant difference in VAS and SNOT-22 between eCRS and neCRS.	1

(Continues)

TABLE 8 | (Continued)

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/side effects	Conclusion	Level of evidence
Shen et al. [42]	2019	RCT	100	1. Group A: Oral prednisolone (n = 43). 2. Group B: Placebo (n = 57).	All participants were diagnosed with CRSwNP and received sinus surgery using Mersserklinger techniques. 1. Group A took oral prednisolone (15 mg) 2× daily for 2 weeks. 2. Group B took placebo 2× daily for 2 weeks. 3. Participants were also subclassed into eCRS and neCRS based on nasal tissue biopsy during surgery.	1. VAS and SNOT-22 scores were assessed (pre-op, 1, 3, and 6 months post-op). 2. LK endoscopy scores were assessed (pre-op, 1, 3, and 6 months post-op).	One patient in Group A had gastrointestinal tract discomfort.	1. No significant difference in VAS or SNOT-22 scores between Groups A and B. 2. No significant difference in LK endoscopy score between Groups A and B. 3. Significant difference in LK endoscopy score improvement for neCRS at 3 months post-op.	1
Brescia et al. [43]	2015	Retrospective study	60	1. Group A: Nonsteroid group. 2. Group B: Two cycles/year of oral steroids.	All participants underwent FESS and were diagnosed with eosinophilic CRSwNP. 1. Group A did isotonic saline nasal rinses 2× daily, and nasal steroid spray post-op. 2. Group B did the same treatment and two cycles/year of oral steroids.	CRSwNP recurrence rate.	None reported	1. Patients with CRSwNP and asthma had significantly lower recurrence in Group B than Group A. 2. Patients with CRSwNP and ASA intolerance had significantly lower recurrence in Group B than Group A. 3. Group B and Group A without sub cohorts did not significantly differ.	4

(Continues)

TABLE 8 | (Continued)

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/side effects	Conclusion	Level of evidence
Dautremont et al. [44]	2014	RCT	36	1. Group A: Oral prednisolone (n = 18). 2. Group B: Control (n = 18).	All participants were diagnosed with CRSwNP and underwent ESS. All participants took oral steroids pre-op. 1. Group A took oral prednisone (30 mg/day/7 days) post-op. 2. All participants also had a steroid eluting spacer placed intra-op.	1. LK endoscopy scores assessed 2 months post-op. 2. SNOT-22 scores assessed 1 week, 3 weeks, 2 months post-op.	None reported	No significant difference in LK endoscopy scores or SNOT-22 scores between Groups A or B at any time points.	2

Abbreviations: ASA, aspirin desensitization; CRS, chronic rhinosinusitis; CRSwNP, chronic rhinosinusitis with nasal polyps; eCRS, eosinophilic chronic rhinosinusitis; ESS, endoscopic sinus surgery; FESS, functional endoscopic sinus surgery; LK, Lund–Kennedy score; neCRS, non-eosinophilic chronic rhinosinusitis; RCT, randomized control trial; SNOT-22, Sinonasal Outcome Test; VAS, visual analog scale.

3.7 | CRSsNP

The role of SCS in CRSsNP is less well established than in CRSwNP, and overall, the evidence base is more limited (Table 9) [45, 46]. CRSsNP may involve a greater component of neutrophilic inflammation, tissue remodeling, and infection-related mechanisms. As such, the responsiveness to SCS is thought to be more variable and possibly less robust.

A prospective, nonrandomized study by De Silva et al. assessed the impact of SCS in medically managed CRSsNP patients who were not yet candidates for surgery at time of enrollment [46]. Patients receiving a 10-day course of SCS showed significant improvement in symptom scores, endoscopic findings, and CT scores. Notably, over half of these patients were able to avoid surgery, with the greatest benefit observed in those with a symptom duration of less than 11 months. These results suggest that early, short-term use of SCS may offer a window of therapeutic opportunity in select CRSsNP patients—particularly those with less established, possibly reversible inflammatory disease.

In the largest RCT evaluating postoperative corticosteroid use in CRSsNP, Chang et al. found no difference in symptom improvement, endoscopic scores, or quality of life between patients who received a postoperative SCS taper and those who received placebo following ESS [45]. Interestingly, the steroid group showed a modest worsening in the psychological domain of the SNOT-22, raising the possibility that SCS may even detract from patient-perceived well-being in certain domains when used without clear benefit.

Taken together, these findings do not support the routine use of SCS postoperatively in CRSsNP but suggest a potential role in select, medically managed patients, especially early in the disease course. The transient nature of the benefit, combined with concerns about cumulative steroid exposure, supports a cautious, individualized approach.

Evidence for SCS use in CRSsNP is limited and mixed. These findings suggest a possible role for SCS early in the disease course, but little to no benefit postoperatively. Due to the limited durability of benefit and concern for systemic exposure, steroid use in CRSsNP should be selective and time-limited.

Summary of evidence for CRSsNP:

Aggregate grade of evidence: B (Level 1: 1, Level 2: 1) (Table 9)
Benefit: Possible short-term benefit in early-stage disease, before consideration for surgery. Minimal to none postoperatively.
Harm: Concerns about unnecessary systemic exposure given limited benefit. Transient mild adverse events (insomnia, dyspepsia, mood change) are reported and repeated use carries well-established systemic risk.
Cost: Low
Benefits-harm assessment: Acceptable only in early or medically refractory cases.
Value judgments: Routine systemic steroid use is not justified; individualized use in select non-polyp patients may be reasonable.

TABLE 9 | Systemic corticosteroids for chronic rhinosinusitis without nasal polyps summary.

Study authors	Year	Study design	Subjects	Study groups	Treatment protocol	Primary clinical endpoints	Complications/side effects	Conclusion	Level of evidence
Chang et al. [45]	2021	RCT	72	1. Group A: Oral prednisone ($n = 33$). 2. Group B: Placebo ($n = 39$).	All participants received ESS and were diagnosed with CRSsNP. 1. Group A took oral prednisone post-op (30 mg, 20 mg, 10 mg for 4 days each). 2. Group B took placebo in the same fashion. 3. All participants took oral antibiotics, fluticasone nasal spray, and saline rinses post-op.	1. SNOT-22 (assessed at 1 week, 1, 3, and 6 months post-op). 2. LK endoscopy score (assessed at 1 week, 1, 3, and 6 months post-op).	Headache, difficulty sleeping, stomach discomfort. No significant difference in adverse events between Groups A and B.	1. No significant difference in SNOT-22 scores between Groups A and B. 2. No significant difference in LK endoscopy scores between Groups A and B.	1
De Silva et al. [46]	2021	Prospective controlled study	82	1. Group A: Oral prednisolone ($n = 61$). Thirty patients underwent ESS. 2. Group B: No treatment ($n = 21$). Eighteen patients underwent ESS.	1. Patients were offered to take a course of prednisone (0.5 mg/kg tapered over 10 days). Those who took steroids were controlled to Group A. 2. All participants were also offered ESS. Group A took prednisolone pre-op. 3. All patients did nasal saline (2× daily) and steroid rinses (1× daily).	1. SNOT-22 2. LK endoscopy score. 3. LM CT score. 4. Scores were compared at baseline and 2 months.	Group A: Three patients had poor sleep, two had gastrointestinal issues, and one had mood disturbances.	1. Significant improvement in SNOT-22, LK, and LM in Group A than B. 2. No significant difference in 2-month SNOT-22 scores in Group A between those who had surgery and those who did not.	2

Abbreviations: CRSsNP, chronic rhinosinusitis without nasal polyps; ESS, endoscopic sinus surgery; LK, Lund–Kennedy; LM, Lund–McKay; RCT, randomized control trial; SNOT-22, Sinonasal Outcome Test.

Policy level: Option (use in early disease only); not recommended post-op.

Intervention: SCS (e.g., prednisone ≈0.5 mg/kg, max 30 mg daily, for 4–7 days, without taper) may be considered in patients with early or severe symptoms to avoid surgery; avoid use after ESS.

3.8 | A Comment on SCS Dosing

Dosing regimens reported across the reviewed studies were highly variable, reflecting differences in study design, population, and treatment intent. Two survey-based studies have reported wide ranges of clinical use of SCS in CRSwNP [47, 48]. The survey of the American Rhinologic Society membership demonstrated a median dose of 50-mg prednisone for 5 days, with 87% of respondents using a taper afterward [48]. Two Cochrane reviews were completed in 2016 looking at SCS alone, or as an adjunct to other therapy [8, 49]. Eight studies using SCS alone were identified with wide ranges of dosing and duration but generally tending to be much higher than those reported in survey studies; the maximum was 50-mg prednisone daily for 2 weeks while the minimum was 30-mg prednisone per day reduced by 5 mg for 14 days. The identified studies for use of SCS as an adjunct used methylprednisone 1 mg/kg (1.3 mg/kg prednisone equivalent) for 15–21 days with a taper [49]. Previous BASCI guidelines have recommended prednisone 0.5 mg/kg for 5–10 days [50]. To provide a practical, evidence-aligned recommendation, both the published literature and current real-world prescribing practices were considered. Based on this synthesis and the collective clinical experience of the authors, a short course of SCS at 25–30 mg daily (or maximum ~0.5 mg/kg) for 4–7 days is recommended for acute symptom control in appropriate patients. This suggests a shift toward shorter, lower-dose courses, though clinicians should tailor the dose and duration to the individual patient's disease severity, comorbidities, and prior response to therapy. In accordance with expert consensus, a short course of SCS for acute disease control in SCS-naive patients does not require a taper, as adrenal suppression is unlikely at that duration [15]. If 3–4 short courses of SCS have been used within the past year to treat other conditions, a taper might be required.

4 | Discussion

SCS have long played a role in the treatment of CRS, particularly in patients with nasal polyps. The available evidence supports a nuanced approach that considers timing of administration, disease phenotype, treatment goals (e.g., symptom control, surgical optimization, olfaction), and the presence of comorbid conditions. Emerging emphasis on minimizing long-term toxicity further underscores the need to reserve corticosteroid use for clearly defined, high-yield indications.

Although some evidence suggests the use of a short course of SCS as an option in the preoperative time period for patients with moderate to severe CRSwNP undergoing ESS, there is also evidence showing no benefit in this setting, and a more detailed evaluation of the supportive evidence suggests that this is an inferior option to multiple non-corticosteroidal alternatives including controlled hypotension, topical vasoconstrictors, reverse Trendelenburg positioning, tranexamic acid, and warm saline irrigation [33–36]. These all provide effective intraoperative field optimization with lower systemic risk. As such, preoperative SCS should be considered a second-line adjunct, used only when these safer modalities are insufficient or contraindicated or if needed for lower airway optimization.

SCS may also offer short-term benefit for olfactory dysfunction in patients with CRSwNP, particularly when followed by topical INCS. In select patients, this may translate to improvement lasting several months. However, this benefit is typically transient, and repeated courses are not advised.

Routine or repeated SCS use lacks evidence for improving outcomes in postoperative patients or those with asthma, NERD, or CRSsNP. SCS should not be used for maintenance because the benefits are transient while cumulative systemic toxicity is well established. Instead, their consideration after surgery should prompt a reassessment of surgical patency for topical delivery and patient candidacy for biologic therapy. Within this stewardship framework, SCS serve only as a time-limited adjunct or diagnostic bridge. Furthermore, prioritizing patient education on topical adherence can significantly improve therapeutic efficacy and reduce systemic reliance.

Of note, while short courses of corticosteroids are generally well tolerated, growing attention must be paid to cumulative lifetime exposure, particularly in chronic conditions such as CRSwNP. Repeated systemic steroid use has been associated with long-term toxicities including osteoporosis, glucose intolerance, hypertension, adrenal suppression, and cardiovascular risk [1]. These risks must be carefully weighed against the limited and often temporary benefits observed in many studies. Importantly, shared decision-making regarding these risks is seldom discussed in the literature. Incorporating patients into conversations about both the limited duration of benefit and the potential cumulative harms of SCS should be considered essential to informed consent and personalized care.

Both our review and the 2020 EAACI position paper align on corticosteroid-sparing approaches [6]. We recommend reserving short, time-limited courses of SCS for severe or uncontrolled CRSwNP, avoiding repeated or maintenance dosing and prioritizing nonsystemic options and topical intranasal therapy [6]. Our review more explicitly discourages routine postoperative SCS and emphasizes mixed or limited benefit in CRSsNP and select comorbid subgroups, while EAACI stresses minimizing lifetime exposure and monitoring for harms. This is particularly relevant as practice evolves toward more personalized care.

In the era of biologics, multidisciplinary collaboration among specialists managing Type 2 inflammatory diseases is essential to establish unified, evidence-based strategies for SCS use. Educating both primary care physicians and patients on the necessity of restricting SCS administration represents a cornerstone of preventing cumulative toxicity and promoting sustainable, corticosteroid-sparing management. Taken together, these findings reflect a change in recommendations against SCS use, toward steroid-sparing maintenance relying on topical therapy, surgery, and biologics for persistent Type 2 inflammation.

Among approved biologics for CRSwNP, dupilumab and mepolizumab demonstrate the most robust corticosteroid-sparing data: Pooled SINUS-24/52 analyses show ~75% fewer rescue systemic steroid courses with dupilumab, while SYNAPSE reported 25% versus 37% of patients requiring ≥ 1 SCS course on mepolizumab versus placebo over 52 weeks; by contrast, benralizumab and omalizumab did not significantly reduce systemic steroid use in pivotal trials [51, 52]. Most recently, the Phase 3 WAYPOINT trial of tezepelumab (a thymic stromal lymphopoietin [TSLP] inhibitor) also showed significant reductions in nasal polyp score and symptom burden, with fewer patients requiring rescue compared to placebo, supporting a potential corticosteroid-sparing effect in severe, Type 2 inflammatory CRSwNP [53]. This aligns with contemporary stewardship goals to minimize systemic exposure while pursuing durable control or remission through targeted, precision-based interventions. Limitations around use of biologic therapies include the lack of data on short-term use and total duration of use.

5 | Conclusion

As the management of CRS evolves, the role of SCS must be viewed through the lens of precision, safety, and stewardship. SCS should be used strategically, sparingly, and when their short-term benefits clearly outweigh the risks. Their role should be primarily as a short, second-line preoperative adjunct in moderate to severe CRSwNP and/or for short-term olfactory rescue. Clinicians are encouraged to prioritize safer, targeted alternatives where available and to reserve SCS for scenarios where they are most likely to provide meaningful value. Clinicians are also encouraged to consider cumulative lifetime SCS exposure prior to prescribing. The emergence of biologic therapies now offers a durable, steroid-sparing option for patients with persistent or recurrent disease despite adequate surgery and topical treatment, underscoring a transition toward individualized, long-term disease modification rather than repeated systemic rescue.

Funding

The authors have nothing to report.

Conflicts of Interest

Andrew Thamboo reports speaker honoraria from GSK, AstraZeneca (AZ), Sanofi, and Stryker; and participation on advisory boards for GSK, Sanofi, and AZ. Deanna Gigliotti reports advisory work for ALK and AstraZeneca. Eugenio De Corso reports lecture fees from and participation in expert board meetings for GSK, Novartis, Sanofi, and AstraZeneca. Stella Lee reports involvement in clinical trials and/or advisory boards for AstraZeneca, Genentech, GSK, Lyra, Optinose, Sanofi Regeneron, Upstream Bio, and equity in Diceros Therapeutics. Benjamin S. Bleier reports consultancy for Novartis, Olympus, Karl Storz, Medtronic, Stryker, and 3D Matrix; equity in Diceros Therapeutics, Sound Health Systems Inc., and Inquis Medical; and royalties from Thieme. Christopher Chin reports speaker and advisory board roles for AstraZeneca, Sanofi-Regeneron, and GSK. Marie-Noelle Corriveau reports grant/research support, employment, honoraria, consulting fees, and travel expenses for advisory board participation from GSK, Sanofi, and Regeneron. Valerie Hox reports speaker and consultancy fees from Sanofi, GSK, AstraZeneca, Novartis, Celltrion, and ALK. Claire Hopkins reports advisory board roles for GSK, AstraZeneca, Sanofi, Regeneron, and Lilly. Peter H. Hwang reports consultancy for Medtronic and Slate Therapeutics, and equity ownership in SoundHealth. Ludger Klimek reports research grants from Allergy Therapeutics/Bencard, ALK-Abelló, Allergopharma, Aimmune, ASIT Biotech, AstraZeneca, Bionorica, BioNTech, Biomay, Blueprint, Boehringer Ingelheim, Celltrion, Circassia, Chiesi, Cytos, Curalogic, HAL, Lofarma, Menarini, Viatris/Mylan, Novartis, Leti, ROXALL, GSK, Sanofi, Stallergenes, and ThermoFisher; and/or speaker or consultancy roles for these companies; and is President of the German Society of Allergology (AeDA), Governance Committee Board Member and ENT Section Board Member of the EAACI, Vice President of the German Academy for Allergy and Environmental Medicine, and Editor-in-Chief of AllergoJournal and AllergoJournal International. Daniel Lee reports advisory board participation for Sanofi/Regeneron and honoraria from Sanofi/Regeneron, GSK, and AstraZeneca. Amber Luong reports consultancy for Lyra Therapeutics, Medtronic, Neurent Medical, Sanofi, Sound Health Systems, and Stryker; advisory board roles for Amgen/AstraZeneca, GSK, Regeneron, and Sanofi; scientific advisory board membership for Maxwell Biosciences; stock ownership in Aerin Medical; and research funding from Eli Lilly, Insmed, and Sanofi. Geoffrey Mortuaire reports lecture payments from Sanofi, GSK, Novartis, Dianosic, and Medtronic; travel support from Audika; advisory board roles for Sanofi, GSK, Novartis, and Dianosic; and a board role with ALK. Joaquim Mullol reports participation on scientific advisory boards, consulting, lecture fees, and/or research grants/clinical trial support from Almirall, AstraZeneca, Genentech-Roche, GSK, LETI, Lilly, Menarini, MSD, Mitsubishi-Tanabe, NOUCOR/Uriach Group, Novartis, Optinose, Procter & Gamble, Regeneron Pharmaceuticals, Sanofi-Genzyme, UCB Pharma, and Viatris/MEDA. Zara M. Patel reports consultancy/advisory roles for Medtronic, Dianosic, Optinose, Wyndly, SoundHealth, and is Co-Founder and Chief Medical Advisor of Olfera. John Scott reports speaker and advisory board roles for GSK, AstraZeneca, and Sanofi-Regeneron. Doron Sommer reports clinical research and advisory board roles with GSK, Sanofi, and AstraZeneca (advisory board only), and consultancy for Stryker. Leigh Sowerby reports grants/clinical trials with AstraZeneca, GSK, Sanofi, Medtronic, Eli Lilly, and Insmed; royalties/licenses with Neilmed and Freudenberg Medical; consulting for Olympus, Freudenberg Medical, Stryker, and Medtronic; and advisory board/honoraria roles for Sanofi, GSK, AstraZeneca, and Paladin. Marc Tewfik reports serving as principal investigator for Sanofi and AstraZeneca, and consultancy for AstraZeneca, GSK, Sanofi, and Stryker. Beatrice Voizard reports speaker honoraria from GSK and Sanofi, advisory board roles for GSK and Sanofi, and serves as a medical advisor for LifeEngine Technologies. Martin Wagenmann reports lecture fees and advisory board participation for Allergopharma, ALK-Abelló, AstraZeneca, Celltrion, CSL Behring, Genzyme, GSK, HAL Allergie, MSD, NeilMed, Regeneron, Sanofi, and Stallergenes; and research grants from ALK-Abelló, AstraZeneca, the EU, GSK, Novartis, Regeneron, Sanofi, and Takeda. Sarah K. Wise reports consultancy and/or advisory board roles with AstraZeneca, GSK, Lilly, Optinose, and Sanofi/Regeneron; research support from Sanofi; and speaking roles for GSK and Medtronic. Jonathan Yip reports serving in advisory board for AstraZeneca, Sanofi/Regeneron, and GSK. Martin Desrosiers reports grant/research support from Sanofi, AstraZeneca, and GSK; employment, honoraria, consulting fees, and travel expenses from Sanofi, AstraZeneca, and MEDA Pharmaceuticals; major stock ownership in Probionase Therapies Inc.; and serving as CPD designate for the ORL-CCF Program, Université de Montréal. Yvonne Chan reports consultancy for Medtronic and advisory board/speaker honoraria from AstraZeneca, GSK, and Sanofi. The other authors declare no conflicts of interest.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.

Supplemental Figure 1: PRISMA for screened studies relevant to chronic rhinosinusitis with nasal polyps and SCS treatment.**Supplementary Figure 2**: PRISMA for screened studies relevant to chronic rhinosinusitis and SCS use for olfactory disfunction.**Supplemental Figure 3**: PRISMA for screened studies relevant to chronic rhinosinusitis and SCS use in a pre-operative setting.**Supplemental Figure 4**: PRISMA for screened studies relevant to chronic rhinosinusitis and SCS use in a post-operative setting.**Supplemental Figure 5**: PRISMA for screened studies relevant to SCS treatment for chronic rhinosinusitis without nasal polyps.