

Overview of Chronic Rhinosinusitis with Nasal Polyps

Przegląd wiedzy na temat przewlekłego zapalenia zatok z polipami nosa

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Abstract

Chronic rhinosinusitis with nasal polyps (CRSwNP) is an inflammatory disease that remains a major challenge in otolaryngology. This review aims to summarize the current knowledge on CRSwNP and provide an overview of available treatment methods. We conducted a PubMed database search and identified 86 publications relevant to this paper.

CRSwNP is characterized by persistent sinonasal symptoms lasting more than 12 weeks (congestion, rhinorrhea, hyposmia) and bilateral polyps, confirmed by endoscopy or computed tomography showing inflammation. The estimated prevalence of CRSwNP ranges up to 4% in the general population and predominantly affects middle-aged patients. In most cases, CRSwNP is driven by a type 2 inflammatory response. Common comorbidities include asthma and *aspirin-exacerbated respiratory disease*.

Management follows a stepwise approach, and treatment selection depends on disease severity, previous treatment response, and type 2 biomarkers. Treatment typically begins with saline irrigation and intranasal corticosteroids. Refractory cases may require short courses of systemic steroids, endoscopic sinus surgery (ESS), or biologics (dupilumab, mepolizumab, omalizumab, and tezepelumab) targeting type 2 inflammation.

Future research should focus on improved phenotyping and cost-effectiveness.

Keywords: Chronic rhinosinusitis, nasal polyps, patient selection, biologic treatment, surgical management, intranasal corticosteroids, treatment algorithm

Streszczenie

Przewlekłe zapalenie zatok przynosowych z polipami nosa jest chorobą zapalną, która wciąż stanowi istotne wyzwanie w otorynolaryngologii. Celem niniejszej pracy jest podsumowanie aktualnej wiedzy na temat przewlekłego zapalenia zatok z polipami nosa oraz przedstawienie dostępnych metod leczenia. Przeprowadzono analizę w bazie danych PubMed i znaleziono 86 publikacji istotnych dla niniejszej pracy.

Przewlekłe zapalenie zatok przynosowych z polipami nosa charakteryzuje się utrzymującymi się ponad 12 tygodni objawami ze strony nosa i zatok przynosowych (nieδροżność, wydzielina z nosa, osłabienie węchu) oraz obustronną obecnością polipów, potwierdzoną w badaniu endoskopowym lub obecnością zmian zapalnych w tomografii komputerowej zatok. Szacuje się, że częstość występowania tej choroby wynosi do 4% w populacji ogólnej, a choroba dotyczy głównie osób w średnim wieku. W większości przewlekłe zapalenie zatok z polipami nosa jest związane z reakcją zapalną typu 2. Częstymi chorobami współistniejącymi są astma oraz choroba układu oddechowego nasilana przez aspirynę.

Postępowanie terapeutyczne ma charakter eskalujący, zatem wybór terapii zależy od ciężkości choroby, reakcji na dotychczasowe leczenie oraz obecności biomarkerów zapalenia typu 2. Leczenie zwykle rozpoczyna się od irygacji solą fizjologiczną i donosowych glikokortykosteroidów. W przypadkach opornych na leczenie mogą być stosowane krótkie cykle ogólnych kortykosteroidów, endoskopowa operacja zatok lub leki biologiczne (dupilumab, mepolizumab, omalizumab, od niedawna także tezepelumab) ukierunkowane na zapalenie typu 2.

Przyszłe badania powinny koncentrować się na lepszym różnicowaniu fenotypów choroby i analizie efektywności kosztowej terapii.

Słowa kluczowe: przewlekłe zapalenie zatok przynosowych, polipy nosa, dobór pacjentów, leczenie biologiczne, leczenie chirurgiczne, donosowe kortykosteroidy, algorytm leczenia

Introduction

Chronic rhinosinusitis (CRS) is a prevalent, long-term inflammatory condition affecting the mucosal lining of the nasal cavity and paranasal sinuses. Unlike acute sinusitis, which

is primarily of infectious origin, CRS is currently understood as an immune-mediated disease [1].

Historically, the clinical classification of CRS was based on a phenotypic model defined by either the presence or absence of nasal polyps upon endoscopic visualization, creating two primary categories: chronic rhinosinusitis with nasal polyps (CRSwNP) and chronic rhinosinusitis without nasal polyps (CRSsNP) [2]. Despite the simplicity of the initial classification, it fails to account for the heterogeneous pathophysiology of CRS, thereby limiting its utility in evaluating the efficacy of diverse modern treatment strategies [2]. Current standards for the definition, diagnosis, and management of CRSwNP are largely based on the European Position Paper on Rhinosinusitis and Nasal Polyps 2020 (EPOS 2020) and the European Forum for Research and Education in Allergy and Airways Diseases 2023 (EUFOREA 2023) consensus, which represent the most comprehensive and widely accepted guidelines in this field [1, 3].

Rather than being a uniform disorder, CRSwNP manifests as a heterogeneous condition with diverse inflammatory endotypes and variable clinical manifestations [3-11].

The chronic inflammatory process underlying CRSwNP may lead to epithelial damage and aberrant tissue repair, thereby promoting persistent inflammation, recurring symptoms, and further growth of inflammatory sinus tissue and nasal polyps [12].

Given the substantial health burden associated with CRSwNP, this review aims to provide a broad overview of current knowledge and contemporary therapeutic strategies, integrating conventional medical treatment, surgery, and biologic therapies into a clinically relevant framework.

Methods

A literature search was conducted in the PubMed database between February and April 2026 using keywords such as “chronic rhinosinusitis with nasal polyps”, “CRSwNP”, “burden”, “pathophysiology”, “epidemiology”, “diagnosis”, “management”, “biologic therapy”, “endoscopic sinus surgery”, “intranasal corticosteroids”, “dupilumab”, “mepolizumab”, “omalizumab”, and “type 2 inflammation”.

No date restrictions were applied to the search; the included full-text articles published in English, spanned from February 2004 to February 2026. In addition, the reference lists of the included articles were manually reviewed to identify further relevant studies. A total of 86 publications were ultimately included in the final synthesis.

Epidemiology

Data on CRS is mostly consistent, indicating a general population prevalence from 3.8 to 12.1% [13-15]. Within this group, CRSwNP accounts for 20-30% of cases of CRS [13-17], resulting in an estimated 4% prevalence in the general population [14-16].

CRSwNP predominantly affects middle-aged patients, with the average age of diagnosis ranging from 42 to 58 years [15, 18-21]. Other studies are broadly concordant and report comparable findings, suggesting that peak incidence occurs between the ages of 45 and 65 [22] or, in some studies, between 50 and 69 years [14]. Notably, the occurrence of CRSwNP at the extremes of age is uncommon. Nasal polyps found in patients younger than 20 years should be evaluated for alternative diagnoses, such as cystic fibrosis or encephalocele. In patients older than 80 years, their presence may raise suspicion for an underlying neoplasm [18].

Table 1. Summary of CRS and CRSwNP prevalence.

Study	Population / design	CRS prevalence	CRSwNP proportion in CRS	CRSwNP prevalence	Age-related findings
Khan et al. [14]	European multi-center (GALEN cohort)	7–27% (range cited across studies)	~20–30%	1.1–4.3% estimated	Mean age 34.3–46.8 years
Starry et al. [15]	German claims database	-	-	0.58–4% estimated	Average age 57.8–61.74 years (only CRSwNP)
Mullol et al. [17]	Spain, cross-sectional	5–12%	20%	0.8%	Mean age 42.8–50.1 years
Pfaar et al. [16]	Review (multidisciplinary care)	-	25–30%	0.5–4%	Not researched
Bhattacharyya et al. [21]	US database study	~4.9%	25–30%	-	Mean age 45.8 years
Chen et al. [20]	Systematic review	-	6.1–31%	1–2.6%	Greatest prevalence at 60–69 years
Hulse et al. [22]	Review	10.9%	-	2.7%	Peak incidence 45–65 years
Stevens et al. [18]	Review	1–4%	25–30%	-	Rare <20 and >80 years (red flags)

Diagnosis

The diagnosis of CRSwNP is established through a combination of clinical symptoms lasting for over 12 weeks, objective evidence of inflammation, and the visualization of nasal polyps by nasal endoscopy or inflammation on computed tomography (CT) imaging

[1, 16, 23-24]. Nasal polyps are benign inflammatory lesions originating from the mucosa of the nasal cavity and paranasal sinuses [4, 25-26]. Macroscopically, they appear as translucent, glistening, and poorly vascularized outgrowths with a gelatinous consistency and a greyish-white or yellowish-grey color [27].

Typical CRSwNP symptoms include nasal obstruction, rhinorrhea, facial pressure or pain, and reduction or loss of smell [16, 23-24]. However, in routine clinical practice, assessment based on symptoms alone is insufficient to establish a definitive diagnosis, as the symptoms are nonspecific and may overlap with other sinonasal conditions. The importance of endoscopic and CT confirmation of CRSwNP should be emphasized, as it allows for a more comprehensive classification, assessment of severity, and treatment planning [24].

Objective confirmation of the disease is essential to assess its extent and to exclude alternative causes of nasal obstruction [28]. Nasal endoscopy is an important diagnostic tool because it allows for the direct visualization of bilateral polyps, assessment of mucosal edema, and identification of mucopurulent discharge [3]. Given its wide availability, it may be considered the primary diagnostic tool. On the other hand, CT of the paranasal sinuses provides complementary information by defining the extent and distribution of mucosal disease, identifying anatomical obstruction, and facilitating preoperative planning by identifying anatomical variations [16, 23-24]. Together, these modalities constitute the foundation of accurate diagnosis, phenotyping, and management of CRSwNP.

Clinical Burden

CRSwNP presents a formidable challenge in otolaryngology due to its high rate of recurrence and persistent nature [23-25]. Recent evidence suggests that CRSwNP is associated with a profound negative impact on health-related quality of life (HRQoL), which is reported to be more severe than in patients with non-polypoid rhinosinusitis [29]. Furthermore, Kim et al. found that diminished HRQoL appears to be strongly associated with a higher susceptibility to anxiety and depression, which was observed particularly in female patients with CRSwNP [29].

The loss of olfaction furthermore impacts HRQoL by impairing personal hygiene and the ability to detect life-threatening hazards, such as toxic gases, fire, and spoiled food. Additionally, since the sense of smell plays a role in mediating social and sexual activities, its loss adds to the psychological burden of the disease [30-31]. The socioeconomic and safety implications are highlighted by Malvezzi et al., who found that 39.5% of patients feel at risk due to hyposmia [32].

Healthcare costs are significantly higher for patients with CRSwNP, averaging €5,406 (range: €4,860–6,012) annually, compared to €4,945 (range: €4,293–5,696) for those with CRSsNP [33]. Another study reported that annual incremental costs were \$11,507 higher for CRSwNP patients than for a reference group without a CRS diagnosis [21]. Specifically, data indicate a distinction between direct medical expenses (€1,501/year per patient) and the much larger indirect burden of €5,659/year per patient, largely driven by absenteeism and productivity losses [34].

Common comorbidities

CRSwNP often coexists with other type 2 inflammatory diseases, which are commonly identified by elevated total serum IgE and eosinophil counts [35]. The most common include asthma and other chronic pulmonary diseases, aspirin-exacerbated respiratory disease (AERD), allergies, allergic rhinitis, atopic dermatitis, and eosinophilia. Furthermore, these conditions are more frequently observed in CRSwNP than in CRSsNP [24, 35–37]. Interestingly, some studies associate the inflammation in CRSwNP with the future development of depression in children and adolescents [38].

Asthma comorbid with CRSwNP typically exhibits a more severe clinical presentation compared to the asthma phenotypes observed in CRSsNP [24, 39–40]. Reported prevalence varies across studies, ranging from 24% [41] up to 34% [42]. Other reports suggest that even up to 45% of affected patients either have or will develop asthma [43], with some studies describing rates as high as 66% [44–46].

AERD, defined by NSAID intolerance, asthma, and CRSwNP, affects approximately 8–26% of patients with CRSwNP. This condition is associated with a more severe clinical course and increased treatment resistance, frequently resulting in a heightened probability of multiple surgical revisions. Furthermore, patients with AERD often present with an earlier disease onset, tending to be significantly younger at the time of their initial surgical intervention [35, 47].

Pathophysiology and Type 2 Inflammation

The majority of CRSwNP cases are driven by a type 2 pattern of inflammation [25]. Type 2 immune responses are characteristic of atopic diseases, allergic rhinitis in the upper airways and asthma in the lower airways [48–49]. This pathway is mainly mediated by eosinophils, mast cells, basophils, T_H2 cells, group 2 innate lymphoid cells (ILC2s), and

IgE-producing B cells. T_H2 cells mainly secrete the prototypical cytokines IL-4, IL-5, and IL-13, which promote type 2 immunity, characterized by high antibody titers and eosinophilia [48-50].

Immune response in the airway epithelium, mediated by master regulators such as thymic stromal lymphopoietin (TSLP), IL-25, and IL-33, leads to an increased production of type 2 cytokines and triggers a cascade of downstream events. These include IgE-mediated hypersensitivity to aeroallergens, the activation of airway epithelial cells, the chemoattraction of effector cells (mast cells, eosinophils and basophils), and the remodeling of the epithelium and subepithelial matrix [48-50].

While type 2 inflammation is the predominant endotype observed in CRSwNP, some CRSwNP cases are driven by type 1 or type 3 inflammatory profiles, reflecting the underlying heterogeneity of the disease [24, 51].

CRSwNP Management

Management and treatment of patients encompass various methods, as the disease is heterogeneous and exhibits different phenotypes and symptom intensities. This means that personalized treatment options should be considered for each individual case.

Conventional Medical Treatment

EPOS 2020 and other studies state that the first line of treatment for CRS, including CRSwNP, involves the use of saline irrigation and topical therapies, most importantly intranasal corticosteroids (INCS). These methods reduce mucosal inflammation, improve nasal patency, and may alleviate symptoms and endoscopic findings. INCS are fundamental in this therapy, as they have potent anti-inflammatory and anti-edematous properties, with minimal systemic and local side effects, even when implied in the long term [3, 5, 52].

Saline Irrigation

Many guidelines reaffirm the use of both intranasal saline sprays and irrigation for CRSsNP, as they are more effective than nasal saline sprays alone. Irrigations of more than 60 mL are favored due to improved mucus clearance, demonstrating significant efficacy compared to placebo over an eight-week period [4, 44]. Conversely, hypertonic saline is not recommended, since it tends to be more irritating to the mucosa [53].

Intranasal Corticosteroids

INCS are fundamental to first-line therapy. Studies show that they are effective at improving quality of life and symptoms [4, 54]. However, a meta-analysis by Bognanni et al. suggests that the improvement is modest and possibly trivial [55]. The risk of adverse effects, such as epistaxis and local irritation, is increased in patients using INCS. Consequently, these symptoms require regular monitoring. The impact of epistaxis on treatment adherence is not well established. Mild epistaxis, characterized by blood-streaked mucus, is often well tolerated and may allow the continuation of therapy [4, 54].

A meta-analysis by Rollema et al. reports several serious (systemic) adverse drug reactions (ADRs), indicating that INCS may contribute to conditions such as adrenal cortical hypofunction, Cushing syndrome, and growth retardation [56]. Moreover, less common but more severe ADRs associated with INCS include visual disturbances, migraines, palpitations, and tinnitus - side effects that are often overlooked or not attributed to localized corticosteroid therapy [56]. However, the same research mentioned that a relevant contributing factor to the development of serious ADRs after INCS is the additional use of other glucocorticoids [56]. Furthermore, other studies have not reported such adverse effects, instead describing side effects as minor or comparable to those observed with placebo [55]. Interestingly, Chong et al. suggest that lower doses have similar efficacy with fewer side effects [54]. Nevertheless, it is also important to note that some polyps are resistant to steroid therapy and alternative treatments may be needed [57].

Oral Corticosteroids

Short-term oral corticosteroids (OCS) are strongly recommended for CRSwNP due to their potent anti-inflammatory effects, leading to rapid symptom relief, polyp size reduction, and improved quality of life. Poetker et al. demonstrated significant improvements in subjective and objective measures after 2-3 weeks, lasting approximately 8-12 weeks, whereas Head et al. reported benefits persisting for about 3-6 months [58-59].

Studies noted very few ADRs, with no severe cases. The most common included insomnia, mood changes, and gastrointestinal issues (e.g., nausea, vomiting, diarrhea) [59-60]. Furthermore, Chan et al. highlighted that cumulative or prolonged OCS use increases the risk of adverse effects [61].

Oral Antibiotics

The benefits of oral antibiotics are unclear. While a Cochrane review shows conflicting evidence on the efficacy of oral antibiotics in the treatment of CRSwNP [44], another study demonstrated that macrolide therapy may be effective in patients with a low risk of adverse effects [62]. Additionally, Hopkins et al. showed that doxycycline successfully reduced polyp size [25].

Surgical Treatment

Another viable treatment option for patients with CRSwNP is endoscopic sinus surgery. Evidence supports its use particularly in cases where medication alone has not achieved satisfactory results, especially in patients with severe, disease-induced, complete obstruction of multiple sinonasal outflow tracts [6]. As with other treatment modalities, ESS should be considered when the anticipated benefits outweigh those of non-invasive approaches and justify the associated risks.

The primary goals of ESS are the removal of obstruction, the restoration of sinus drainage, the reduction of inflammatory mucosal changes, and the facilitation of access for future topical therapy [7]. The effectiveness of this intervention varies, and available studies present conflicting results. A study by Lourijssen et al. found that the difference at 12 months between patients receiving combined surgical and medical treatment and those receiving medical therapy alone did not exceed the minimal clinically important difference (MCID) [63].

On the contrary, other studies report high recurrence rates of nasal polyposis, reaching approximately 40% at 6 months and persisting at a similar level after 18 months [64]. The timing of intervention also appears to influence outcomes. Patients undergoing surgery within 0-12 months of symptom onset achieved higher rates of MCID compared to those treated later (71.2% vs 53% at a 60-month follow-up) [65]. Conversely, some studies indicate that patients with a high disease burden experience significant short- and long-term improvement following surgical treatment [6]. However, there is general agreement on the importance of continued conventional medical therapy after surgery [6, 64, 66-68].

Biologic Therapy

Biologic therapy has proven to be an important treatment option for patients with severe and uncontrolled CRSwNP, particularly in cases where conventional medical treatment and surgery fail to achieve adequate disease control [8,9]. As previously noted, these agents

target key components of type 2 inflammation, which represents the dominant inflammatory pathway in most CRSwNP cases. By interfering with this pathway, biologics contribute to a reduction in nasal polyp size, an improvement in nasal obstruction and olfactory function, and a decreased need for systemic corticosteroids or revision surgery [69].

The rationale for biologic treatment is based on the immunopathology of CRSwNP, in which type 2 cytokines and mediators - such as interleukin 4, interleukin 5, interleukin 13, and IgE - play central roles. In this context, dupilumab blocks the shared receptor for interleukin 4 and interleukin 13, mepolizumab targets interleukin 5, and omalizumab neutralizes IgE [8, 70]. Recently, tezepelumab, a monoclonal antibody targeting TSLP – an upstream regulator of Th2 inflammation, has been approved for the treatment of CRSwNP [71, 72]. These mechanisms underpin the clinical efficacy of biologics, particularly in patients with eosinophilic inflammation and common comorbidities, such as asthma or N-ERD [8, 70].

Clinical trials and systematic reviews have shown that biologics improve several key outcomes in CRSwNP, including the nasal polyp score, nasal congestion, quality of life, and olfactory function [10-11, 69]. A network meta-analysis by Wu et al. found that dupilumab likely leads in overall biologic performance. While mepolizumab showed stronger efficacy than omalizumab, it carried a higher safety risk, leading omalizumab to be ranked higher when both efficacy and safety were integrated [73]. In contrast, some evidence suggests only a moderate supremacy of dupilumab, and there is still no evidence-based consensus regarding the most effective biologic agent [11]. Additionally, a more recent study by Xu et al. that evaluated biologic therapy including tezepelumab reports superior efficacy across multiple endpoints for both dupilumab and tezepelumab, with tezepelumab demonstrating exceptional performance in reducing nasal polyps (with a size reduction comparable to omalizumab) and alleviating nasal congestion, achieving a 98% reduction in polyp surgery requirements and an 88% decline in systemic corticosteroid dependence alongside sustained symptom improvement, thereby suggesting its potential as a novel alternative [71]. Other studies support the efficacy of Tezepelumab, stating that significant improvements occur across all patient-reported outcomes [72]. Tezepelumab maintains a manageable safety profile characterized primarily by mild respiratory infections, nasopharyngitis, epistaxis, and headaches, while significantly reducing both the incidence of asthma exacerbations and the worsening of chronic rhinosinusitis compared to placebo[71-72].

Current guidance recommends reserving biologic therapy for patients with severe uncontrolled CRSwNP, typically after the failure of appropriate medical treatment and prior sinus surgery. These recommendations emphasize careful patient selection based on disease

severity, a history of surgical intervention, evidence of type 2 inflammation, the need for systemic corticosteroids, impaired quality of life, olfactory dysfunction, and the presence of comorbid asthma [3, 74]. Thus, biologic therapy is not considered a first-line treatment, but rather a step-up strategy for selected patients with a persistent disease burden [3, 9-10, 74].

High costs and the necessity for regular clinical monitoring remain significant barriers to the widespread adoption of biologics as a primary treatment. Generally, biologic agents are less cost-effective than ESS, as they often require long-term administration. Nevertheless, expanded use, particularly among non-surgical candidates, may drive cost reductions in the near future [75-77]. Consequently, authors emphasize the necessity of individualized decision-making, integrating key biomarkers, asthma control, patient age, and the practical aspects of treatment convenience [8, 76, 78].

Patient Selection and Clinical Decision Making

The choice of the optimal treatment in patients with CRSwNP should be guided not only by symptom severity, but also by disease burden, inflammatory phenotype, comorbidities, and response to previous therapy. CRSwNP is a heterogeneous condition, and therefore the same therapeutic strategy does not provide equal benefit for all patients. For this reason, individualized management is extremely important. Treatment should integrate a comprehensive symptom assessment—incorporating tools such as the Sino-Nasal Outcome Test-22 (SNOT-22), alongside endoscopic findings, CT results, the frequency of oral corticosteroid use, and the overall impact on quality of life. Patients with higher SNOT-22 scores are reported to have a greater disease burden, and thus may require more advanced therapeutic approaches, including biologic treatment or surgical intervention. Regular assessment using SNOT-22 allows for the objective monitoring of treatment response and supports more precise, personalized clinical decision-making [79-80].

Patients with Mild Symptoms

In patients with mild symptoms and no major sinonasal obstruction, first-line treatment consists of saline irrigation and INCS [4, 81-82]. This approach is most appropriate when symptoms are well-controlled, exacerbations are infrequent, and nasal polyps do not cause significant obstruction or pronounced olfactory impairment. In such cases, surgical intervention and biologic therapy are usually not indicated, provided that adequate disease control is maintained [3, 8, 83]. Regular follow-up is essential, as CRSwNP is a persistent condition characterized by a tendency toward relapse and progression over time [8-9, 84].

Patients Suitable for Endoscopic Sinus Surgery

ESS is particularly useful in patients with marked mechanical obstruction, a high symptom burden, and a failure of previous appropriate medical therapy. Surgery should be considered when persistent nasal blockage, recurrent exacerbations, significant olfactory dysfunction, or extensive disease on imaging remain despite adequate topical treatment [6-7]. The goal of surgery is not only to remove obstruction, but also to restore sinus ventilation and improve the effectiveness of subsequent topical therapy. The best surgical candidates are patients with a high burden of disease who do not yet require biologic therapy as their primary strategy [85-86].

Patients suitable for biologic therapy

Biologic therapy should be considered in patients with severe, uncontrolled CRSwNP, particularly following the failure of conventional treatment and typically after prior sinus surgery [3, 9]. According to current consensus statements, appropriate candidates typically have bilateral nasal polyps, persistent symptoms despite intranasal corticosteroid therapy, a frequent need for systemic corticosteroids, impaired quality of life, olfactory dysfunction, and evidence of type 2 inflammation, especially in the presence of comorbid asthma or N-ERD [3, 74]. Consequently, biologic agents are most appropriately used in patients with confirmed type 2 inflammation, recurrent disease after surgery, or contraindications to surgery. Treatment response should be evaluated after several months to determine whether therapy should be continued, modified, or discontinued [3, 9-10, 74].

Table 2. Proposed treatment indications for CRSwNP based on disease severity and clinical profile

Patient Group	Key Selection Criteria	Recommended Therapy	Monitoring/ Biomarkers	References
Mild Symptoms	• SNOT-22 <30 • No obstruction • Rare exacerbations • Minimal HRQoL impact	Saline irrigation + INCS	Endoscopy every 3-6 months Eosinophils <150/ μ l	[3-4, 8-9, 81-83]
Surgery Candidates	• Persistent obstruction • Conventional treatment failure • Extensive CT changes	ESS + postoperative INCS	CT/endoscopy at 3 months Polyp recurrence	[6-7, 85-86]
Biologics Candidates	• Post-ESS or OCS ≥ 2x/yr • Total IgE ≥ 100 • SNOT-22 >40 despite therapy • Bilateral polyps • Type 2: eosinophils $\geq 150/\mu$l, high IgE, asthma/N-ERD	Biologics	At 16-24 weeks: ↓SNOT-22 ≥ 12 pts, ↓polyp score ≥ 1 , ↓OCS use	[3, 9-10, 74]

Discussion

CRSwNP presents a formidable challenge in otolaryngology due to its high rate of recurrence and persistent nature [23-25]. With an estimated global prevalence ranging up to 4% [14-16], the disease reaches its peak incidence typically among middle-aged adults [15, 18-21].

The diagnosis of CRSwNP is based on the presence of persistent sinonasal symptoms lasting longer than 12 weeks, accompanied by objective evidence of sinonasal inflammation [25]. Diagnosis requires the presence of at least two key symptoms typical of CRS, including nasal congestion, rhinorrhea, anosmia or hyposmia [23-24]. In addition, objective evidence of mucosal disease, such as polyps, sinuses, mucopurulent discharge, edema, or mucosal obstruction within the ostiomeatal complex must be confirmed by endoscopy or CT [26]. While CRSwNP is immunologically heterogeneous, it is most frequently driven by a type 2 inflammatory endotype [25]. This clinical profile is associated with a high burden of other type 2 inflammatory diseases, including asthma and AERD [35]. CRSwNP symptoms may significantly impair the patient's quality of life [23, 25]. Consequently, evaluating mental health and psychological status is essential for a comprehensive understanding of the total disease burden.

Patients with CRSwNP should initially be managed with conventional, less invasive pharmacologic therapy, including saline irrigation and intranasal corticosteroids, before escalation to endoscopic sinus surgery or biologic treatment in cases of inadequate disease control [3-4, 6]. The evidence regarding antibiotics remains inconsistent. While some studies suggest a potential benefit in selected patients, overall data are limited and do not support routine long-term use [25, 44, 62].

ESS is an effective option for patients with persistent symptoms and obstructive disease despite maximal medical therapy, but its impact on long-term clinically meaningful outcomes remains variable, and recurrence is common. Therefore, postoperative topical treatment and close follow-up are essential, particularly in patients with asthma, AERD, or other features associated with recurrence [6, 63-64, 66-68].

Biologic therapy has expanded treatment options for severe, uncontrolled CRSwNP, especially in patients with type 2 inflammation and relevant comorbidities. Although biologics improve symptoms, polyp burden, and olfactory function, there is still no universal consensus on the single most effective agent, and treatment selection should be individualized according to disease severity, prior surgery, biomarkers, comorbid asthma, and cost-effectiveness [10-11, 69-70].

For individualized treatment decisions, particular emphasis is placed on the disease severity, inflammatory phenotype, and comorbidities.

Conclusion

CRSwNP remains a challenging type 2 inflammatory condition with a substantial impact on quality of life, driven by a heterogeneous pathophysiology and frequent comorbidities. Stepwise management from saline irrigation and INCS to ESS and biologics may offer effective control when tailored to disease severity, prior treatment response, and inflammatory phenotype.

While biologics have transformed the management of severe, refractory cases by reducing polyp burden and improving olfaction, their widespread utility is currently constrained by high costs and the necessity for rigorous monitoring. Consequently, future research must prioritize head-to-head biologic trials, predictive phenotyping, and long-term cost-effectiveness data. Such advancements, coupled with early multidisciplinary intervention, are essential to refining clinical guidelines and alleviating the global burden of CRSwNP.

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Conflict of Interest

The authors declare no conflict of interest.

List of Abbreviations

ADRs (Adverse Drug Reactions), **AERD** (Aspirin-Exacerbated Respiratory Disease), **CRS** (Chronic Rhinosinusitis), **CRSsNP** (Chronic Rhinosinusitis without Nasal Polyps), **CRSwNP** (Chronic Rhinosinusitis with Nasal Polyps), **EUFOREA 2023** (European Forum for Research and Education in Allergy and Airways Diseases 2023), **EPOS 2020** (European Position Paper on Rhinosinusitis and Nasal Polyps 2020), **ESS** (Endoscopic Sinus Surgery), **HRQoL** (Health Related Quality of Life), **INCS** (Intranasal Corticosteroids), **MCID** (Minimal Clinically Important Difference), **N-ERD** (NSAID-Exacerbated Respiratory Disease), **OCS** (Oral Corticosteroids), **SNOT-22** (Sino-Nasal Outcome Test-22)

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