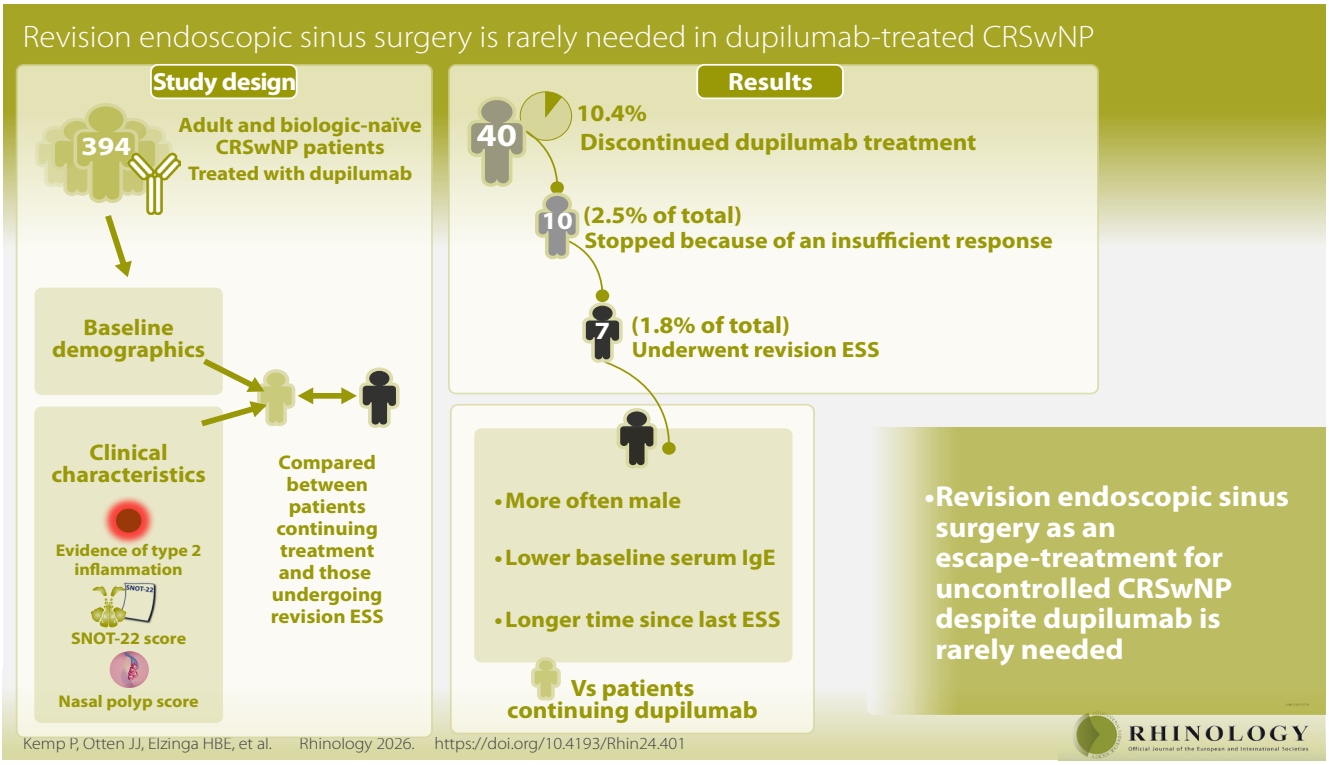
Revision endoscopic sinus surgery is rarely needed in dupilumab-treated chronic rhinosinusitis with nasal polyps

Pieter Kemp[1], Josje J. Otten[1], Hester B. E. Elzinga[1], Rik J.L. van der Lans[1], Gwijde F.J.P.M. Adriaensen[1], Linda B.L. Benoist[1], Marjolein E. Cornet[2], Rienk Hoven[1], Bas Rinia[3], Wytske J. Fokkens[1], Sietze Reitsma[1]

Rhinology 64: 3, 0 - 0, 2026
https://doi.org/10.4193/Rhin24.419



Abstract

Background: This study was set out to investigate the incidence of revision endoscopic sinus surgery (ESS) in patients treated with dupilumab for chronic rhinosinusitis with nasal polyps (CRSwNP). Furthermore, clinical course and outcome of surgery of these patients was described.

Methods: A prospective observational cohort study of adult and biological-naïve patients with CRSwNP treated with dupilumab as per EPOS2020 indication criteria (at least one previous ESS) was undertaken. Patients that had ESS due to an insufficient response to dupilumab were compared to those still on treatment. Baseline demographics and clinical characteristics (such as evidence of type 2 inflammation, SNOT-22 score, and nasal polyp score) were compared between the two groups. Furthermore, clinical measurements at indication of surgery, type of surgery and clinical outcomes are described.

Results: Discontinuation of dupilumab treatment occurred in 41 out of 394 (10.4%) patients, of whom 10 (2.5%) stopped because of an insufficient response. Seven of these patients (1.8% of total) underwent revision ESS. The patients that needed revision surgery for uncontrolled CRSwNP were significantly more often male, had lower baseline serum IgE and longer time since the last ESS compared to those still on dupilumab. Despite revision ESS, disease control postoperatively was insufficient in all but two patients.

Conclusions: Revision endoscopic sinus surgery as an escape-treatment for uncontrolled CRSwNP despite dupilumab is rarely needed. The disappointing results of revision ESS for patients with uncontrolled CRSwNP who failed dupilumab calls for new treatments for this limited group.

Key words: chronic rhinosinusitis, dupilumab, endoscopic sinus surgery, biological therapy, nasal polyps

Introduction

Primary diffuse chronic rhinosinusitis is a heterogeneous inflammatory disease of the nose and paranasal sinuses that formerly was divided into phenotypes with nasal polyps (CRSwNP) and without (CRSsNP) based on the endoscopic appearance of nasal polyps. With the evolving knowledge about the pathophysiology, we now understand that the majority (approximately 85%) of primary diffuse chronic rhinosinusitis with nasal polyps in the Western world shows a type 2 endotype [1, 2]. It is strongly related to other T2-inflammation-driven diseases, such as (late-onset) asthma and Non-Steroidal Anti-Inflammatory Drug (NSAID)-Exacerbated Respiratory Disease (N-ERD).
CRSwNP has an estimated prevalence of 0.5-4% and leads to a substantial negative impact on patients individually and a burden on society [3-7].

Disease control is pursued by a sequential and escalating approach depending on disease severity that includes appropriate medical therapy (nasal rinsing, intranasal corticosteroids), short courses of oral corticosteroids and/or endoscopic sinus surgery (ESS). Surgery is generally considered to be safe and efficacious with revision percentages around 15% [8-10]. Despite optimal care, a small portion of CRSwNP patients develops severe and uncontrolled disease [11]. Since 2019, biological add-on therapy is available to treat these patients in many parts of the world [11]. At the moment, three biologics are available in most countries: dupilumab (anti-IL-4rα, blocking IL-4 and IL-13) [12-16], mepolizumab (blocking IL-5) [17, 18] and omalizumab (blocking IgE) [19, 20]. However, in a number of countries one or even all three biologics remain without reimbursement. All three biologicals have shown to reduce the need for repeated sinus surgery in their respective phase 3 trials. Moreover, dupilumab has shown to be efficacious regardless of the number of prior sinus surgeries [21].

Biological add-on therapy has shown to significantly reduce the need for repeated sinus surgery; however, little is known about the patients that fail biologic therapy and are still in need for surgery, especially in the real world. We therefore set out to investigate the incidence of revision sinus surgery in CRSwNP patients treated with dupilumab with special emphasis on their characteristics, the clinical course, the extent and outcome of these procedures.

Materials and methods

Study population

Our findings are reported from a prospective observational real-world cohort on CRSwNP patients treated with dupilumab. Eligible patients were adult (≥ 18 years) with severe CRSwNP with an indication for biological treatment per the EPOS2020 biological criteria [1]. This implies previous endoscopic sinus surgery (with at least an ethmoidectomy) unless there is a contra-indication for ESS (3 patients). The data from this cohort is collected in PolyREG, a multicenter registry for CRSwNP patients on biologicals in the Netherlands [12, 22]. Assessment of the institutional Medical Ethical Review Committee of the PolyREG registry deemed it not to be subject to the Dutch Medical Research Involving Human Subjects Act (MREC ID: W21_030#21.034). All patients consented to data collection and use in line with the GDPR.

Study design and outcomes

Patients treated with dupilumab as the first biological between December 2019 and November 2023 were selected. All patients that discontinued treatment were identified. Patients that discontinued treatment because of an insufficient response to dupilumab were split into those that underwent revision ESS and those that did not. The EPOS-EUFOREA2023 response criteria (five in total) were used to identify patients that had an insufficient response, meaning those fulfilling 0 criteria (no response) or 1-2 criteria (poor response) [23]. Patients needing surgery for other reasons, such as mucoceles, were excluded.
Baseline demographics and clinical characteristics (Table 1) of the patients that underwent revision ESS due to an insufficient response were compared to patients that continued dupilumab treatment.

Clinical measurement were collected from the patients that underwent revision ESS at start of treatment and at the time of indication of surgery, consisting of gender, age at start of therapy, percentage of patients that has evidence of type II inflammation (blood eosinophils ($\times 10^9$/L) ≥0.15, total serum IgE (kU/L) ≥100 or tissue eosinophils≥10 hpf), 22-item SinoNasal Outcome Test (SNOT-22) score, bilateral nasal polyp score (0-4 per side, 0-8 in total), Sniffin' Sticks-12 identification test (SSIT) and the Asthma Control Test (ACT: five items with 1–5 Likert type scale, total score 5–25 with higher being better and >19 indicating well-controlled asthma). Furthermore, type of surgery, current (biological) treatment and physician-rated control (not at all / a little / somewhat / very / completely) after surgery was reported. The reason for surgery was described in those patients that were excluded from the analysis due to other causes than failing dupilumab therapy.

Statistical analysis

Non-parametric testing was performed because not all groups had normally distributed data (and because of small group sizes for the surgical group). The Mann-Whitney U test was used for groupwise comparisons. Fisher's exact test was used for proportion characteristics (gender, asthma, N-ERD, type 2 inflammation and ACT.) Data are presented as medians with interquartile range (IQR), unless otherwise specified. All data was analyzed using SPSS Statistics version 28.0.

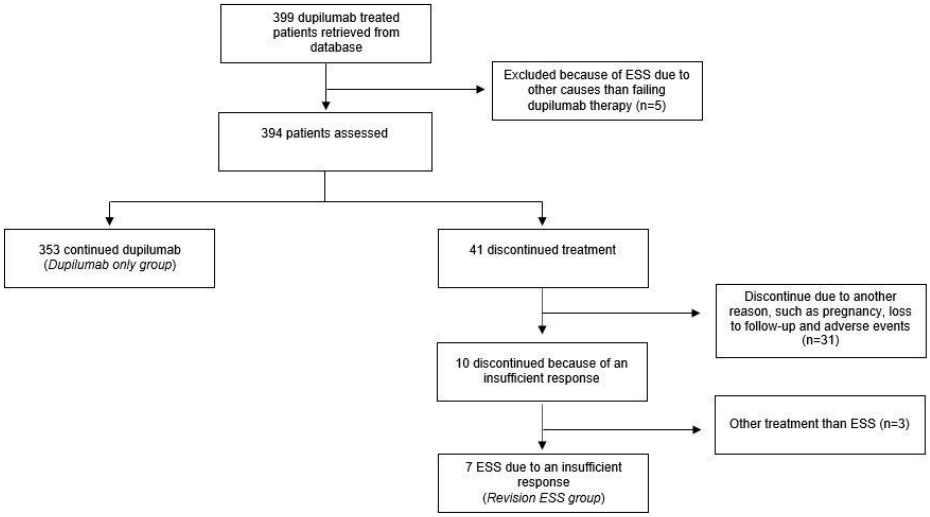


Figure 1. Flowchart of patient selection and definition of the study groups: 'Dupilumab only' and 'Revision ESS'. ESS: endoscopic sinus surgery.

Results

In total, 399 patients treated with dupilumab were retrieved from the database. Median treatment duration with dupilumab was 19.9 (8.0-30.7) months and median time since previous ESS 3.7 (1.6-7.1) years. Five patients were excluded from the analysis because of needing ESS due to other causes than failing dupilumab therapy (see below). Discontinuation of treatment occurred in 41 (10.4%) patients, of which 10 (2.5%) stopped because of an insufficient response and 31 (7.8%) due to another reason (such as lost to follow-up, adverse events and pregnancy; Figure 1).

Three patients (0.8%) with an insufficient response did not receive revision ESS. One patient was not motivated for any treatment beside appropriate medical therapy, one patient was sufficiently controlled with maintenance therapy with cotrimoxazole 960 mg/day and one patient preferred switching to mepolizumab (just started). Seven patients (1.8%) had surgery due to uncontrolled CRSwNP despite dupilumab treatment. Baseline demographics and clinical characteristics of these patients (revision ESS group) are reported in Table 1 and compared to the patients that continued dupilumab treatment (dupilumab only group). The patients in the revision ESS group were all male (100%), which significantly differed from the patients on dupilumab only (63%). Furthermore, total IgE levels (revision ESS: 64.4 (7.2-148.3) kU/L versus dupilumab only: 172.0 (92.8-362.0) kU/L) and time since most recent ESS in years (revision ESS: 9.6 (5.9-14.0) versus dupilumab only 3.7 (1.6-6.7)) differed significantly.

The individual clinical measurements at baseline and at indication of surgery, the type of surgery, and the clinical course of the patients that had revision ESS due to an insufficient response are listed in Table 2. The duration of biological treatment before surgery differed considerably between the patients with a range of 5 to 22 months. The bilateral nasal polyp score was stable or worsened in all patients during dupilumab treatment and the ACT test did not improve notably. The SNOT-22 score improved in three patients but still indicated moderate to severe disease. Five patients underwent a "Full FESS" of which one was combined with a Draf III. One patient underwent a Draf III solely and one a bilateral Draf IIA and sphenoidotomy. Level of disease control after ESS was insufficient in all but two patients.

Four patients started again with a biological directly after ESS (two on dupilumab and two on mepolizumab). Three of these four patients remained uncontrolled despite this intense treatment. Two patients were not motivated to be treated with biologics after surgery. One uses appropriate medical therapy (rinsing and intranasal corticosteroids) and is insufficiently controlled, and one is lost to follow-up.
One patient did not have clear evidence of type 2 inflammation (Table 2, #1; blood eosinophils 0.11 $\times 10^9$/L, total IgE 6.4 kU/L and tissue eosinophils were unknown). He did not receive oral corticosteroids shortly before the baseline measurements. In this patient, after 6 months only the SNOT-22 score improved slightly and an indication for surgery was made. The (current) disease control is very well with maintenance therapy with cotrimoxazole 960 mg/day.

Five patients (1.3%) were excluded from the analysis because of surgery due to other causes than uncontrolled CRSwNP, consisting of two patients with a mucocele for which marsupialization was performed. One patient was already planned for surgery before starting dupilumab and was operated within 3 months. One patient presented with a severe persisting headache, nasal endoscopy showed a narrow frontal recess bilaterally with scar tissue and CT-sinus partially opacified frontal sinuses for which a

Table 1. Baseline demographics and clinical characteristics of patients.

		Patient groups based on surgery during treatment		
		Dupilumab only, N= 353	Revision ESS ,N= 7	P-value
Age at start of therapy (year)	Median (IQR)	52 (42-61)	56 (45-58)	0.72
Male	N (%)	166 (63%)	7 (100%)	0.05
Nasal polyp surgery ≥1 ≥2 ≥3 ≥4 ≥5	Median (IQR) N (%)	2 (1-3) 339 (99.1%) 241 (70.5%) 145 (42.4%) 82 (24.0%) 56 (16.4%)	3 (2-3) 7 (100%) 7 (100%) 4 (57.1%) 1 (14.3%) 1 (14.3%)	0.30
Time since most recent ESS (year)	Median (IQR)	3.7 (1.6-6.7)	9.6 (5.9-14.0)	0.05
Asthma	N (%)	269 (77%)	3 (42,9%)	0.06
N-ERD	N (%)	112 (34%)	1 (14.3%)	0.43
Type 2 inflammation	N (%)	334 (99.7%)	6 (85.7%)	1.00
Patients with ACT > 19 *	N (%)	174 (64%)	2 (67%)	0.56
SNOT-22 score (0-110)	Median (IQR)	54 (39-66)	46 (32-73.5)	0.72
Smell test score †	Median (IQR)	3 (2-5)	3 (2-4)	0.73
PNIF (0–350 L/min)	Median (IQR)	100 (70-130)	140 (87.5-192.5)	0.08
Bilateral nasal polyp score (0-8)	Median (IQR)	6 (4-6)	6 (4-8)	0.85
Modified LK score (0–20)	Median (IQR)	9 (7-10)	10 (7.5-12)	0.44
Blood eosinophils ($\times 10^9$/L)	Median (IQR)	0.51 (0.36-0.77)	0.46 (0.27-0.60)	0.16
Total IgE (kU/L)	Median (IQR)	172.0 (92.8-362.0)	64.4 (7.2-148.3)	0.02
Lund-Mackay CT total score (0–24)	Median (IQR)	20 (16-22)	20 (12-23)	0.84

*Asthma control test, percentage of well controlled patients (cut off value >19). † Sniffin' Sticks identification test (score ranging from 0-12; 0-6 indicates anosmia, 7-10 hyposmia, and 11-12 normosmia). Abbreviations: ESS: endoscopic sinus surgery. IQR: interquartile range. N-ERD: Non-Steroidal Anti-Inflammatory Drugs Exacerbated Disease. SNOT-22: 22-item SinoNasal Outcome Test. PNIF: Peak Nasal Inspiratory Flow. Modified LK-score: modified Lund-Kennedy score.

bilateral Draf IIA was carried out. Post-operatively his headache persisted even though his frontal sinuses were functional and open. In one patient, a clinical suspicion for a sinonasal malignancy indeed proved a high grade differentiated liposarcoma of the left maxillary sinus on surgical biopsies.

Discussion

This prospective observational real-world cohort study shows that revision sinus surgery for CRSwNP patients on dupilumab is rarely needed (1.8% of cases). Patients that had ESS due to an insufficient response (revision ESS group) were significantly more often male, had lower baseline serum IgE and a longer time since the last ESS compared to those that continued treatment with dupilumab (dupilumab only group). However, we are not sure whether these characteristics would be the same when a much larger group is evaluated. Unfortunately, revision ESS did not bring the warranted disease control in most patients with an insufficient response to dupilumab.

For non-responders, there are currently no guidelines on how to handle poor control of sinonasal symptoms. Generally, revision ESS or a shift to another biologic is considered after 6 months of treatment [24, 25]. Switching from omalizumab to dupilumab is generally efficient and safe [26]. However, data on switching from dupilumab to another biological is limited and results have mostly been poor, with 70% of the patients switching to an anti-IL-5 being uncontrolled [27]. Standardization of inclusion criteria and outcomes is necessary in future trials, so that data of this small and difficult to treat patient group can be combined to provide evidence and guidance for practicing clinicians [28]. In this cohort, a choice for revision ESS was made in most patients with an insufficient response to dupilumab. Clinical factors influencing this decision were well-controlled coexisting type 2 disease (such as asthma), no contraindication for surgery, and the limited and generally poor results of switching from dupilumab to another biological.

All patients with an insufficient response to dupilumab that underwent ESS within 12 months had a poor response after 6 months according to the EUFOREA/EPOS criteria on biologic

Table 2. Characteristics and outcomes of patients needing revision ESS due to an insufficient response.

N=7	Characteristics at baseline								Characteristics at moment of indication of surgery					
	Gender	Age at start of therapy	SNOT-22	Bilateral nasal polyp score (0-8)	Smell test ^	ACT	Blood eosinophils ($\times 10^9$/L)	Total serum IgE (kU/L)	Duration of dupilumab (months)	SNOT-22	Bilateral nasal polyp score (0-8)	Smell test	ACT	Need for OCS/AB
1	Male	57	34	4	4	15	0.11	6.4	6	26	4	3	17	-
2	Male	56	43	6	3	23	0.53	116	22*	44	6	3	22	Maintenance prednisone * Long-term azithromycin
3	Male	23	N/A	8	4	No asthma	0.67	99.7	5	N/A	8	1	No asthma	-
4	Male	54	28	4	1	No asthma	0.46	7.4	12	N/A	6	3	No asthma	1 short course of OCS 2 short courses of AB
5	Male	58	70	8	2	No asthma	0.60	245	15	39	8	1	No asthma	-
6	Male	45	49	6	2	No asthma	0.27	29.1	6	43	8	1	No asthma	-
7	Male	71	84	2	3	24	0.27	N/A	9	N/A	2	7	22	-

N=7	Type of surgery and clinical course		
	Type of surgery	Current disease control	Current treatment
1	Full FESS ‡	Very	Maintenance therapy with cotrimoxazole
2	Draf III	A little	On dupilumab Q2W
3	Full FESS ‡	N/A †	N/A †
4	Full FESS ‡ with sphenoidotomy	Somewhat	On mepolizumab Q4W
5	Full FESS ‡ with Draf III	A little	On mepolizumab Q4W
6	Full FESS ‡	Somewhat	Appropriate medical therapy
7	Bilateral Draf IIA and sphenoidotomy	Completely	On dupilumab Q4W

* The patient received maintenance prednisone because of rheumatoid arthritis (which was stopped 8 months before surgery). A switch to mepolizumab was made before surgery for 8 weeks, which further exacerbated his symptoms. Long-term azithromycin had insufficient effect. ^ Sniffin' Sticks identification test (score ranging from 0-12; 0-6 indicates anosmia, 7-10 hyposmia, and 11-12 normosmia). † data not available because of loss-to-follow-up. ‡ Full FESS consisting of bilateral infundibulotomy, anterior and posterior ethmoidectomy, and Draf IIa. Abbreviations: ESS: endoscopic sinus surgery. SNOT-22: 22-item SinoNasal Outcome Test. IgE: immunoglobulin E. QxW: treatment with dupilumab 300mg every x weeks. OCS: oral corticosteroids. AB: antibiotics. N/A: not available. ACT: Asthma control test, total score 5–25 with higher being better and >19 indicating well-controlled asthma.

treatment [25]. One patient (Table 2, #1), had a low SNOT-22 score of 26 but still underwent revision ESS. This clinical decision was made because he was mostly bothered by his persisting anosmia and post-nasal drip and there was no improvement in nasal polyps and purulence objectified in the middle meatus. Furthermore, there was no clear evidence of type 2 inflammation and CT-sinus showed incomplete previous sinus surgery.

The other available SNOT-22 scores were 39, 43 and 44. Scores over 40 are generally accepted to reflect severe disease and are used as indication criterion for biologic therapy as such. One other patient had a large reduction in the SNOT-22 score compared to baseline (baseline: 73, after fifteen months of treatment: 39), but despite this he still had anosmia and a persisting maximum NPS of 8/8 (no asthma), again suggesting a poor treatment response. These results indicate that looking at SNOT-22 scores alone might be somewhat oversimplifying the situation in daily clinical practice. One patient (Table 2, #7) had a low nasal polyp score (2) at indication of surgery. One might argue that a valid alternative would have been to continue dupilumab only and wait longer for a more pronounced treatment response. This is

also suggested by the fact that after surgery, the patient is now well-controlled and still using dupilumab at a slightly tapered dose. However, the NPS did not change from baseline and smell recovery was only partial with SSIT-12 scores changing from 3/12 (anosmia) to 7/12 (hyposmia) only. Furthermore, CT-sinus showed persistent bilateral opacification of the frontal sinus and the right sphenoid sinus.

Little is known about the patients with uncontrolled type 2 CRSwNP that are unresponsive to dupilumab. Currently, there is no suitable biomarker for dupilumab efficacy in CRSwNP. Post-hoc analyses of the SINUS trials found similar improvements of dupilumab irrespective of blood eosinophil levels but greater improvements in objective outcomes of CRSwNP in patients with a shorter duration since last sinus surgery [21]. Our current study also suggests this difference in time since last sinus surgery between patients with an adequate and an insufficient response. However, 14.7 % of patients of the dupilumab only group had a longer time since ESS then the median time of the revision ESS group (9.6 years). This implies that most patients with a long time since their last ESS still respond well to dupilumab. Therefore, upfront surgery seems to be unnecessary in most patients with a long time since their last ESS. Six out of seven patients that had surgery because of uncontrolled CRSwNP had high tissue or blood eosinophil levels, and high serum IgE levels. However, whether these high levels fully represent the type 2 endotype and predict the treatment outcome of biologics remains understudied [29]. Our study showed a lower baseline serum IgE for the patients that had ESS because of an insufficient response (revision ESS group), but larger numbers are needed to interpret whether this finding has clinical relevance.

This study shows the minimal percentage of insufficient responders to dupilumab treatment needing revision surgery (1.8%) in a real-life setting. This percentage is comparable to the results reported in the phase 3 dupilumab (1.1%) but better than the data from the phase 3 mepolizumab (13.9%) trial. This is important information to discuss with patients when considering biologics treatment. The differences found in this study between patients on dupilumab only and those that had revision ESS due to an insufficient response (male, lower baseline serum IgE and a longer time since the last ESS) have not been evaluated in earlier studies. Due to the small number of patients in our revision ESS group, we would interpret these data with care and wait for other studies to corroborate our findings. Our cohort may be different from those in other countries. For example, our asthma rate is much higher compared to other large dupilumab cohorts [15, 30]. However, our results of dupilumab treatment are very comparable to those cohorts.
This study indicates that revision surgery in these patients usually does not lead to significant improvement in QOL and other clinical parameters. This finding is an important warning that needs to be discussed with the patient before deciding on revision surgery when dupilumab fails.

Conclusion

This study demonstrates that revision ESS is rarely needed as an escape treatment because of an insufficient therapeutic response. The disappointing results for patients who failed dupilumab and received revision ESS calls for new treatments for this limited group.

Author contributions

PK: writing – original draft; data curation; formal analysis; visualization. JO, HE, RL, GA, LB, MC, DH, BR: resources; writing – review & editing. SR & WF: conceptualization; methodology; resources; supervision; writing – review & editing.

Acknowledgments

The authors would like to thank Y. te Winkel and I.M. Bruins for their assistance in organization and data collection.

Conflict of interest

JO has acted as a speaker for Sanofi. RL has acted as a consultant and/or advisory board member for GSK. MC has acted as a consultant and/or advisory board member for Sanofi, ALK, Mylan, and Medtronic. BR has acted as a consultant and/or advisory board member for Sanofi. WJF has acted as a consultant and/or advisory board member and/or gave lectures for Sanofi, GSK, and Dianosic. SR has acted as a consultant and/or advisory board member for Sanofi, GSK, and Novartis. The department of otorhinolaryngology and head/neck surgery of the Amsterdam UMC has received research funding from Sanofi, GSK, and Novartis. The department of otorhinolaryngology of the Alrijne Hospital has received research funding from GSK. PK, HE, GA, LB, and RH have no (further) conflict of interest to disclose.

Funding

The authors received no funding for this work.

References

1. Fokkens WJ, Lund VJ, Hopkins C, et al. European Position Paper on Rhinosinusitis and Nasal Polyps 2020. Rhinology. 2020;58(Suppl S29):1-464.
2. Stevens WW, Peters AT, Tan BK, et al. Associations between inflammatory endotypes and clinical presentations in chronic rhinosinusitis. J Allergy Clin Immunol Pract. 2019;7(8):2812-2820.e3.
3. Hirsch AG, Nordberg C, Bandeen-Roche K, et al. Radiologic sinus inflammation and symptoms of chronic rhinosinusitis in a population-based sample. Allergy. 2020;75(4):911-20.

4. Dietz de Loos D, Lourijsen ES, Wildeman MAM, et al. Prevalence of chronic rhinosinusitis in the general population based on sinus radiology and symptomatology. J Allergy Clin Immunol. 2019;143(3):1207-14.
5. Khan A, Huynh TMT, Vandeplas G, et al. The GALEN rhinosinusitis cohort: chronic rhinosinusitis with nasal polyps affects health-related quality of life. Rhinology. 2019;57(5):343-51.
6. Lourijsen ES, Fokkens WJ, Reitsma S. Direct and indirect costs of adult patients with chronic rhinosinusitis with nasal polyps. Rhinology. 2020;58(3):213-7.
7. Sanchez-Collado I, Mora T, Munoz-Cano R, Ribo P, Mullol J, Valero A. Prevalence of chronic rhinosinusitis with nasal polyps in Catalonia (Spain): a retrospective, large-scale population-based study. Rhinology. 2022;60(5):384-96.
8. Lourijsen ES, Reitsma S, Vleming M, et al. Endoscopic sinus surgery with medical therapy versus medical therapy for chronic rhinosinusitis with nasal polyps: a multicentre, randomised, controlled trial. Lancet Respir Med. 2022;10(4):337-46.
9. Hopkins C, Browne JP, Slack R, et al. The national comparative audit of surgery for nasal polyposis and chronic rhinosinusitis. Clin Otolaryngol. 2006;31(5):390-8.
10. Arancibia C, Langdon C, Mullol J, Alobid I. Twelve-year long-term postoperative outcomes in patients with chronic rhinosinusitis with nasal polyps. Rhinology. 2022;60(4):261-9.
11. Bachert C, Han JK, Wagenmann M, et al. EUFOREA expert board meeting on uncontrolled severe chronic rhinosinusitis with nasal polyps (CRSwNP) and biologics: Definitions and management. J Allergy Clin Immunol. 2021;147(1):29-36.
12. van der Lans RJL, Otten JJ, Adriaensen G, et al. Two-year results of tapered dupilumab for CRSwNP demonstrates enduring efficacy established in the first 6 months. Allergy. 2023;78(10):2684-97.
13. Boscke R, Heidemann M, Bruchhage KL. Dupilumab for chronic rhinosinusitis with nasal polyps: real-life retrospective 12-month effectiveness data. Rhinology. 2023;61(3):203-13.
14. Kiricsi A, Bella Z, Kraxner H, et al. Real-life effectiveness of dupilumab in chronic rhinosinusitis with nasal polyps. Results from eight Hungarian centres with 12-month follow-up. Rhinology. 2024;62(4):410-420.
15. De Corso E, Pasquini E, Trimarchi M, et al. Dupilumab in the treatment of severe uncontrolled chronic rhinosinusitis with nasal polyps (CRSwNP): a multicentric observational Phase IV real-life study (DUPIREAL). Allergy. 2023;78(10):2669-83.
16. Bachert C, Han JK, Desrosiers M, et al. Efficacy and safety of dupilumab in patients with severe chronic rhinosinusitis with nasal polyps (LIBERTY NP SINUS-24 and LIBERTY NP SINUS-52): results from two multicentre, randomised, double-blind, placebo-controlled, parallel-group phase 3 trials. Lancet. 2019;394(10209):1638-50.
17. Hopkins C, Han JK, Lund VJ, et al. Evaluating treatment response to mepolizumab in patients with severe CRSwNP. Rhinology. 2023;61(2):108-17.
18. Mullol J, Lund VJ, Wagenmann M, et al. Mepolizumab improves sense of smell in severe chronic rhinosinusitis with nasal polyps: SYNAPSE. Rhinology. 2024;62(3):320-9.
19. Gevaert P, Saenz R, Corren J, et al. Long-term efficacy and safety of omalizumab for nasal polyposis in an open-label extension study. J Allergy Clin Immunol. 2022;149(3):957-65 e3.
20. Bidder T, Sahota J, Rennie C, Lund VJ, Robinson DS, Kariyawasam HH. Omalizumab treats chronic rhinosinusitis with nasal polyps and asthma together-a real life study. Rhinology. 2018;56(1):42-5.
21. Hopkins C, Wagenmann M, Bachert C, et al. Efficacy of dupilumab in patients with a history of prior sinus surgery for chronic rhinosinusitis with nasal polyps. Int Forum Allergy Rhinol. 2021;11(7):1087-101.
22. van der Lans RJL, Fokkens WJ, Adriaensen G, Hoven DR, Drubbel JJ, Reitsma S. Real-life observational cohort verifies high efficacy of dupilumab for chronic rhinosinusitis with nasal polyps. Allergy. 2022;77(2):670-4.
23. Fokkens WJ, Viskens AS, Backer V, et al. EPOS/EUFOREA update on indication and evaluation of biologics in chronic rhinosinusitis with nasal polyps 2023. Rhinology. 2023;61(3):194-202.
24. De Corso E, Settimi S, Montuori C, et al. How to manage recurrences after surgery in CRSwNP patients in the biologic era: a narrative review. Acta Otorhinolaryngol. 2023;43:S3-S13.
25. Fokkens WJ, De Corso E, Backer V, et al. EPOS2020/EUFOREA expert opinion on defining disease states and therapeutic goals in CRSwNP. Rhinology. 2024;62(3):287-98.
26. Brkic FF, Liu DT, Klimbacher R, et al. Efficacy and safety of switching between biologics in chronic rhinosinusitis with nasal polyps or N-ERD. Rhinology. 2023;61(4):320-327.
27. Otten J, van der Lans R, de Corso E, et al. Evaluation of switching or simultaneous use of biologic treatment in patients with severe chronic rhinosinusitis with nasal polyps and severe asthma. Considerations in clinical decision making. Expert Rev Clin Immu. 2023;19(8):1041-9.
28. Boechat JL, Sousa-Pinto B, Delgado L, Silva D. Biologicals in severe chronic rhinosinusitis with nasal polyps: translation to clinical practice while waiting for head-to-head studies. Rhinology. 2023;61(3):283-6.
29. Guo CL, Liu FF, Wang DY, Liu Z. Type 2 Biomarkers for the indication and response to biologics in CRSwNP. Curr Allergy Asthma Rep. 2023;23(12):703-13.
30. Galletti C, Ragusa M, Sireci F, et al. Dupilumab in chronic rhinosinusitis with nasal polyps: real life data in a multicentric Sicilian experience. Am J Otolaryngol. 2024;45(1):104106.

Pieter Kemp, MD
Amsterdam UMC
Department of Otorhinolaryngology
Head and Neck Surgery
ZH 1D 118
De Boelelaan 1117
1081 HV Amsterdam
The Netherlands

E-mail: p.kemp@amsterdamumc.nl

Pieter Kemp[1], Josje J. Otten[1], Hester B. E. Elzinga[1], Rik J.L. van der Lans[1], Gwijde F.J.P.M. Adriaensen[1], Linda B.L. Benoist[1], Marjolein E. Cornet[2], Rienk Hoven[1], Bas Rinia[3], Wytske J. Fokkens[1], Sietze Reitsma[1]

[1] University of Amsterdam, Department of Otorhinolaryngology, Head and Neck Surgery, Amsterdam, The Netherlands

[2] Department of Otorhinolaryngology, Alrijne Hospital, Leiden, The Netherlands

[3] Department of Otorhinolaryngology, Isala Hospital, Zwolle, The Netherlands

Rhinology 64: 3, 0 - 0, 2026

https://doi.org/10.4193/Rhin24.401

Received for publication:

September 18, 2024

Accepted: February 15, 2026

Associate Editor:

Michael Soyka