

Symptoms in Chronic Rhinosinusitis With and Without Nasal Polyps

Dirk A. E. Dietz de Loos, MD; Claire Hopkins, BMBCh, MD; Wytse J. Fokkens, MD, PhD

Objectives/Hypothesis: In this study we analyzed differences in symptoms scored between chronic rhinosinusitis patients with (CRSwNP) and without nasal polyps (CRSsNP). According to the European Position Paper on Rhinosinusitis and Nasal Polyps, CRSwNP and CRSsNP diagnoses are defined by clinical criteria supported with endoscopy. We wanted to know if it is possible to make an accurate distinction between patients with and without nasal polyps based on clinical impression.

Study Design: Retrospective case-control study.

Methods: We collected Rhinosinusitis Outcome Measure 31 (RSOM-31) questionnaires from chronic rhinosinusitis patients with and without nasal polyps and compared mean total RSOM-31 scores, mean domain scores, mean symptoms scores, and percentages of patients reporting symptoms per diagnosis based on endoscopy and computed tomography scan.

Results: RSOM-31 questionnaires were collected from 234 patients. Although the total RSOM-31 score was similar and symptomatology considerably overlapping, patients with CRSwNP scored significantly higher and more often on nasal symptoms such as "rhinorrhea" and "decreased sense of taste or smell." Patients with CRSsNP significantly scored more often and higher on "facial pain" and "ear pain."

Conclusions: Although there were significant differences in scores on several symptoms, there was considerable overlap of many symptoms, and it remains difficult to distinguish between CRSwNP and CRSsNP based on clinical impression alone.

Key Words: Chronic rhinosinusitis, nasal polyps, diagnosis, quality of life, symptom score.

Level of Evidence: 3b.

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INTRODUCTION

In the European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS),^{1,2} chronic rhinosinusitis (CRS) is defined as an inflammation of the nose and the paranasal sinuses characterized by two or more symptoms during more than 12 weeks, one of which should be either nasal blockage/obstruction/congestion or nasal discharge (anterior/posterior nasal drip), supplemented with facial pain/pressure and/or reduction or loss of smell, and either endoscopic signs of disease and/or computed tomography (CT) changes.

In recent years it has been shown that in the Western world, CRS with nasal polyps (CRSwNP) and CRS without nasal polyps (CRSsNP) have a different inflammatory pattern.³ CRSwNP is characterized by higher eosinophilia, immunoglobulin E (IgE), and interleukin 5 compared to CRSsNP, and patients with CRSwNP more

often have asthma than patients with CRSsNP.⁴ In the response to treatment there also seem to be differences. Patients with CRSwNP tend to react better to nasal and systemic corticosteroids,^{5,6} and the effect of local corticosteroids in CRSsNP is less prominent.⁷ There are some indications that in CRSsNP, especially in patients with low IgE, long-term therapy with macrolides is effective.⁸

It is the clinical impression of otorhinolaryngologists that patients with CRSwNP more often complain of nasal obstruction and loss of smell, and that patients with CRSsNP mainly complain of facial pain and rhinorrhea.^{9,10} As health-related quality-of-life questionnaires fulfill a substantial role in the diagnosis and evaluation of treatment of CRS, we wanted to analyze the difference in symptoms between patients with CRSwNP and patients with CRSsNP according to EPOS criteria. Additionally, we analyzed whether it is possible to make a distinction between patients with CRSwNP and patients with CRSsNP based on Rhinosinusitis Outcome Measure 31 (RSOM-31) symptom scores.

MATERIALS AND METHODS

Patients visiting our tertiary referral outpatient clinic were asked to fill in a standard set of questionnaires, including the RSOM-31. Additional presence of asthma, based on doctors' diagnosis, and aeroallergen sensitization based on IgE or skin prick test, were recorded. In this study we analyzed patients who visited our clinic for the first time with the diagnosis of CRS with or without nasal polyps, according to EPOS criteria. The presence of nasal polyps is defined as bilateral, endoscopically visualized, grape-like, pedunculated lesions in the middle meatus. Patients suffering from cystic fibrosis (CF), vasculitis, granulomatous disorders, immotile cilia dysfunction syndrome, neoplasia, and cocaine abuse were excluded.

From the Department of Otorhinolaryngology (D.A.E.D.D.L., W.J.F.), Academic Medical Centre, University of Amsterdam, Amsterdam, the Netherlands; and the Department of Otolaryngology (C.H.), Guy's Hospital, London, United Kingdom.

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Send correspondence to Dirk A. E. Dietz de Loos, MD, Department of Otorhinolaryngology, Academic Medical Centre, Meibergdreef 9, 1105 AZ Amsterdam, the Netherlands. E-mail: D.A.DietzdeLoos@amc.nl

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The patients with CRS were divided into two groups based on endoscopy: CRSwNP and CRSsNP. In case the diagnosis of CRS was doubtful, diagnosis was based on consensus by the AMC rhinologists, all of whom are experts in the field of sino-nasal disease, and based on endoscopy and CT scan. All patients included had abnormalities on CT scan and endoscopy, fulfilling the EPOS criteria for CRS.

Paranasal CT-scans were scored according to the Lund-Mackay scoring system (0–24).

Other Investigations

Inhalation allergy was determined based on either a positive skin prick test or detection of specific IgE in the blood, unless the referring specialist provided us with recent investigations on sensitization. Asthma diagnosis was based on doctor-diagnosed asthma. In case the patient was suspected of asthma, the patient was sent to the pulmonologist for confirmation of an asthma diagnosis.

The RSOM-31 is a 31-item rhinosinusitis-specific questionnaire that contains seven subscales: nasal, eye, sleep, ear, general, practical, and emotional. Patients score their symptoms on a six-item scale (0–5): 0, not present/no problem; 1, very mild problem; 2, mild or slight problem; 3, moderate problem; 4, severe problem; 5, problem is as bad as it can be. The maximum RSOM-31 score can be 155, domain scores are mean scores of the related symptom scores, and all symptoms contribute equally.

The items in the questionnaire reflect the full spectrum of physical problems, functional limitations, and emotional consequences of rhinosinusitis.¹¹ The RSOM-31 has been found to be one of the best quality-of-life questionnaires in CRS, based on the measurement goals, the discriminant validity, responsiveness, and the points obtained in the quality assessment.¹² Only fully completed questionnaires were included.

Statistical Analysis

Data were analyzed using Statistical Package for Social Sciences version 18.0 (IBM, Armonk, NY). Means, standard deviations (SD), mean differences, and 95% confidence intervals (95% CI) of the total RSOM-31 scores, the domain scores, and the individual RSOM-31 symptom scores for both groups were calculated and compared with *t* tests. Apart from analyzing the mean differences per item score, we dichotomized the answers into no/yes, based on a symptom score ≥ 2 (i.e., “mild or slight problem” and worse). Percentage of positive outcomes of the separate symptom scores in the two groups were compared using the χ^2 test with the corresponding odds ratio (OR) and 95% CI.

A *P* value $< .05$ was considered statistically significant. A Bonferroni correction was applied to correct for multiple testing, resulting in a *P* value considered statistically significant of $.05/31 = 0.0016$.

Additionally, we conducted a multivariable regression analysis to determine the best set of independent predictors for CRSwNP. Because there is no linear association between symptom severity and risk for CRSwNP, we dichotomized the RSOM-31 scores based on a symptom score ≥ 2 (i.e., “mild or slight problem” and worse).

First, we made a preselection of possible predictors by univariate regression analysis. Based on the total number of patients with nasal polyps ($n = 137$), we could examine about 13 possible predictors. Possible predictors with a Wald *P* value $< .10$ were included in a multivariable logistic regression analysis. To obtain a model for predicting individual risk for nasal polyps that can be used in daily practice, we applied a back-

TABLE I.
Patient Characteristics.

	CRSwNP, n = 137	CRSsNP, n = 97
Age, mean (SD), yr	44.8 (15)	42.9 (15)
Male, %	69	47
Smoking, %		
Current	15	24
Stopped	35	32
Never	50	43
Asthma, %	51	31
Patients tested for allergy, %	91	89
Aeroallergen sensitization, %	47	26
Patients with CT scan, %	100	99
Median LM score (range)*	18 (12–22)	5 (2–10)

*Lund-Mackay (LM) score (0–24).

CRSwNP = chronic rhinosinusitis with nasal polyps; CRSsNP = chronic rhinosinusitis without nasal polyps; SD = standard deviation; CT = computed tomography.

ward selection (significance level to stay in the model: $P \leq .05$ based on a likelihood ratio test ($P \leq .10$) and Nagelkerke R^2 to reduce the number of predictors.

The last remaining variables were double-checked for association with nasal polyps, based on the univariate Ln-odds and on Wald *P* value when running the model separately with every variable one by one.

RESULTS

In total, 234 patients (mean age, 44 years [SD 15]; 60% male) fulfilling the EPOS criteria for CRS were included, with 137 patients with CRSwNP. Characteristics are shown in Table I. Prevalence of asthma was more common in patients with CRSwNP (51%) than in patients with CRSsNP (31%), as was sensitization to aeroallergens: 47% in patients with CRSwNP and 26% in patients with CRSsNP.

Total RSOM-31 and Domain Scores

When comparing total RSOM-31 scores, there was no significant difference between patients with CRSwNP (mean, 66 [SD 26.8]) and patients with CRSsNP (mean, 67 [SD 25.5]). As shown in Table II, there were differences in domain scores. The nasal domain scores were higher in patients with CRSwNP versus patients with CRSsNP (mean, 3.0 [SD 0.9] vs. mean 2.5 [SD 0.8], $P < .001$). There was a trend for the practical domain scores in patients with CRSwNP versus CRSsNP (mean, 2.2 [SD 1.2] vs. mean, 1.9 [SD 1.3], $P = .05$). The general domain scores tended to be higher in patients with CRSsNP versus CRSwNP (mean, 2.6 [SD 1.1] vs. mean, 2.3 [SD 1.2], $P = .033$).

Symptom Scores

Table III shows that there was a considerable overlap of the majority of symptom scores between patients with and without nasal polyps (NP). Patients with CRSwNP scored higher on nasal symptoms. Patients with CRSsNP scored higher on “headache.” Table IV

TABLE II.
Domain Scores.

RSOM-31 Domain Score	CRSwNP Mean Symptom Score	CRSsNP Mean Symptom Score	Mean Difference	95% CI
Nasal	3.0	2.5	0.41*	0.20 to 0.63
Eye	1.3	1.5	-0.19	-0.55 to 0.18
Sleep	2.0	2.2	-0.21	-0.56 to 0.14
Ear	1.4	1.5	-0.17	-0.50 to 0.15
General	2.3	2.6	-0.33 [†]	-0.63 to -0.03
Practical	2.2	1.9	0.32 [‡]	-0.0004 to 0.65
Emotional	2.1	2.3	-0.12	-0.50 to 0.26
Total RSOM-31 score	66.2	67.1	-0.99	-7.85 to 5.87

* $P < .001$.

[†] $P = .033$.

[‡] $P = .050$.

CRSwNP = chronic rhinosinusitis with nasal polyps; CRSsNP = chronic rhinosinusitis without nasal polyps; CI = confidence interval; RSOM-31 = Rhinosinusitis Outcome Measure 31 questionnaire.

displays the frequency of symptoms scored in each group. Patients with CRSwNP scored nasal symptoms “rhinorrhea” and “decreased sense of taste or smell,” with its associated symptoms of the “inconvenience of having to carry tissues” and “the need to blow nose,” significantly more often than patients with CRSsNP.

Subanalyses of Patients With Asthma and Aeroallergen Sensitization

For the whole group of patients, those with asthma were comparable to patients without asthma except for shortness of breath ($P < .001$). The domain of “general health” showed a trend of being worse in the patients with asthma as did the symptoms of “dizziness” and “cough” (Table V).

When subanalyses were performed separately for patients with CRSwNP and CRSsNP, the same pattern was seen, although patients with CRSwNP with asthma score significantly higher symptom scores on the “general domain” (mean, 2.5 [SD 1.20]) versus those without asthma (mean, 2.0 [SD 1.10], $P = .019$), mainly due to the significant difference in symptom score on the “short of breath” item (mean, 3.04 [SD 1.56]) versus those without asthma (mean, 1.86 [SD 1.44], $P < .0001$).

Patients sensitized to aeroallergens had significantly fewer hearing problems (mean, 1.30 [SD 1.53]) versus not sensitized patients (2.13 [SD 1.79], $P < .0001$) and tended to have a lower score on the “domain ear” (1.22 [SD 1.23] vs. 1.65 [SD 1.28], $P = .015$) and the item “ear fullness.”

Multivariable Regression Analysis

Several potential prognostic factors were significantly associated with CRSwNP in the univariate analysis as shown in Table VI. However, in the multivariable model, “rhinorrhea,” “decreased sense of taste or smell,” “ear pain,” “facial pain,” and “the inconvenience

of having to carry tissues” were significantly associated with nasal polyps. Table VII shows symptoms with its corresponding OR for having nasal polyps. Please note that “facial pain” appears not to be a significant predictor of nasal polyps. However, when it is excluded from the model there is a significant change in the -2 log likelihood test ($P < .10$). This can be interpreted that “facial pain” is a relevant variable in the model.

DISCUSSION

Otorhinolaryngologists often tend to assign typical signs of disease to patients with or without NP. Previous literature is not always applicable to our own population when we want to analyze whether we can make a distinction based on EPOS criteria and symptom scores between patients with CRSwNP and patients with CRSsNP.

Eccles,¹³ described in his review the primary and secondary symptoms of rhinosinusitis, but he provided no specific numbers or comparison. Deal and Kountakis,¹⁴ in their evaluation for the need for revision surgery between patients with CRSwNP and patients with CRSsNP, described the difference in total Sino-Nasal Outcome Test 20 (SNOT-20) scores, but gave no further analysis on domain or individual item scores.

Banerji et al., in their prospective analysis on the burden of illness in a population of 126 patients with CRS, described similar findings using SNOT-20+1 questionnaire; patients with CRSsNP more often suffered from facial pain/pressure/headache, and patients with CRSwNP scored higher on nasal obstruction and hyposmia.¹⁵ However, to analyze 17 different variables in such an analysis, at least 170 patients with CRSwNP are needed.¹⁶

Bhattacharyya,¹⁷ in his study on the additional disease burden of nasal polyps in CRS with 462 patients, also found higher scores on nasal symptom severity in patients with CRSwNP and higher scores on facial symptom severity in patients with CRSsNP. However, he used the Rhinosinusitis Symptom Inventory with no analysis in further detail.

Ragab et al.,¹⁸ in their prospective randomized controlled trial that evaluated and compared the effect of medical and surgical treatment of CRS, mentioned that the mean SNOT-20 in the medical group before treatment was 2.3 (SD 0.9) for the patients with CRSsNP and 2.0 (SD 1.0) in the group with CRSwNP. For the surgical group, these data were 2.1 (SD 1.0) for the patients with CRSsNP and 1.6 (SD 0.6) in the group with CRSwNP. Data for the whole group were not given, nor was statistical analysis of these differences. Sahlstrand et al.¹⁹ compared SNOT-22 in patients with recurrent acute rhinosinusitis, CRSsNP, and CRSwNP. They found no difference in the mean SNOT-22 among these groups. However, differences among the three groups were found for the items “runny nose,” “loss of sense of taste/smell,” “cough,” “dizziness,” “ear pain,” “facial pain/pressure,” “fatigue,” “reduced productivity,” and “sad.” Unfortunately, no statistical analysis was made between patients with CRSsNP and CRSwNP, but

TABLE III.
Mean Symptom Score.

	CRSsNP Mean Symptom Score, n = 137	CRSsNP Mean Symptom Score, n = 97	P Value	95% CI
1. Blockage/congestion of nose	3.5	3.2	.047	0.004 to 0.6
2. Rhinorrhea	2.6	1.7	<.001*	0.44 to 1.19
3. Sneezing	1.8	1.7		–0.20 to 0.48
4. Sense of taste/smell	3.9	2.8	<.001*	0.75 to 1.54
5. Postnasal drip	3.0	3.0		–0.44 to 0.40
6. Thick nasal discharge	3.0	2.9		–0.30 to 0.51
7. Itchy eyes	1.6	1.6		–0.41 to 0.43
8. Swollen eyes	1.1	1.4		–0.80 to 0.03
9. Difficulty falling asleep	1.4	1.6		–0.61 to 0.21
10. Waking up at night	2.1	2.2		–0.59 to 0.25
11. Lack of good night's sleep	2.0	2.2		–0.59 to 0.29
12. Waking up tired	2.4	2.8		–0.76 to 0.09
13. Ear fullness	1.8	1.9		–0.58 to 0.33
14. Ringing	1.3	1.7		–0.85 to 0.08
15. Dizziness	1.1	1.3		–0.53 to 0.22
16. Ear pain	0.9	1.2		–0.63 to 0.08
17. Decreased hearing	1.8	1.7		–0.39 to 0.50
18. Fatigue	2.6	3.1	.026	–0.89 to –0.06
19. Reduced productivity	2.3	2.6		–0.67 to 0.71
20. Reduced concentration	2.2	2.4		–0.69 to 0.13
21. Headache	2.0	2.9	.001*	–1.27 to –0.36
22. Facial pain/pressure	2.2	2.9	.003	–1.15 to –0.24
23. Cough	2.1	2.0		–0.32 to 0.54
24. Short of breath	2.5	2.4		–0.32 to 0.53
25. Inconvenience of having to carry tissues	2.2	1.4	.002	0.29 to 1.22
26. Need to rub nose/eyes	2.1	2.0		–0.29 to 0.53
27. Need to blow nose	3.0	2.3	.002	0.26 to 1.12
28. Bad breath	1.5	1.8		–0.69 to 0.17
29. Frustrated/restless/irritable	2.4	2.5		–0.55 to 0.31
30. Sad	1.9	2.0		–0.52 to 0.35
31. Embarrassed	2.1	2.2		–0.60 to 0.31

*P < .0016 (Bonferroni correction).

CRSsNP = chronic rhinosinusitis with nasal polyps; CRSsNP = chronic rhinosinusitis without nasal polyps; CI = confidence interval.

judging from the data, “loss of sense of taste/smell,” “cough,” and “facial pain/pressure” were different between these groups, whereas “loss of sense of taste/smell” was worse in the CRSsNP group. The other two items were worse in the CRSsNP group. The latter data are in concordance with the data found in our study.

Furthermore, Agius¹⁰ found in his CRS cohort in Malta that “postnasal drip,” “nasal obstruction,” and “hyposmia” were significantly associated with positive CT findings, whereas “facial pain” was significantly associated with negative CT findings. He also underlines the challenge of facial pain in CRS patients, where in the majority the diagnosis cannot be supported by CT or endoscopy findings.⁹

Although we found some symptoms to be more prevalent in patients with CRSsNP than CRSsNP, the overlap is considerable. For example, “loss of taste/smell” would seem a typical CRSsNP item; however, 63% of CRSsNP patients scored this symptom as present. On

the contrary, “facial pain” would seem a typical CRSsNP symptom, but almost half of CRSsNP scored this item as present.

Despite some indications for pathophysiological differences between CRSsNP and CRSsNP, as of now it does not seem possible to differentiate based on symptoms. However, in the pathophysiology there also seems to be a considerable overlap and no correlation between endoscopic appearance and inflammatory pattern.^{20,21} Chinese and European polyps cannot be discriminated based on endoscopy but show a very different inflammatory pattern. The same holds true for polyps in patients with CF compared to non-CF polyps.^{22,23}

We dichotomized the data to account for the symptom frequency based on a symptom score of ≥ 2 . This means patients grade their symptom as “a mild or slight problem” or worse. Keeping in mind that the most important findings of this study are the mean symptom scores, we found it illustrative to add a symptom

TABLE IV.
Symptom Frequency.

Symptom Score ≥ 2	CRSwNP Symptom Frequency, n = 137	CRSsNP Symptom Frequency, n = 97	P Value (Fisher Exact)	Odds Ratio	95% CI
1. Blockage/congestion of nose	93	91	.001*	2.52	1.44 to 4.39
2. Rhinorrhea	75	55			
3. Sneezing	57	55			
4. Sense of taste/smell	91	73	<.001*	3.49	1.69 to 7.23
5. Postnasal drip	81	78			
6. Thick nasal discharge	80	80			
7. Itchy eyes	45	44	.028	0.56	0.32 to 0.98
8. Swollen eyes	31	37			
9. Difficulty falling asleep	38	46			
10. Waking up at night	60	63			
11. Lack of good night's sleep	58	61			
12. Waking up tired	65	75			
13. Ear fullness	47	54			
14. Ringing	34	41			
15. Dizziness	32	40			
16. Ear pain	26	38			
17. Decreased hearing	49	45			
18. Fatigue	74	81			
19. Reduced productivity	68	73			
20. Reduced concentration	66	69			
21. Headache	59	71			
22. Facial pain/pressure	62	73			
23. Cough	58	59			
24. Short of breath	69	65			
25. Inconvenience of having to carry tissues	56	34	.001*	2.49	1.45 to 4.27
26. Need to rub nose/eyes	59	57	.001*		
27. Need to blow nose	79	59			
28. Bad breath	39	45	2.61	1.47 to 4.65	
29. Frustrated/restless/irritable	69	68			
30. Sad	55	54			
31. Embarrassed	58	58			

* $P < .0016$ (Bonferroni correction).

CRSwNP = chronic rhinosinusitis with nasal polyps; CRSsNP = chronic rhinosinusitis without nasal polyps; CI = confidence interval.

frequency table and a multivariable regression model to our analysis. A linear regression model was not possible, because we found no linear association between symptom scores and outcome (CRSwNP); therefore, we had to dichotomize our data for a multivariable logistic regression model.

The cutoff at a symptom score of ≥ 2 was chosen because we felt we had to count at least present symptoms, rated as "mild" or "slight." We also made subanalyses of other limits. A cutoff at ≥ 1 would count too many irrelevant complaints, and a cutoff at ≥ 4 would give to many false-negative findings. A cut off at ≥ 3 gave comparable results.

In agreement with others, we found a higher portion of asthmatics in the CRSwNP group.^{4,24–28} Interestingly, the patients in the CRSwNP group did not complain significantly more often about cough and shortness of breath compared to the patients with CRSsNP. In the Sahlstrand et al.¹⁹ study, cough was found even

more in the CRSsNP group. Unfortunately, the prevalence of asthma was not given for the subgroups in this study.

We found a higher prevalence of aeroallergen sensitization in patients with CRSwNP, contrary to Collins et al.'s findings.²⁹ Emanuel and Shah described a higher prevalence of aeroallergen sensitization in patients with grade 2 (88%) and grade 3 (88%) CT classification, according to Glicklich.³⁰ Unfortunately, abnormalities on CT scan were not described in further detail, or was the reader provided with more detailed clinical information. A subanalysis in our study showed no significant influence of aeroallergen sensitization on the symptom scores.

We also found "ear pain" as a significant predictor of CRSwNP in the multivariable regression analysis. This association is previously described by Stoikes and Dutton, and might be related to eustachian tube dysfunction.³¹

TABLE V.
Mean Symptom Scores With and Without Asthma.

	Asthma		P Value	95% CI
	Yes, Mean Symptom Score, n = 100	No, Mean Symptom Score, n = 127		
Total RSOM-31 score	69.56	64.26		−1.60 to 12.20
Domain nose	2.85	2.74		−0.13 to 0.32
Domain eye	1.45	1.37		−0.29 to 0.45
Domain sleep	2.17	1.89		−0.17 to 0.55
Domain ear	1.61	1.30		−0.02 to 0.63
Domain general	2.59	2.24	.026	0.04 to 0.65
Domain practical	2.00	2.11		−0.44 to 0.22
Domain emotional	2.25	2.15		−0.28 to 0.48
1. Blockage/congestion of nose	3.29	3.46		−0.47 to 0.14
2. Rhinorrhea	2.24	2.19		−0.35 to 0.45
3. Sneezing	1.90	1.66		−0.10 to 0.58
4. Sense of taste/smell	3.64	3.31		−0.09 to 0.74
5. Postnasal drip	3.02	2.96		−0.37 to 0.48
6. Thick nasal discharge	2.89	2.90		−0.32 to 0.49
23. Cough	2.31	1.83	.032	0.04 to 0.91
24. Short of breath	2.99	1.97	<.001*	0.60 to 1.44

*P < .0016 (Bonferroni correction).

CI = confidence interval; RSOM-31 = Rhinosinusitis Outcome Measure-31 questionnaire.

A potential weakness of this study is that it is performed in a tertiary referral rhinosinusitis specialized outpatient clinic with a selected population. All patients have undergone previous treatment, usually also surgery, and visit our center with persisting symptoms. However, all selected patients fulfill the EPOS diagnosis of CRS with or without nasal polyps based on symptomatology, and endoscopy and/or CT scan.¹ It is not very likely that the subject of this study, the difference in symptomatology between patients with and without nasal polyps, will be very different, but differences in total mean RSOM-31 score could be different in a primary population; only patients with persistent symptoms are referred to us.

Interesting for further research would be how symptom scores differ between CRSwNP and CRSsNP in patients without any previous treatment or surgery.

The golden standard for the diagnosis nasal polyps will remain nasal endoscopy, with grading of the nasal mucosa for polyps, edema, discharge scarring, and crusting³²; however, pulmonologists, general practitioners, and many other medical professionals dealing with CRS patients do not have an endoscope at hand as in the standard ear, nose, and throat practice.

This analysis does not provide a diagnostic tool, but gives scientific support for evidence-based discussions on differences between patients with CRS with and without nasal polyps.

CONCLUSION

This study shows that there is a considerable overlap in CRS symptoms in patients with and without nasal polyps. Nasal symptoms, such as decreased sense of taste/smell and rhinorrhea, are often seen and more bothersome in patients CRSwNP. Patients with CRSsNP more often score higher on facial pain and ear pain. Unfortunately, the clinical impression that the

TABLE VI.
Independent Risk Factors for CRSwNP in Univariate Model.

Characteristics	OR	95% CI
2. Rhinorrhea	2.52	1.44 to 4.39
4. Decreased sense of smell/taste	3.49	1.69 to 7.23
12. Wake up tired	0.61	0.34 to 1.089
16. Ear pain	0.56	0.32 to 0.98
21. Headache	0.59	0.34 to 1.02
22. Facial pain	0.60	0.34 to 1.06
25. Inconvenience of having to carry tissues	2.49	1.45 to 4.27
27. Need to blow nose	2.61	1.47 to 4.65

CRSwNP = chronic rhinosinusitis with nasal polyps; OR = odds ratio; CI = confidence interval.

TABLE VII.
Risk Factors for CRSwNP in Multivariable Model.

Characteristics	OR	95% CI
2. Rhinorrhea	2.40	1.26 to 4.57
4. Decreased sense of smell/taste	3.72	1.72 to 8.04
16. Ear pain	0.44	0.24 to 0.82
22. Facial pain	0.55	0.29 to 1.03
25. Inconvenience of having to carry tissues	1.98	1.08 to 9.63

CRSwNP = chronic rhinosinusitis with nasal polyps; OR = odds ratio; CI = confidence interval.

distinction between patients with CRSwNP and patients with CRSsNP is only based on typical symptoms is not very accurate, due to considerable overlap of symptom scores.

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