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Original scientific paper

Influence of Allergy and Bacterial Colonization on the Quality of Life in Nasal Polyposis Patients

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A B S T R A C T

Allergies and bacterial colonization are frequently found in patients with chronic rhinosinuitis with nasal polyposis (CRSwNP). The aim of this study was to identify patients with allergy and present microorganisms in ethmoid sinus among the patients with refractory CRSwNP undergoing surgical treatment at the University Hospital Centre Osijek, and to compare their life quality, defined by SNOT-20 analysis (sinonasal outcome test) to the rest of patients, and a control group consisting of patients undergoing septoplasty but free of allergy and/or CRS. An additional aim was to identify specific types and strains of microorganisms (bacteria and fungi) found in these patients, in order to compare them to other reports, and to revise the empirical antimicrobial therapy. In this paper we demonstrate a high incidence of bacterial colonization (83.3%) among CRSwNP patients. As in previous studies, gram positive aerobes were the most frequently isolated bacteria and all of them were covered by specific antibiotics given before the specimen collection. Allergy was found in only 20% of these patients, who presented with a reduced quality of life when compared to the control group and CRSwNP without allergy. Significantly more frequent dominant symptoms in these patients were cough, frustration and irritation. In the line with this finding is the objective assessment by endoscopy (Malm score) that showed more prominent nasal polyposis in allergy patients.

***Key words**: chronic rhinosinuitis, nasal polyposis, allergy, bacterial colonization*

Introduction

Chronic rhinosinusitis (CRS) is an inflammatory disease defined as a paranasal sinus infection that has persisted longer than 12 weeks. CRS is classified into CRS with nasal polyps (CRSwNP) and CRS without nasal polyps (CRSsNP) on the basis of cytokine, mediator, and cellular profiles. CRS is estimated to result in an annual 18 to 22 million physician office visits in the US[1]. It is an extremely common condition, affecting 14.2% US adults, and 10.9% European adults[2–4]. In addition, CRSwNP appears in 1.4 to 4.3% of European population[5], mostly occurring between 30 and 60 years of age and with a clear male dominance. Data on the prevalence and incidence of CRSsNP and CRSwNP in Croatia are scarce.

CRSwNP presents a complex disease, perhaps even a common symptom of various entities. Nasal polyps are inflammatory outgrowths of paranasal sinus mucosa caused by chronic mucosal inflammation that typically arise from the middle meatus and ethmoid region[6]. The etiology and pathophysiology of CRS and NP are very heterogeneous and have been intensively investigated. Although they remain debatable, bacteria, virus, and fungi have been theorized to be main infectious agents inciting in intense host inflammatory responses[7–9]. However, association between bacterial colonization and CRSwNP and CRSsNP remains unclear. Paranasal sinuses were considered to be sterile cavities until Brook[10] showed that normal sinus aspirates had aerobic bacteria in 58% of the samples and anaerobic bacteria in all samples. *Haemophilus influenzae, Streptococcus viridians,* other *streptococci, bacteroides, Veilonella, rhinobacteria,*

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and the other anaerobes have been found as causal agents in chronic sinusitis[11,12]. Another study by Orobello and colleagues[13] reported that coagulase (–) staphylococci, *Staphylococcus aureus*, and *S. viridans* were the most frequently isolated bacteria in the aspiration and present in 25 to 40% of nasal flora biopsy materials of the maxillary and ethmoid sinuses of children with chronic sinusitis. Recent hypothesis suggests the involvement of superantigen induced inflammation, particularly involving enterotoxins from *S. aureus*[14]. According to this theory, enterotoxins might activate a type 2 T-helper cell response which would lead to an inflammatory process[15]. Furthermore, it has been found that bacterial biofilm attributes to clinical symptoms and/or progression of disease and lower quality of life in nasal polyposis patients[16]. Conversely, Niederfuhr et al.[17] found no significant differences in the bacteriologic features of ethmoidal biopsy specimens between CRSsNP, CRSwNP and control patients, neglecting the active role of microorganisms in the pathogenesis of the nasal polyps in CRS. Although seen very rarely, infections caused by fungi must be remembered[18,19]. Ponikau and colleagues suggest that the immunological response to the presence of fungi in the sinonasal cavity has a role in the pathogenesis of CRS. They were able to detect fungi in 93% of patients with CRS who underwent endoscopic sinus surgery by using an exquisitely sensitive culture technique[20].

Everyday clinical practice keeps revealing obvious connection between CRSsNP and CRSwNP with various chronic respiratory diseases, such as asthma, intolerance of aspirin and other non-steroidal anti-inflammatory drugs, cystic fibrosis, ciliary dysfunction, various syndromes, and chronic atopic and non-atopic sinusitis[21]. Allergy is often found in patients with CRS, nevertheless it is still debated whether allergy has an active role in the etiology of CRS with or without NP, or it is a separate entity, developing in parallel.

Symptoms of CRS cause not only physical suffering, but also impacts psychological wellbeing and daily functioning. There were attempts to assess the quality of life in CRSsNP and CRSwNP by various questionnaires. The difficulties arise from the subjectivity and possibly low feedback of the patients while participating in the questionnaires, nevertheless, the SNOT-20 has been validated trough many comparative studies[22,23]. It is an increasingly popular tool to describe patient burden and clinical effectiveness in sinonasal disease and it is now generally accepted as a good measure of the life quality that can correlate to the objective findings[24].

The aim of this study was to identify patients with allergy and present microorganisms in ethmoid sinuses among the patients with refractory CRSwNP undergoing surgical treatment at the Clinical Hospital Centre Osijek, and to compare their life quality (defined by SNOT-20 analysis) to the rest of patients, and a control group consisting of patients undergoing septoplasty but free of allergy and/or CRS. An additional aim was to identify specific types and strains of microorganisms (bacteria and fungi) found in these patients, in order to compare them to other reports, and to revise the antimicrobial therapy.

In this paper we demonstrate a high incidence of bacterial colonization (83.3%) among CRSwNP patients. Our findings on types and frequencies of bacteria are comparable to previous studies. Allergy was found in only 20% of these patients, who presented with a reduced quality of life when compared to the control group and CRSwNP without allergy. Significantly more frequent dominant symptoms in these patients were cough, frustration and irritation.

Patients and Methods

Study design

This is a prospective study exploring patients with CRSwNP subjected to the surgery during a one and half-year period (from the 1st of October 2011 to the 1st of March 2013) at the Department of Otorhinolaryngology and Head and Neck Surgery, University Hospital Centre Osijek. In addition, a control group consisting of patients undergoing septoplasty because of deviated nasal septum (having reduced life quality because of nasal obstruction) was also included into this study. To assess the influence of allergy and bacterial colonization on the life quality in CRSwNP patients, it was important to exclude patients suffering of allergy or having bacterial colonization from the control group. Information regarding their gender, age, allergy status, smoking, asthma, sinus swabs and nasal cavity swabs, SNOT 20 analysis, CT Lund-Mackey score, Malm classification-total nasal endoscopy score, the surgery performed, and possible recurrence of NP were collected. The study was approved by the Ethical Committee of the Faculty of Medicine Osijek. All participants signed their informed consent.

Patients

There were 69 (48 CRSwNP and 21 control group) patients operated. They completed the one and a half year follow up and were included in this study. Initially, they were examined by anterior rhinoscopy and endoscopy and underwent all standard laboratory diagnostics, including blood tests, nasal smear for eosinophils, serum total IgE and bacteria etc. In CRSwNP patient's indication for performing FESS (Functional Endoscopic Sinus Surgery) was unsatisfactory response to intranasal corticosteroid sprays and antibiotics during a six-month therapy with persistent symptoms and reduced quality of life. An informed consent form was obtained from each patient before the surgery. All tissue specimens were harvested by the same investigator in a same fashion. The patients were operated by FESS (Wigand technique) and septoplasty (Cottle technique) or combination of these two techniques by using Karl Storz and Wolf operating equipment. Control mucosal specimens (mucosal punctuates from lower turbinate) were acquired from 21 patients with no history of NP or asthma, when they underwent septoplasty for correction of anatomic variation,

such as deviated nasal septum or hypertrophic lower turbinate. Exclusion criteria were: patients under the age of 18, systemic disease involving the nose (Wegener's granulomatosis, cystic fibrosis, Kartageners syndrome, sarcoidosis), primary ciliary dyskinesia, pregnancy or ongoing treatment for cancer. In the case of control group, excluding criteria was proven allergy or bacterial and/or fungal colonization of the nasal cavity.

Endoscopic and CT grading scores

Endoscopic physical findings were scored according to Malm classification[25]. A polyp score was graded for each nasal cavity on a 0 to 3-point scale (0 = no polyps; 1 = polyps in the middle meatus, not reaching below the inferior border of the middle turbinate; 2 = polyps reaching below the inferior border of the middle turbinate but not the inferior border of the inferior turbinate; 3 = large polyps reaching to or below the inferior border of the inferior turbinate or polyps medial to the middle turbinate). Since each side was graded separately, the scores from each side were added to determine the overall endoscopy score, so that the maximal endoscopy score was 6. Findings on preoperative CT scans were graded according to the Lund–Mackay system. The mucosal abnormalities were graded as 0 (no abnormality), 1 (partial opacification), or 2 (total opacification) for each sinus group. The ostiomeatal complexes were scored bilaterally as 0 (not occluded) or 2 (occluded). The maximal CT grading score was 24[26].

The polypoid tissue and nasal mucosa from the inferior nasal concha removed during the surgery was sent to the Department of Pathology for pathohistological assessment. The ethmoid sinus swabs samples were sent to the Department of Microbiology within one hour of the specimen collection. In the period between October 2011 until March 2013, data was prospectively collected and the patients could had been followed up at 1, 6, and 12 months postoperative.

SNOT-20 assessment of patients' life quality

To assess the quality of life problems, including physical problems, functional limitations and emotional consequences we used SNOT-20 questionnaire. It consists of 20 questions addressing these problems, and for each symptom patient gives a score (0–5) according to severity of his problems. Total score is calculated by adding all scores, and it is a measure of the life quality. SNOT-20 summary score may range from 0–100.

Statistics

Collected data were summarized in Microsoft Excel tables and statistical analysis performed by using SPSS 16.0 software (SPSS Inc., Chicago, IL, USA) and Sigma Plot 11.0 (Systat Software Inc., San Jose, California, USA) software. Data distribution was tested by Shapiro Wilk tests. To compare between two or more than two groups Student t test or one-way ANOVA were used, respectively. In the case of abnormal distribution these tests were substituted by nonparametric contemplar (Mann-Whitney U-test or Kruskal-Wallis test). Frequencies between the groups and subgroups were compared by χ^2. Additionally Pearson's or Spearman correlation was calculated. All data are presented as $\overline{X}\pm SD$, and $p<0.05$ was considered significant.

Results

Subjects

The average age of the patients suffering from nasal polyposis with chronic rhinosinutis (CRSwNP) was significantly higher when compared to the control patients undergoing septoplasty ($p<0.001$, Student t test, Table

TABLE 1
PATIENTS' CHARACTERISTICS

	CRSwNP	Control	p value
N	48	21	–
Age*	52.3±10.6 (27–75)	34.3±10.9	<0.001
Gender (M/F)	27/21	16/5	0.116
Smokers	11 (22.9%)	7 (33.3%)	0.365
RIST/RAST positive	10 (20.8%)	0	–
Asthma	6 (12.5%)	0	–
Samter's trias	3 (4.2%)	0	–
Sinus swab positive	40 (83.3%)	–	–
Nasal swab – sterile	–	21 (100%)	–
SNOT-20*	44.6±24.4 (6–88)	–	0.375
CT grading score*	12.9±4.7 (2–23)	–	–
Total endoscopy score*	4.3±1.9 (0–6)	–	–

N – number of patients; CRSwNP – chronic rhinosinuitis with nasal polyposis, * – data are presented as X±SD (range), CT score was obtained using Lund-Mackay classification, endoscopy score was determined according to the Malm classification, p-value was calculated by Mann-Whitney U or Pearsons χ^2-test, where appropriate.

1). The ratio of man and woman in the group of CRSwNP patients was equal (27:21), whereas the control group showed a male dominance (16:5, χ^2=0.116). There was no difference in the frequency of smokers between the groups (χ^2=0.365), and the majority of patients were non-smokers in both groups (Table 1). Ten (20.8%) patients from the CRSwNP group had positive RIST and RAST test, and proven eosinophils in nasal smear, which together with patients' history of clinical signs and symptoms confirmed the diagnosis of allergy. Six (12.5%) patients from that group had proven diagnosis of asthma, and only half of them had also positive history of aspirin intolerance known together as Samter's triad. In the case of patients from the control group, those that were positive for allergy and/or asthma (3/24) were excluded from the study.

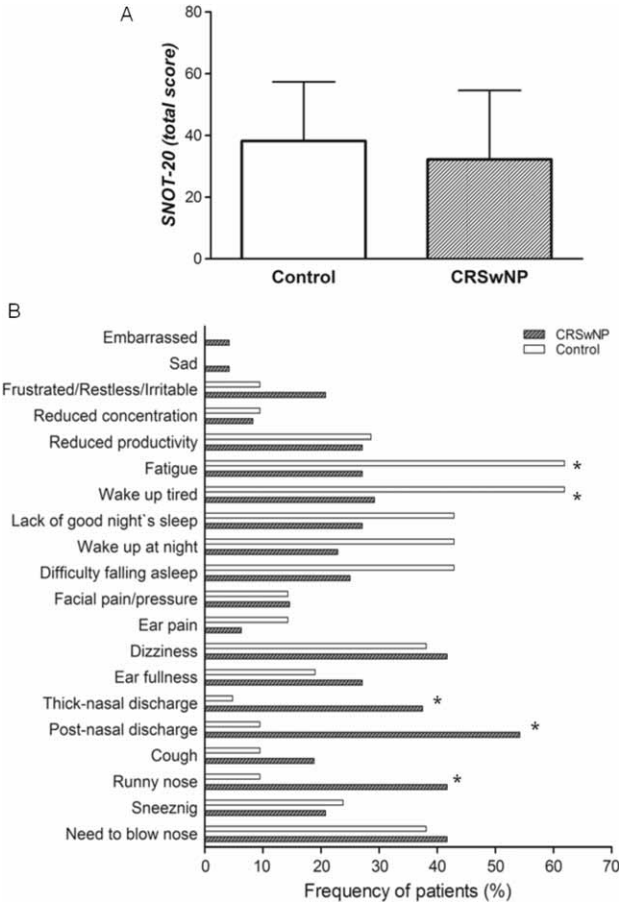

*Fig. 1. Comparison of SNOT-20 between NP and control patients. Life quality of the patients was tested by SNOT-20 questionnaire, covering severity of 20 symptoms (panel B). The patients were asked to grade each symptom with a score in the range from 0 to 5. Additionally, patients were asked to denote 5 dominant symptoms. The total score was compared between CRSwNP patients and control group (patients undergoing septoplasty, without a history of allergy and chronic rhinosinuitis).There was no significant difference in SNOT-20 score between the groups (p=0.375; panel A), however, the dominant scores were significantly different between those two groups (panel B). NP – nasal polyposis; p<0.05 was considered significant; significantly different symptoms are marked with *, CRSwNP – chronic rhinosinuitis with nasal polyposis.*

SNOT-20 – life quality of the patients

Life quality of the patients was tested by SNOT-20 questionnaire, covering severity of 20 symptoms (Figure 1, panel B). The patients were asked to grade each symptom with a score in the range from 1 to 5, and to denote their 5 dominant symptoms (shown in Figure 1, panel B). Statistical analysis showed no difference in SNOT-20 total score between the CRSwNP and control patients (44.5, min. 6, max. 88 vs. 35.0 min. 11, max. 75; p=0.375, Mann-Whitney U-test; Figure 1, panel A), however, the frequency of dominant scores were significantly different between those two groups (Figure 1, panel B). We found that runny nose (χ^2=0.08), post-nasal discharge (χ^2= 0.001), and thick-nasal discharge (χ^2=0.005) were more frequent dominant symptoms in CRSwNP group, whereas in the control group dominant symptoms were related to sleeping difficulties, including waking up at night (χ^2=0.093), waking up tired (χ^2=0.010), and fatigue (χ^2=0.006).

Objective assessment of the nasal polyposis by Lund-Mackay and Malm classification

Expansion of the nasal polyps and involvement of sinuses was assessed by CT and endoscopy. Based on the findings, severity of nasal polyposis was determined by Lund-Mackay classification (CT grading score, range 0–24) and Malm classification (Total endoscopy score, range 0–6). There was no significant correlation between the quality of life determined by SNOT-20 total score and the CT grading score (r=–0, 0987, p=0,503) or total endoscopy score (r=0.179, p=0.222). However, we found a significant positive correlation between the CT grading score and total endoscopy score (r=0.539, p=0.0000871; Figure 2).

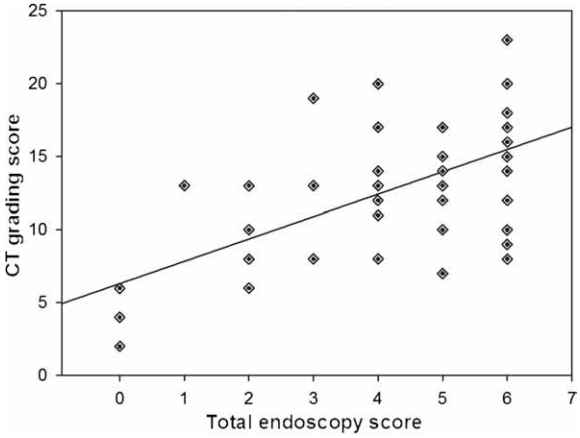

Fig. 2. Correlation between CT grading score and Total endoscopy score. The CT grading score was calculated using Lund-Mackay classification and the total endoscopy score by Malm classification. We found a significant positive correlation between the CT grading score and the total endoscopy score. However, there was no correlation between the quality of life of CRSwNP patients (SNOT-20) and any of the scores. p<0.05 was considered significant; r and p values are indicated at the plot, CRSwNP – chronic rhinosinuitis with nasal polyposis.

Bacterial colonization of the ethmoid sinus in nasal polyposis patients

The frequency of ethmoid sinus colonization by bacteria and the type of bacteria found differs among studies. They have been implicated an important role in the etiology of nasal polyposis, and can lead to chronic rhinosinuitis, which has been found in most of the CRSwNP patients. Therefore, intra-operative swabs of the ethmoid sinuses were taken and sent for analysis to the Department of Microbiology at the University Hospital Centre Osijek. In the case of control group patients, we analysed nasal cavity swabs. Bacteria were isolated in most of CRSwNP patients (83.3%), (Table 2), while the nasal cavity was sterile in all patients undergoing septoplasty. Among 11 bacterial species identified, the most frequent was *Staphylococcus epidermidis* (37.5%), followed by *S. aureus* and *K. pneumoniae* (both 12.5%).

TABLE 2
MICROORGANISMS ISOLATED FROM INTRA OPERATIVE SINUS CULTURES

Microorganisms	Frequency in CRSwNP patients (%)
S. Aureus	5 (12.5)
Klebsiella pneumoniae	5 (12.5)
E. coli	3 (7.5)
Streptococcus hemolyticus group B	2 (5)
Morganella morganii	2 (5)
Enterobacter spp.	2 (5)
Serratia marcescens	1 (2.5)
Proteus mirabilis	1 (2.5)
Enterobacter freundi	1 (2.5)
Klebsiella oxytoca	2 (5)
Staphylococcus epidermidis	15 (37.5)
Total	40 (100)

The swabs were taken from ethmoid sinuses with special care to avoid contamination, CRSwNP – chronic rhinosinuitis with nasal polyposis.

Influence of allergy and bacterial colonization on the life quality of the patients

All patients were tested for allergy and the CRSwNP patients additionally for bacterial colonization in the ethmoid sinus, as described above. Based on the allergy results patients were divided into 3 groups: 1) control, 2) CRSwNP and allergy, and 3) only CRSwNP. Comparison of SNOT-20 total score among those groups by Kruskal-Wallis test showed a significant difference (p=0.018, Figure 3, panel A). Following, all pairwise multiple comparison procedure by Dunn's method showed a significantly reduced quality of life in CRSwNP patients with allergy (60.0, min. 40.0, max. 86), when compared to CRSwNP only (32.5, min. 6, max. 88) and control patients (35.0, min. 11, max. 75). In addition, these patients had also significantly higher total endoscopy score, when compared to only CRSwNP group (6.0, min. 4, max. 6 vs. 4.5, min. 0, max. 6; p=0.028, Mann-Whitney U-test; Fig-

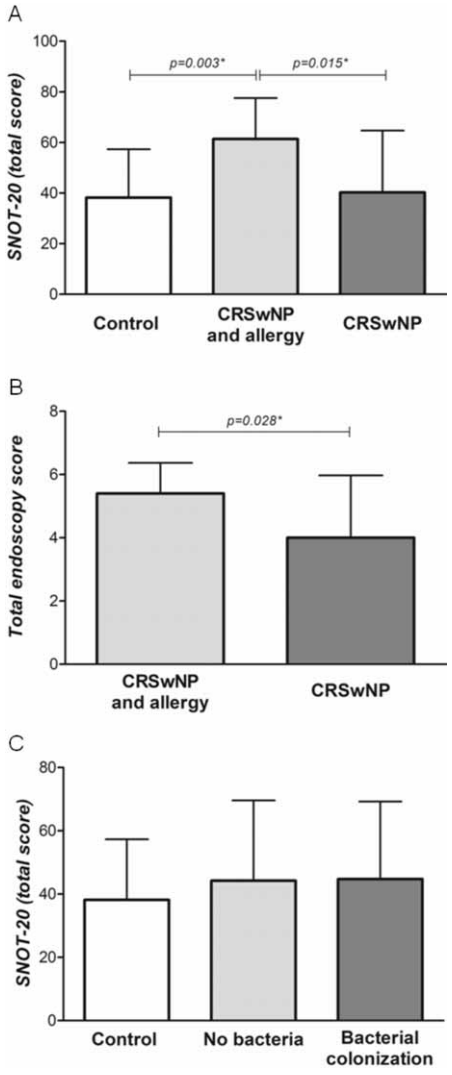

Fig. 3. Influence of allergy and bacterial colonization of the sinuses on the quality of life in CRSwNP patients. All patients were tested for allergy (RIST, RAST, nasal smear for eosinophils, skin test) and the CRSwNP patients additionally for bacterial colonization in the ethmoid sinus. In the case of patients undergoing septoplasty, those with proven allergy were excluded from the study (3/24). Based on the allergy results patients were divided into 3 groups: 1) control, 2) CRSwNP and allergy, and 3) CRSwNP. Following, comparison of SNOT-20 total score by one way ANOVA and Mann-Whitney test showed a significantly reduced quality of life in CRSwNP patients with allergy, when compared to CRSwNP only and control patients (higher SNOT-20 score, panel A). In addition, these patients had also significantly higher total endoscopy score (panel B). Based on the results of microbiology, patients were also divided into 3 groups: 1) control patients, 2) CRSwNP with no bacteria, and 3) CRSwNP with bacterial colonization. Statistical analysis did not show any difference among those groups (panel C). CRSwNP – chronic rhinosinuitis with nasal polyposis; results are presented as $\overline{X}\pm SD$; $p<0.05$ was considered significant; p values are shown at the panels.

TABLE 3
LEADING SNOT-20 SYMPTOMS IN CRSWNP PATIENTS WITH/WITHOUT ALLERGY

SNOT-20	RIST/RAST negative (%)	RIST/RAST positive (%)	p value*
Need to blow nose	50	10	0.022
Sneezing	21.1	20	0.942
Runny nose	47.4	20	0.118
Cough	13.2	40	0.053
Post-nasal discharge	55.3	50	0.766
Thick-nasal discharge	34.2	50	0.359
Ear fullness	23.7	40	0.302
Dizziness	39.5	50	0.548
Ear pain	5.3	10	0.582
Facial pain/pressure	15.8	10	0.644
Difficulty falling asleep	26.3	20	0.682
Wake up at night	26.3	10	0.275
Lack of good night's sleep	26.3	30	0.816
Wake up tired	28.9	30	0.948
Fatigue	28.9	20	0.571
Reduced productivity	26.3	30	0.816
Reduced concentration	7.9	10	0,830
Frustrated/Restless/Irritable	15.8	40	0.093
Sad	2.6	10	0.299
Embarrassed	5.3	0	0.459

* – the differences between the groups were tested by Persons χ^2 and $p<0.05$ considered significant, CRSwNP – chronic rhinosinuitis with nasal polyposis

ure 3, panel B). Based on microbiological findings, patients were additionally divided into 3 groups: 1) control patients, 2) no bacteria, and 3) CRSwNP with bacterial colonization. Statistical analysis did not show any significant difference among those groups ($p=0.666$, Kruskal-Wallis test; Figure 3, panel C). Most of our patients (8/10) with allergies had isolated bacteria. Next, we have analysed the frequency of dominant symptoms between CRSwNP patients with and without allergy. We found that need to blow nose was significantly less frequent symptom ($\chi^2=0.022$, Table 3.) in CRSwNP with allergy, whereas cough ($\chi^2=0.053$) and frustration/irritation ($\chi^2=0.005$) were more frequent dominant symptoms in the same group of patients.

Discussion

It has been generally accepted that initial treatment of CRS should be preferably conservative rather than surgical, in order to reduce the symptoms and to improve the quality of life. Nevertheless, success of the therapy can be significantly affected by previous treatments, patient referral patterns and local bacterial sensitivities[27]. The main goal of conservative therapy is to establish patency of the nose, recover the sense of smell and allow ventilation and drainage of paranasal sinuses. It includes local and systemic steroids, antibiotics, nasal lavage with saline and topical decongestans[28]. Surgical removal of nasal polyps is indicated for patients not responding adequately to conservative management, those with continued or recurrent infections, as well as patients who are developing complications of sinusitis. Patients with polyps and asthma may benefit from surgery by reduction of one trigger for asthma, while the patients with CRSsNP benefit from surgery which relives them from headache and facial pain.

The main symptoms of nasal polyps are perennial nasal congestion, nasal obstruction, and anosmia or hyposmia. Unlike patients with chronic rhinosinusitis without nasal polyps (CRSsNP) who suffer from headache and facial pain, patients with nasal polyps typically do not complain on those symptoms. In our study, we found that the most frequent dominant symptoms in CRSwNP patients were runny nose (in 41.7% of patients), post-nasal discharge (in 54.2% of patients), thick-nasal discharge (in 37.5% of patients), and dizziness (in 41.7% of patients). In addition to these, patients suffering from allergy had more frequently cough and feeling of restlessness, irritation and frustration as dominant symptoms, resulting in significantly reduced overall quality of life.

During the therapy of CRSwNP it is preferred to apply a specific antimicrobial agent, however, it is very difficult and technically demanding to obtain an ethmoid sinus culture. As it requires an invasive procedure like FESS, routine practice is to give broad spectrum empirical antibiotics directed against the most common pathogenic microorganisms. It has been shown that inappropriate use of empirical antibiotics may lead to an increased bacterial resistance and virulence[29]. It is therefore important to isolate the most common pathogens in a defined population. Previous findings of geographic differences in sinus colonization further justify local studies of sinus microbiology[30]. Our study has showed that 40/48 (83.3%) patients had a bacteria isolated from ethmoid sinuses, while there were no fungi isolated in sinus swabs. Aerobic bacteria were most frequently found in our study (*S. aureus, S. epidermidis, K. pneumoniae*), similar to other studies of ethmoid sinus colonization. In addition, all of the isolated bacteria in our study were covered by given empirical antibiotics during conservative treatment. Results of previous studies reporting bacterial colonization of ethmoid sinus showed contradictory data. Based on the high frequency of bacterial and fungal colonization, which is also comparable to control patients in some cases, several groups propose them to be a normal sinus flora with even a protective role[31]. On the other hand, there are evidence that toxins from bacteria found in biofilms are responsible for development of CRS and NP[32]. The same groups did not find bacteria in biofilms of control patients. Other point of underlining bacterial resistance could be low level of antibiotics penetration to sinus cavities.

In our study we aimed to assess the prevalence of allergy in patients with refractory CRSwNP, and to test whether it can significantly alter the life quality of these

patients. We found 10 (20.8%) patients with allergy among the CRSwNP. Wong and Dolovich, in a series of 249 patients undergoing nasal polypectomy, reported a positive skin prick test in 66%. Bunnag[33] and co-workers reported a 4.5% incidence of nasal polyps in 300 patients with allergic rhinitis. Thus, it has been concluded that NP does not occur with increased frequency in allergic patients and patients with nasal polyps do not appear to have a positive allergy skin test more often than control subjects[34]. Our results implicate that allergy greatly affects the life quality of CRSwNP patients.

Present study showed that the quality of life in CRSwNP patients is similar to the one in the control group, based on SNOT-20 score, but their dominant symptoms differ significantly. In CRSwNP dominant symptoms were runny nose, post-nasal discharge, and thick-nasal discharge. The control group of patients with nasal septal deformation had symptoms related to sleeping difficulties, including waking up at night, waking up tired, and fatigue, which was also found to affect their quality of life in previous studies[35]. Total endoscopy score and CT grading score also reflect the severity of the NP. There was no significant correlation between the quality of life determined by SNOT-20 total score and the CT grading score or total endoscopy score, and this finding is consistent with several other reports[36,37]. The quality of life is greatly affected by allergies and is not affected by bacterial colonization. The reason lays probably in the actual fact that bacteria are etiological factors and allergies are not. The evidence in various studies[38–41] suggest that nasal polyps are not caused by allergy, thus the allergies can add to the nasal polyposis symptoms and patients life quality. In line with that is our finding of significantly higher Malm endoscopy score in the allergy subgroup.

In our study we have found a high incidence of bacterial colonization (83.3%) among CRSwNP patients, although all of them received specific antimicrobial therapy before the specimen collection. This finding raises the question of the efficiency and justification of the long term treatment of CRSwNP with high doses of antibiotics. Furthermore, allergy was found in only 20% of our CRSwNP patients, who presented with a reduced quality of life when compared to the control group and CRSwNP without allergy. In addition, objective inspection by endoscope revealed a significantly higher Malm score in these patients. Thus, our results implicate that this minor group of patients require additional care specifically focused on the treatment of allergy.

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UTJECAJ ALERGIJE I KOLONIZACIJE BAKTERIJAMA NA KVALITETU ŽIVOTA PACIJENTA S NOSNOM POLIPOZOM

S A Ž E T A K

Alergije i kolonizacija bakterijama se često pojavljuju kod bolesnika sa kroničnim rinosinuitisom i nosnom polipozom (CRSwNP). Cilj ove studije je bio identificirati pacijente koje boluju od alergije i/ili imaju patogene mikroorganizme u etmoidnom sinusu među pacijentima sa refraktornim CRSwNP, koji se podvrgavaju funkcionalnoj endoskopskoj sinusnoj kirurgiji u Kliničkom bolničkom centru Osijek. Uspoređivala se njihova kvaliteta života (definirana sa SNOT-20 analizom) sa ostalim pacijentima te sa kontrolnom skupinom koju su činili pacijenti podvrgnuti rekonstrukciji nosne pregrade, a koji nisu imali alergiju niti su bolovali od kroničnog rinosinuitisa. Drugi cilj ove studije je bio identifikacija specifične vrste i sojeva mikroorganizama (bakterija i gljivica) koje se nalaze u ovih pacijenata kako bi se usporedile sa učestalostima u drugim populacijama te preispitala učinkovitost empirijske antimikrobne terapije. U ovom članku prikazujemo visoku incidenciju bakterijske kolonizacije (83,3%) među pacijentima sa nosnom polipozom. Sukladno prijašnjim istraživanjima, gram pozitivni aerobi su bili najčešće izolirane bakterije i sve su bile pokrivene specifičnim antibioticima, ordiniranim prije skupljanja uzoraka. Alergija je bila prisutna u 20% CRSwNP pacijenata te je kod njih nađena značajno smanjena kvaliteta života u usporedbi sa kontrolnom grupom i grupom nosne polipoze bez alergije. Značajno učestaliji dominantni simptomi u ovih pacijenta su bili kašalj, frustracija i iritacija. Sukladno ovim rezultatima je i objektivni endoskopski nalaz po Malmu koji pokazuje značajno naglašeniju nosnu polipozu u pacijenata sa alergijom.