

Influence of asthma on quality of life and clinical characteristics of patients with nasal polyposis

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Abstract Recent studies have evidenced that nasal polyposis (NP) may lead to significant limitations in physical, emotional and social aspects of life of the affected patients. The study is aimed to investigate the influence of asthma on quality of life (QoL), intensity of symptoms, endoscopic and computerized tomography (CT) sinus findings in patients with NP. The cross-sectional study included 88 adult patients with NP out of whom 35 (39.8 %) were asthmatic while 53 (60.2 %) were non-asthmatic. QoL is assessed based on Short Form-36 Health Survey (SF-36) questionnaire, while symptom intensity was presented using visual analogue scale (VAS). The objective finding is presented as endoscopic and CT score. Comparison of individual symptom intensity, total score and major symptom score failed to evidence any statistically significant difference between the groups. Minor symptom score which include intensity of headache, fetor ex ore, fatigue/malaise, dental pain, cough, pressure/fullness in the ears and fever was higher in the group with asthma ($p < 0.05$). Comparison of scores according to SF-36 domains, as well

as summary scores for physical and mental health did not reveal statistically significant difference between the observed groups. Mean value of the endoscopic score in the group with asthma was 8.57 ± 2.22 , being 8.38 ± 1.93 in the group without asthma ($p > 0.05$). Mean value of the CT score in the groups with and without asthma was 20.37 ± 4.34 and 17.47 ± 4.75 , respectively ($p < 0.01$). Asthma has no influence on QoL and endoscopic findings of patients with NP, however it influences minor symptom score and CT findings.

Keywords Nasal polyposis · Asthma · Quality of life

Introduction

Nasal polyposis (NP) is a chronic inflammatory disease of the nasal and sinus mucosa leading to protrusion of edematous polyps in the nasal cavity [1]. NP is considered to be a subgroup of chronic rhinosinusitis and it frequently develops within different diseases such as asthma, aspirin intolerance and cystic fibrosis. According to some studies, prevalence of asthma among the NP patients is 45 % [2]. Recent studies have evidenced that NP may lead to significant limitations in physical, emotional and social aspects of life of the affected patients [3, 4]. Therefore, in addition to clinical measurements of the intensity of the disease based on symptoms, endoscopic and computerized tomography (CT) sinus findings, measurement of health-related quality of life (QoL) also represents an important additional aspect in global assessment of NP patients. Some authors proved Short Form-36 Health Survey (SF-36) questionnaire to be valid and reliable for assessment of QoL of NP patients [3, 4]. Only a few studies dealing with investigation of the influence of asthma on the QoL,

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intensity of symptoms and CT findings in NP patients have been published so far in the literature.

The study is aimed to investigating influence of asthma on QoL, symptom intensity, endoscopic and CT findings in NP patients.

Materials and methods

Study population

The cross-sectional study is carried out at the Clinic of Otorhinolaryngology and Maxillofacial Surgery, Clinical Center of Serbia in Belgrade in the period from December 2010 to December 2011. The study included 88 consecutive adult patients (≥ 18 years) with NP who were candidates for surgical treatment using functional endoscopic sinus surgery (FESS) after failure of the medicamentous treatment. Diagnosis of NP was established based on medical history, anterior rhinoscopy, endoscopic examination of the nose and CT findings on the paranasal sinuses. The study was approved by the Ethics Committee of the Faculty of Medicine, University of Belgrade and informed consents for surgical treatment and participation in the study were obtained from all the patients.

Inclusion criteria were the following: bilateral nasal polyposis detected upon anterior rhinoscopy or nasal endoscopy, bilateral opacification of the paranasal sinuses on CT scans and postoperative histopathological verification of the nasal polyposis. Exclusion criteria were the following: unilateral nasal polyposis, antrochoanal polyp and histopathological verification of the neoplasm.

Depending on the presence or absence of the associated asthma, all the patients were divided in two groups: patients with NP and asthma and patients with NP without asthma.

Subjective measurements and QoL

Based on the recommendations of the Task Force on Rhinosinusitis, subjective symptoms of the patients were divided to major and minor factors [6]. Major factors were the following: nasal obstruction, nasal/postnasal secretion, facial pain/pressure, facial congestion/fullness and hyposmia. Minor factors were the following: headache, malaise/fatigue, fetor ex ore, cough, dental pain, pain/pressure/fullness in the ears and fever. Intensity of each symptom was assessed by the patients themselves using visual analogue scale (VAS) with values ranging from 0 to 10, with higher value designating more intensive symptoms. Scores for minor symptoms, major symptoms and total symptom score were obtained by summation of the individual symptom intensity.

QoL is presented by general health questionnaire SF-36 completed by patients themselves. The questionnaire included 36 questions and it was designed to measure eight major health domains, including: physical function (PF), physical role (RP), body pain (BP), general health (GH), vitality (VT), social function (SF), emotional role (RE) and mental health (MH). Using certain methodology, scores for domain scales with their values ranging between 0 and 100 were obtained. Based on domain scales summary scales for physical (PCS) and mental health (MCS) were obtained [7, 8].

Objective measurements

All the patients were examined by the same otorhinolaryngologist and in addition to routine anterior rhinoscopy, endoscopic examination of the nose using 4.0 mm rigid endoscope at the angle of 0° and 30° was also performed. The finding was represented through endoscopic score according to recommendations given by Lund and Kennedy [9]. Using a three-stage scale, the following elements were graded: polyps (0, absent; 1, confined to middle meatus; 2, beyond the middle meatus), secretion (0, absent; 1, clear and thin; 2, thick and purulent), edema, crusts and adhesions (0, absent; 1, mild; 2, severe). Each side of the nose is separately assessed and their score represent the total endoscopic score.

All the patients underwent preoperative CT examination of the paranasal sinuses in two planes, coronal and axial, with 3 mm section intervals. The findings are presented through CT score based on recommendations given by Lund and Mackay [10]. CT findings were evaluated by the same radiologist who had no insight into other clinical characteristics of the patients. Maxillary, anterior and posterior ethmoid, frontal and sphenoid sinuses were graded using three-stage scale (0, no abnormality; 1, partial opacification; 2, total opacification), while ostiomeatal complex was graded using two-stage scale (0, not obstructed; 2, obstructed). Each side of the nose is separately evaluated with their score representing total CT score. Higher values of the endoscopic and CT scores designate higher intensity of the disease.

Statistical analysis

All statistical analyses were performed in SPSS 12.0 (SPSS Inc., Chicago, IL) statistical package. Results were presented as frequency, percent and mean $\pm$ SD. The χ^2 , Mann–Whitney *U* test and *t* test were used to compare the two groups. All *p* values less than 0.05 were considered significant.

Table 1 Characteristics of patients with NP and objective findings (mean $\pm$ SD)

	NP with asthma (<i>n</i> = 35)	NP without asthma (<i>n</i> = 53)	<i>p</i> value
Age	51.3 $\pm$ 12.7	46.3 $\pm$ 15.1	0.113
Males/females ^a	15/20	38/15	0.007
Allergy ^b	15 (28.3 %)	17 (48.6 %)	0.053
Aspirin sensitivity ^b	3 (5.7 %)	16 (45.7 %)	<0.001
Number of symptoms	7.26 $\pm$ 2.34	6.96 $\pm$ 2.12	0.598
Duration of symptoms (years)	12.57 $\pm$ 8.89	7.91 $\pm$ 8.30	0.002
Endoscopic score	8.57 $\pm$ 2.22	8.38 $\pm$ 1.93	0.518
CT score	20.37 $\pm$ 4.34	17.47 $\pm$ 4.75	0.003

^a Number of patients^b Number of patients (%)**Table 2** Intensity of major and minor symptoms according to groups and scores (mean $\pm$ SD)

	NP with asthma (<i>n</i> = 35)	NP without asthma (<i>n</i> = 53)	<i>p</i> value
Major			
Nasal obstruction	7.46 $\pm$ 1.93	8.19 $\pm$ 1.74	0.075
Nasal/postnasal secretion	6.77 $\pm$ 3.02	6.09 $\pm$ 3.02	0.265
Facial pain/pressure	2.66 $\pm$ 3.37	2.34 $\pm$ 2.60	0.924
Facial congestion/fullness	3.34 $\pm$ 3.36	3.77 $\pm$ 3.46	0.566
Hyposmia	8.60 $\pm$ 2.74	8.19 $\pm$ 2.43	0.080
Minor			
Headache	2.69 $\pm$ 3.04	2.40 $\pm$ 3.09	0.527
Fetor ex ore	1.60 $\pm$ 2.30	1.53 $\pm$ 2.43	0.727
Fatigue/malaise	4.71 $\pm$ 3.54	4.00 $\pm$ 2.92	0.293
Dental pain	0.63 $\pm$ 1.39	0.64 $\pm$ 1.69	0.478
Cough	3.20 $\pm$ 3.53	2.32 $\pm$ 2.91	0.292
Pressure/fullness in the ears	3.00 $\pm$ 3.04	2.15 $\pm$ 2.86	0.146
Fever	0.66 $\pm$ 1.62	0.49 $\pm$ 1.35	0.600
Major score	28.83 $\pm$ 8.58	28.58 $\pm$ 8.03	0.969
Minor score	16.49 $\pm$ 10.11	13.53 $\pm$ 10.81	0.045
Total score	45.31 $\pm$ 16.12	42.11 $\pm$ 15.97	0.227

Results

The study included total of 88 adult NP patients averagely aged 48.4 ± 14.4 years (range 18–78 years). Asthma was

Table 3 SF-36 domain scales and summary scales (mean $\pm$ SD)

	NP with asthma (<i>n</i> = 35)	NP without asthma (<i>n</i> = 53)	<i>p</i> value
PF	71.71 $\pm$ 20.18	77.17 $\pm$ 17.02	0.207
RP	44.29 $\pm$ 41.16	56.13 $\pm$ 43.55	0.215
BP	64.71 $\pm$ 24.60	72.57 $\pm$ 24.66	0.124
GH	57.37 $\pm$ 17.56	59.72 $\pm$ 18.92	0.560
VT	58.29 $\pm$ 22.26	56.98 $\pm$ 19.34	0.771
SF	68.09 $\pm$ 20.63	67.91 $\pm$ 23.24	0.805
RE	60.00 $\pm$ 41.11	59.13 $\pm$ 43.21	0.960
MH	67.31 $\pm$ 21.44	64.75 $\pm$ 22.79	0.602
PCS	59.14 $\pm$ 20.71	64.43 $\pm$ 19.38	0.226
MCS	62.20 $\pm$ 20.26	61.72 $\pm$ 20.79	0.914

diagnosed in 35 (39.8 %) patients. Characteristics of NP patients with and without asthma are presented in Table 1. The table reveals absence of any significant difference between the observed groups with respect to their age, however statistically significant difference between the observed groups was evidenced in distribution of patients according to their gender. Allergy and aspirin intolerance were more frequent in patients with NP and asthma, but no significant differences between the groups for allergy. No difference was found between the observed groups related to number of symptoms, however duration of symptoms was considerably longer in NP group with asthma. Endoscopic score values were similar in both groups, while CT score was significantly higher in the groups with NP and asthma.

Comparison of mean values of intensity of individual symptoms, total score and major symptom score revealed no statistically significant difference between the groups. Comparison of mean values of minor symptom score evidenced statistically significant difference between the groups (Table 2).

Comparison of the mean values of SF-36 domain scales and summary scales for physical and mental health, evidenced no statistically significant difference between the observed groups (Table 3).

Discussion

Most of the earlier studies dealing with chronic rhinosinusitis are related to clinically heterogenous groups of patients, including the patients with and without nasal polyps. Additionally, intensity of symptoms is generally represented by the total score that includes major and minor symptoms of different intensity and clinical significance. For the above reasons, we have decided to observe

the group of patients with NP and investigate whether concomitant presence of asthma has additional adverse influence on intensity of individual symptoms, symptom scores and QoL.

Our study confirmed the fact that nasal obstruction, nasal secretion and hyposmia are dominant symptoms of NP based on their intensity. As we expected, nasal secretion and hyposmia were more prominent in the group of NP patients with asthma. Interestingly, degree of nasal obstruction was higher in the group of NP patients without asthma. Facial pain and facial congestion were significantly less prominent in comparison to other major symptoms. Alobid et al. [4] evidenced in their study on 130 patients with NP that nasal obstruction and hyposmia were significantly more prominent in patients with associated asthma. Our investigation evidenced no adverse influence of asthma on intensity of individual major symptoms, that is, no statistically significant difference in intensity of any of the observed symptoms was evidenced between the groups. Generally, insufficient attention is paid to minor symptoms in the literature, however the ongoing study revealed that some of them may be potentiated by the associated asthma and thus, owing to their intensity they may have the same clinical significance as individual major symptoms. Fatigue, malaise and cough are minor NP symptoms, however, on the other hand they represent significant symptoms in other lower respiratory tract diseases. Therefore, it may be expected to certain extent for them to be more prominent in the group of NP patients with asthma. Fullness or pressure sensation in the ears are also more prominent in this group of patients, most probably as a result of even higher degree of inflammation, which is clinically reflected in greater polyp volume as well as significant CT findings. Except for headache, the remaining minor symptoms were practically clinically irrelevant. Although statistically significant difference was not evidenced in intensity of any of the individual minor symptoms between the groups, minor symptom score was found to be higher in NP patients with asthma. Both groups of patients are characterized by broad spectrum of subjective complaints of different intensities and possible influence on QoL, while in the group of NP patients with asthma, duration of symptoms was considerably longer.

Radenne et al. [3] showed in their prospective study that general questionnaire SF-36 was highly reliable in detection of limitations related to everyday activities among NP patients. They stressed that NP has greater influence on mental than on physical health, while QoL was the lowest within the domains of general health, vitality and body pain. In our study, the lowest average values of the QoL score were also within SF-36 domains of general health and vitality, however also within domains of limitations related to physical and emotional health. QoL of NP patients with asthma was lower in comparison to patients without asthma

in domains of limitations due to physical health and body pain. However, in our study, no statistically significant difference in QoL was evidenced with respect to the above two and the remaining domains of health between the observed groups. Alobid et al. [4] showed that associated asthma in NP patients contributes to significantly lower QoL in SF-36 domains of limitations due to physical health, body pain and vitality. They also reported that NP and asthma have greater negative influence on mental than on physical health, which was not demonstrated in our study. Although both studies are dealing with QoL of patients with high degree NP, scores for mental and physical health were averagely somewhat higher in our study, which corresponds to higher QoL of our subjects. Radenne et al. [3] evidenced that QoL of NP patients is considerably lower in comparison to patients with perennial allergic rhinitis in almost all SF-36 domains. Negative influence of asthma on QoL of NP patients was also evidenced in all domains, except for general health, mental health and social function. The former indicated possible correlation of SF-36 score with pulmonary function. However, subsequent evaluation carried out averagely 10 months after conservative and/or surgical treatment of NP revealed significant improvement of symptoms and QoL without any significant change in pulmonary function. The authors concluded that improvement of QoL was primarily associated with improvement of the nasal symptoms. Comparing their results with those reported by Bousquet et al. [11] the same authors concluded that QoL of patients with asthma without nasal polyps was higher in comparison to those with NP without asthma. The former points out to the fact that NP has greater influence on QoL than asthma. Riccioni et al. [5] evidenced on their study on 89 patients that NP had no influence on increase of bronchial hyperreactivity and QoL of asthma patients as assessed based on Asthma Quality of Life Questionnaire (AQLQ). Our investigation did not reveal additional negative influences of asthma on QoL of NP patients estimated based on general SF-36 questionnaire. It appears that intensity of symptoms and QoL are primarily influenced by inflammation of the nasal and sinus mucosa and presence of nasal polyps. In Table 4. we summarized the data from the literature.

Specific questionnaires are better tools for assessment of influence of the specific symptoms on the QoL in comparison to general ones. No specific questionnaire for assessment of QoL of NP patients has been developed so far. Such a questionnaire should represent more precisely spectrum and intensity of symptoms along with their influence on daily activities, sleep disorders and other practical problems.

Earlier studies revealed that patients with chronic rhinosinusitis and nasal polyps have more intensive disease as assessed based on the objective methods of the endoscopic and CT scores in comparison to patients with chronic rhinosinusitis without nasal polyps [12, 13]. Analyzing

Table 4 Summary of the literature data

Study	Number of patients	Group of patients	QoL instrument	Results
Radenne et al. [3]	49	NP with asthma vs. NP without asthma	SF-36	Significant difference for RP, BP, VT, PF and RE
Alobid et al. [4]	130	NP with asthma vs. NP without asthma	SF-36	Significant difference for RP, BP and VT
Riccioni et al. [5]	89	NP with asthma vs. asthma	AQLQ	No significant difference for all domains

clinically heterogeneous group of patients with chronic rhinosinusitis, some authors emphasize higher values of the endoscopic and CT scores in patients with asthma and aspirin intolerance, however it should be kept in mind that frequency of polyps is greater within the subgroups [12, 13]. It was interesting to investigate whether the presence of asthma has any additional negative influence on intensity of disease of NP patients as assessed by objective methods of nasal endoscopy and CT findings. Endoscopic score values obtained in our study were similar between the observed groups, while CT score values were significantly higher in NP patients and asthma. The former is most probably the consequence of higher degree of inflammation of the nasal and sinus mucosa, which was demonstrated by Jankowski et al. [14] in their study. Similar results were reported by Alobid et al. [4], however, instead of endoscopic score, they observed only size of the polyps in patients with and without asthma. Using four-stage scale, they have also evidenced that polyp size was averagely similar in the both groups of patients. The same authors also stressed that aspirin intolerance has no additional negative influence on intensity of symptoms, QoL, polyp size and CT score in patients with NP and asthma. Staikuniene et al. [15] concluded that chronic rhinosinusitis with nasal polyps represents the most severe form within respiratory tract diseases. It is characterized by more advanced age, longer duration of symptoms and higher CT score, which is consistent with our study.

In conclusion, our results suggest that asthma has no influence on intensity of individual symptoms and QoL of NP patients, however it may potentiate intensity of individual minor symptoms, which results in significantly higher minor symptom score. Total endoscopic score is not significantly higher in patients with asthma, however total CT score is significantly higher in NP patients with asthma.

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