

## Correlation of Preoperative Sinusitis Patients' Characteristics with Final Diagnostic Findings

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Received: 21 Oct. 2012; Received in revised form: 22 Jan. 2013; Accepted: 15 Feb. 2013

**Abstract**—Chronic rhinosinusitis (CRS) is a common disease which is usually diagnosed clinically, considering the combination of natural history, physical examination and imaging studies. This study aimed to evaluate the clinical value of routine postoperative histopathologic examination (POHE) in patients with a clinical diagnosis of chronic rhinosinusitis with polyposis (CRSWP), or without polyposis (CRSWOP). One hundred of patients with clinically approved CRSWP and CRSWOP were enrolled in this study. All patients underwent complete physical examination, scoring paranasal sinuses involvement by Lund-Mackay (LM) CT scoring scale, determining the extent of polyposis by Stumberger's endoscopic classification, and assessing health related quality of life by Sinonasal Test 22 (SNOT22) questionnaire. After FESS, histopathologic results were compared with preoperative clinical diagnosis. Among our patients, 65% were male, and the rest of them were female. Also, 66% of them suffered from CRSWP, and the rest of them were CRSWOP. LM CT score and SNOT22 score was  $36.62 \pm 12$ ,  $17.11 \pm 6$ , and  $43.62 \pm 20$  respectively. Only in one of patients with CRSWP, POHE was other than what was expected preoperatively (adenoid cystic carcinoma). In all other cases, POHE was well correlated with preoperative clinical diagnosis. HRQOL was better in males, absence of septal deviation and CRSWOP ( $P < 0.05$ ). Para nasal sinuses involvement in preoperative CT was more severe in the presence of eosinophil in POHE ( $P = 0.008$ ) and in patients with class 3 Stumberger's classification ( $P < 0.001$ ). This study suggested preoperative clinical diagnosis of CRS considering the combination of natural history, physical examination and imaging studies can be accurate, and POHE is indicated only in suspicious cases.

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*Acta Medica Iranica*, 2013; 51(8): 525-529.

**Keywords:** Sinusitis; Pathology; CT scan; Pathology; SNOT22

### Introduction

Rhinosinusitis is a common disease causes a variety of morbidities and economic problems. (1) The chronic rhinosinusitis (CRS) is suspected when primary and secondary symptoms (such as nasal obstruction, nasal discharge, facial pain, sneezing and ...) (2) lasts for more than 3 months (3,4). The diagnosis of CRS is based on a combination of history, physical examination and imaging studies (5) including CT scan and endoscopy (6). Regarding the multivariate causation of CRS (3) and some neoplasms and systemic diseases which may mimic symptoms of CRS (7), we were interested to show the role of the post endoscopic sinus surgery histologic findings in confirming the clinical diagnosis of CRS.

Until now, many investigations have been done to show the clinical importance of examination of routine

postoperative material in patients who didn't have preoperative diagnosis other than paranasal sinusitis, and unilateral or bilateral polyposis. Some studies suggested histopathologic examination of postoperative specimens is only indicated when unilateral polyposis and opacification, or intraoperative suspicious of tumor is present or when additional diagnostic information is needed (8,9). Some other studies recognized that there was a good correlation between clinical and histopathologic diagnosis of nasal and paranasal polyposis and sinusitis, and introduced a questionable value for routine post-operative histopathological examination (POHE), in patients whom preoperational occult pathology were not suspicious (10,1). In contrast, some other studies considered a high clinical value for POHE in patients who underwent endoscopic treatment for paranasal sinusitis, regarding the complex evaluation of inflammation and appropriate anti-inflammatory

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## Preoperative sinusitis and diagnostic findings

therapy (1). Some other homogenous studies suggested that the preoperative clinical diagnosis of CRS or chronic rhinosinusitis with polyposis (CRSWP) could be inaccurate (5) and postoperative examination of specimens was more cost-effective in comparison with medico-legal cost occurred as a result of misdiagnosis in patients treated surgically for nasal polyposis (12).

Therefore, the results of previous investigations are controversial, mandate further investigations. This study aimed to show the clinical significance of routine POHE in patients with preoperative clinical diagnosis not other than chronic rhinosinusitis with polyposis (CRSWP) or without polyposis (CRSWOP) who were the candidate for functional endoscopic sinus surgery (FESS).

## Materials and Methods

This study as an interventional prospective study was performed in two tertiary referral centers (Imam Khomeini and Amir-Alam hospital) between 2011 and 2012.

### Study subjects

participants in this study were selected among patients attending the rhinology clinic, complaining from primary (nasal obstruction, nasal discharge, facial pain and loss of sense of smell) and/or secondary (cough, sneezing, sore throat and voice changes, epiphora, fever) symptoms of rhinosinusitis who resistant to maximal medical treatment (6 weeks of widespread antibiotic (Tab Co-Amoxiclav 625mg TDS) therapy in addition to nasal corticosteroid (Nasal Spray Fluticasone 1 puff BD), Mucolytic (Guaifenesin 400mg QID), and nasal saline douche) who were candidates for endoscopic sinus surgery were selected.

### Inclusion criteria

Diagnosis of the CSWP was based on history, imaging, and endoscopic findings; selection of sinusitis patients was conducted after at least 6 weeks of maximal medical treatment, if they had resistant symptoms and also sinuses involvement in CT scan.

### Exclusion criteria

None of our patients suffered from systemic diseases, such as sarcoidosis, Wegner granulomatosis, cystic fibrosis or psychological problems that could influence their QOL. None of them was on medications which interfered with postoperative treatment.

Moreover, pregnant patients, patients younger than 18 years, immunodeficient patients, and individuals with

neoplasia or fungal rhinosinusitis were excluded from this study.

Furthermore, one patient who did not participate in the follow-up evaluation was excluded from the study. The characteristics of the patient who was lost to follow-up did not affect the final outcome and their characteristics also were not more different than others.

### Ethical approval

The protocol of this study was approved by the Institutional Review Board of the Tehran University of Medical Sciences. All aspects of the study were conducted according to the Declaration of Helsinki. All participants gave informed consent for participation in the study.

### Variables measurement

All eligible participants underwent complete nasal examination, nasal and paranasal CT scan study and nasal endoscopy, pre-operatively.

Stammberger's classification was used to grade the extent of the polyposis (I= polyps limited to the middle meatus, II=polyps partially occupying the nasal space but not reaching the inferior meatus, and III = polyps reaching the inferior meatus) (13,14). Because of the small number (4) of patients with score 1, it was ignored in statistical analysis.

We used Lund-Mackay (LM) classification system to score the images before the operation (14-16).

severity of symptoms and health related quality of life (HRQOL) was assessed using sino-nasal outcome test 22 (SNOT22) questionnaire (17).

After endoscopic sinus surgery, all obtained specimens were examined with the same pathologist, noticing the presence of underlying occult pathology other than what is expected in CRS.

### Statistical analysis

Demographic data were analyzed via Pearson correlation test, Chi-Square test and t-test using the Statistical Package for the Social Science 20 (SPSS 20). A p value of less than 0.05 considered significant. Data are presented as mean  $\pm$  standard deviation, minimum, maximum, total count and percentage.

Statistical calculation for the volume required for sampling done via the following method:

$$n = \frac{Z_{1-\alpha/2}^2 pq}{d^2}$$

Alfa=	0.05	Z <sub>1-<math>\alpha</math>/2=</sub>	1.961150776
d=	0.03		
p=	0.03	n=	100

## Results

Regarding the inclusion and exclusion criteria, 100 patients with CRSWP or CRSWOP were enrolled in this investigation. Descriptive analysis of demographic data, were shown in tables 1 and 2.

Only one of 100 participants (1%) enrolled in this study had post-operative histopathologic diagnosis different from preoperative clinical diagnosis. pre and post-operative diagnosis was CRSWP and adenoid cystic carcinoma respectively.

Mean SNOT22 score showed a significant difference between male and female (39.29, 51.66 respectively;  $P=0.003$ ), presence or absence of septal deviation (48.08, 35.69 respectively;  $P=0.002$ ) and CRSWP or CRSWOP (47.18, 36.71 respectively;  $P=0.012$ ) but not between score 2 and 3 of Stammberger's classification in patients with preoperative diagnosis of CRSWP ( $P=0.24$ ).

**Table 1.** Descriptive analysis of qualitative characteristics.

variables		Total count (%)
Gender	Male	65 (65)
	Female	35 (35)
Clinical diagnosis	CRSWOP	34 (34)
	CRSWP	66 (66)
Histopathologic Diagnosis	CRSWOP	34 (34)
	CRSWP	65 (65)
	ACC	1 (1)
eosinophil in specimen	Negative	37 (37)
	Positive	63 (63)
Extent of <sup>†</sup> polyposis	I	4 (4)
	II	36 (36)
	III	26 (26)
SD	Yes	64 (64)
	No	36 (36)
Alignment of SD	Right	35 (35)
	Left	29 (29)

† Stammberger's classification; CRSWOP (chronic rhinosinusitis without polyposis); CRSWP (chronic rhinosinusitis with polyposis); ACC (adenoid cystic carcinoma); SD (septal deviation)

**Table 2.** descriptive analysis of quantitative characteristics.

Variables	Min	Max	Mean±SD
Age	15	65	36.62±12.087
SNOT22	10	100	43.62±19.895
LM classification scores	4	24	17.11±6.281

SNOT22 =Sino-Nasal Outcome Test 22, LM= Lund-Mackay, SD= standard deviation

There was a poor correlation coefficient between SNOT22 score and age of patients or severity of paranasal sinuses involvement (LM CT scan score) (0.123 and 0.148 respectively).

The presence or absence of eosinophil in POHE had no significant relationship with gender, preoperative clinical diagnosis (CRSWOP; CRSWP), and extent of polyposis (I, II, III classes of Stammberger's classification) ( $P=0.64$ ;  $P=0.53$ ;  $P=0.38$ ; chi-square respectively). There was a significant relationship between the presence of eosinophil in POHE and presence of septal deviation ( $P<0.0005$ ; chi-square). There were no significant difference in average of age and SNOT 22 score between patients with the presence or absence of eosinophil POHE ( $P>0.05$ ). Patients with the presence of eosinophil in POHE, had higher mean LM CT scan score (18.41) in compare with the absence of eosinophil (14.91,  $P=0.008$ ).

There was no significant difference in mean age of patients with CRSWP or CRSWOP (39.97, 36 years respectively;  $P=0.12$ ), and there was no significant association between gender and polyposis ( $P=0.353$ , chi-square).

The mean value of total Lund-Mackay score in patients with class 2 Stammberger's classification was 16.9 while in patients with class 3 was 21.71 ( $P<0.001$ ), but regarding the septal deviation and gender there was no significant difference (0.542 and 0.483 respectively). This study showed poor correlation coefficient (0.23) between LM score and age. Patients with CRSWP had more severe paranasal sinus involvement in comparison with patients with CRSWOP (mean Lund-Mackay score 18.67, 14.35 respectively;  $P=0.001$ ).

There were no significant association between the extent of polyposis in endoscopic examination (Stammberger's classification) and gender ( $P=0.233$ , chi-square) or septal deviation ( $P=0.410$ , chi-square).

There was no significant relationship between septal deviation and the presence or absence of polyposis ( $P=0.439$ , chi-square).

## Discussion

This study determined clinical diagnosis of CRS considering symptoms, imaging study (paranasal sinus CT scan) and nasal endoscopy was accurate, and POHE had little clinical value in confirmation of diagnosis in this circumstances. Some other similar studies have revealed a good correlation between pre and post-operative diagnosis of CRSWOP and CRSWP, but POHE remained still indicated in unilateral polyposis

and some other suspicious clinical conditions (8,10,11). In contrast to our study, Busaba *et al.*, in a retrospective study on 380 patients with CRSWP and, CRSWOP found the preoperative clinical diagnosis of CRSWOP or CRSWP could be inaccurate (5). Some other authors have suggested routine POHE of all nasal polyps should be done to decrease medico-legal cost complications of misdiagnosis (12) and to evaluate inflammation type more precisely (18).

Significant consistency of septal deviation with the presence of eosinophil in PSHPE suggested that the anti-allergic therapy in conjunction with surgical repair of septal deviation could be treatment of choice in patients with septal deviation and CRS.

According to this study, female gender, presence of septal deviation and polyposis in CRS could worsen HRQOL (SNOT-22 test) and presence of these characteristics mandate more precise therapeutic attentions. Similarly, Buamann *et al.*, reported that gender had a significant impact and age didn't influence on HRQOL (using German Adapted Version of SNOT20 questionnaire) (19). Nair et al, same as our study found patients with CRSWP were more symptomatic in compare with CRSWOP (20). Similar to some other studies, there was a poor association between severity of paranasal sinuses involvement (LM CT score) and HRQOL (SNOT-22 test) (5,15,16) (Basu et al and Ryan et al considered SNAQ and SNOT20 questionnaire for assessing HRQOL in their study respectively).

Similar to Ryan et al study (using SNOT20 questionnaire and Lund-Kennedy endoscopy scoring scale), and some other studies, our study recognized the extent of polyposis (Stammberger's classification) didn't have a significant impact on HRQOL (15), but there was a strong correlation between severity of paranasal sinuses involvement (LM CT scoring scale) and extent of polyposis (4,15,20).

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