

Relationship between the endoscopic, radiological, and operative findings in sinonasal polyposis

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Received 2 August 2015

Accepted 17 September 2015

The Egyptian Journal of Otolaryngology
2016, 32:147–151

Objectives

The aim of the present study was to assess the correlation between preoperative endoscopic, radiological, and operative findings of sinonasal polyposis.

Materials and methods

A total of 30 patients with sinonasal polyposis underwent preoperative endoscopic assessment using the Meltzer staging system, radiologic evaluation using the Lund–Macky staging system, and operative evaluation during functional endoscopic sinus surgery using the Meltzer staging system, and findings in each sinus (polyp, fungal mud, mucous, and normal) were recorded.

Results

There was a highly significant positive correlation between preoperative computed tomography (CT) and operative findings [right (RT) side=0.731 and left (LT) side=0.814, $P<0.001$]. There was also a highly significant positive correlation between the preoperative endoscopic and operative staging scores (RT side=0.892 and LT side=0.827, $P<0.001$). Furthermore, there was a highly significant positive correlation between preoperative endoscopic and CT staging scores (RT side=0.768 and LT side=0.782, $P<0.001$).

Conclusion

No single procedure can be sufficient in accurately diagnosing nasal polyposis, and both the preoperative CT and the preoperative endoscopic examination are complementary to each other.

Keywords:

computed tomography, functional endoscopic sinus surgery, preoperative assessment, sinonasal polyposis

Egypt J Otolaryngol 32:147–151

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1012-5574

Introduction

The history of nasal polyps goes back over 4000 years to ancient Egypt [1]. According to European paper on rhinosinusitis, chronic rhinosinusitis [with or without sinonasal polyposis (SNP)] is characterized by the presence of two or more symptoms, one of which should be nasal blockage/obstruction/congestion or nasal discharge (anterior/posterior nasal drip), or facial pain/pressure, or reduction or loss of smell for a period of greater than or equal to 12 weeks. Allergic symptoms (i.e. sneezing, watery rhinorrhea, nasal itching, and itchy watery eyes) are also to be considered. Chronic rhinosinusitis with nasal polyposis is defined as above with bilateral, endoscopically visualized polyps in the middle meatus [2]. The etiology of nasal polyposis is mainly unknown, although it has been connected with many causes like allergy, infections (bacterial and fungal), diseases associated to nasal polyps like Samter's triad, environmental pollutants, and local host factors like deviated septum [3].

Materials and methods

A total of 30 patients were recruited from the ENT Department, Kasr Al Ainy Faculty of Medicine, Cairo University, between November 2013 and June 2014. The inclusion criteria were SNP not responding to a full course of medical treatment in the form of systemic and local corticosteroids, and cases with allergic fungal sinusitis. Exclusion criteria were patients with simple chronic sinusitis (without nasal polyposis), antrochoanal polyp, patients who had previous functional endoscopic sinus surgery (FESS), or patients with complicated sinusitis. Patients presenting with a concomitant septal deviation were included in the study and listed for a combined approach. The study received ethical committee

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approval of Kasr Al Ainy College of Medicine, and all patients gave their signed informed consent.

All 30 patients underwent

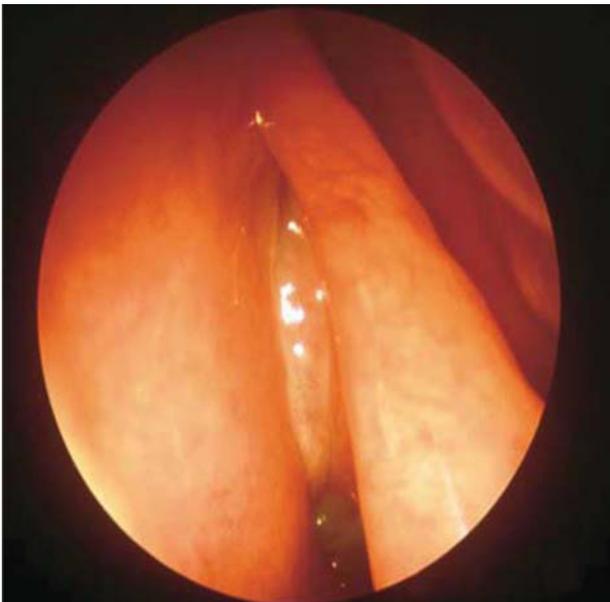
- (1) endoscopic evaluation using grading of polyp system proposed by Meltzer *et al.* [4] (Table 1 and Fig. 1),
- (2) radiological evaluation using Lund–Mackay [5] scoring system (Table 2 and Fig. 2), according to which a score of 0=no abnormality, 1=partial pacification, 2=total pacification, and 0 or 2 for the ostiomeatal complex. Thus the maximum score was 24 and each side was considered separately,
- (3) FESS: All patients underwent FESS, and the correlation was in two points.
 - (a) Endoscopic assessment using Meltzer staging system during operation.
 - (b) Specific correlation with finding of each sinus alone (polyp, fungal mud, mucous, and normal) (Fig. 3).

Data were then transferred to the statistical package of social science software program, version 21 (SPSS Inc., Chicago, Illinois, USA) to be statistically analyzed.

Data were summarized using mean and SD for quantitative variables, and frequency and percentage for qualitative ones.

Comparison of different scores as regards sex was performed using the independent sample *t*-test.

Figure 1



Right nasal cavity with a small polyp extending from the middle meatus (Meltzer 1).

Pearson or Spearman correlation coefficients were calculated to get the association between different quantitative variables.

Results

Demographic data

The present study included 14 men (46.7%) and 16 women (53.3%), ranging in age between 14 and 51 years with a mean age of 29.3±9.8 years.

Correlation between results

- (1) General correlation (Figs 4–6).
- (2) Correlation between results in each sinus (Table 3).

The most common pathology found within the maxillary sinus was polyps, which was found in 45% of the cases, followed by discharge in 25%, fungal mud in 15%, and 15% of the cases were found to have a normal sinus.

The most common pathology found within the anterior ethmoid sinus was polyps, found in 50% of the cases, followed by fungal mud in 30% of the cases, 5% of the cases had discharge, and 15% were found to have a normal sinus.

The most common pathology found within the posterior ethmoid sinus was polyps, which was found in 65% of the cases; fungal mud was found in 20% of the cases and 15% of the cases were found to

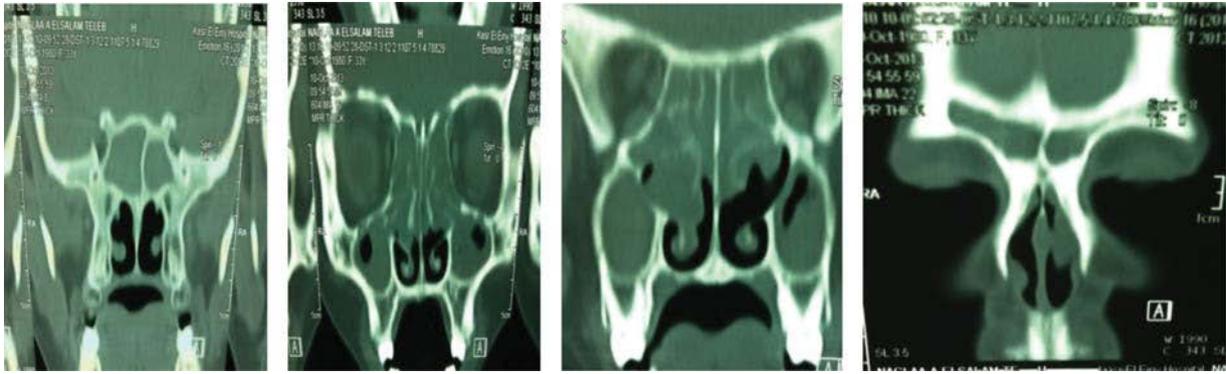
Table 1 Grading of polyps system proposed by Meltzer *et al.* [4]

0	No visible polyps seen
1	Small amount of polypoid disease confined within the middle meatus
2	Multiple polyps occupying the middle meatus
3	Polyps extending beyond the middle meatus, within the sphenoidal recess but not totally obstructing, or both
4	Polyps completely obstructing the nasal cavity

Table 2 Lund–Mackay scoring system [5]

Sinus	Left	Right
Maxillary (0,1,2)	0,1,2	0,1,2
Anterior ethmoid (0,1,2)	0,1,2	0,1,2
Posterior ethmoid (0,1,2)	0,1,2	0,1,2
Sphenoid (0,1,2)	0,1,2	0,1,2
Frontal (0,1,2)	0,1,2	0,1,2
Ostiomeatal complex (0 or 2)	0 or 2	0 or 2
Total (0–24)	0–12	0–12

Figure 2



Computed tomography nose, paranasal sinuses, coronal cut, bone window of sinonasal polyposis. Lund–Mackay score (5).

Table 3 Correlation between CT staging score and operative findings in maxillary sinus

CT Lund–Mackay score	FESS (%)				Total
	Normal	Discharge	Polyps	Fungal mud	
0	15	0	0	0	15
1	0	10	10	5	25
2	0	15	35	10	60
Total	15	25	45	15	100

CT, computed tomography; FESS, functional endoscopic sinus surgery.

Figure 3



Endoscopic view of right nasal cavity with a polyp extending from the middle meatus (Meltzer 2), but, during operative examination, polyps from sphenoethmoidal recess were found (Meltzer 3).

have a normal sinus. The frontal sinus was found to be normal in 40% of the cases, polyps were found in 30% of the cases, discharge in 15% of the cases, and fungal mud in 15%. The sphenoid sinus was found to be normal in 35% of the cases, polyps were found in 30% of the cases, followed by fungal mud in 20% and discharge in 15%.

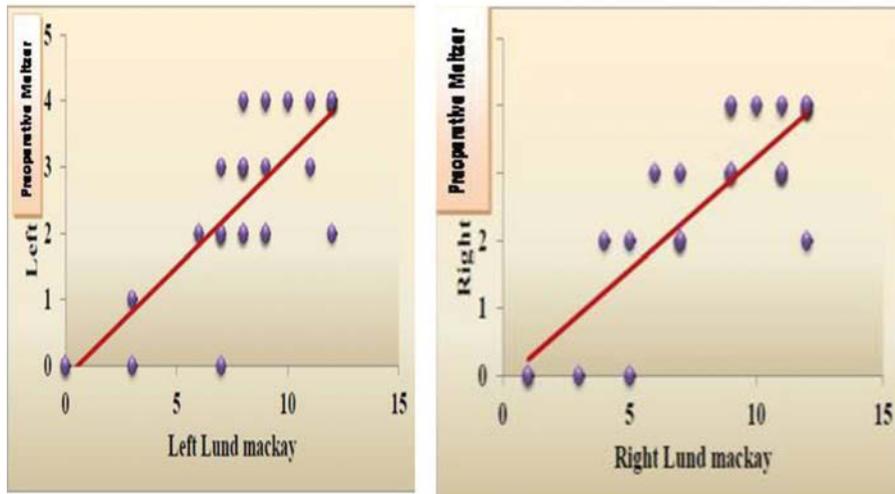
Discussion

In the present study, there was a highly significant positive correlation between preoperative computed tomography (CT) and operative findings [right (RT) side $r=0.731$ and left (LT) side $r=0.814$, $P<0.001$]. In agreement with our findings, Jiannetto and Pratt [6] and Stanojković [7] in their studies also showed a positive correlation between preoperative CT and operative findings ($r=0.791$, $P<0.001$; $r=0.831$, $P<0.001$), respectively. In addition, Zojaji *et al.* [8] and Duarte *et al.* [9], in their studies, showed the same results.

In this work, there was a highly significant positive correlation between the preoperative endoscopic and operative staging scores (RT side, $r=0.892$ and LT side, $r=0.827$, $P<0.001$). Deepthi *et al.* [10] in their study showed similar results, as they also showed a positive correlation between the preoperative endoscopic and operative staging scores ($r=0.94$, $P<0.001$). However, there was another endoscopic staging system (Lund–Mackay endoscopy staging system) used in their study. There was a highly significant positive correlation between the preoperative endoscopic and CT staging scores (RT side $r=0.768$ and LT side $r=0.782$, $P<0.001$).

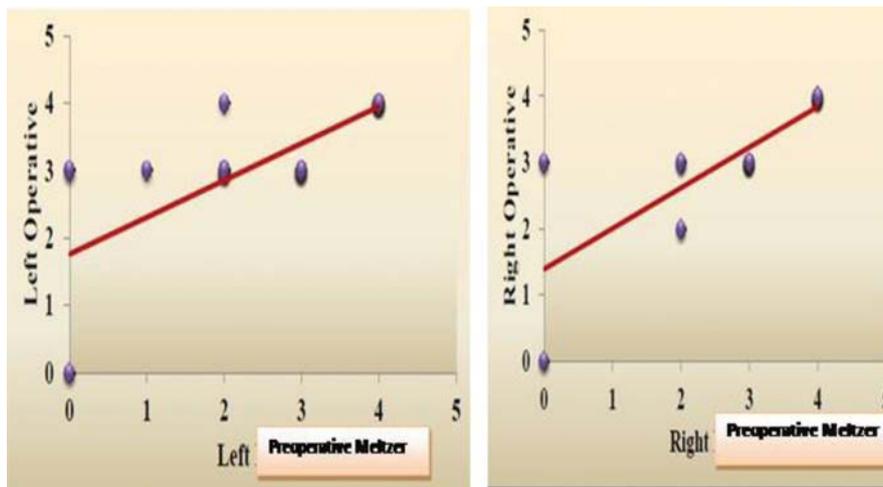
The majority of previous studies – for example, studies conducted by Casiano [11], Rosbe and Jones [12], and Deepthi *et al.* [10] – showed a high degree of

Figure 4



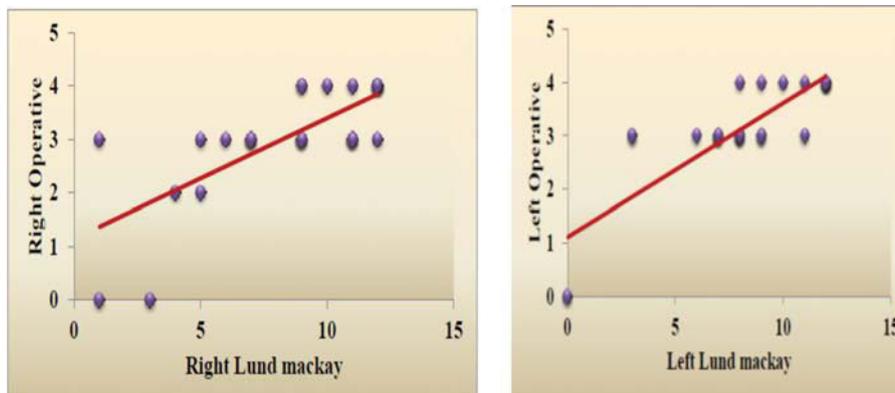
There was a highly significant positive correlation between preoperative endoscopic and Lund–Mackay staging scores with a *P* value of less than 0.001, and the (*r*) Spearman correlation coefficient was (right side=0.768 and left side=0.782).

Figure 5



There was a highly significant positive correlation between preoperative endoscopic (Meltzer) and operative staging scores with a *P* value of less than 0.001, and the (*r*) Spearman correlation coefficient was (right side=0.892 and left side=0.827).

Figure 6



There was a highly significant positive correlation between operative endoscopic and Lund–Mackay staging scores with a *P* value of less than 0.001, and the (*r*) Spearman correlation coefficient was (right side=0.731 and left side=0.814).

agreement with our results, as they also showed a positive correlation between preoperative endoscopic and CT staging scores. However, Stankiewicz [13] reported poor correlation between the preoperative endoscopic and CT staging scores. The discrepancy between these studies regarding the correlation between the preoperative endoscopic and CT staging scores could be due to co-operation of patients during endoscopic examination, quality of tools used for examination, pre-examination, preparation, and quality of CT images. In this study, the correlation between preoperative endoscopic and operative staging scores (RT side, $r=0.892$ and LT side, $r=0.827$) was slightly greater than the CT Lund–Mackay and operative staging scores (RT side, $r=0.731$ and LT side, $r=0.814$). In agreement with our results, in a study conducted by Duarte *et al.* [9], four out of 20 cases of nasal polypus were evidenced by preoperative endoscopic examination and not by CT scan, and the patients who had negative CT scan showed septal deviation, mucosa edema involving the middle meata, as well as adenoid and turbinate hypertrophy by preoperative endoscopic examination. Pizzichetta *et al.* [14], in a similar study, did not consider the CT findings in most of the studied cases to explain the symptoms of nasal obstruction, considering the endoscopic exam enough for that purpose. Preoperative endoscopic examination and CT scan can be considered complementary techniques for effective demonstration of nasal anatomy and paranasal sinuses, according to Morra *et al.* [15]. Such a statement can be added to the theory that the CT scan would be more specific for the assessment of paranasal sinuses, whereas, according to Pinheiro and Freitas [16], sinonasal endoscopy would have better accuracy to assess nasal fossa.

Contrary to our results, Deepthi *et al.* [10] found that CT Lund–Mackay and operative staging scores correlate more than does preoperative endoscopic and operative staging scores. We presume that it could be because of the difference in the used endoscopic staging systems. In the present study, Meltzer preoperative endoscopic staging system was used, whereas in the study conducted by Deepthi *et al.* [10], Lund–Mackay preoperative endoscopic staging system was used.

Conclusion

There was a highly significant correlation between the CT and the preoperative endoscopic findings with

those findings observed during the operation. The degree of correlation between the preoperative endoscopic and operative findings was slightly higher than that between the CT findings and the operative findings. In the present study, it was found that both preoperative endoscopy and CT are good preoperative indicators, but there is no single procedure that can accurately diagnose SNP, and that both the preoperative CT and the preoperative endoscopic examination are complementary to each other.

Conflicts of interest

There are no conflicts of interest.

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