Original Article

A Comparative Study of Diagnostic Nasal Endoscopy and Computed Tomography in Chronic Rhinosinusitis

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Abstract

Background: Chronic rhinosinusitis (CRS) is a common condition in medical practice. It is defined as inflammation of the mucosa of nose and paranasal sinuses, the fluids within these cavities, and/or the underlying bone that has been present with or without treatment for at least 12 weeks' duration. **Objective:** This study aimed to determine the correlation of nasal endoscopy examination and computed tomography (CT) in the early diagnosis of CRS. **Materials and Methods:** The study was carried out in outpatient Department of Otorhinolaryngology, in Rizgary Teaching Hospital in Erbil. A total of 60 patients with clinical evidence of sinonasal diseases were evaluated with nasal endoscopy and computed tomographic evaluation. Patients with previous variation of paranasal sinus anatomy due to facial trauma and former sinus surgery were rejected. Patients with history of having malignant neoplasms or congenital malformations were also excluded from the study. **Results:** Sixty patients with chronic rhinosinusitis participated in the study. Their mean age + standard deviation was 38.18 + 10.19 years, ranging from 20 to 63 years. The median was 37.5 years. The largest proportion (41.7%) of the sample aged 30–39 years old, and only 16.7% aged ≥50 years. The main symptoms of the patients were nasal obstruction (80%), ear pressure (80%), and nasal discharge (78.3%). No significant difference was detected between the two tests regarding their findings. **Conclusion:** Nasal endoscopy have sensitivity and specificity almost as good as CT scanning, and being an outpatient procedure, it may reduce unnecessary diagnostic scanning procedures.

Keywords: Chronic rhinosinusitis, computed tomography, diagnostic nasal endoscopy

Introduction

Chronic rhinosinusitis (CRS) is a common condition in medical practice. It is defined as inflammation of the mucosa of nose and paranasal sinuses, the fluids within these cavities, and/or the underlying bone that has been present with or without treatment for at least 12 weeks' duration. In 1997, a detailed definition of the syndrome was established by the Rhinosinusitis Task Force of the American Academy of Otolaryngology-Head and Neck Surgery, consisting of the major and minor diagnostic criteria.[1,2]

The impact of CRS has been well documented. It affects many people worldwide, and its prevalence is rising. Although CRS diagnosis is clinical and symptom based, it is necessary to perform further investigations as Stankiewicz and Chow showed that only 47% of the patients who were diagnosed with CRS had sinus disease on computed tomography (CT), thus leading them to re-evaluate the symptom-based definition.[3-5]

As suggested by the European Position Paper on Rhinosinusitis and Nasal Polyp (EPOS 2007 and 2012), from an epidemiological standpoint, CRS (with or without nasal polyp) in adults is defined as the presence of two or more symptoms, one of which should be either nasal blockage/obstruction/congestion or nasal discharge (anterior/posterior nasal drip): ± facial pain pressure: ± reduction/loss of smell; and symptoms must be present for more than 12 weeks.[6]

CT scan of the paranasal sinuses is regarded as the gold standard diagnostic radiological tool for CRS. Because CT scan is not commonly offered in resource poor countries, it is regularly indicated after unsuccessful medical treatment, when surgical treatment is scheduled and if there is complication.[7]

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Nasal endoscopy plays a main role in recognizing anatomical structural variations and mucosal changes of middle meatus and osteomeatal complex producing drainage block leading to CRS both in patients with normal CT and in patients with abnormal scans.[8]

Nevertheless, both nasal endoscopy and CT scan are implemented to begin diagnosis in routine practice since the relative values of each have not been well established.

Nasal endoscopy is obligatory clinical examination in Otolaryngology, more so in patients with sinonasal symptoms. Moreover, it allows a detailed examination of the nasal and sinus cavities not possible by standard examination such as anterior rhinoscopy using head light or head mirror.[9]

CT scan offers information on anatomical variations, sinus status, and complications.[10] To perform a CT scan simply to confirm CRS poses the unacceptable risk of additional exposure to ionizing radiation, not to mention the additional cost of the procedure.[11] The current study was conducted to assess the precise diagnosis in respect to its cost in comparison to CT when deciding about sinonasal disease.

Materials and Methods

This prospective study was conducted in the outpatient Department of Otorhinolaryngology, in Rizgary Teaching Hospital in Erbil, Iraq, from August 2017 to August 2018. A total of 60 adult patients with clinical evidence of sinonasal diseases were evaluated with nasal endoscopy and computed tomographic evaluation. The study included those patients who were unoperated and clinically diagnosed and satisfy the definition of CRS with or without nasal polyposis in the age group 20–60 years irrespective of sex.

All the patients were enrolled in detailed clinical history particularly for nasal symptoms, general examination, and otolaryngological examination. Thereafter, they were subjected to diagnostic nasal endoscopy and CT. In the present study, diagnostic nasal endoscopy was done under local anesthesia using fiberoptic nasendoscopy (lidocaine nasal spray 4% for 2 min was used as a local anesthesia before examination). However, rigid endoscopy was not used for diagnosis during this study. It was made to obtain the information regarding purulent secretions, polypoidal mucosa in middle meatus, and anatomical variations.

Patients with previous variation of paranasal sinus anatomy due to maxillofacial trauma, former sinus surgery, and history of having malignant neoplasms or congenital malformations were excluded from the study.

Approval for the study was obtained from Ministry of Higher Education and Scientific Research. Written informed permission was taken before registration of patients into the study.

Results

Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 22, IBM corporation, USA). Frequencies and percentages were calculated for the categorical variables. Mean and the standard deviations (SDs) were calculated for the numerical variables. McNemar test was used (in the 2 × 2 table) when the results of endoscopy were compared with the CT scan findings (of the same patients), as in Table 1.

A total of 60 patients with chronic rhinosinusitis participated in the study. Their mean age + SD was 38.18 + 10.19 years, ranging from 20 to 63 years. The median was 37.5 years. The largest proportion (41.7%) of the sample aged 30–39 years old, and only 16.7% aged ≥50 years. The majority (73.3%) of the sample were males. The male: female ratio was 2.75:1 as shown in Table 1.

The main symptoms of the patients were nasal obstruction (80%), ear pressure (80%), nasal discharge (78.3%), halitosis (78.3%), hyposmia (68.3%), and nasal congestion (65%), in addition to the other symptoms that are mentioned in Table 2.

It is evident in Table 3 that the sensitivity of the nasal endoscopy (in diagnosing deviated nasal septum) compared with the CT findings was 100%, its specificity was 85%, the positive predictive value was 93%, the negative predictive value was 100%, and the total agreement was 95%. No significant difference was detected between the two tests regarding their findings (P = 0.250). The Kappa statistics showed high level of agreement ($\kappa = 0.883$, $P < 0.001$).

Table 1: Age and gender distribution

	n (%)
Age (years)	
20-29	13 (21.7)
30-39	25 (41.7)
40-49	12 (20.0)
≥50	10 (16.7)
Gender	
Male	44 (73.3)
Female	16 (26.7)
Total	60 (100.0)

Table 2: Frequencies of symptoms in the studied sample (*n*=60)

	n (%)
Nasal obstruction	48 (80.0)
Ear pressure	48 (80.0)
Nasal discharge	47 (78.3)
Halitosis	47 (78.3)
Hyposmia	41 (68.3)
Nasal congestion	39 (65.0)
Fatigue	34 (56.7)
Facial pain	27 (45.0)
Purulent discharge	21 (35.0)
Headache	19 (31.7)
Dental pain	16 (26.7)
Fever	8 (13.3)
Cough	8 (13.3)

Table 4 shows no significant differences between the endoscopy findings and the CT findings ($P = 0.125$) regarding the diagnosis of paradoxical middle turbinate. The sensitivity of endoscopy was 78.9%, the specificity was 100%, the PV+ was 100%, the PV− was 91.1%, and the total agreement was 93.3%. Kappa statistics showed a significantly high level of agreement ($\kappa = 0.837$, $P < 0.001$).

The most common findings of the CT scan were nasal polyp (70%), followed by deviated nasal septum (66.7%) and concha bullosa (60%). The other findings are presented in Table 5.

The most common endoscopy finding was nasal discharge (73.3%), deviated nasal septum (71.7%), nasal polyp (70%), and the paradoxical medial turbinate (25%) as presented in Table 6.

Discussion

Rhinosinusitis is a major health problem with its increasing prevalence consequent with the raising frequency of allergic rhinosinusitis globally. The present study showed that sinonasal pathology has a higher preponderance in male patients and the largest proportion (41.7%) of the sample aged 30–39 years old; the male: female ratio was 2.75:1. This agrees with the findings from other similar studies on CRS where the disease has been reported to have a higher male sex predilection.[12,13]

The symptomatology of patients in this study is similar to what had also been reported in the literature.[2,14,15] The main symptoms of the patients in this study were nasal obstruction (80%), ear pressure (80%), nasal discharge (78.3%), halitosis (78.3%), hyposmia (68.3%), and nasal congestion (65%). These result were compatible with several authors who mentioned that diagnosis of chronic rhinosinusitis is done on two major criteria.[14,15]

In the present study, maxillary sinus was recognized as the highest involved paranasal sinus by the disease. The role of maxillary sinus in CRS is very important, and the sinus should be considered while managing the disease. Ethmoidal sinus was the second most involved paranasal sinus in this study. The previous studies have mentioned the same, and moreover, diagnostic nasal endoscopy could not detect mucosal thickening of the involved sinus as in CT.[16,17]

CT scan has been used by clinicians to make diagnosis, allocate disease extent, and identify the involved paranasal sinus as well as any anatomical abnormalities, such as deviated nasal septum. In this study, diagnostic nasal endoscopy showed no difference than CT findings as the sensitivity of the nasal endoscopy (in diagnosing deviated nasal septum) compared with the CT findings was 100%; its specificity was 85%. Maru and Gupta mentioned as the most common diagnosis by nasal endoscopy in CRS was deviated nasal septum (43% and 45%, respectively) followed by nasal polyposis (26.5%).[18]

The most common findings of the CT scan were nasal polyp (70%). The diagnosis of this opacity as polyps using

Table 3: Measures of validity of nasal endoscopy in diagnosing deviated nasal septum versus computed tomography

	CT findings		Total	*P**
	Positive	Negative		
Endoscopy findings				
Positive	40	3	43	0.250
Negative	0	17	17	
Total	40	20	60	
Sensitivity (%)	100			
Specificity (%)	85			
PV+ (%)	93			
PV− (%)	100			
Agreement (%)	95			

*By McNemar test, κ=0.883 (*P*<0.001). CT: Computed tomography

Table 4: Measures of validity of nasal endoscopy in diagnosing paradoxical middle turbinate versus computed tomography

	CT findings		Total	*P**
	Positive	Negative		
Endoscopy findings				
Positive	15	0	15	0.125
Negative	4	41	45	
Total	19	41	60	
Sensitivity (%)	78.9			
Specificity (%)	100			
PV+ (%)	100			
PV− (%)	91.1			
Agreement (%)	93.3			

*By McNemar test, κ=0.837 (*P*<0.001). CT: Computed tomography

Table 5: Computed tomography findings (*n*=60)

	n (%)
Deviated nasal septum	40 (66.7)
Concha bullosa	36 (60.0)
Nasal polyposis	42 (70.0)
Sinus thickening opacity	
None	16 (26.7)
Ethmoid sinus	10 (16.7)
Maxillary sinus	24 (40.0)
Frontal sinus	1 (1.7)
Ethmoid and maxillary	8 (13.3)
Ethmoid, maxillary and frontal	1 (1.7)
Septated maxillary sinus	12 (200)
Paradoxical medial turbinate	19 (31.7)

Table 6: Diagnostic nasal endoscopy findings (*n*=60)

	n (%)
Deviated nasal septum	43 (71.7)
Nasal discharge	44 (73.3)
Paradoxical medial turbinate	15 (25.0)
Nasal polyposis	42 (70.0)

CT only base on the fact that the soft tissue density polypoid masses within the nasal cavity and paranasal sinuses and with looping and minimally enhancing soft tissue densities.

This present study also found there are no significant differences between the endoscopy findings and the CT findings ($P = 0.125$) regarding the diagnosis of paradoxical medial middle turbinate. The sensitivity of endoscopy was 78.9% and the specificity was 100%. This makes diagnostic nasal endoscopy an important tool in the assessment of CRS.

Conclusion

Diagnostic nasal endoscopy could have sensitivity and specificity almost as worthy as CT scanning, and being an outpatient procedure, it may lessen unjustified diagnostic CT scanning procedures. It admits an unparalleled image with bright illumination of nose and paranasal sinuses. The radiation dose to the patient is not negligible in standard CT of the sinuses; therefore, nasal endoscopy should be promoted, thereby reducing unnecessary radiation exposure to the patients.

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Conflicts of interest

There are no conflicts of interest.

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