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Original Research Article

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

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Abstract:

Background: Chronic rhino sinusitis affects a significant population worldwide, imposing a huge toll on the human economy as well as on quality of life. Chronic headache is one of the most common symptoms which are distressing to both patients and physicians. The investigative modalities available for an ENT surgeon are many like X-ray, CT scan, DNE, etc. Hence, this study is taken to compare the computed tomographic findings to the diagnostic nasal endoscopy findings in patients with chronic Rhinosinusitis.

Objectives: This study aims to compare CT-scan findings and DNE findings in diagnosing Chronic Rhinosinusitis.

Material & Methods: 60 Patients attending ENTOPD at ESIC Medical College & Hospital with any Sino-nasal complaints lasting for more than 4 weeks and not responding to medical line of management. Patients are selected by random sampling method. Patients were evaluated with CT scan and DNE.

Results: Sixty patients with chronic rhinosinusitis participated in the study. Their mean age + standard deviation was 38.5 + 10.19 years, ranging from 20 to 63 years. The median was 37.5 years. The largest proportion (45%) of the sample aged30–39 years old, only 10% aged ≥50 years. The main symptoms of the patients were nasal obstruction (81.6%), Headache (78.3%), and nasal discharge (45%).

Conclusions: Nasal endoscopy has sensitivity and specificity almost as good as CT scanning, and being an outpatient procedure, it may reduce unnecessary diagnostic scanning procedures & define cost-effective and easily an available diagnostic tool.

Keywords: Chronic Rhinosinusitis, Computerized tomography, Diagnostic nasal endoscopy, Anatomical variants.

Introduction

Chronic Rhinosinusitis 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]. As suggested by the European Position Paperon Rhinosinusitis and Nasal Polyp (EPOS 2007 and 2012), from an epidemiological stand point, 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/ posteriornasaldrip)± facial pain, pressure:±reduction/loss of smell; and symptomsmustbepresentformorethan12weeks. [3]

This disease entity has a broad and vague symptomatology. This can be easily accepted from the fact that the disease involves an anatomically complex area, which is located in the central face and has a close relationship with other important structures. Owing to the area involved in CRS, it is not uncommon in clinical practice to encounter similar symptomatology in other diseases. Thus, attempts to diagnose it with symptomatology alone are futile. There have been infrequent amendments in the defined diagnostic criteria for CRS, and the most updated and widely followed are the recent recommendations for CRS by the American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS). The recommendations by AAO-HNS include both subjective and objective parameters of more than a 12-week duration. The subjective component considers two or more of the four main symptoms (anterior and or posterior mucopurulent discharge, nasal stuffiness, pressure-fullness-pain in face, and hyposmia), and the objective component includes inflammation, which is characterized by one or more of the following: purulent character of mucus/edema present in middle meatus or the

ethmoid area, nasal polyps (NPs) or polyps in middle meatus, and/or radiological imaging showing inflamed paranasal sinuses (PNS)[4,5,6].

To evaluate the objective components of CRS diagnosis, diagnostic nasal endoscopy (DNE) and the computed tomography (CT) scan play important roles.

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 Chronic Rhinosinusitis both in patients with normal CT and in patients with abnormal scans.[7] Variations in intranasal and sinus anatomy have been implicated in the etiology of chronic and recurrent sinusitis, and CT imaging has become an important diagnostic tool. Despite this, some patients present with symptoms and telescopic examination suggestive of sinonasal disease, yet demonstrate little abnormality on CT scan [8].

With the increased use of endoscopy for the evaluation and surgical treatment of paranasal sinus disease, attention is now directed towards the analysis of the lateral nasal wall and paranasal sinus anatomy. Thus, it is particularly important to define a cost-effective and easily available diagnostic tool for it. Hence, we have conducted this study with the aim of assessing the effectiveness of DNE in comparison with CT for evaluating Chronic Rhinosinusitis.

Aims and Objectives

1. To compare the CT findings with endoscopic findings in patients with chronic paranasal sinus disease
2. To compare the anatomical variants in CT and DNE.
3. To compare which is better assessing tool in diagnosing chronic Rhinosinusitis.

Materials and Methods

This present study is conducted in the Department of ENT, ESIC Medical College and Hospital, Kalaburagi, from the period of October 2021 to April 2022. Ethical clearance was obtained from the Institutional Ethical Committee. An informed consent was obtained from all the patients before the start of study.

Source of Data: Patients at tending the ENT OPD for sinus related problems at ESIC Medical College and Hospital, Kalaburagi.

Sample Size: 60

Mode of Selection: by simple random sampling method.

Inclusion Criteria:

- Patients presenting with complaints like headache, nasal obstruction, not responding to medicine line of treatment for more than four weeks.
- Patients whose diagnosis is been established by CTPNS or DNE are investigated for the other modalities.
- Chronic inflammatory disease of Para-nasal sinuses.

Exclusion Criteria:

- Patients with acute attack of sinusitis.
- Patient with previous sinus surgery.
- Patients with facial trauma.
- Patients with malignant neoplasms and congenitalmal formations.
- Patients below the age group of 20 years.
- Patients who are not giving consent for the procedure.

Methods of collection of data:

- The cases selected for the study were subjected to detailed history taking and examination.
- Each patient underwent a systematic DNE and CT of nose and para-nasal sinuses

Methodology:

All the patients were subjected with 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 Rigid nasal endoscopy (lidocaine nasal spray 4% for 2 min was used as a local anesthesia before examination). DNE was done to obtain the information regarding purulent secretions, polypoidal mucosa in middle meatus, and anatomical variations.

Statistical Analysis: 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).

Observation and Results

Age distribution Table-1:

A total of 60 patients with chronic rhinosinusitis participated in the study. Their mean age + SD was 38.5 + 10.19 years, ranging from 20 to 63 years. The median was 37.5 years. The largest proportion (45%) of the sample aged 30–39yearsold, and only 10% aged ≥50 years (Table-1).

Table1: Sex distribution

Sex	Number of patients	Percentage (%)
Male	**45**	**75%**
Female	15	25%
Total	**60**	**100**

The majority (75%) of the sample were males. The male : female ratio was 3:1 as shownin Table-2

Table 2: Symptoms

Symptoms	Number of patients	Percentage (%)
Nasal obstruction	**49**	**81.6%**
Headache	47	78.3%
Nasal discharge	27	45%
Facial pain	21	35%
Hyposmia	9	15%

The main symptoms of the patients were nasal obstruction (81.6%), Headache (78.3%), nasal discharge (45%), Facial pain(35%), hyposmia (15%) mentioned in Table-3.

Table 3: DNE Findings

DNE Findings	Numbers%
Deviated nasal septum	43(71.7%)
Nasal discharge	44(73.3%)
Concha Bullosa	32(53.3%)
Nasal polyposis	42(70%)

The most common endoscopy finding was nasal discharge (73.3%), deviated nasal septum (71.7%), nasal polyp (70%), and the pneumatized middle turbinate (53.3%) as presented in Table-4

CT-Findings

Table 4:

Deviated nasal septum	**41(68.3%)**
Conchabullosa	**36(60%)**
Nasal polyposis	**42(70%)**
Sinus Opacity	
Maxillary sinus	**24(40%)**
Ethmoid sinus	**10(16.7%)**
Frontal sinus	**1(1.7%)**
Sphenoid sinus	**8(13.3%)**

The most common findings of the CT scan were nasal polyp (70%), followed by deviated nasal septum (68.3%) and conchabullosa (60%). The other findings are presented in Table-5.

Table 5: Accuracy of nasal endoscopy in diagnosing deviated nasal septum versus computed tomography

	CT Findings		Total	P valve
Endoscopic Findings	**Positive**	**Negative**		
Positive	**40**	**3**	**43**	**0.250**
Negative	**0**	**17**	**17**	
Total	**40**	**20**	**60**	

Sensitivity (%)	**100**
Specificity (%)	**85**
Positive predictive value (%)	**93**
Negative predictive value (%)	**100**
Agreement (%)	**95**

It is evident in Table-6 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 (κ =0.883, P<0.001).

Table 6: Accuracy ofnasalendoscopyindiagnosingConchaBullosaversuscomputedtomography

	CT Findings		Total	P valve
Endoscopic Findings	**Positive**	**Negative**		
Positive	**15**	**0`**	**15**	**0.125**
Negative	**4**	**41**	**45**	
Total	**19**	**41**	**60**	

Sensitivity (%)	**78.9**
Specificity (%)	**100**
Positive predictive value (%)	**100**
Negative predictive value (%)	**91.1**
Agreement (%)	**93.3**

Table-7 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 ($\kappa = 0.837$, $P< 0.001$).

Discussion

In our present study, a total of 60 patients with chronic rhinosinusitis were evaluated, with the largest proportion (45%) of the sample aged 30–39 years old, and only 10% aged ≥50 years with male preponderance (male: female ratio:-3:1). Nasal obstruction (81.6%) was the main symptom in most of the patient followed by Headache (78.3%), nasal discharge (45%), Facial pain (35%) & hyposmia (15%). The most common endoscopy finding was nasal discharge (73.3%) followed by deviatednasalseptum (71.7%), nasal polyp (70%), and the pneumatized middle turbinate (53.3%) In our present study the result were compatible with several other studies conducted as mentioned below:

Age Distribution

As mentioned in Table I, in the present study age of patients varies between 20 and 63 years, with the maximum number of patients in 30 to 39 years category. In study conducted by Sheetal et al [9](2011)with 45 patients the majority of patients is in the age group of 20 to 40 years. By above studies we understand this age group is predominant because they are more exposed to the environment, recurrent upper respiratory tract infections, irregular check-up and treatment. The study conducted by Zojaji et al[10] (2008) of 51 patients the mean age of the patients is 33 years, and in study conducted by Rafael José Geminiani et al, in35 patients the mean age turned out to be 40.

With comparing to the above studies, the mean age group in the present study is 38.5 years, which is almost equal.

Sex Distribution

In the present study of 60 patients according to table II, 45 cases are male while 15 cases are females which accounts for 75% being male and 25 % being female.; the male: female ratio was 3:1. This agrees with the findings from other similar studies on CRS where the disease has been reported to have a higher male sex predilection.[11],[12]

Symptoms

As shown in Table III, nasal obstruction and headache are the commonest symptoms which are present in 49(81.6%) and 47(78.3%) cases respectively. The next frequently occurring complaint is nasal discharge present in 27(45%) cases. The other symptoms are facial pain in 21(35%) cases & hyposmia in 9(15%) cases. In majority of the cases the duration of symptoms is more than 4weeks and is not responding to medical line of management.

In the study conducted by Sheetal D et al[9](2011) the commonest complaints is headache in 90% followed by nasaldischargein80%. The average durationofsymptomsvariesfrom1-5years.

In the study conducted by Zojaji et al[10](2008) nasal obstruction is the most common symptom with 51 patients and headache is noted in 37(72.5%) patients and nasal discharge in 46(90.1%) patients and other related complaints such as hyposmia is seen in 15 cases, cough in 11 and asthma in 6 cases. The signs and symptoms ranged from 12 weeks to many years.

These result were compatible with several authors who mentioned that diagnosis of chronic rhinosinusitis is done on two major criteria.[13],[14].

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.[15],[16]

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%).[17]

The most common findings of the CT scan were nasal polyp (70%). The diagnosis of this opacity as polyps using CT only based 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. Hence, DNE is a cost-effective and easily available diagnostic tool for chronic Rhinosinusitis.

Bibliography

1. Kennedy DW, Zinreich SJ, Rosenbaum AE, Johns ME. Functional endoscopic sinus surgery. Arch Otolaryngol1985;111:576-82.
2. Lanza DC, Kennedy DW. Adult rhinosinusit is defined. Otolaryngol Head Neck Surg. 1997; 117:1-7.
3. Hastan D, Fokkens WJ, Bachert C, Newson RB, Bislimovska J, Bockelbrink A, et al. Chronic rhinosinusitis in Europe –An underestimated disease. AGALEN study. Allergy2011;66:1216-23.
4. Benninger, M.S.; Ferguson, B.J.; Hadley, J.A.; Hamilos, D.L.; Jacobs, M.; Kennedy, D.W.; Lanza, D.C.; Marple, B.F.; Osguthorpe, J.D.; Stankiewicz, J.A.; et al. Adult chronic rhinosinusitis: Definitions, diagnosis, epidemiology, and pathophysiology. Otolaryngol. Head Neck Surg. 2003,129(Suppl.3), 1–32.
5. Hopkins, C.; Browne, J.P.; Slack, R.; Lund, V.; Brown, P. The Lund-MacKay staging system for chronic rhinosinusitis: How is it used and what does it predict? Otolaryngol. Neck Surg. 2007,137, 555–561.
6. Rosenfeld, R.M.; Andes, D.; Neil, B.; Cheung, D.; Eisenberg, S.; Ganiats, T.G.; Gelzer, A.; Hamilos, D.; Haydon, R.C.; Hudgins, P.A.; et al. Clinical practice guideline: Adult sinusitis. Otolaryngol. Neck Surg. 2007;137:S1–S31.
7. Bhattacharyya N. The role of CT and MRI in the diagnosis of chronic rhinosinusitis. Curr Allergy Asthma Rep. 2010;10:171-174.
8. Vining E.M., Yanagisawa, K. and Yanagisawa, E. (1993), the importance of preoperative nasal endoscopy inpatients with sinonasal disease. The Laryngoscope,103:512-519.
9. Sheetal D, Devan P P, Manjunath P, Martin P, Satishkumar K, Sreekantha, CT PNS- DoWe really require beforeFESS?2011;2:179-181
10. 10. S Naghibi, R Zojaji, M Khaki Hesari, A H Hashemi. Sinus CT scan and Functional Endoscopic Sinus Surgery findings in chronic sinusitis: A Comparative study. Iranian Journal of Radiology.2008;5(S1):13-13.
11. 11. Kenny TJ, Duncavage J, Bracikowski J, Yildirim A, Murray JJ, Tanner SB. Prospective analysis of sinus symptoms and correlation with paranasal computed tomography scan. Otolaryngol Head Neck Surg 2001;125:40-43. 12. Bhattacharyya N. A comparison of symptom scores and radiographic staging systems in chronic rhinosinusitis. Am J Rhinol. 2005; 19:175-179.
12. 13. Benninger MS, Ferguson BJ, Hadley JA, Hamilos DL, Jacobs M, Kennedy DW, et al. Adult chronic rhinosinusitis: Definitions, diagnosis, epidemiology, and pathophysiology. Otolaryngol Head Neck Surg 2003;129:S1-32.
13. 14. Fasunla J, Nwaorgu O. Adult chronic rhinosinusitis: Spectrum of clinical features and management in a tertiary health institution and literature review. East Cent Afr J Surg. 2011; 16:3.
14. 15. Schwartz RH, Pitkaranta A, Winther B. Computed tomography imaging of the maxillary and ethmoid sinuses in children with short-duration purulent rhinorrhea. Otolaryngol Head Neck Surg. 2001; 124:160-3.
15. 16. Nair S. Correlation between symptoms and radiological findings in patients of chronic rhinosinusitis: A modified radiological typing system. Rhinology 2009; 47:181-6.
16. 17. Maru YK, Gupta Y. Nasal endoscopy versus other diagnostic tools in sinonasal diseases. Indian J Otolaryngol Head Neck Surg. 2016; 68:202-6.