

A Comparative Study Between CT scan and Endoscopic Examination in Chronic Sino Nasal DiseaseBadal Kumar¹, Vivek Kumar²¹Junior Resident, Department of ENT, Patna Medical College and Hospital, Patna, Bihar, India²Assistant Professor, Department of ENT, Patna Medical College and Hospital, Patna, Bihar, India

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Conflict of interest: Nil

Abstract:

Introduction: Chronic rhinosinusitis is a highly prevalent disease with significant effects on productivity and quality of life. Endoscopy and CT scan have revolutionised the diagnosis and treatment of chronic sinonasal diseases.

Aim: The purpose of this study was to compare the diagnostic endoscopic and CT findings of sinus disease patients.

Methods: From March 2021 to November 2022, cases were selected from the outdoor, indoor, and emergency departments of the ENT department at Patna Medical College and Hospital. The research methodology included a comprehensive history, clinical examination, investigation, and management. This study included 50 patients who were selected using a basic random sampling technique.

Results: In this study, the most prevalent symptoms among patients were nasal obstruction (80%) and headache (70%). In the current 50 cases, DNE identifies septal deviation in 27 cases while CT identifies septal deviation in 30 cases. In 21 (42%) cases, the uncinate process is attached to the lamina papyracea on the right and left sides in both DNE and CT.

Conclusion: CT scan has a greater advantage than DNE in detecting anatomical variations and determining the condition of the sinus cavity and the severity of sinus disease. When conditions such as middle meatal secretions, mucosal condition, and lesions are being evaluated, DNE may be a superior diagnostic modality than CT scan.

Keywords: CT scan, DNE, Chronic Sinonasal Diseases.

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Introduction

Computerised tomography imaging (CT) of the paranasal sinuses and diagnostic nasal endoscopy (DNE) has become widely accepted tools for evaluating the PNS and providing detailed anatomy of the lateral nasal wall and disease process [1, 2]. The majority of diagnoses for Chronic Rhinosinusitis (CRS), fungal polyposis, fungal sinusitis, and numerous other conditions are based on clinical judgement. This conclusion is founded on a number of subjective symptoms and a few physical examination findings [3, 4].

These symptoms are inherently nebulous and insufficiently sensitive for a precise diagnosis. Therefore, a more objective and conclusive methodology or investigative modality is required for confirming the diagnosis and determining the subsequent management [5]. Currently, Computerised Tomography (CT) scans and Diagnostic Nasal Endoscopy (DNE) serve a crucial role in the evaluation and management of all sinonasal pathology. Both investigative modalities are costly and have their own benefits and

drawbacks; this research will provide insight into the necessity of using either or both in combination [6, 7]. CT provides crucial preoperative information for evaluating patients undergoing functional endoscopic sinus surgery (FESS) [8]. CT of the sinuses aims to delineate the disease's extent, identify any anatomical variants, and determine the sinuses' relationship to adjacent vital structures. Currently, CT scanning is the most prevalent imaging method for evaluating Sino nasal pathologies and identifying anatomic abnormalities [3, 8].

The primary function of the coronal CT scan is to identify the severity and, if possible, the underlying cause. Generally, surgeons customise their surgical approach based on the extent and location of disease revealed by a CT scan [9]. Endoscopic techniques for paranasal sinus surgery have enabled detailed and comprehensive visualisation of sinus disease with minimal patient discomfort [10]. The endoscopic view of the operative field displays anatomical and pathological details of the sinuses.

During surgery, it is feasible to identify areas of the cribriform and orbital wall that pose a risk for cerebrospinal fluid rhinorrhea and orbital complications [10, 11]. Similarly, landmarks for avoiding these complications can be defined to guide the surgeon during the endoscope-assisted surgery.

Anterior rhinoscopy reveals little information about the middle meatal fissure and nothing about the infundibulum and maxillary sinus orifice. Nasal endoscopy allows for precise access to these areas in search of evidence of localised disease or anatomical defects that compromise ventilation and mucociliary clearance [12]. Consequently, endoscopy and computed tomography (CT) have recently revolutionised the understanding and treatment of chronic sinusitis. The purpose of this investigation was to compare the endoscopic and CT findings of patients with sinus diseases.

Materials and Methods

From March 2021 to November 2022, cases were selected from the outdoor, indoor, and emergency departments of the ENT department at Patna Medical College and Hospital. The research methodology included a comprehensive history, clinical examination, investigation, and management. This study included 50 patients who

were selected using a basic random sampling technique.

Inclusion criteria

- Patients with headache, nasal obstruction, and other symptoms that are difficult to diagnose by anterior and posterior rhinoscopy, and who have not responded to medical treatment for more than four weeks, are selected for Computerised Tomography (CT) of the paranasal sinuses and diagnostic nasal endoscopy (DNE).
- Patients whose diagnosis has been established by CT PNS or DNE are investigated for the other modalities; for instance, a patient with a recent CT PNS diagnosis of DNS to the left with bilateral maxillary sinusitis is sent for DNE and both modalities are compared, and vice versa.
- Patients with chronic Para-nasal sinusitis inflammation

Exclusion criteria

- Patients suffering from acute sinusitis.
- Exclusion of patients with sinus malignancies confirmed by histopathology.
- Patients younger than 15 years of age.
- Individuals unwilling to undergo CT PNS or DNE.

Observations

Table 1: Age, sex and symptoms distribution

Age		
Age (Years)	Frequency	Percentage
0 – 20	15	30
21-40	20	40
41-60	12	24
61-80	3	6
Sex		
Sex	Frequency	Percentage
Male	33	66
Female	17	34
Symptoms		
Symptoms	Frequency	Percentage
Headache	35	70
nasal obstruction	40	80
nasal discharge	20	40
Post Nasal discharge	22	44
Sneezing	12	24
Epistaxis	10	20
Others	5	10

Patients in the present investigation range in age from 15 to 65 years. The majority of patients are between 21 and 40 years of age; therefore, 40% of patients are in their second and third decades. Patients have a mean age of 32.48 years. The current study reveals a preponderance of men, with 66% men and 34% women. Nasal obstruction (80%) and

Headache (70%) are the most common symptoms of the patients in this study.

Less frequent were Postnasal Discharge (44%), Nasal Discharge (40%), Sneezing (24%), Epistaxis (20%), and Other Symptoms (10%), such as ear blockage, offensive odour, etc.

Table 2: Comparative findings of CT and DNE

	Diagnostic Nasal endoscopy				Computed tomography findings			
	Right	%	Left	%	Right	%	Left	%
Septal deviation	27				30			
Uncinate attachments: to lamina papyracea	21	42	21	42	21	42	21	42
Uncinate attachment: to middle turbinate	10	20	9	18	10	20	9	18
Uncinate attachments: to skull base	19	38	20	40	19	38	20	40
Middle meatus secretions	32	64	29	58	NV	0	NV	0
Frontal recess patency	10	20	9	18	31	62	31	62
Maxillary ostium patency	14	28	19	38	18	36	17	34

In the current sample of 50 cases, DNE identifies septal deviation in 27 cases while CT identifies septal deviation in 30 cases. In 21 (42%) cases, the uncinat process is attached to the lamina papyracea on the right and left sides in both DNE and CT. 10 (20%) cases demonstrate uncinat attachment to the middle turbinate on the right side using both DNE and CT, compared to 9 (18%) cases on the left. In 19 (38%) cases on the right and 20 (40%) cases on the left, both DNE and CT reveal uncinat attachments to the cranium base.

DNE reveals secretions in the middle meatus in 32 (64%) cases on the right and 29 (58%) cases on the left, whereas CT does not. Frontal recess patency is observed in 10 (20%) cases on the right side and 9 (18%) cases on the left side in DNE, whereas 62 percent of cases in CT have patency in both the right and left sides. Using DNE, the patency of the maxillary ostium is established in 14 (28%) cases on the right and 19 (38%) cases on the left, whereas in CT, the patency is established in 18 (36%) cases on the right and 17 (34%) cases on the left.

Discussion

This research was conducted at the ENT department of the Patna Medical College in Patna. The study involves 50 patients with nonresponsive chronic Sino-nasal diseases who are willing to undergo both Diagnostic nasal endoscopy and CT Paranasal sinus imaging. As shown in Table 1, the ages of the patients in the present study range from 15 to 65 years, with the greatest number of patients falling between the ages of 20 and 40. In a study involving 45 patients conducted by Rafael et al. [13], the majority of patients are between the ages of 20 and 40. According to the preceding studies, this age group is predominate because they are more exposed to the environment, upper respiratory tract infections, and irregular checkups and treatment. In the study by Naghibi et al [14] involving 51 patients, the mean age of the patients is 33 years, while in the study by Rafael José Geminiani et al [13], the mean age of the patients was 40. Comparatively, the mean age group in the present analysis is 32.48 years, which is almost identical to the previous studies.

In the current study of 50 patients, according to Table 1, 33 cases are male, and 17 cases are female, accounting for 66% male and 34% female. 62% of

the patients in the study conducted by Stankiewicz et al [15] are male, while 38% are female. In the study conducted by Rafael et al [13], there are more male patients (18, 51.5%) than female patients (17, 48.5%). There are 35 men (69%) and 16 women (31%) in the study by Naghibi et al [14]. All investigations, including the current one, have a male preponderance over females.

According to Table 1, nasal obstruction and headache are the most prevalent symptoms, occurring in 40 (80%) and 35 (70%) cases, respectively. The next most common complaint is postnasal discharge, which occurs in 22 (44%) cases. Other symptoms include postnasal discharge in 20 (40%) cases, sneezing in 12 (24%) cases, epistaxis in 10 (20%) cases, and fever, anosmia/cacosmia, etc. in 5 (10%) cases. In the majority of cases, the duration of symptoms exceeds four weeks and does not respond to medical treatment. In the study by Dieulate et al. [16], the most prevalent complaints were headaches (90%) and nasal discharge (80%). Other symptoms such as wheezing are reported by 9% of patients. The average duration of symptoms ranges between one and five years.

In the study conducted by Naghibi et al. [14], nasal obstruction was the most prevalent symptom among 51 patients, followed by headache in 37 (72.5% of patients) and nasal discharge in 46 (90.1% of patients), as well as hyposmia in 15 cases, wheezing in 11 cases, and asthma in 6 cases. The duration of the indications and symptoms ranged from 12 weeks to years. All of these studies have considered chronic sinonasal pathology; the results of the present investigation are comparable to those of all of these studies. 27 (54%) patients have a deviated nasal septum on endoscopy, while 30 (60%) patients have a deviated nasal septum on CT scan. This difference of 3 cases is accounted for by posterior (bony) DNS, which can be seen on CT scan but not visualised in DNE. This could be due to an extensive mass occupying lesion or gross anterior DNS, where the endoscope is unable to visualise the posterior segment of the septum. CT scans revealed deviated nasal septum to be the most prevalent finding in the study conducted by Kasapoglu et al [17]. According to the research conducted by Jareoncharsri P et al

[18], septal deviation is evident in 60 (72.3%) of 83 patients with DNE.

There is no conclusive literature comparing CT scan and endoscopy for deviated nasal septum in the same patients. With multiple anatomical attachments, the uncinata process is one of the most variable structures in the nasal cavity. On endoscopy and CT scan, the uncinata process is connected to the lamina papyracea on the right and left sides of 21 (42%) patients. Attachment to the base of the cranium in 19 (38%) cases on the right and 20 (40%) cases on the left; attachment to the middle turbinate in 10 (20%) cases on the right and 9 (18%) cases on the left.

The attachment to the cranium base and lamina papyracea is difficult to determine with endoscopy because both have a lateral turn; a blunt probe is required to evaluate the attachment. On CT scan, according to the findings of Maltz et al. [12], the uncinata process is frequently affixed to the lamina papyracea (70% on the right and 66% on the left), followed by the middle turbinate (24% on the right and 31% on the left). On DNE, the uncinata process is frequently affixed to the lamina papyracea (71% on the right and 69% on the left), followed by the middle turbinate (26% on the right and 31% on the left). When compared, the percentage of attachment of the uncinata process to the lamina papyracea and the middle turbinate is nearly the same in both studies.

Conclusion

The present study concludes that sino-nasal pathology is more prevalent in patients aged 21 to 40 years and is more prevalent in male patients. CT scan has an advantage over DNE in detecting anatomical variations and determining the condition of the sinus cavity and the severity of sinus disease. When conditions such as middle meatal secretions, mucosal condition, and lesions are being evaluated, DNE may prove to be a superior diagnostic modality than CT scan.

The diagnosis of a pathological benign nasal mass requires histopathological examination. Thus indicating that CT scan and DNE must be performed on all patients with sinonasal disease in order to determine the precise pathology and to plan for further treatment.

References

1. Journal of Optoelectronics and Biomedical Materials Vol.2 Issue 4, October- December 2010, p. 281 – 289
2. Vining, E. M., Yanagisawa, K. and Yanagisawa, E. (1993), the importance of preoperative nasal endoscopy in patients with sinonasal disease. *The Laryngoscope*, 103: 512–519
3. GAS Llyod, VJ Lund, GK Scadding. CT of the paranasal sinuses and functional endoscopic surgery: a critical analysis of 100 symptomatic patients. *J LaryngolOtol* 1991; 105: 181-185pp.
4. Lynn D Cooke, Donald M Hadley. MRI of the paranasal sinuses: incidental abnormalities and their relationship to symptoms. *J LaryngolOtol* 1991; 105:278-281pp.
5. Messerklinger W. *Endoscopy of the Nose*. Munich: Urban and Scharzenberg; 1978:52-54
6. Stammberger H. Endoscopic endonasal surgery - concept in treatment of recurring rhinosinusitis. *Otolaryngol head and neck surg* 1986;94:143-156
7. Kennedy DW. Functional endoscopic Sinus surgery. Technique. *Arch Otolaryngol* 1985;111:643-649
8. Woodham J. History of the development of surgery for sinusitis. In: Donald PJ, Gluckman JL, Rice DH, editors. *The sinuses*. New York: Raven; 1995. P. 3-14.
9. Hirschmann A. About endoscopy of the nose and sinuses. A new method of investigation. *Arch Otolaryngol Rhino* 1903, 14:195-7
10. Reichert M. About A New method of examination of the upper antrum means of Antroskops. *Berlclin Wochenschr* 1902, 401:478 (in German).
11. Spielberg W. Antroscopy of the maxillary sinus. *Laryngoscope* 1922; 32:441-4.
12. Maltz J. New instrument: the sinuscope. *Laryngoscope* 1925; 35:805-11.
13. Rafael José Geminiani, Rodrigo Faller Vitale, Adriano Baptista Mazer, Henrique Penteado de Camargo Gobbo, João Jovino da Silva Neto, José Carlos Bolini Lima. Comparison between Computed Tomography Scan and Nasal Endoscopy in Diagnosis of Chronic Rhinosinusitis. *Intl Arch Otorhinolaryngol*. 2007; 11(4):402-405.
14. 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.
15. Stankiewicz JA, Chow JM. Nasal endoscopy and the definition and diagnosis of Chronic Rhinosinusitis. *Otolaryngol Head Neck Surg*.2002; Jun; 126(6):623-7.
16. Dieulate L. Morphology and embryology of the nasal fossae of vertebrates. *Ann Otol Rhinol Laryngol*, 1906; 15: 1-60, 267-399, 5 14-584.
17. Fikerkasapoglu, Selcukonart, Oguzbasut: Preoperative evaluation of Chronic Rhinosinusitis patients by conventional radiographies, computed tomography and nasal endoscopy. *Kulak Burun BogazIhtis Derg* 2009; 19(4):184-191.
18. Jareoncharsri P, Thitadilok V, Bunnag. C et al: Nasal endoscopic findings in patients with perennial allergic rhinitis. *Asian Pac J Allergy Immunol*.1999 Dec; 17(4):261-7.