

Original Research Article

A comparative study of diagnostic nasal endoscopy and computerized tomography of paranasal sinus in diagnosing sino nasal disease

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ABSTRACT

Background: Paranasal sinus diseases are one of the commonest causes of patients visit to an otolaryngologist. The symptoms are multiple and vague, while examination is often limited as sinuses cannot be examined directly. The objective of the study was to compare the diagnostic nasal endoscopy and computerized tomography findings of paranasal sinus in diagnosing sino nasal disease.

Methods: A comparative study was conducted at Hassan Institute of Medical Sciences, Hassan for duration of one year from June 2017 to June 2018. All the patients attending the ENT OPD with sin nasal disease and who meets the inclusion criteria during the study periods were included in the study. A total of 100 Patients were included in the study and analyzed.

Results: The most common diagnosis leading for diagnostic evaluation was chronic sinusitis. The septal deviation was best diagnosed using CT scan. CT scan was also found to effective and better than DNE in identifying the haziness in the sinus and checking the patency of sinus. DNE was found to better in identifying the secretion in the middle meatus.

Conclusions: Sino nasal disease in the adults needs to evaluate using DNE and CT scan before planning for the sino nasal surgeries. Both the diagnostic techniques have merits over the other, but CT scan can give better view and reports of the sinonasal diseases.

Keywords: Sinonasal, DNE, CT, Sinusitis, Paranal sinus

INTRODUCTION

The majority of the patients who will be visiting the Outpatient of the ENT will be suffering from paranasal sinuses. These paranasal diseases usually presents with various symptoms which are multiple and vague. The direct examination of the sinuses is not possible and the procedure of anterior rhinoscopy gives very little information about middle meatus and about the osteomeatal unit.¹

The older sinus radiographic diagnostic techniques used failed to identify and detect minimal to moderate degree

of mucosal thickening in the ethmoidal and middle meatus region. In the recent years the newer diagnostic technique has been developed to improve the radiographic evaluation and better visualization of the intranasal findings.

Hence the various investigation modalities like computer tomography and nasal endoscopic procedures are done for the better diagnosis of paranasal disease. This investigation helps in the identifying mucosal abnormalities, anatomical and bony variations of paranasal sinuses and also helps in to localize the pathogenic changes among the patients who are subjected for sinusitis surgery.²

The computerized tomographic (CT) findings have improved the imaging of paranasal sinus anatomy and gives better results than the radiographic findings and improves and gives the better anatomical variations in the paranasal sinus.³

Computerized tomography (CT) provides an essential preoperative information for the assessment of patients undergoing functional endoscopic sinus surgery (FESS) in defining the anatomical variants and its relation to the sinus and surrounding structures.

The primary role of the coronal CT scan is to determine the extent and possibly the underlying cause of sinusitis. As a rule, surgeons individualize their surgical approach according to the amount and location of disease they see on CT scan.^{2,4}

Endoscopic techniques for paranasal sinus surgery gives the surgeon complete and detailed visualization of the inner structures of sinus with minimum discomfort to the patient. The telescopic view of the operative field shows detail of the sinus anatomy and its disease. It has been possible to see areas which are not so clearly defined in CT like cribriform and orbital wall that are at risk to produce cerebrospinal fluid rhinorrhea and orbital complications during the surgery. At the same time, landmarks for avoiding these complications can be defined to guide the surgeon during the surgery as seen through the endoscope.⁵

In this study we have compared the diagnostic endoscopic and CT findings with the operative findings of patients with sinus diseases.

Objective

To compare the diagnostic nasal endoscopy and computerized tomography findings of paranasal sinus in diagnosing sino nasal disease.

METHODS

A comparative study was conducted at Hassan Institute of Medical Sciences, Hassan for a duration of one year from June 2017 to June 2018. All the patients attending the ENT OPD with Sino nasal disease and who meets the inclusion criteria during the study periods were included in the study.

A total of 100 patients were included in the study and analyzed.

Inclusion criteria

All the patients with clinically proven chronic sinusitis not responding to routine medical line of treatment and who are willing to give consent for the purpose of the study were included in the study.

The patients who are not willing to get the CT of PNS or DNE, suffering from acute attack of sinusitis and children with less than 10 years and patients with previous maxilla facial trauma and sinus surgery were excluded from the study.

A routine haemogram (HB, BT, CT, TC, DC) and urine examination (albumin, sugar, microscopy), swab from middle meatus for culture sensitivity along with X-ray para nasal sinuses were done for the patients. All the patients in active stage of the disease were treated with course of suitable antibiotic, systemic antihistamines and local decongestants. They were also treated for medical conditions like diabetes mellitus, hypertension, nasal allergy. No patient received steroid therapy or immunotherapy. Each patient underwent a systematic diagnostic nasal endoscopy and computed tomography of nose and para nasal sinuses.

RESULTS

The present study was analyses for the sample of 100 study subjects.

In our study the majority of the study participants were in the middle age between 21 to 40 years. Our study showed male predominance with 59% male and 41% female in the study. The majority of the respondents were from urban area.

Table 1: Socio demographic profile of patients.

Socio demographic profile	No of patients	Percentage (%)
Age group (in years)	10-20	8
	21-30	32
	31-40	29
	41-50	17
	>50	14
Gender	Male	59
	Female	41
Place	Urban	67
	Rural	33

The commonest symptoms in our study was nasal obstruction (92%) followed by nasal discharge and headache with 86%. Post nasal discharge and sneezing were the other symptoms seen among our study subjects. Edematous nasal mucosa and hypertrophied turbinates were the most common sings seen among the patients. Nearly 76% of the subjects had chronic sinusitis and 24% had other sino nasal diseases.

In the above table the comparison of nasal cavity with the two diagnostic techniques. Septal deviation was seen among 65 subjects using DNE and 66 cases using CT. Nearly 48 cases showed attachment of unicate process to lamina Papyracea on both sides in DNE and CT. 20 cases on right and 21 cases on left side showed unicate

attachment to middle turbinate using DNS and CT. 75 cases on right and 72 cases on left showed unicate attachment to skull base using DNE and CT. Middle meatus secretion was seen among 68 subjects in right and 57 subjects in DNE where as it was not visible in CT. Frontal recess patency was seen in 58 subjects on both right and left side in DNE where as it was 64 subjects on both right and left side in CT. Maxillary ostium patency was seen among 38 subjects on right and 36 subjects in left using DNE and 46 subjects in right and 44 in left using CT.

Anatomical variations were seen in location of Agger Nasi with 14 on right side and 20 on left side using DNE and it is seen in 28 on right side 34 on left side using CT scan. Accessory maxillary ostium presence was seen only in DNE with 24 on right and 30 on left side. Middle turbinate paradoxical findings using DNE was seen in 2 subjects on right and 4 subjects on Left side, in CT Scan it was 2 on right side and 8 on left side. Concha Bullosa was seen in 20 subjects on both sides using DNE and 26 on right and 28 on left side in CT scan. Onodi or sphenoidal cells was seen in CT scan only and not visible in DNS.

Table 2: Signs and symptoms of study subjects.

		No of patients	Percentage (%)
Symptoms	Nasal obstruction	92	92
	Nasal discharge	86	86
	Headache	86	86
	Post nasal discharge	48	48
	Sneezing	39	39
Sings	Nasal mucosa congested	24	24
	Nasal mucosa pale	36	36
	Nasal mucosa edematous	42	42
	Hypertrophy of turbinate	36	36
	Nasal polyps	36	36
	Tenderness	42	42
Diagnosis	Chronic sinusitis	76	76
	Other sino nasal disease	24	24

Table 3: Comparative findings in CT and DNE of nasal cavity.

	Diagnostic nasal endoscopy				Computed tomography findings			
	Right	%	Left	%	Right	%	Left	%
Septal deviation	65				66			
Unicate attachment to lamina papyracea	48	48	48	48	48	48	48	48
Uncinate attachment to middle turbinate	20	20	21	21	20	20	21	21
Uncinate attachments to skull base	75	75	72	72	75	75	72	72
Middle meatus secretions	68	68	57	57	NV	0	NV	0
Frontal recess patency	58	58	58	58	64	64	64	64
Maxillary ostium patency	38	38	36	36	46	46	44	44

Table 4: Comparative findings in CT and DNE with respect to anatomical variant.

	Diagnostic nasal endoscopy				Computed tomography findings			
	Right	%	Left	%	Right	%	Left	%
Agger nasi	14	14	20	20	28	28	34	34
Accessory maxillary ostium presence	24	24	30	30	0	0	0	0
Middle turbinate: paradoxical	2	2	4	4	2	2	8	8
Middle turbinate: concha bullosa	20	20	20	20	26	26	28	28
Onodi or sphenoidal cells	0	0	0	0	6	6	0	0

Pathological findings were seen in both DNE and CT scan. Hypertrophy of middle turbinate was seen in 18 cases on right and 16 cases on left using DNE and using CT scans 20 cases in right and 16 cases in left side. Inferior turbinate hypertrophy was seen among 40 cases

in right and left side using DNE and CT scan. Haziness in the frontal, maxillary and sphenoidal sinus was seen only in CT scan and not visible in DNE scan. Nearly 30 cases of nasal polyp were seen on both sides using DNE and 24 cases on both side using CT scan.

Table 5: Comparative findings in CT and DNE with respect to pathological signs.

	Diagnostic nasal endoscopy				Computed tomography findings			
	Right	%	Left	%	Right	%	Left	%
Hypertrophy of middle turbinate	18	18	16	16	20	20	16	16
Hypertrophy of inferior turbinate	40	40	40	40	40	40	40	40
Frontal sinus haziness	NV	0	NV	0	52	52	54	54
Maxillary sinus haziness	NV	0	NV	0	58	58	58	58
Sphenoidal sinus haziness	NV	0	NV	0	56	56	56	56
Nasal polyps	30	30	30	30	24	24	24	24

DISCUSSION

In our study the majority (32%) of the subjects were in the range of 21-30 30 Years and Male (59%) were affected. The findings of the age and gender seen in our study was similar to the study findings of Sheethal et al, Kumar et al and Kirtane et al.⁶⁻⁸

The most common symptom seen in our study was nasal obstruction (92%) and followed by nasal discharge and headache (86%). In the study done by Kirtane et al, Gandotra et al also nasal obstruction and discharge with headache was the major symptoms like our study.^{8,9}

The clinical findings seen in our study like hypertrophied turbinates in inferior and middle turbinate's (36%), congested (24%) n pale nasal mucosa (36%) was also seen in the study done by Venkatachala et al.¹⁰ The diagnosis of chronic sinusitis (76%) was the most common diagnosis done in our study, similar results was also seen in the study done by Gandotra et al and Jones et al.^{9,11}

The deviated nasal septum was seen in both DNS and CT Diagnostic techniques. In CT scan a case of septum deviation was identified which was missed by DNS, which could be visualized the posterior segment of septum. Fikert et al and Jareoncharsi et al also found the CT scan gave the better diagnosis on deviated nasal septum than DNS.^{12,13} In our study there was no difference between the DNS and CT diagnostic techniques with respect to the attachment of unicate process to the lamina papyracea, middle turbinate and skull base though it is one of the most variable structures in nasal cavity. In the study done Sheetal et al the CT scan shows the unicate process is commonly attached to the lamina papyracea (70% on the right, and 66% on the left side), followed by the middle turbinate (24% on the right, 31% on the left side).⁶ The unicate process on DNE is commonly attached 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).

The secretion from the middle meatus could be only visualized by DNE (68% on both sides) but nothing in CT scan. The study done by Kumar et al and Kumar et al

also found almost similar percentage of subjects with discharge which was assessed by DNE.^{7,14}

The patency of frontal recess which was elicited by both techniques in our study showed that CT scan (64% on both the sides) and gave good percentage of Patency than DNE (58% in both sides), similar findings was also seen in the study done by Sheethal D et al and Amith Kumar et al where CT scan gave better values than DNE.^{6,7}

The maxillary Ostium patency was best detected using CT scan (46% on Right and 44% on Left) than DNE (38% on Right and 36% on Left) where CT Scan showed better results of Patency. The findings of our study was contrast to the study findings of Zojaji et al.¹⁵

The Agger Nasi was elicited better by CT scan (28% on right and 34% left) than DNE (14% on right and 20% on left) in our study which is again similar to the findings of the study done by Sheethal and Kumar et al.^{6,7} Onda cell was also elicited by CT scan only (6% on right) in our study. Other anatomical variants compared between the DNE and CT Scan elicited in our study was also seen in the study done by Sheethal et al and Kumar et al.^{6,7}

The pathological changes seen in the sino nasal disease like hypertrophy of turbinate's in the middle and inferior turbinate's was elicited same in both the diagnostic DNE and CT scan. The haziness in the sinuses of frontal, maxillary and Frontal was elicited by computer tomography (52% for Frontal and 58% for Maxillary and 56% for sphenoidal) and was not elicited by DNE. The findings of our study of nasal polyp (30% in DNE and 24% in CT) in our study was found to be similar to the study findings of Kumar et al and Kumar et al.^{7,14}

CONCLUSION

Diagnostic endoscopy and CT scan is a must prior to any functional endoscopic sinus surgery. They help in assessing the extent of sinus disease and to know the variations and vital relations of the paranasal sinuses. CT assists the surgeon as a "road-map" during FESS. CT scan should be used to provide supplementary clinical data to the history and endoscopic examination, and assist in directing surgical treatment to the affected areas. Finally, we can conclude that the CT scan has a good and

better advantages when compared to DNE to identify the anomalies in the Sino Nasal Diseases.

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REFERENCES

1. Becker SP. Applied anatomy of the paranasal sinuses with emphasis on endoscopic surgery. *Annals of otorhinology.* 1994;103:3-11.
2. Babbal R, Harnsberger HR, Nelson B, Sonkens J, Hunt S. Optimization of techniques in screening CT of the sinuses. *AJNR Am J Neuroradiol.* 1991;12(5):849-54.
3. Bolger WE, Butzin CA, Parsons DS. PNS Surgery: Anatomic variations and mucosal abnormalities: CT analysis for endoscopic sinus surgery. *Laryngoscope.* 1991;101:56-64.
4. Earwaker J. Anatomic variants in sinonasal CT. *Radiographics.* 1993;13:381-415.
5. Dale H, Rice MD. Basic surgical techniques and variations of endoscopic sinus surgery. *Otological Clin N Am.* 1989;4:713-26.
6. Sheetal D, Devan PP, Manjunath P, Martin P, Satish KK, Sreekantha, et al. CT PNS – Do We Really Require Before FESS? *J Clin Diagnos Res.* 2011;5:179-81.
7. Kumar A, Kumar P, Kumar N. A Comparative Study of Chronic Sino-Nasal Diseases Between Diagnostic Nasal Endoscopy (DNE) And CT Scan. *J Dental Med Sci.* 2017;16(1):05-11.
8. Kirtane MV, Nayak S, Desai PV. Functional endoscopic sinus surgery (A preliminary study). *Indian J Otolaryngol.* 1991;43:126-9.
9. Gandotra SC, Matvani G, Kapoor R, Choudhary M. Functional Endoscopic Sinus Surgery results in 69 patients. *Indian J Otolaryngol Head Neck Surg.* 2000;52:5-8.
10. Venkatachalam. VP, Bhat A. Functional Endoscopic Sinus Surgery – A new surgical concept in the management of Chronic sinusitis. *Indian J Otolaryngol Head Neck Surg.* 2000;52:3-16.
11. Jones NS, Strobl A, Holland I. A study of the CT findings in 100 patients with rhinosinusitis and 100 controls. *Clinical Otolaryngol.* 1997;22:47-51.
12. Fikerkasapoglu, Selcukonart, Oguzbasut. Preoperative evaluation of Chronic Rhino sinusitis patients by conventional radiographies, computed tomography and nasal endoscopy. *Kulak Burun BogazIhtis Derg.* 2009;19(4):184-91.
13. Jareoncharsri P, Thitadilok V, Bunnag.C et al:Nasal endoscopic findings in patients with perennial allergic rhinitis. *Asian Pac J Allergy Immunol.* 1999;17(4):261-7.
14. Patel AK, Patel A, Sing B, Sharma MK. The study of functional endoscopic sinus surgery in patients of sinus headache. *Int J Biol Med Res.* 2012;3(3):1924-30.
15. Zojaji R, Hesari MK, Hashemi AH. Sinus CT scan and Functional Endoscopic Sinus Surgery findings in chronic sinusitis:A Comparative Study. *Iranian J Radiol.* 2008;5(1):13-3.

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