

A Comparative Study between Diagnostic Nasal Endoscopy (DNE) and CT Scan in Chronic Sinonasal Diseases.

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Abstract

Background: Chronic rhinosinusitis is a very prevalent disease worldwide with great impact on productivity and quality of life. CT scan and endoscopy have revolutionized the diagnosis and management of chronic sinonasal diseases. This study aims to get an insight of advantage of one over the other and if either or both are needed for diagnosis. **Methods:** Fifty patients attending the otolaryngology outpatient department NMCH, Patna fulfilling the diagnostic criteria for chronic rhinosinusitis and willing to participate in the study were included. After optimal antibiotic course, all patients were subjected to DNE and CT scan and result were compared. **Results:** CT scan has distinctive advantage of delineating extent of disease, study of anatomical variation and preoperative planning of case. DNE has better diagnostic value for mucosal and mental secretions and office based evaluation. Both are complimentary to each other. **Conclusion:** This study revealed that sinonasal pathologies are more common in male population in the age group of 20 to 40 years.

Keywords: DNE, Chronic Sinonasal Diseases.

INTRODUCTION

Rhinosinusitis has now been defined as a diagnosis made on clinical grounds based on the presence of characteristic symptoms, combined with objective evidence of mucosal inflammation.^[1] Rhinosinusitis can be further categorized as acute being less than 12 weeks duration and chronic being greater.^[1,2] Chronic rhinosinusitis is estimated to affect at least 11 % of the population.^[3] Worldwide and consequently great economic burden to healthcare systems, to patients and to the economy from loss of productivity in the workplace.^[3,4]

Diagnostic criteria for rhinosinusitis includes:

Primary symptom - Nasal blockage/obstruction/congestion (at least one) Nasal discharge

Additional symptoms - Facial pain/pressure olfactory dysfunction
Endoscopic findings - Nasal polyps
Mucopurulent discharge (middle meatus) Oedema / mucosal obstruction in middle meatus

CT scan findings - Mucosal changes within the osteomeatal complex and / or sinuses.

Computerized Tomography (CT) provides essential preoperative information and aims to delineate the extent of the disease, define any anatomical variants and relationship of the sinuses with the surrounding important structures

Endoscopic techniques for nose and paranasal sinuses have allowed detailed and complete visualization of sinus disease while minimizing the complications. With the advent of angled scopes, it is possible now to examine and clear disease in nook and corner of paranasal sinuses.

Endoscopic and computerized tomography have revolutionized the understanding and management of chronic sinusitis in recent times.

In this study we have compared the diagnostic.

Endoscopic findings and CT finding of the patients with sinus diseases and to get an insight into the necessity if either or both in combination are needed.

MATERIALS AND METHODS

The prospective diagnostic study was performed in the department of Otolaryngology at NMCH, Patna over a period of two years after approval from the institutional ethics committee and written informed consent from each participant. 50 patients clinically diagnosed as suffering from chronic rhinosinusitis after detailed history and clinically examination and not responding to optimal antibiotic course were selected for study.

Exclusion criteria includes patients less than 15 years, those not willing to undergo CT and DNE and those suffering from acute sinusitis. All the participants received a course of antibiotics and antihistaminics before the procedure. Diagnostic nasal endoscopy was performed with 00 and 300 endoscopes in OPD after preparation with 4% lignocaine using standard three pass techniques. During DNE suction cleaning of nose was done and after topical decongestion patients were sent for CT scan. Plain CT scan nose and paranasal sinuses on somatom spiral CT scanner with 2 mm slices in coronal, axial and sagittal planes was done. The findings from both the procedures were measured and recorded and statistical analysis was done using SPSS software (Version 21.0)

RESULTS

A total of 50 patients were included in the study in the age group 15-70 years with mean age being 34.4 Years.

Table 1: Age distribution

Age group	No. of patients	Percentage
0 - 20 years	13	26
20 - 40 years	23	46
40 - 60 years	12	24
60 - 80 years	02	04
Total	50	100

The present study male preponderance with 66% male and 34% female patients. Male to female ratio is 1.9:1.

Table 2: Sex distribution

Sex	No. of Cases	Percentage
0 - 20 years	13	26
20 - 40 years	23	46
40 - 60 years	12	24

Common symptoms of the patients are Headache (78%) and Nasal obstruction (74%). Nasal discharge (40%), epistaxis (18%) and other symptoms (8%) like ear block, foul smell etc, are less common. Postnasal discharge is seen in 38% of patients, sneezing in 26% with other symptoms.

Table 3: Symptoms

Symptoms	No. of Cases	Percentage
Headache	39	78
Nasal obstruction	37	74
Nasal discharge	20	40
Post Nasal discharge	19	38
Sneezing	13	26
Epistaxis	09	18
Others	04	08

In this study, commonest sign is sinus tenderness which is seen in 86% of patients followed by purulent middle meatal discharge in 76% and granular posterior pharyngeal wall in 62% of patients.

Table 4: Signs

Signs	No. of Case	Percentage
Nasal mucosa: Congested	17	34
Nasal mucosa: Pale	13	26
Nasal mucosa: normal	11	22
Nasal mucosa: Edematous	09	18
Inferior turbinate hypertrophy	21	42
Middle turbinate hypertrophy	17	34
Middle meatus: Non purulent	38	76
Nasal polyps	16	32
Sinus Tenderness	43	46
Granular Posterior pharyngeal wall	31	62
Deviated Nasal septum	23	46

In the study, 33 cases have septal deviation using DNE while using CT, 36 cases have septal deviation.

Table 5: Comparative findings in CT and DNE of nasal cavity

	Diagnostic Nasal endoscopy				Computed tomography findings			
	Right	%	Left	%	Right	%	Left	%
Septal deviation	30	36						
Uncinate attachment : to	23	46	23	46	23	46	23	46

lamina papyracea								
Uncinate attachment : to middle turbinate	9	18	10	20	9	18	10	20
Unicinate attachment : to skull base	18	36	17	34	18	36	17	34
Middle meatus secretions	31	62	27	54	NV*	0	NV	0
Frontal recess patency	25	30	28	56	30	60	30	60
Maxillary ostium patency	18	36	19	38	22	44	17	34

Table 6: Comparative findings in CT and DNE in relation to anatomical variant

	Diagnostic Nasal endoscopy				Computed tomography findings			
	Right	%	Left	%	Right	%	Left	%
Pneumatised uncinated	0	0	1	2	2	4	1	2
Aggernasi	8	16	14	28	15	30	18	36
Haller or Infraorbital cells	NV	0	NV	0	5	10	4	8
Onodi or Sphenoethmoidal Cells	NV	0	NV	0	2	4	0	0
Accessory maxillary ostium presence	11	22	16	32	NV	0	NV	0
Middle turbinate: paradoxical	0	0	3	6	1	2	5	10
Middle turbinate: concha bullosa	9	18	10	20	13	26	10	20

Table 7: Comparative finding of CT and DNE of mucosal changes and other pathological conditions

	Diagnostic Nasal endoscopy				Computed tomography findings			
	Right	%	Left	%	Right	%	Left	%
Middle turbinate: hypertrophy	7	14	6	12	8	16	5	10
Inferior turbinate: hypertrophy	22	44	22	44	20	40	20	40
Inferior turbinate : pale	31	62	31	62	NV	NV	NV	NV
Polyp	13	26	14	28	8	16	12	24
Benign Nasal growth	8	16	3	6	8	16	3	6
Frontal sinus haziness	NV	0	NV	0	23	46	27	54
Anterior ethmoidal cells haziness	NV	0	NV	0	37	74	35	70
Maxillary sinus haziness	NV	0	NV	0	28	56	31	62
Sphenoidal sinus haziness	NV	0	NV	0	12	24	8	16
Posterior ethmoidal sinus haziness	NV	0	NV	0	19	38	14	28

Table 8: Diagnosis

Diagnosis Percentage	No of Patients	
Chronic Rhino Sinusitis (CRS)	31	62
Fungal Rhinosinusitis	6	12
Allergic Rhinitis	7	14
Ethmoidal Polyp	6	12
AC polyp	5	10
FrontoethmoidalMucocoele	1	2
Deviated Nasal Septum	20	40
Atrphic Rhinitis	3	6

DISCUSSION

Age Distribution

As mentioned in [Table 1], most common age group involved is between 20 – 40 years of age with mean age being 34.4 years. In study conducted by sheetal et al,^[7] the majority of patients is in the age group of 20 to 40 years.

Sex Distribution

In our study 33 cases (66%) are male while 17 (34%) cases are females. The study conducted by Rafael Jose Geminiani et al,^[8] the number of male patients was 18 (51.5%) and females was 17 (48.5%). The study of Zojaji et al,^[9] there were male (69%) and 16 female (31%).

Clinical Features

Symptoms:

Nasal obstruction and headache are the commonest symptoms which are present in 37 (74%) and 39 (78%) cases respectively. The next frequently

occurring complaint is nasal discharge present in 20 (40%) cases.

In the study conducted by Zojajiet al⁹ 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.

Signs:

The commonest clinical sign present is sinus tenderness, seen in 43 (86%) patients; followed by purulent discharge in middle meatus in 38(76%) patients and granular posterior pharyngeal wall in 31(62%) patients. Deviated nasal septum is seen in23(46%) patients with majority being asymptomatic. Inferior turbinate hypertrophy 21(42%) and middlturbinate hypertrophy 17(34%), congested nasal mucosa in 17(34%) patients, while pale mucosa, is present in 13(26%)patients, the other findings are nasal polyps in 16 (32%0 patients, middle meatal discharge non-purulent in 15(30%) patients and oedematous nasal mucosa in ⁹18%0 patients.

In the study conducted by Venkatchalam V.P, et al,^[10] clinical findings are hypertrophied inferior turbinate (10%0, hypertrophied middle turbinate (17.14%), congested mucous membrane (15.71%), sinus tenderness (7.14%) and ethmoidal polyps (1.8%0.

Comparative findings in CT and DNE of nasal cavity:

Deviated nasal septum: It is seen in 33(66%0 patients on endoscopy and 36(72%) patients on CT scan, this



difference of 3 cases is accounted for posterior (bony) DNS which can be seen on CT scan but not visualized in DNE either, could be due to extensive mass occupying lesion or gross anterior DNS where endoscope does not aid to visualize the posterior segment of septum.

In the study conducted by FikretKasapoglu et al,^[11] the most common findings are deviated nasal septum noted in 18(41.9%0 cases on CT scan.

In the study conducted by Jreoncharsri P et al,^[12] septal deviation is obvious in 60(72.3%0 of the patients out of 83 cases on DNE.

Uncinate process: On endoscopy as well as CT scan uncinate process is attached to lamina papyracea in 23(46%) patients, both sides. Attachment to skull base is present in 18(36%) cases on right and 17 cases(34%) on lefty and attachment to middle turbinate in 9(18%0 cases on right and 10(20%cases on left. The attachment to the skull base and lamina papyracea is difficult to establish with endoscopy as both have a lateral turn and need to be palpated using a blunt probe to assess the attachment. Sheetal D et al,^[7] in their study had similar results.

Middle meatus secretions: In the present study on DEN, mucopurulent discharge in middle meatus is seen in 37(74%0 cases, out of which 17(34%) cases are unilateral and 20(40%0 cases are bilateral. Middle meatus secretions

can only be assessed with DNE but not on CT scan.

In the study conducted by Arun Kumar Patel et al,^[13] on endoscopy, mucopurulent discharge in middle meatus is seen in 58(63%) cases, out of which 34(36.95%) cases are unilateral and 24 (26.08%) cases are bilateral.

Frontal recess patency: It is seen in 25(50%) cases on the right and 28(56%0 cases on the left by DNE and 30(60%) cases each on both sides when seen with CT scan. The DNE had to be done with an angled scope 30 degree in most cases by medializing of the middle turbinate to have a better visualization of the recess.

Maxillary ostium patency:Patency of the maxillary ostium is seen in 18(36%) cases in right and 19(38%) cases on the left on DNE. The patency is assessed with an angled endoscope and in many of the cases with the help of a curved suction tube which can be passed into the ostium, thereby confirming patency even though it is blind procedure. On CT scan the present study shows 22(44%0 on right and 17(34%0 cases on left, has patency.

In the study conducted by Zojaji et al,^[9] maxillary sinus patency is seen in 32(62.7%) on right and 33(64.7%0 on left when seen by CT scan and 35(68.6%0 on both right and left when seen by DNE.

Comparative findings in CT and DNE in relation to anatomical variant.

Uncinate process: Pneumatized uncinate process is seen in 2 cases (4%0 on the right and one case on the left on CT scan, while on DNE only 1 case (2%) is seen on the left.

Agger nasi: It cannot be fully assessed with DNE as only excess pneumatized cells can be seen, which is seen in 8(16%) cases on the right and 14(28%) cases on left whereas on CT scan shows 15 (30%) on right and 18(36%) cases on the left.

Haller cells: In present study these cells are seen in 5 cases on the right and 4 cases on the left which accounted for 10% and 8% respectively on CT scan, but cannot be seen on DNE.

Onodi cells: It is only seen on CT scan in 2(4%0 cases on the right side. Importance of Onodi cells is its close relation to the optic nerve and it can be only appreciated completely in axial cuts of the CT scan.

Accessory maxillary ostium: By DNE 11(22%0 cases on the right and 16 (32%) cases on the left is seen but on CT scan, it cannot be visualized on 5mm or 2mm cuts taken, as the ostia are small enough to be missed between the cuts. Hence one requires 1mm cut sections which cannot be done in our CT scan machine.^[1]

In the study conducted by Sheetal D et al,^[7] accessory maxillary ostium was present in 13% and 11% patients on the right and left sides respectively.

Middle turbinate conch bullosa & paradoxical turbinate: Middle turbinate concha bullosa is the most

common variation present, seen both in DNE and CT scan. 9(18%) cases of concha bullosa is seen in right side and 10 (20%) cases on the left side on DNE whereas CT scan shows 13(26%) on the right and 10(20%) on the left side. The whereas on CT scan 1 (2%) case is seen on the right and 5 (10%0 is seen on the left side.

Comparative study of CT and DNE on mucosal changes and other pathological conditions.

Hypertrophy of Middle turbinate: It is seen in 7(14%) cases on the right and 6(12%) on the left side on DNE, but CT scan shows 8(16%0 cases on the right and 5(10%0 cases on the left side. The hypertrophy of the middle turbinate is mostly seen in cases with allergy. Zojaji et al,^[9] had similar results in their study.

Inferior turbinate hypertrophy: It is seen in 22 (44%) patients on both right and left on DNE, whereas on CT scan shows 20 (40%0 on both the left and right side. Pale inferior turbinate is evident in 31 cases on the right (62%) and 31 cases on the left (62%). Whereas this finding is not appreciated on CT scan, hence indicating that the condition of the mucosa whether pale, congested and edematous can only be clearly appreciated on DNE, whereas CT scan holds no diagnostic value about the condition of the mucosa.

In the study conducted by S. Naghibi et al,^[14] hypertrophy of the inferior turbinate is the most obvious finding in the CT scan (70.6%) as well as in endoscopic evaluation (68.6%).

Polyp: It is seen in 13(26%) cases on the right side and 14(28%) cases on the left on DNE whereas 8(16%) cases on right side and 12(24%) cases on left side by CT scan, thereby showing that DNE is of more diagnostic value in evaluating polyps.

Benign nasal growth: They are seen in 8(16%) cases on the right side and 3(6%) on the left side both in CT and in DNE, But DNE gives a much better view of the lesion its surface, consistency, margins etc.

Sinus haziness: Frontal sinus haziness can only be seen in CT scan as frontal sinus itself cannot be visualized with DNE. 23(46%) cases on the right and 27(54%) cases on the left have frontal sinus haziness on CT scans.

Anterior ethmoidal and maxillary sinus haziness can only be seen in CT scan as DNE cannot be used to assess the condition of the sinus cavity except for their ostium. Anterior ethmoidal cells are hazy in 37(62%) cases on left indicating anterior group pathology to be more prevalent in our study.

Sphenoid sinus haziness is seen in 12 cases (24%) on the right and 8 cases (16%) on the left on CT scans.

Posterior ethmoidal sinus haziness is seen in 19 cases (38%) on the right and 14 cases (28%) on the left side which is seen in majority of the cases associated with anterior ethmoidal sinus disease. On DNE posterior ethmoidal sinus cannot be assessed.

Diagnosis

In the present study [Table 7] maximum numbers of patients have been diagnosed with Chronic Rhinosinusitis [31 patients (62%)]. Allergic rhinitis 7(14%), fungal Rhinosinusitis 6(12%) cases. Deviated nasal septum diagnosed in 20(40%), Antrochonal poly 5 (10%) and Frontoethmoidalmucocele is seen in 1(2%) of the cases. Other benign lesions like inverted papilloma, Rhinoscleroma, Atrophic rhinitis etc is seen in 4(8%) which have been confirmed with a histopathological study conducted on the biopsy specimen taken during diagnostic nasal endoscopy.

CONCLUSION

1. This study revealed that sinonasal pathologies are more common in male population in the age group of 20 to 40 years.
2. CT scan has got a better advantage compared to DNE in detecting the anatomical variants as well as know the condition of sinus cavity and the extent of disease in sinuses.
3. DNE can prove to be a better diagnostic modality compared to CT scan when conditions like middle meatal secretions, condition of mucosa, polyps are looked for.
4. In pathological benign nasal mass histopathological is essential for its diagnosis.
5. Best approach would be to go for DNE for early assessment, give adequate medical treatment and hence forth CT



scan for surgical planning and assessment of extent of disease.

- Both CT scan and DNE are complimentary to each other.

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