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"A Comparative Study of Chronic Sino-Nasal Diseases Between Diagnostic Nasal Endoscopy (DNE) And CT Scan"

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Abstract:
Introduction: *Recently combination of diagnostic endoscopy and systematic understanding of the lateral nasal wall with CT in the coronal plane has become the corner stone in the evaluation of the PNS disease. This is the basis for the concept of FESS.*
Material and Method: *Patients attending ENT OPD in RIMS, Ranchi with any sino-nasal complains lasting for more than 4 weeks and not responding to medical line of management. Patients are selected by random sampling method.*
Results: *The most common co-morbidity found among the patients is chronic Rhinosinusitis in 31 cases (62%). Middle meatal purulent secretions are the most obvious finding in DNE evaluation seen in 31 (62%) cases. Anterior ethmoidal sinus haziness is seen in 37(74%) cases on CT scan with majority of cases showing associated sinus involvement.*
Conclusion: *Sino nasal pathology has a higher preponderance in male patients and is commonly seen in the age group of 20 to 40 years. CT scan has got a better advantage compared to DNE in detecting the anatomical variants as well as to know the condition of sinus cavity and the extent of disease in sinuses.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. Thereby indicating that in all patients with Sino nasal disease both CT scan and DNE has to be done, to know the exact pathology and to plan for further management. Both CT scan and DNE are complimentary to each other.*
Keywords: *Sino nasal disease, Computerized tomography, Diagnostic nasal endoscopy, Anatomical variants.*

I. Introduction

Chronic headache is one of the most common symptoms which are distressing to both patients and clinicians. Computerised Tomography (CT) scan and Diagnostic Nasal Endoscopy (DNE) play a vital role in the present day to day assessment of all the sinonasal pathology and their management. Both the investigative modalities are expensive and both, having merits and demerits of their own, this study will help in having an insight into the necessity if either or both in combination are needed.

During foetal development, the paranasal sinuses originate as invaginations of the nasal mucosa into the lateral nasal wall, frontal, ethmoid, maxilla and sphenoid bones[1]. 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[2].

The three important factors on to which the pathophysiology of the sinus disease is related are the

1. Patency of the Ostia,
2. The function of the cilia and
3. The quality of the nasal secretions.

Alteration in any one of these factors, alone or in combination, can change the physiology and lead to sinusitis. Of the three factors, the patency of the ostia is the most important factor in the development of Chronic Rhinosinusitis. The ostiomeatal complex is the key area for the pathogenesis of Chronic Rhinosinusitis[3]. Based on this concept, functional endoscopic sinus surgery (FESS) aims to eliminate the disease from its primary site, i.e. the ostiomeatal complex and allow the resolution of secondary infection from the larger sinuses[4].

Computerized Tomography (CT) provides essential preoperative information for the assessment of patients undergoing functional endoscopic sinus surgery (FESS). One of the aims of CT of the sinuses is to

delineate the extent of the disease, define any anatomical variants and relationship of the sinuses with the surrounding important structures.

Endoscopic techniques for paranasal sinus surgery have allowed detailed and complete visualization of sinus disease while promising minimum distress to the patient. The endoscopic view of the operative field shows detail of the sinus anatomy and its disease. It is possible to see areas of the cribriform and orbital wall that are at risk to produce cerebrospinal fluid rhinorrhoea 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.

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

II. Materials and methodology

Source of Data:

Patients attending the ENT OPD & Indoor for sinus related problems at Rajendra Institute of Medical Sciences, Ranchi, Jharkhand.

Sample Size: 50

Mode of selection: By simple random sampling method.

Inclusion Criteria:

1. Patients presenting with complaints like headache, nasal obstruction such symptoms are difficult to diagnose by anterior rhinoscopy and posterior rhinoscopy, not responding to medical line of treatment for more than four weeks, are selected for Computerised Tomography (CT) paranasal sinus and diagnostic nasal endoscopy (DNE).
2. Patients whose diagnosis is been established by CT PNS or D N E are investigated for the other modalities, for example a patient with recently done CT PNS diagnosed as DNS to left with bilateral maxillary sinusitis is again sent for DNE and both modalities are compared and vice versa.
3. Chronic inflammatory diseases of Para-nasal sinuses.

Exclusion Criteria:

1. Patients with acute attack of sinusitis.
2. Patient with sinus malignancies which are confirmed with histopathology is excluded.
3. Patients below the age group of 15 years.

III. Results

Statistical Analysis: The data was analyzed by using SPSS 20 software. The data is presented in percentages, rates and ratios. Chi square test was used to find the association between attributes.

Age distribution: The age of the patient in the present study is from 15 years to 70 years. Maximum numbers of patients are in 20 to 40 years of age group; therefore 46% of patients are in 2^{nd} & 3^{rd} decade of age.

Table – I: 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

Comparative findings in CT and DNE of nasal cavity: In the present 50 cases, 33 cases have septal deviation using DNE while using CT, 36 cases have septal deviation.

23(46%) cases show attachment of uncinate process to lamina papyracea on right and left in DNE as well as in CT. 9(18%) cases show uncinate attachment to middle turbinate on right side and 10(20%) cases on left using DNE whereas 9(18%) cases show the same on the right side and 10(20%) cases on left in CT. Uncinate attachment to the skull base is seen in 18(36%) cases each on the right and 17(34%) on left side in both DNE and CT.

Secretions in the middle meatus is visualized in 31(62%) on right and 27(54%) cases on the left side in DNE while it is not visualized in CT.

Frontal recess patency is seen in 25(50%) cases on right side and 28(56%) cases on left side in DNE while 30(60%) cases has patency in right and left side each in CT.

Maxillary ostium patency is established in 18(36%) cases on the right and 19(38%) cases on the left using DNE whereas in CT 22(44% cases on right and 17(34%) cases on left have patency.

Table – II: Comparative finding s in CT and DNE of nasal cavity

	Diagnostic Nasal endoscopy				Computed tomography findings			
	Right	%	Left	%	Right	%	Left	%
Septal deviation	33				36			
Uncinate attachment: to lamina papyracea	23	46	23	46	23	46	23	46
Uncinate attachment: to middle turbinate	9	18	10	20	9	18	10	20
Uncinate attachments: 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	50	28	56	30	60	30	60
Maxillary ostium patency	18	36	19	38	22	44	17	34

Comparative findings in CT and DNE in relation to anatomical variant: A pneumatised uncinate is seen in 1(2%) case on left side in DNE whereas 2(4%) cases show on right side and 1(2%) case on left in CT. Agger nasi is seen pneumatised in 8 (16%) on left and 14(28%) cases on right on DNE and it is seen in 15(30%) cases on left and 18(36%) cases on right with CT scan . Haller cells are visualized in 5(10%) cases on right side and on left side in 4(8%) cases in CT. Only CT showed Onodi or sphenoethmoidal air cells in 2(4%) cases on the right side. Accessory maxillary ostium is seen only in DNE in 11(22%) cases on right side and 16(32%) cases on left. Paradoxical middle turbinate is seen in 3(6%) cases on left side in DNE whereas CT shows 1(2%) case on right and 5(10%) cases on left side. 9(18%) cases have concha bullosa on right side and 10(20%) cases on left using DNE while 13(26%) cases have concha bullosa on right and 10(20%) cases on left when their CT is done.

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

	Diagnostic Nasal endoscopy				Computed tomography findings			
	Right	%	Left	%	Right	%	Left	%
Pneumatised uncinate	0	0	1	2	2	4	1	2
Agger nasi	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

Comparative findings of CT and DNE of mucosal changes and other pathological conditions: In DNE 7(14%) cases show middle turbinate hypertrophy on right side and 6(12%) cases show on left side whereas in CT 8(16%) cases show hypertrophy of middle turbinate on right and 5(10%) cases on the left.

22(44%) cases show hypertrophy of inferior turbinate on right and left side each in DNE whereas 20(40%) cases show hypertrophy of inferior turbinate on right and left side each in CT.

Pale inferior turbinate was visualized in 31(62%) cases each on right and left nasal cavity. 13(26%) cases have a polyp on right side and 14(28%) cases on the left side in DNE whereas 8(16%) cases have polyp on right and 12(24%) cases on left using CT. Benign nasal growth on right is seen in 8(16%) cases both in DNE

and CT and 3(6%) cases have benign growth on left side in both DNE and CT. The integrity of bone such as erosions, expansion or dehiscence is only visualized using CT scan.

23(46%) cases have right frontal sinus haziness and 27(54%) cases have left haziness in CT. 37(74%) cases have right ethmoid sinus haziness and 35(70%) cases have haziness on the left side in CT. 28(56%) cases showed haziness in maxillary antrum on right and 31(62%) cases showed on left. 19(38%) cases show posterior ethmoid sinus haziness on right side and 14(28%) cases on left side in CT. Sphenoidal sinus are hazy in 12(24%) cases on right and 8(16%) cases on the left.

Table IV: Comparative findings 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: hypertrophied	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

IV. Discussion

Age distribution: - As per our observation (Table – I) Maximum numbers of patients are in 20 to 40 years of age group compared to study conducted by Sheetal et al[5] (2011) with 45 patients the majority of atients is in the age group of 20 to 40 years.

Comparative findings in CT and DNE of nasal cavity (table II)

Deviated nasal septum: It is seen in 33(66%) 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 Fikret Kasapoglu[6] et al the most common findings are deviated nasal septum noted in 18 (41.9%) cases on CT scan and by Jareoncharsri P[7] et al septal deviation is obvious in 60(72.3%) of the patients out of 83 cases on DNE.

Uncinate process: It is one of the most variable structures in nasal cavity with different anatomical attachments. On endoscopy as well as CT scan uncinate process is attached to lamina papyracea, in 23(46%) patients in both right and left side. Attachment to skull base in 18(36%) cases on right and 17 cases (34%) on left and attached to middle turbinate in 9 (18%) 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 got a lateral turn and need to palpate with a blunt probe to assess the attachment. In Sheetal D et al[5] study the results showed, on CT scan the uncinate 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). The uncinate 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).

Middle meatus secretions: In the present study on DNE, mucopurulent discharge in middle meatus is seen in 37(74%) cases, out of which 17(34%) cases are unilateral and 20(40%) 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[8] et al 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%) 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.
Sheetal D[5] et al the frontal recess is patency in 65% on CT scan whereas DNE shows the frontal recess is patent in 63%.

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 a blind procedure. On CT scan the present study shows 22(44%) on right and 17(34%) cases on left, has patency.
Zojaji[9] et al maxillary sinus patency is seen in 32(62.7%) on right and 33(64.7%) on left when seen by CT scan and 35(68.6%) on both right and left when seen by DNE.

Comparative findings in CT and DNE in relation to anatomical variant (Table III)

Uncinate process : Pneumatised uncinate process is seen in 2 cases (4%) on the right and one case on the left on CT scan, while on DNE only 1case (2%) is seen on the left.
G.L Fadda[10] et al pneumatised uncinate process is noted in 1(0.7%) case on the right and 4(2.8%) on left.

Agger nasi: It cannot be fully assessed with DNE as only excess pneumatised 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. Sheetal D[5] et al on CT scan the Agger nasi cells are present in 37% and 33% of the cases on the right and left sides respectively.

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.
Sheetal D[5] et al on CT scan Haller's cells are present in 6% and 8% of the patients on the right and left sides.

Onodi cells: It is only seen on CT scan in 2(4%) 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 hence making axial cuts to be a must in CT study of paranasal sinus.

Accessory maxillary ostium: By DNE 11(22%) 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 these ostium are small enough to be missed between the cuts. Hence needs 1 mm cut sections which cannot be done in our CT scan machine. Presence of an accessory ostium is a sign of long standing disease process which is confirmed with DNE.
Sheetal D[5] et al accessory maxillary ostium is present in 13% and 11% patients on the right and left sides respectively.

Middle turbinate concha 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. Paradoxical middle turbinate is seen only on left side in 3 (6%) on endoscopy whereas on CT scan 1 (2%) case is seen on the right and 5 (10%) is seen on the left side.

Sheetal D[5] et al on CT scan Concha bullosa is seen in 35% and 42% of the patients on the right and left sides respectively. On DNE concha bullosa is seen in 33% and 40% of the patients on the right and left sides respectively. On CT scan Paradoxical middle turbinate is seen in 17% and 8% of the patients on the right and left sides respectively.

Comparative study of CT and DNE on mucosal changes and other pathological conditions (table IV)

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%)cases on the right and 5(10%) cases on the left side.
Zojaji[9] et al out of 51 patients, middle turbinate hypertrophy is seen in 8(15.6%) cases on DNE and 7 (13.7%) cases in CT scan.

Inferior turbinate hypertrophy: It is seen in 22 (44%) patients on both right and left on DNE, whereas on CT scan shows 20 (40%) on both the left and right side.
S. Naghibi[9] et.al 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 as mild polyposis could only be seen in DNE. On CT, only extensive polyposis can be identified. Arun Kumar Patel[8] et al nasal polyposis is seen in 22(23.91%) cases of which

bilateral is seen in 10(10.86%) and unilateral in 12(13.04%), whereas a total of 17(34%) cases is seen in the present study.

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. This is of more help in diagnosing the lesion than CT scan.

Zojaji[9] et al nasal masses are seen in 5 (9.8%) cases on CT scan and 4(7.8%) cases on DNE.

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(74%) on right and 35(70%) on left. Whereas maxillary sinus is hazy in 28(56%) cases on the right and 31(62%) cases on left indicating anterior group pathology to be more prevalent in our study. In majority of the cases where anterior ethmoidal sinus is hazy, maxillary sinus pathology is also associated with it.

Sphenoid sinus haziness is seen in 12 cases (24%) on the right and 8 cases (16%) on the left on CT scans. It is mostly seen associated with other sinus involvement and never as an isolated sphenoidal sinus disease. 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.

Sheetal D[5] et al on CT scan maxillary sinus is found to be the most common sinus to get affected (57% on the right and, 46% on the left side), followed by the anterior ethmoid cells (40% on the right and, 37% on the left side), the posterior ethmoid cells (33% on the right and, 28% on the left side), the frontal sinus (28% on the right and, 26% on the left side) and, the sphenoid (20% on the right and, 13% on the left side) respectively.

V. Conclusion

From the present study it is concluded that sino nasal pathology has a higher preponderance in male patients and is commonly seen in the age group of 20 to 40 years. CT scan has got a better advantage compared to DNE in detecting the anatomical variants as well as to know the condition of sinus cavity and the extent of disease in sinuses. 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. Thereby indicating that in all patients with sino nasal disease both CT scan and DNE has to be done, to know the exact pathology and to plan for further management.

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]. Sheetal D, Devan P P, Manjunath P, Martin P, Satish Kumar K, Sreekantha, et al.. CT PNS – Do We Really Require Before FESS?. Journal of Clinical and Diagnostic Research [serial online] 2011 April [cited: 2017 Jan 9]; 5:179-181.
[6]. Fikerkasapoglu, Selcukonart, Oguzbasut: Preoperative evaluation of Chronic Rhinosinusitis patients by conventional radiographies, computed tomography and nasal endoscopy. Kulak BurunBogazIhtisDerg 2009;19(4):184-191.
[7]. 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.
[8]. Arun kumar patel, Arun patel, Brijesh sing, Manoj kumar sharma: the study of functional endoscopic sinus surgery in patients of sinus headache. International journal of Biology and Medical research. 2012;3(3):1924-1930.
[9]. 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.
[10]. G.L. Fadda, S. Rosso, S. Aversa, A. Petrelli, C. Ondolo, G. Succo Acta Otorhinolaryngol Ital. 2012 Aug; 32(4): 244–251.