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Original Research Article

Comparative study between diagnostic nasal endoscopy and computed tomography of PNS in sino nasal diseases

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ABSTRACT

Background: The objective of this study is to compare the tomographic findings to the nasal endoscopy findings in patients with chronic sino-nasal diseases. This study aims to compare CT scan and DNE in sino-nasal diseases.
Methods: 50 Patients attending ENT, OPD, BTGH 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: The most common co-morbidity found among the patients is chronic rhino sinusitis 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.
Conclusions: Thereby indicating that in all patients with sino nasal diseases 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

INTRODUCTION

Chronic headache is one of the most common symptoms which are distressing to both patients and physicians. Due to the nagging nature of patients and inability of the physician to diagnose and problems of self-medications, nature of headache remains undiagnosed in spite of many elaborated battery of test. The investigative modalities available for an ENT surgeon are many, like X-ray, CT scan, DNE, etc. 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.

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] Infection of these sinuses is of the most common causes of patients to visit the otorhinolaryngologist.

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 osteomeatel 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 osteomeatel complex and allow the resolution of secondary infection from the larger sinuses.[4] Hence

endoscopy and computerized tomography (CT) have revolutionized the understanding and management of chronic sinusitis in recent times.

The study was conducted with the aim to compare the CT findings with endoscopic findings in patients with chronic paranasal sinus disease, to compare the mucosal edema in both the investigative modality, to compare the anatomical variants in CT and DNE, to compare which is better investigation modality according to different age group and sex and to compare which is a better in diagnosis or if both are needed.

METHODS

This present study entitled is conducted in the department of ENT, Basaveshwar Teaching and General hospital, MR Medical College, Gulbarga from the period of October 2010 to April 2012.

Source of data

Patients attending the ENT OPD for sinus related problems at, Basaveshwar Teaching and General hospital, Gulbarga.

Sample size: 50

Mode of selection: By simple random sampling method

Inclusion criteria

- Patients presenting with complaints like headache, nasal obstruction such symptoms are difficult to diagnose by anterior rhinoscopy and posterior rhinoscopy, not responding to medicine line of treatment for more than four weeks.
- Patients whose diagnosis is been established by CT PNS 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 sinus malignancies which are confirmed with histopathology.
- Patients below the age group of 15 years.
- Patients who are not willing to get CT PNS or DNE done.

Methods of collection of data

The cases selected for the study were subjected to detailed history taking and examination. A routine haemogram (Hb%, TC, DC, BT,CT) and urine examination, swab from middle meatus for culture and sensitivity along with X-ray PNS were done for the patients. All the patients in active stage of the disease were treated with course of suitable antibiotics, systemic antihistamines and local decongestants. Each patient underwent a systematic DNE and CT of nose and para-nasal sinuses. Most of the patients presented with h/o headache and nasal obstruction (Table 3).

RESULTS

Most of the patients age group was between 20-40 yrs, least being >60 yrs (Table 1). Males were more common than females (Table 2).

Table1: Age distribution.

Age (in years)	No. of patients	Percentage (%)
0-20	13	26
20-40	23	46
40-60	12	24
60-80	2	4
Total	50	100

Table 2: Sex distribution.

Sex	No. of patients	Percentage (%)
Male	33	66
Female	17	34
Total	50	100

Table 3: Symptoms.

Symptoms	No. of patients	Percentage (%)
Headache	39	78
Nasal obstruction	37	74
Nasal discharge	20	40
Post nasal discharge	19	38
Sneezing	13	26
Epistaxis	9	18
Others	4	8

Middle meatel purulent secretions are the most obvious finding in DNE evaluation seen in 31 (62%) cases (Table 4). But uncinate attachment was consistent both on DNE and CT scan. Paradoxical middle turbinate was most consistent anatomical variant in CT as well as DNE (Table 6). Table 7 shows nasal mucosal changes are better visualized on endoscopy such as Inferior turbinate hypertrophied, inferior turbinate pale, middle turbinate hypertrophy whereas paranasal sinus changes are better appreciated on CT PNS such as haziness of sinuses. Anterior ethmoidal sinus haziness is seen in 37 (74%) cases on CT scan with majority of cases showing associated sinus involvement. The most common co-morbidity found among the patients is chronic rhinosinusitis in 31 cases (62%) as in Table 8.

Table 4: Signs.

Signs	No. of patients	Percentage (%)
Nasal mucosa: congested	17	34
Nasal mucosa: pale	13	26
Nasal mucosa: normal	11	22
Nasal mucosa: edematous	9	18
Inferior turbinate hypertrophy	21	42
Middle turbinate hypertrophy	17	34
Middle meatus: non-purulent	15	30
Middle meatus: purulent	38	76
Nasal polyps	16	32
Sinus tenderness	43	86
Granular posterior pharynx	31	62
Deviated nasal septum	23	46

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

Findings	Diagnostic nasal endoscopy				Computed tomography findings			
	Right	%	Left	%	Right	%	Left	%
Septal deviation	33				36			
Uncinate attachments: to lamina papyracea	23	46	23	46	23	46	23	46
Uncinate attachments: 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
Sinus tenderness	43				86			
Granular posterior pharynx	31				62			
Deviated nasal septum	23				46			

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

Findings	Diagnostic nasal endoscopy				Computed tomography findings			
	Right	%	Left	%	Right	%	Left	%
Pneumatized uncinate	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 findings of CT and DNE of mucosal changes and other pathological conditions.

Findings	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 cell haziness	NV	0	NV	0	37	74	35	70
Maxillary sinus haziness	NV	0	NV	0	28	56	31	62
Sphenoid sinus haziness	NV	0	NV	0	12	24	8	16
Posterior ethmoidal sinus haziness	NV	0	NV	0	19	38	14	24

Table 8: Diagnosis.

Diagnosis	Number of patients	Percentage
Chronic rhinosinusitis	31	62
Fungal rhinosinusitis	6	12
Allergic rhinitis	7	14
Ethmoidal polyp	6	12
AC Polyp	5	10
Frontoethmoidal mucocele	1	2
Deviated nasal septum	20	40
Atrophic rhinitis	3	6
Others	2	4

DISCUSSION

Age distribution

As mentioned in Table 1, in the present study age of patients varies between 15 and 75 years, with the maximum number of patients in 20 to 40 years category. In study conducted by Sheetal et al with 45 patients the majority of patients is in the age group of 20 to 40 years.[5] 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 Naghibi et al of 51 patients the mean age of the patients is 33 years.[6] With comparing to the above study, the mean age group in the present study is 34.4 years, which is almost equal.

Sex distribution

In the present study of 50 patients according to Table 2, 33 cases are male while 17 cases are females which accounts for 66% being male and 34 % being female. In the study conducted by Sheetal et al (2011) the majority of the patients are male 62% and 38% are female.[5] The study of Naghibi et al there are 35 male (69%) and 16 female (31%).[6] All of the studies including the present study have a male predominance than female.

Clinical features

Symptoms

As shown in Table 3, 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. The other symptoms are postnasal discharge 19 (38%), sneezing 13 (26%), epistaxis 9 (18%) and symptoms like fever, anosmia/cacosmia etc. in 4 (8%) cases. In majority of the cases the duration of symptoms is more than 4 weeks and is not responding to medical line of management.

In the study conducted by Sheetal et al the commonest complaints is headache in 90% followed by nasal discharge in 80%.[5] The other complaints such as sneezing are seen in 9% of the patients. The average duration of symptoms varies from 1-5 years.

In the study conducted by Naghibi et al 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.[6] The signs and symptoms ranged from 12 weeks to many years. The results of the present study are comparable with all of these studies showing a chronic sino nasal pathology taken into consideration in all the studies.

Signs

In the present study (Table 4) by anterior rhinoscopic examination the commonest clinical sign present is sinus tenderness, seen is 43 (86%) patients. Next most common sign is purulent discharge in middle meatus seen in 38 (76%) patients and granular posterior pharyngeal wall seen in 31 (62%) patients. Deviated nasal septum is seen in 23 (46%) patients with majority being asymptomatic DNS. Inferior turbinate hypertrophy 21 (41%) and middle turbinate 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%) patients, middle meatal discharge non-purulent in 15 (30%) patients and edematous nasal mucosa in 9(18%) patients. In the study conducted by Venkatchalam, clinical findings are hypertrophied inferior turbinate (10%), hypertrophied middle turbinate (17.14%), congested mucous membrane (15.71%), sinus tenderness (7.14%) and ethmoidal polyps (12.8%).[7] In the present study all the signs are present in more significant percentage of our patients compared to this study.[7]

Comparative findings in CT and DNE of nasal cavity

Deviated nasal septum 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 (Table 5). In the study conducted by Fikret Kasapoglu et al the most common findings are deviated nasal septum noted in 18 (41.9%) cases on CT scan.[8] In the study conducted by Jareoncharsri et al septal deviation is obvious in 60 (72.3%) of the patients out of 83 cases on DNE.[9] No conclusive literature is presents to compare CT scan and endoscopy of deviated nasal septum on the same patients.

Uncinate process

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.

In Sheetal et al's 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).[5] 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). When compared both the studies shows almost equal in percentage, in attachment of uncinate process to lamina papyracea and middle turbinate.

Middle meatus secretions

In the present study on DNE, mucopurulent discharge in middle meatus is seen in 38 (76%) cases, out of which 17 (34%) cases are unilateral and 20 (40%) cases are bilateral. In the study conducted by Patel 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.[10] By comparing both the studies middle meatal secretions is significantly more in our study.

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. In the study conducted by Sheetal et al the frontal recess is patency in 65% on CT scan whereas DNE shows the frontal recess is patent in 63%.[5] By comparing both the study it is almost equal.

Comparative findings in CT and DNE in relation to anatomical variant

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 (Table 6). In the study conducted by Fadda et al pneumatised uncinate process is noted in 1(0.7%) case on the right and 4(2.8%) on left.[11] On comparison both the studies shows almost equal percentage of patients with pneumatised uncinate.

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. In the study conducted by Sheetal 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.[5] On comparing both studies showed similar number of cases with Agger nasi cells.

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. In the study conducted by Sheetal et al on CT scan Haller's cells are present in 6% and 8% of the patients on the right and left sides.[5] On comparison both the study it is equally present.

Onodi cells

It is only seen on CT scan in 2(4%) cases on the right side. In the study of Talaipour et al CT scan shows Onodi cells 2.8% on the right and 0.7% on the left.[12] On comparison both the study shows similar percentage of case with Onodi cells are evident.

Accessory maxillary ostium: By DNE 11(22%) cases on the right and 16 (32%) cases on the left is seen. In the study conducted by Sheetal et al accessory maxillary ostium is present in 13% and 11% patients on the right and left sides respectively.[5] This is almost comparable with the present study.

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%)cases on the right and 5 (10%) cases on the left side (Table 7). In the study conducted by Naghibi 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.[6] On comparison both the studies has almost similar number of cases seen with middle turbinate hypertrophy.

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. 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 Naghibi 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%).[6] On comparison with the present study both the study shows both DNE as well as CT scan can detect hypertrophied inferior turbinate in almost equal percentage of cases.

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. In the study conducted by Patel 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.[10]

In the study conducted by Duarte et al two cases of nasal polyposis were evidenced in nasal endoscopy but not in CT, besides two other cases without detection in CT scan, but detected by nasal endoscopy, in other words, normal CT with abnormal nasal endoscopy. On comparison with the present study the same situation is seen.[13]

Diagnosis

In the present study (Table 8) the maximum numbers of patients has been diagnosed with chronic rhinosinusitis, 31 patients (62%). Allergic rhinitis 7 (14%), fungal Rhinosinusitis 6 (12%) and ethmoidal polyposis is seen in 6 (12%) cases. Deviated nasal septum diagnosed in 20 (40%), antrochonal polyp 4 (8%) and frontoethmoidal mucocele 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. In the study conducted by Naghibi et al out of 51 patients, most are diagnosed with chronic rhinosinusitis 33 (64.7%).[6] The other 18 (35.2%) patients are diagnosed with allergic rhinitis with chronic rhinosinusitis. The present study shows more varied pathological conditions which can be attributed to less exclusion criteria in the present study. The incidence in chronic rhinosinusitis cases is same.

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 meatel secretions, condition of mucosa, polyps are looked for. In pathological benign nasal mass histopathological is essential for its diagnosis. 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.

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