Original Research Article

Comparative study between CT-PNS with nasal endoscopy findings in chronic rhinosinusitis

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Abstract

Background: This study aims to compare the efficacy of CT and nasal endoscopy findings for the evaluation of CRS in patients with persistent complaints despite appropriate medical therapy. **Materials And Methods:** Randomised Control study with Primary inclusion criteria are age 15 -70 years, and patients diagnosed as per the criteria given by AAO-HNS , 88 patients failed to respond to the previous medical/conservative management and are willing to undergo endoscopic examination and CT scanning of paranasal sinuses are taken in study. **Results:** In the present study age of patient's maximum patients were between the age group of 21-30 years i.e. 35 (30%) cases with male preponderance. most common finding was congested nasal mucosa and mucopurulent nasal discharge. On nasal endoscopy, septal deviation was found to be the most common finding. Septal deviation was diagnosed in 84(95.5%) cases. It was more common on left side 48 (54.5%), septal deviation with spur was seen in 40(45.5%) . Sensitivity is high for hypertrophied middle turbinate/concha bullosa (CB), Sensitivity is low for large ethmoidal bulla and Accessory ostium, Specificity of DNE is high in diagnosing large EB, Accessory ostium, and Paradoxically curved middle turbinate. In our study, all parameters were statistically significant, except pneumatised uncinated process that is not seen endoscopically. **Conclusion:** Nasal endoscopy has essential role in accurately diagnosing this pathology, which includes anatomical variations as well as polypoid changes in the mucosa. DNE is outpatient procedure, relatively economic with no radiation hazards, aids in early diagnosis and medical management of CRS.

Key Words: Anatomical variants, Chronic Rhinosinusitis, Computerised Tomography, Diagnostic Nasal Endoscopy.

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INTRODUCTION

India is a country where almost 15% of the population is suffering from chronic rhinosinusitis,[1] CT scan of paranasal sinuses and diagnostic nasal endoscopy [DNE] are the two commonly used investigative modalities for chronic rhinosinusitis. 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. The diagnosis of CRS relies on the clinical judgement based on a number of subjective symptoms and few findings in physical examination. These symptoms and signs are inherently vague and because of the uncertainty associated with the diagnosis of CRS, it is necessary to have the data that are more objective about the extent of the disease[3] DNE enable clear visualisation of all the structures of the middle meatus and of the osteomeatal complex an ability to accurately access these areas for evidence of localised disease, or for the anatomical defects that compromise ventilation and mucociliary clearance. However, the limitations of DNE includes inability to discern the extent of the disease within the ethmoidal sinus, difficulty in identifying disease in constricted middle meatus and the presence of the hidden air space such as posterior ethmoidal cells.[4] Computerised Tomography (CT) provides essential

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preoperative information for the assessment of patients undergoing functional endoscopic sinus surgery. It has high sensitivity and provide objective findings regarding the condition of the paranasal sinuses and the presence of fluid and polyps. Furthermore, CT findings are integral part of severity staging system that are used for CRS8. This study aims to compare the efficacy of CT and nasal endoscopy findings for the evaluation of CRS in patients with persistent complaints despite appropriate medical therapy.

MATERIAL AND METHODS

It is prospective study carried out in 88 patients included in this study who were exposed to direct nasal endoscopy and CT scanning of paranasal sinuses after they were diagnosed as chronic rhinosinusitis and were resistant to medical management.

Inclusion Criteria: Age 15-70 years and Patients who failed to respond to previous medical/ conservative management.

Exclusion Criteria: Previous facial trauma, Paranasal sinus and extra paranasal sinus tumours., Sinusitis due to dental origin, Previous septal or turbinate surgeries, CRS responding to medical management.

Statistical Analysis

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean± SD(Min-Max) are results on categorical measurement are presented in Number (%). Significance is assessed at 5% level of significance. Correlation between Nasal endoscopy and CT scan findings were done. Chi-square test and Fisher's test have been used to analyse the categorical data and for testing the association between variables. $p<0.05$ was considered statistically significant.

RESULTS

The present study includes 88 patients diagnosed as chronic rhinosinusitis as per the criteria given by AAO-HNS between the period of July 2014 to September 2016. Their clinical features, endoscopic and CT scan findings were studied in detail as per pretested proforma.

Table 1: Distribution of cases according to age

Age (years)	No. of patients (%)		
	Females (n=34)	Males (n=54)	Total (n=88)
≤20	3 (8.8)	12(22.22)	15(13)
21-30	15 (44)	20(37)	35 (30)
31-40	9 (26.5)	16 (29.6)	25(21.7)
41-50	7 (20.5)	5(9.2)	12(10.4)
>50	0 (0.00)	1(1.8)	1(0.87)
Total	34 (39)	54(61)	88(100.00)

In present study out of 88 cases, maximum patients were between the age group of 21-30 years i.e. 35 (30%) cases, followed by 31-40 years i.e. 25 (21.7%) cases. Youngest patient was 16 year old as below 15 years excluded and eldest was 68 years old. Mean Age: 31.3±10.2. In present study we found male preponderance in cases of chronic rhinosinusitis.

Table 2: Distribution of cases according to nasal endoscopic findings

Nasal endoscopic findings	No. of patients(n=88)	Percentage
Nasal Mucosa		
Congested	47	53.4
Oedematous	13	14.8
Oedematous + Polypoidal	12	13.6
Pale	9	10.2
Normal	7	7.9
Nasal Discharge		
Mucopurulent	62	70.4
Watery	14	15.9
No discharge	12	13.6

In present study we observed congested nasal mucosa in 47 (53.4%) cases followed by oedematous mucosa and oedematous with polypoidal mucosa in 13 (14.8%) cases which was mucopurulent in 62 (70.4%) and watery in 14 (15.9%).

Table 3: Distribution of cases according to anatomical variation visualised on nasal endoscopy

Nasal Endoscopy Findings	No. Of Patients (%) (n=88)		
	Right	Left	Bilateral
Nasal septal deviation	36(41)	48(54.5)	0(0.00)
With spur	16(18.1)	40(45.5)	0(0.00)
Without spur	20(22.9)	8(9.1)	0(0.00)
Agger nasi cells	21(23.6)	2(2.7)	12(13.8)
Middle Turbinate			
Hypertropied turbinate / Concha bullosa	23(26)	9(10.2)	3(3.4)
Paradoxically curved MT	6(6.8)	10(11)	3(3.4)
Bifurcated MT	0(0.00)	2(2.3)	0(0.00)
Uncinate process			
Medially rotated	7(7.9)	20(22.7)	0(0.00)
Ethmoidal bulla			
Ballooned	10(11)	8(9.1)	18(20.5)
Flat	3(3.4)	0(0.00)	0(0.00)
Accessory ostium	11(12.5)	16(18.2)	7(7.9)

On nasal endoscopy, septal deviation was found to be the most common finding. Septal deviation was diagnosed in 84(95.5%) cases. It was more common on left side 48 (54.5%), septal deviation with spur was seen in 40(45.5%).

Table 4: Distribution of cases showing correlation of endoscopic and CT scan findings

Parameters	Anatomical variations (No. of patients) (n=88)						
	SD	AN	CB	PCMT	UP Pn.	Large EB	AO
Sensitivity (%)	87	75	82	77	-	33	44
Specificity (%)	46	58	53	89	-	94	94
PPV (%)	92	55	56	71	-	78	80
NPV(%)	33	78	78	92	-	67	76

Sensitivity is high for hypertrophied middle turbinate/concha bullosa (CB) Sensitivity is low for large (EB) and (AO) Specificity of DNE is high in diagnosing large EB, AO, and PCMT

DISCUSSION

In present study, Chronic rhinosinusitis can be reliably identified using the AAO-HNS Taskforce 19972. Diseased oedematous or congestion of nasal mucosa, pathological secretion, purulence or mucous in middle meatus mucosa, middle meatus have non-specific features on coronal CT. The present study includes 88 patients diagnosed as chronic rhinosinusitis as per the criteria given by AAO-HNS Task Force 19972 between the period of July 2014 to September 2016. Their clinical features, endoscopic and CT scan findings were studied in detail as per pretested proforma. In present study out of 88 cases, maximum patients were between the age group of 21-30 years i.e. 35 (30%) cases, followed by 31-40 years i.e. 25 (21.7%) cases. Youngest patient was 16 year old as below 15 years excluded and eldest was 68 years old. Mean Age: 31.3±10.2. In present study we found male preponderance in cases of chronic rhinosinusitis. (Table-1). Tegnoor MS *et al*. study5 age 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* 6 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*[7] of 51 patients the mean age of the patients is 33 years. With comparing to the above study, the mean age group in the present study is 34.4 years, which is almost equal. In present study 54(61%) male while 41(39%) cases are females. we found male preponderance in cases of chronic rhinosinusitis. (Table-1) Tegnoor MS *et al*5. study 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) [6]the majority of the patients are male 62% and 38% are female.[5] The study of Naghibi *et al*[7] there are 35 male (69%) and 16 female (31%). All of the studies including the present study have a male predominance than female. In present study we observed congested nasal mucosa in 47 (53.4%) cases followed by oedematous mucosa and oedematous with polypoidal mucosa in 13 (14.8%) cases which was mucopurulent in 62 (70.4%) and watery in 14 (15.9%). (Table-2)In the Tegnoor MS *et al*.5 study 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, 8 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%). In the present study all the signs are present in more significant percentage of our patients compared to this study. In present study we observed congested nasal mucosa in 47 (53.4%) cases followed by oedematous mucosa and oedematous with polypoidal mucosa in 13 (14.8%) cases which was mucopurulent in 62 (70.4%) and watery in 14 (15.9%). (Table-3) Tegnoor MS *et al*.[5] study 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* [9] the most common findings are deviated nasal septum noted in 18 (41.9%) cases on CT scan. In the study conducted by Jareoncharsri *et al*[10] septal deviation is obvious in 60 (72.3%) of the patients out of 83 cases on DNE. No conclusive literature is presents to compare CT scan and endoscopy of deviated nasal septum on the same patients. Cases in present study had prominent agger nasi on the right side and 21(23%) had bilateral agger nasi. In Tegnoor MS *et al*[5]. study agger nasi cells 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*[6] on CT scan the agger nasi cells are present in 37% and 33% of the cases on the right and left sides respectively. On comparing both studies showed similar number of cases with Agger nasi cells. The definition of concha bullosa used in various studies is the main reason for this variation. Concha Bullosa was seen in 64(61.53%). It was bilateral in 30(28.85%) cases. On right side in 22(21.15%) cases and on left side in 12(11.54%) cases. The incidence of concha bullosa (60.37%) in present study correlates well with Al-QudahM *et al*[11] .Studies of Gupta AK *et al*[12] and Mamtha H *et al* [13] showed lower incidence. Paradoxically curved middle turbinate was reported in 35(39%) cases which included 9(10.2%) cases on left side and 23(26%) cases on right side and bilaterally in 3(3.4%) cases.(Table-3) This correlated well with study conducted by Bolger *et al* (1991)[14]. Sensitivity is high for hypertrophied middle turbinate/concha bullosa (CB), Sensitivity is low for large ethmoidal bulla and Accessory ostium, Specificity of DNE is high in diagnosing large EB, Accessory ostium, and Paradoxically curved middle turbinate. In our study, all parameters were statistically significant, except pnematised uncinate process that is not seen endoscopically. In 2008 Shahizon *et al*[15] reported correlation of CT and nasal endoscopic findings in CRS. They found CT scan identifies a higher frequency of enlarged turbinate/concha bullosa, paradoxical turbinate and nasal septal deviation abnormalities. They stated that multiple inexperienced endoscopist who were ENT medical officers in speciality training may have contributed to the low detection rate of enlarged turbinate/concha bullosa endoscopically. Srinivasa V *et al*[16] studied 60 patients and concluded that nasal endoscopy was better than CT scan in diagnosing septal deviation, spur, polyp and hypertrophied turbinate. Similar study by Vining in 1993 has shown that diagnostic nasal endoscopy could pick up more findings in nasal cavity than CT Scan.[17] In another study by Bhattacharyya N [18] it was concluded that combined with a symptom history, endoscopy can be a highly specific technique for predicting positive CT findings of chronic rhinosinusitis. Rosbe[19] in his study, came to the conclusion that nasal ensoscopy was moderately sensitive and highly specific in predicting results of CT Scanning. Arun Kumar Patel *et al* (2015)[20] concluded that in patients with CRS symptoms (AAO-HNS) nasal endoscopy has high specificity in identifying CRS but does not rule it out which as compared to CT scan has high sensitivity. Out of 90 patients studied ,49 (54.44%) were with positive CT findings and 41 (45.55%) with negative CT findings. 33 (36.66%) patients had positive endoscopic findings and 57 (63.3%) with negative endoscopic results. Out of 33 (36.66%) positive endoscopic findings patients, 23 (25.55%) were CT positive and 10 (11.11%) were with CT negative findings. Thus, there is a correlation between nasal endoscopy and CT scan findings in CRS patients i.e. most of the endoscopic positive findings were having CT positive findings also. Therefore CT scan is much useful to confirm the CRS prior to any surgical intervention and with the use of high specificity of DNE and high sensitivity of CT Scan PNS , patients with CRS symptoms can be selected for surgical intervention.

CONCLUSION

Nasal endoscopy has essential role in accurately diagnosing this pathology, which includes anatomical variations as well as polypoidal changes in the mucosa.

DNE is outpatient procedure, relatively economic with no radiation hazards, aids in early diagnosis and medical management of CRS. However, CT scan PNS helps in recognising extent of the disease, posterior anatomical variations and density of each sinus, which is important in evaluation and surgical planning of CRS. Hence, we conclude that nasal endoscopy and CT scan paranasal sinus are complimentary to each other and both help in more accurate diagnosis and make treatment planning easier, while avoiding complications.

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