



Research Paper

MDCT Evaluation of Paranasal Sinus Lesions

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Abstract

Aim: To find out types of lesion, age & sex distribution and diagnostic yield of MDCT.

Result: This study was conducted to evaluate the role of MDCT in detection and characterization of paranasal sinus lesions. This study included 50 patients (30 males:20 females) in the range of 11-69 years. All these patients of paranasal sinus lesions were studied and CT was correlated with it.

Conclusion: MDCT is useful tool for detection and characterization of paranasal sinus lesions.

Keywords: MDCT, paranasal sinus, sinusitis, fungal sinusitis, polyp, retention cyst, squamous cell carcinoma.

Introduction

Paranasal sinus disorders commonly affect a wide range of population with variety of etiology. Lesions in the paranasal sinus may be non-neoplastic or neoplastic. The lesions produces wide range of features ranging from epistaxis, respiratory obstruction of local structures. Conventional radiography is often the initial examination performed in patients with clinical presentation of paranasal sinus disorders. conventional radiography lacks sensitivity and specificity and radiography based evaluation can either over or underestimate soft tissue changes in the paransal cavities and they often fail to demonstrate accurately the extent of the lesion. Dreaded complications like intracranial and intraorbital involvement cannot be well assessed. Early lesions are likely to be missed and advanced

diseases can be underestimated.

The introduction of CT has improved the visualization of PNS anatomy and has allowed greater accuracy in disease correlation. The use of CT scanning combined with functional endoscopic sinus surgery (FESS) has empowered the modern sinus surgeon to treat patients more effectively, facilitating reduced morbidity and complications¹. CT scan with its excellent capability to image both bones and soft tissues reliably increased the accuracy of defining the cause and extent of both inflammatory and neoplastic diseases of the PNS². The introduction of MDCT has revolutionized the diagnostic aspects of PNS. Using CT, detailed images of normal and pathologic anatomy can be obtained in axial, coronal and sagittal projection, either directly or by image reconstruction. Also three-

dimensional relationship are easily appreciated; Accurate localization of pathological process is possible³. Again the techniques like contrast enhanced CT scan (CECT) has given additional information like the extent of the lesion, and to some extent assess the type of the lesion by noting the enhancement pattern⁴.

Materials and Methods

The present study was carried out in The Department of Radiodiagnosis, V.S.S. Medical College & Hospital, Burla, and Sambalpur. Patients referred to the department of

Radiodiagnosis presenting with history and clinical features suggestive of lesion in the paranasal sinuses were evaluated with CT. 50 cases of different age groups of either sex, who had paranasal lesions on the CT scan, were studied in detail. The CT diagnosis was based on the clinical presentation, age of the patient, sex, site and size of the lesion, its extend, bony involvement and invasion to adjacent structures, attenuation values, type of calcification, and contrast enhancement pattern. CT examination of the PNS was done with Canon 160n CT scan.

Results

Table 1: Age Distribution

Age	No. of Patients	Percentage	Male	Percentage	Female	Percentage
11-20	4	8	3	10%	1	5%
21-30	16	32	10	33%	6	30%
31-40	10	20	4	13%	6	30%
41-50	10	20	7	23%	3	15%
51-60	7	14	5	17%	2	10%
61-69	3	6	1	3%	2	10%
TOTAL	50	100	30	100%	20	100%

Table -2 Clinical Symptoms

Symptoms	NUMBER OF PATIENTS	PERCENTAGE (%)
Headache	32	64
Epistaxis	11	22
Facial pain	18	36
Nasal discharge and obstruction	20	40
Facial swelling	9	18
Proptosis	6	12
Epiphora	8	16
CNS symptoms	4	8

Table-3 Distribution of Various Pns Lesions

Lesions	Number of Patients	Percentage
Inflammatory	35	70
Neoplastic	15	30

Table- 4 Age and Gender Distribution (Inflammatory/Infective Condition)

Age In Years	Number of Patients	Percentage	Male	Percentage	Female	Percentage
11-20	4	11.4	3	14.4	1	7.1
21-30	16	45.7	10	47.6	6	42.9
31-40	8	22.8	4	19	4	28.6
41-50	2	5.7	2	9.5	0	0
51-60	3	8.6	2	9.5	1	7.1
61-70	2	5.7	0	0	2	14.3
TOTAL	35	100	21	100	14	100

Table-5 Incidence of Inflammatory Lesions Arising from PNS

Lesion	Number	Percentage
Acute/Chronic Sinusitis	15	43
Polyp	9	26
Retention Cyst	4	11
Allergic Sinusitis	4	11
Fungal Sinusitis	3	9

Table-6 Incidence of site of Inflammatory Lesions Arising from PNS

Paranasal Sinus	Number	Percentage
Maxillary	26	74.3
Ethmoid	17	48.6
Frontal	10	28.6
Sphenoid	9	25.7

Table - 7 Age and Sex Distribution of Neoplastic Lesions

Age In Years	Number of Patients	Percentage	Male	Percentage	Female	Percentage
11-20	0	0	0	0	0	0
21-30	0	0	0	0	0	0
31-40	2	13.3	0	0	2	33.3
41-50	8	53.3	5	55.6	3	50
51-60	4	26.7	3	33.3	1	16.7
61-70	1	6.7	1	11.1	0	0
Total	15	100	9	100	6	100

Table -8 Incidence of Neoplastic Lesions

Lesions	Number	Percentage
Squamous Cell Carcinoma	11	73.3
Lymphoma	2	13.3
Glandular Tumor	2	13.3

Table -9 Affection of Sinus in Neoplastic Lesion

Paranasal Sinus	Number	Percentage
Maxillary	7	46.7
Ethmoid	4	26.7
Sphenoid	3	20
Frontal	1	6.6

Table 10 Plain CT Findings

Lesion	Isodense	Hyperdense	Hypodense	Mixed	Total
Sinusitis	5		10		15
Polyp	3		6		9
Mucous Retention Cyst	1		3		4
Allergic Sinusitis	1	2	1		4
Fungal Sinusitis		3			3
Squamous Cell Carinoma	4		4	3	11
Glandular Tumor	1		1		2
Lymphoma			2		2
Total	15	5	27	3	50

Table 11 Enhancement Pattern in PNS Lesions

Lesions	Enhancement Pattern
Sinusitis	No Enhancement
Polyp	Peripheral Enhancement
Retention Cyst	No Enhancement
Fungal Sinusitis	Minimal Heterogenous Enhancement
Allergic Sinusitis	No Enhancement
Squamous Cell Carcinoma	Moderate Enhancement
Lymphoma	Moderate Enhancement
Glandular Tumor	Heterogenous Enhancement

Table 12 Involvement of Contiguous Structures

Lesions	Bony Changes				Orbital Extension	Intracranial Extension
	Remodelling	Hyperostosis	Erosion	Destruction		
Sinusitis					2	
Polyp	1					
Retention Cyst	1					
Allergic Sinusitis						
Fungal Sinusitis	1		1	2		2
Squamous Cell Carcinoma	2	1	4	9		1
Lymphoma	1			2	1	
Glandular Tumor				1		
Total	6	1	5	14	3	3

Discussion

Table I shows age and sex distribution of PNS lesions. Total numbers of males were 30 (60%) and that of females were 20 (40%). We observed that PNS lesions were common in males and the male: female ratio was 1.5: 1. This correlate with the study done by Bist S et al⁵. The commonest age group affected was found to be 31-50 years. This finding also correlate with the study done by Harika Surapaneni et al⁶

Table 2: The commonest symptoms were that of headache (64%), nasal obstruction and discharge (40%). This correlate to the observations of the study done by Asuddin et al.⁷

Table 3: shows the distribution of various PNS lesions. In our present study the inflammatory conditions outnumbered other pathologies. The order of occurrence in the order of decreasing frequency was inflammatory (70%), neoplastic (30%). This is in accordance to the study done by Vikas Dhillon et al.⁸

Table 4: shows shows age and sex distribution of inflammatory PNS lesions. Total numbers of males were 21 (60%) and that of females were 14 (40%). Inflammatory PNS lesions were observed more commonly in males than in females. The commonest age group affected was found to be 21-30 years. This correlates with the study done by Ahmed et al.⁹

Table 5,6: shows distribution of inflammatory lesions of PNS. Inflammatory lesions most commonly occurred in the maxillary sinus (74.3%), followed by ethmoids (48.6%) frontal (28.6%), and sphenoid (25.7%). Which was

correlated with Kushwah et al.¹⁰. Among this the acute and chronic sinusitis, fungal sinusitis, retention cyst and polyps found to involve multiple sinuses. In our study there were 35 patients under this category. out of which 15 had a/c sinusitis(43%), 9 inflammatory polyps(26%), 4 retention cyst (11%), 4 allergic sinusitis (11%) and 3 fungal sinusitis (9%). The most common inflammatory pathology was sinusitis which was also found in study done by Azzam MA, Salmi et al.¹¹.

Table 7: shows age and sex distributions of neoplastic lesions of PNS. The total no of patients observed were 15, of which 9 were males (60%) and 6 were females (40%). The most common age group found was 41-50 i.e, 8 out of 15(53.3%). Malignancy was more common in males between the age group of 41-60. These findings were comparable to those of Zbaren P et al¹².

Table 8,9: shows the incidence of various neoplastic lesions. Squamous cell carcinoma was found to be in 11 cases (73.3%), lymphoma in 2 cases (13.3%) and glandular tumor in 2 cases (13.3%). The most common neoplastic lesion was squamous cell carcinoma. Among various paranasal sinuses, maxillary sinus is most commonly involved in 7 cases (46.7%) followed by ethmoid sinus in 4 cases (26.7%). Maxillary sinus was most commonly involved in squamous cell carcinoma (5 out of 11 cases). These findings were consisted with the study done by Mohammed A. Gomma et al.¹³

Table 10 and 11: shows the plain and contrast CT characters of the lesion. The study showed that

54% (27/50) of the lesions were hypodense followed by isodense (30%), hyperdense (10%) and mixed (6%) on plain CT. These findings were consistent with Kral T et al 1997.¹⁴

Multiple sinuses were affected in patients of sinusitis and spread to contiguous sinuses was common. In our study, the commonest CT findings were those of fluid level and total opacification of the sinuses. On contrast, there was no enhancement seen. There were in accordance to the CT finding of Lindback M et al.¹⁵

Polyps on CT appeared as bulky, soft tissue mass, associated with chronic thickening of the mucosa within the sinuses with mild irregular enhancement. 6 cases have showed as hypodense and 3 cases as isodense lesion on plain CT. Some of them has taken mild peripheral enhancement. These were correlated with Som PM et al.¹⁶

Mucous retention cyst appeared as a homogeneous soft tissue mass. This was the same finding described by Rodrigues CD et al.¹⁷

Allergic sinusitis showed near complete opacification. On CT it appeared as central opacified lesion of hyperdense material with a peripheral rim of hypodense mucosa. This was the same finding described by Ishida M et al.¹⁸

Fungal sinusitis: In our study 3 patients were diagnosed to have fungal infection. This constitutes about 13.7% of all the sinusitis we observed. On unenhanced CT it appeared as hyperdense opacified lesion. This observation correlate with those of Karci B et al.¹⁹

Squamous cell Carcinoma. According to Hasso²⁰, the CT features of these lesions show a mass having irregular margins and variable enhancement and bone destruction. Our studies correlated well with these. Administration of iv contrast was useful to show the early extension into the infratemporal fossa and intraorbital and intracranial extension.

Glandular tumors: The CT features of these tumors were indistinguishable from that of squamous cell carcinoma. Ireland PE et al²¹ also stated the same.

Lymphoma: CT finding in this patient constitutes a homogeneous soft tissue mass in the right maxillary antrum and the nasal cavity, which enhance mildly. Histopathology came as Non-Hodgkin's that is the most common form of lymphoma affecting the PNS. This was consistent with the findings of Bush SE et al.²²

Table12: shows associated change seen in CT.

Bony changes: The most common bony change was bone destruction-14 cases. The findings were consistent with Zimmerman et al²³. All patterns of involvement except for hyperostosis were found in fungal infections.

Orbital involvement: The most common lesion showing orbital involvement was again squamous cell carcinoma-50% (3/12).

Intra Cranial involvement: were observed in 6 cases. Fungal sinusitis was common among these 50% (2/4).

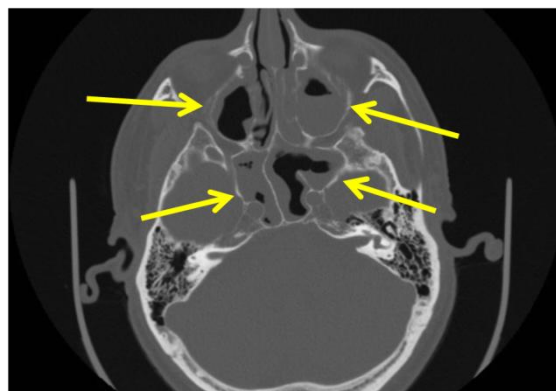


Fig 1 showing acute maxillary and sphenoid sinusitis. Air fluid level in b/l maxillary and sphenoid sinus noted.

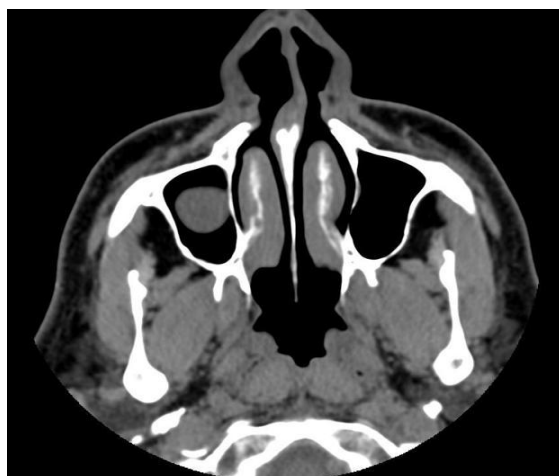


Fig-2 showing mucous retention cyst. A well margined, homogenous, isodense mass in right maxillary sinus noted



Fig-3 showing antrochoanal polyp. Soft tissue mass within left maxillary sinus and nasal cavity with maxillary ostil widening noted.

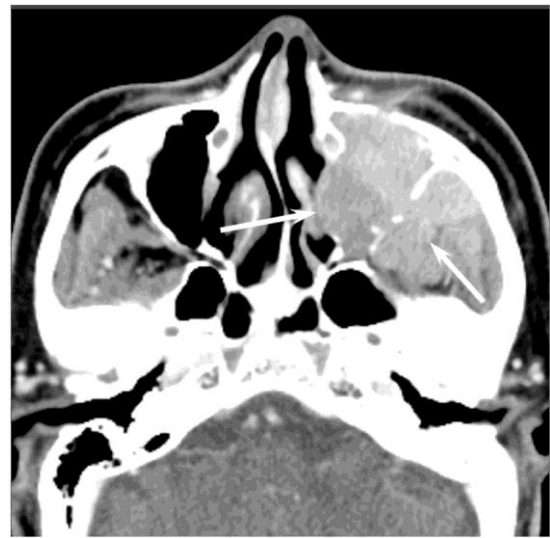


Fig 6 showing Lymphoma. Bulky soft tissue mass with inhomogenous enhancement within left maxillary sinus with bone erosion with extension to nasal cavity and infratentorial fossa.



Fig-4 showing fungal sinusitis. Hyperdense SOL noted in left maxillary sinus extending to nasal cavity noted with bony destruction.

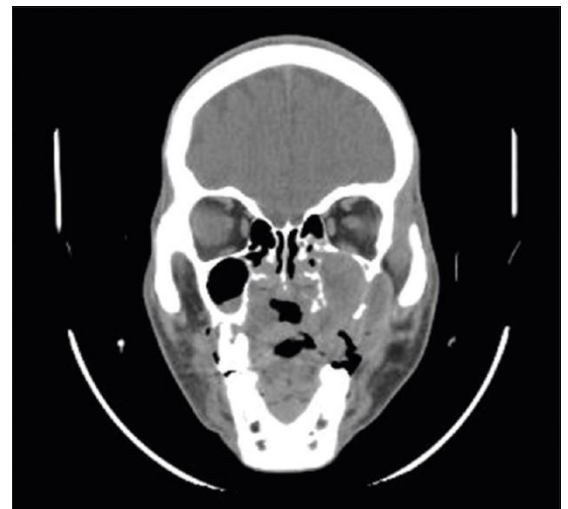


Fig 7 showing Glandular tumour. Moderately enhancing mass in left maxillary sinus extending to nasal cavity with remodeling of the bone.



Fig-5 Showing squamous cell carcinoma. Heterogenously enhancing soft tissue mass in Maxillary sinus with aggressive bony destruction into nasal cavity, pterygoid plates, nasopharynx

Summary and Conclusion

CT scan was very helpful in detection of PNS lesions and predicting the correct pathology in majorities of cases. The few fallacies that occurred are mainly due to the rarity and atypical presentation of the lesion. The main objective to study i.e., to evaluate the detailed anatomy, site of origin, extent of the lesion and to detect the possible complication, was fulfilled. The study also indicates the necessity of health education in people, accounting the severity of the lesion and

late presentation to hospitals. Due to its unique property of Visualization of bones as well as air and advanced processing technique, CT scanning is an indispensable diagnostic modality in the detection and management of paranasal sinus lesions in the present era and many more years to come.

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