Indian Journal of Public Health Research and Development
Volume 14 No. 1, January-March 2023

Role of Computed Tomography of Paranasal in Nasal and Sinus Pathology

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How to cite this article: Grace Budhiraja, Harsimrat Singh, Navjot Kaur et. al. Role of Computed Tomography of Paranasal in Nasal and Sinus Pathology. Indian Journal of Public Health Research and Development 2023;10(1).

Abstract

Background: Pathological lesions of the paranasal sinuses include a wide spectrum of Conditions ranging from inflammation to neoplasms both benign and malignant. Most patient of common cold present with symptoms of nasal discharge, nasal obstruction, headache and nasal allergy etc. The patient of paranasal mass usually present with facial deformity, swelling or repeated episodes of epistaxis.

Aim: The aim of the study was to establish the role of CT in evaluation of pathologies and their proper early diagnosis.

Materials and Methods: This is a prospective study, from may 2016 to september 2016, who attended the ENT department of AIMSR.

Statistical Analysis Used: SPSS.

Results: Out of 50 cases 51 (51%) cases were males and rest 49 (49%) patients were females. The majority of the cases were of age group 16-30 which were 37case (37%) The most common symptoms were nasal obstruction (50%), followed by nasal discharge (49%), headache in 20% cases. Most common anatomical variations seen was deviated nasal septum (49%) more commonly on right side next common was agger nasi in 48% of cases. Maxillary sinuses are most commonly involved in the study, followed by the ethmoid sinuses and frontal sinuses. The most common pathology seen was masses in 30% cases followed by DNS in 21% cases. The most common form of mucosal thickening noted is circumferential type seen in 7% cases. The most common pathology involving the sinuses was sinusitis (30%) followed by polyp (25%).

Keywords: CT-PNS, Rhinosinusitis, Sino-nasal diseases.

Introduction

Pathological lesions of the paranasal sinuses include a wide spectrum of Conditions ranging from inflammation to neoplasms both benign and malignant. Most patient of common cold present with symptoms of nasal discharge, nasal

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obstruction, headache and nasal allergy etc. The patient of paranasal mass usually present with facial deformity, swelling or repeated episodes of epistaxis. Preliminary investigation by standard sinus radiographs are sub optimal in displaying regional morphology of ostiomeatal area, Ethmoid & Sphenoid sinuses and anatomical variants. Further there is overlapping between these structures hence these are insufficient to diagnose and as a guide to endoscopic sinus surgery & modified PNS surgeries.

Computed Tomography (CT) has shown enormous development since the original CT images obtained by Hounsfield in early 1970. CT has been revolutionalised by utilizing differential contrast enhancement characteristics of lesion, a clear distinction between tumor mass and inflammatory tissue can be made out which is of utmost importance for treatment of patients. CT also plays role in diagnosing the complications and intracranial extension of sinonasal diseases**.**

The multifaceted benefits of CT in PNS over other imaging & diagnostic procedures are countless. The present study was conducted to establish the role of CT in evaluation of pathologies and their proper early diagnosis.

Materials and Methodology

This prospective study was done in the Department of otorhinolaryngology of AIMSR. A total of 50 patients who were referred to our department with clinical suspicion of PNS disease underwent CT evaluation of PNS using 64 Multi slice CT scanner from may 2016 to september 2016.

Observations and Results

The present study was conducted in a study population of 50 patients, who presented with clinical complaints of nasal obstruction, nasal discharge & positive ENT examination findings and underwent computed tomographic imaging. The computed tomographic imaging was then evaluated to identify the abnormalities in our study group.

Table 1: classification of cases on the basis of their Age & Sex

Age group	Male	Female	Total No. case	%
< 15	3	2	5	13%
16-30	11	7	18	37%
31-45	6	9	15	30%
46-60	5	4	9	15%
>60	2	1	3	5%
Total	27	23	50	100%

The majority of the cases were of age group 16-30 which were 18 case (37%), 15 case (30%) in age group 31-45 yrs, 9 cases (15%) in age group 46-60 yrs. 5 cases (13%) below 15 yrs. and 3 cases (5%) more than 60 yrs. age group.

Table 2: Classification of Cases on the Basis of their Presenting Complaints

Symptom	No. of Cases	%
Nasal Obstruction	25	50%
Nasal Discharge	24	49%
Headache	10	20%
Face Swelling	8	17%
Allergy	4	8%
Epistaxis	3	5%
Proptosis	2	4%
Loss of Vision	1	1%

The most common symptoms were Nasal obstruction (50%), followed by Nasal discharge (49%), headache in 20% cases.

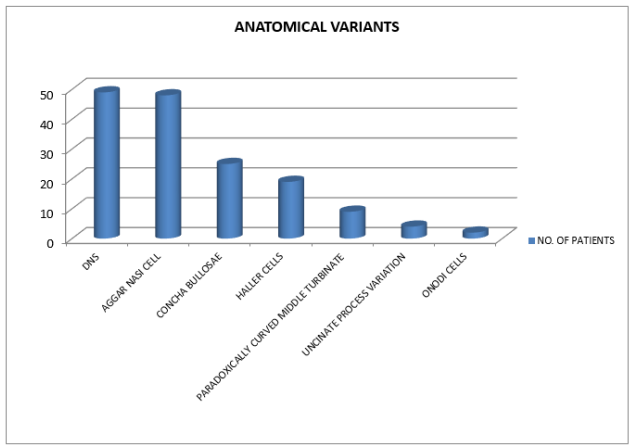

Fig 2: Classification of cases on the Basis of Anatomical Variants of PNS

Most common anatomical variations seen was Deviated nasal septum (49%) more commonly on Rt. Side next common was agger nasi in 48% of cases.

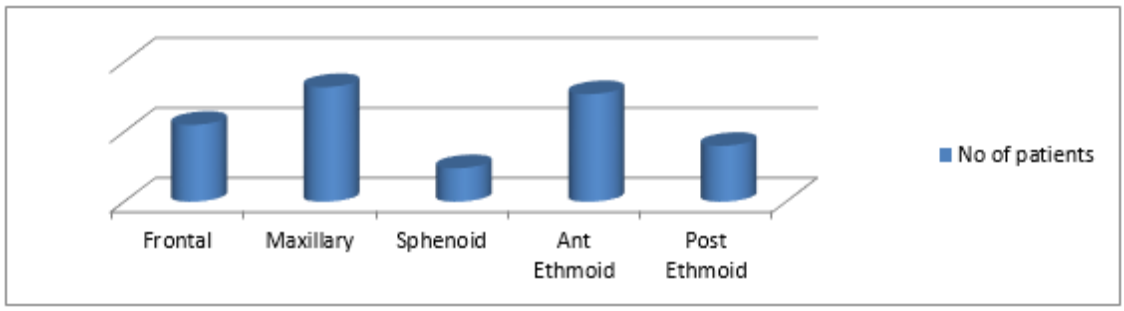

Fig 3: CT. Findings in Paranasal Pathologies

Maxillary sinuses are most commonly involved in the study(41 cases), followed by The ethmoid sinuses (ant.group 38cases, post group 20 case) and frontal sinus 27 cases.

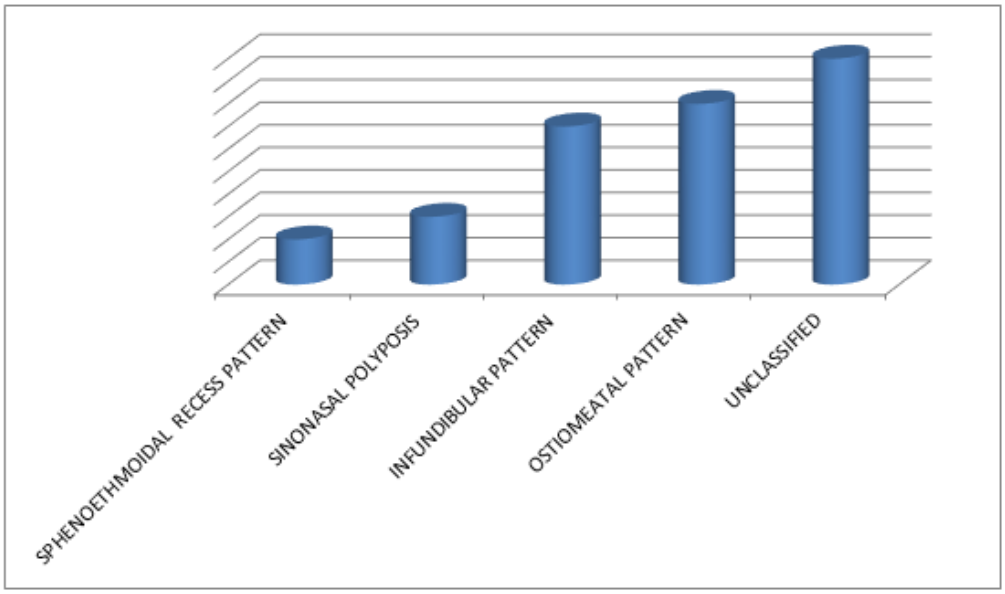

Fig 4: Classification of Cases on the Basis of Radiological Pattern Of Rhinosinusitis

The most common radiological pattern of sinus involvement is unclassified type seen in 33% of cases, followed by ostiomeatal pattern in 26%.

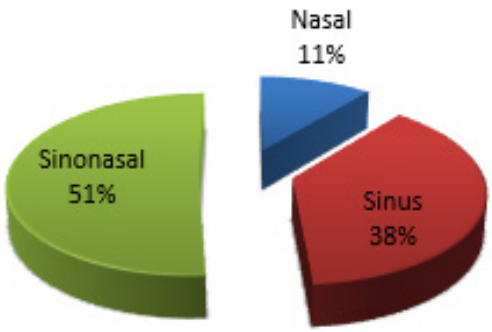

Fig 5: Classification of Cases on the Basis of Type of Pathology

The most common pathologies are sinonasal(51%) followed by sinus involvement in 38% cases.

The most common pathology seen was Masses in 30% cases followed by DNS in 21% cases.The most common form of mucosal thickening noted is circumferential type seen in 7% cases.

Cases are distributed on the basis of bony involvement.

The most common form of metastasis seen is soft tissue involvement (33%) followed by intracranial(22%) and infratemporal(22%) region.

The most common pathology involving sinonasal region is polyp(37%) followed by carcinoma(21%).

The most common Nasal pathology noted was Angiofibroma(28%) followed by carcinoma(18%).

The most common pathology involving the sinuses was Sinusitis(30%) followed by Polyp(25%).

Discussion

Computed Tomography plays an indispensable role in the detection and characterization of paranasal sinus pathologies. The characterisation of PNS lesions is of immense importance because the identifying abnormalities of PNS influence the clinical and surgical decision making. Our study was carried out in the department of Otorhinolaryngology and head and neck surgery,.It included 50 patients having PNS pathology who underwent CT. The majority of the cases in our study were of the age group 16 - 30 years(37%) followed by 31-45 years(30%), 46-60 years(15%) below 15yrs(13%) and age group above 60years(5%).

In our study, 51% of the cases were male while 49% were female with marginal preponderance for male which is in concordance with study conducted by **Nitin.V.D et al**.[1] Patients presented with overlapping symptoms in most cases, of which the most common presenting complain being nasal obstruction(50%) followed by nasal discharge(49%), which is consistent with the study conducted by **Gautam.p. et al**.[2]

In our study, the most common PNS pathology was sinusitis, it is classified as bacterial, viral, fungal; acute, or chronic sinusitis and based on region involved sinonasal or purely nasal or sinosal. In our study the most common pattern of involvement was sinonasal (51%) with maxillary sinus being the most common sinus involved (82%) followed by posterior ethmoidal(77%), which is consistent with the study done by **Bolger et al** [3] There are 5 basic pattern of mucosal involvement seen in patients of chronic sinusitis chronic sinusitis they are, Infundibular, Osteomeatal unit, Sphenoethmoidal recess, Sinonasal polyposis and Unclassified. Most common pattern in our study was unclassified (33%) followed by osteomeatal unit pattern(26%), infundibular pattern(24%), sinonasal polyposis(10%), sphenoethmoidal recess pattern(7%). The findings are consistent with the study done by **Naimi et al.** [4]

Mucocele is an expansile, cystic, hypo to isodense lesion with bony erosion and intraorbital extension with no contrast enhancement. In our study frontal sinus was the most common sinus involved(80%). 10% cases showed orbital extension and 20% showed bony erosion, this is consistent with study done by Beratriz peral et al. Diagnostic accuracy of mucocele in our study was 100% which is consistent with the study done by **Silberstein et al** [5]

Granulomatous disease is characterised by mucosal thickening, bony sclerosis and calcification. In our study 3 cases were diagnosed as granulomatous disease. 2 out of 3 were sinonasal and 1 was purely nasal. The diagnostic accuracy in our study is 100% which is in concordance with study done by **Bakshi j et al.**

Kaplan BA et al determine the diagnostic criteria and etiology of complete unilateral maxillary sinus opacification and found that unilateral maxillary sinus opacification is a relatively common finding. Early identification of inverting papillomas and mucoceles may avoid delay in surgical intervention, whereas acute/chronic rhinosinusitis and nasal polyposis can initially be managed medically. Careful history, endoscopic examination, and radiographic studies can often determine the responsible disease process. **K Dua et al** comment that CT Scan Paranasal sinuses has become mandatory for all patients undergoing functional endoscopic sinus surgery. It depicts the anatomical complexities of ostiomeatal complex in much simpler way and acts as a road map for endoscopic sinus surgery. Fifty patients of chronic sinusitis were evaluated by CT Scan PNS -coronal and axial views. The anatomical variations and changes in osteomeatal complex on CT Scanwere studied. In majority of patients, osteomeatal complex and anterior ethmoids were involved (88%).Agger nasi cells (40%) were the most common anatomical variations followed by concha bullosa and hallercells (16%). Apart from this deviated nasal septum was found in 44% of patient.

Sinus computed tomography (CT) is widely performed in the imaging workup of sinusitis, but it is sometimes criticized by the surgeons for its lack of specificity. There have been studies where Mucosal thickening of the paranasal sinus has been

seen in up to 30% of the asymptomatic population. **Rak KMNewell et.al.** In addition to that, the mucosal thickening of sinuses has been reported in patients with nonspecific upper respiratory tract infection, such as the common cold and coryza. **Gwaltney Jr et.al.** there have been numerous reports in surgical journals that found sinus CT findings did not correlate well with a patient's clinical symptoms, since results of sinus CT can be normal for severely symptomatic patients and abnormal for patients with minimal symptoms. **Yoshimi Anzai. et.al.**

R Shwartz 2010 describe CT findings in primary nasal and nasopharyngeal rhinoscleroma include soft-tissue masses of variable sizes. The lesions are characteristically homogeneous and nonenhancing, and they have distinct edge definition. Adjacent fascial planes are not invaded. Findings also include calcifications, luminal stenosis, wall thickening, and nodules The diagnostic accuracy using above CT criteria for different lesions was assessed. The CT accuracy for inflammatory lesions in our study was 86%, for benign lesion was 90% and 80% for malignant lesions. Thus CT had a high accuracy, sensitivity and specificity for differentiating and characterisation of inflammatory, benign and malignant lesions of PNS.

Conclusion

The present study was undertaken to determine the role of CT in evaluation of PNS pathology and its potential role in differentiating benign from malignant lesion. 50 patients with complains of PNS pathology were imaged. The CT characteristics of pathology were evaluated. From the observations we concluded that Most of the patients with PNS pathology were from 2nd and 3rd decade. Slight male preponderance was noted. Majority of the patients presented with nasal obstruction. Most common anatomical variant seen was DNS. Most common sinus involved was maxillary. Sinonasal pathologies were the most common followed by pure nasal or pure sinosal. The most common pathology was inflammatory (74%). The most common benign pathologies were polyps with 92% accuracy. 15% of cases had malignancy with diagnostic accuracy of 90%. Computed Tomography has high accuracy, sensitivity and specificity for detection, characterisation and differentiation of inflammatory, benign and malignant lesions of PNS.

Declaration of Ethical clearance- Taken from ethical committee of institute

Source of funding- Self

Conflict of Interest – Nil

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