



CT FINDINGS IN PATIENTS WITH PARANASAL SINUSES DISEASES

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ABSTRACT The study aimed to evaluate the CT findings in patients with paranasal sinus pathologies in two planes. Descriptive, cross sectional study design has been used, conducted on 45 patients (from September 2018 to May 2019), at Prince Saud Bin Jalawy hospital. Both male and female patients of different age groups from 12 to 60 years old with clinically suspected PNS diseases were enrolled for the study. Both axial and coronal images were acquired using multi-detector CT unit. The paranasal sinuses were evaluated for: mucosal thickening, nasal polyposis, chorionic sinusitis, acute sinusitis, fungal and pattern of bony involvement. There was a male predominance of 62% as compared to females 38%. Most common pattern of involvement was chronic sinusitis (31.2%) followed by polyposis (26.9%), mucosal thickening (22.8%), acute sinusitis (11.8%), fungal sinusitis (7.5%) and bone erosion (4.2%). Maxillary sinus was the most commonly involved sinus (39.9%) followed by frontal sinus (29%), sphenoid sinus (16.7 %) and ethmoid sinus (14.5%). The study concluded that the two image planes were performed together and used as an essential technique in diagnosing of pathological change of PNS.

KEYWORDS : Axial view, computed tomography, coronal view, paranasal sinuses, paranasal sinuses diseases

INTRODUCTION

Paranasal sinuses (PNSs) diseases commonly affect the varied range of population, which range from inflammatory conditions to neoplasms, both benign and malignant. [1][2] Their clinical assessment is hampered by the surrounding bony structures, hence for confirmation of their diagnosis, the role of radiology is paramount importance. [3] Imaging of the sinuses is usually done to approve the clinical findings when history and physical examinations are suggestive of PNS lesions, but the patient is not responding to conventional treatment. Plain radiography is the commonly used imaging modality for diagnosis of PNS diseases as it is economical, simple, and widely available. However, it only provides a basic overview of the anatomy and underlying pathology. Plain radiography could not display the three-dimensional structures in a two-dimensional plane. It can provides limited views of the anterior ethmoid cells along with the upper two-thirds of the nasal cavity. [4] Computerized tomography (CT) is considered the gold standard for preoperative evaluation of PNS diseases for appropriate patient selection for functional endoscopic sinus surgery (FESS). It is mandatory to evaluate the PNS and nose by CT before planning for FESS. It can provide a "ROAD MAP" to direct the surgical approach to otolaryngologist. CT has some medico-legal importance as well. [5][6] CT plays an important diagnostic role to determine the distribution and extent of paranasal disease and detect those anatomic variations (such as septal deviation, spur formation, concha bullosa, and paradoxical curve of middle turbinate) that may place the patients at increased risk for intra- and post-operative FESS complications and thereby reduces the morbidity and mortality of patients. [7] Coronal imaging plane offers the best visualization of the drainage pathways of the sinuses, whereas some drainage pathways (such as sphenoid sinus ostia) and sinus walls, oriented close to the coronal plane, are better seen on axial images. [7][8] Contrast enhanced CT scans are obtained only in patients who are acutely ill and suspected of having a complication of acute sinusitis. [9] The present study was aimed to evaluate the CT findings in patients with paranasal sinus pathologies and correlate it with clinical findings.

MATERIALS AND METHODS

This was a cross-sectional study design was conducted (from September 2018 to May 2019), at Prince Saud Bin Jalawy hospital. Both male and female patients of different age groups from 12 to 60 years old. Random samples of (45) who clinically have paranasal sinuses diseases were enrolled for the study. Both axial and coronal images were acquired using multi-detector CT unit. A lateral 256 mm scout scan was first obtained at 120 kvp and 100 mA. Routinely axial scanning was done in supine position. Reformatting in coronal and

sagittal planes was done using software provided. For direct coronal imaging, the patient was kept in prone position or in supine position with the head of the patient free leading edge of the table of the scanner. Images were performed with contiguous 2mm-thick. The paranasal sinuses were evaluated for: mucosal thickening, nasal polyposis, chorionic sinusitis, acute sinusitis, fungal and pattern of bony involvement. The results were recorded and expressed as sinus distribution, side of involvement and frequency of deviated nasal septum (DNS). Using data collection sheet including (age, gender, CT coronal and axial findings were recording.

RESULTS

There was a male predominance of 62% as compared to females 38%. The most common CT. Table 1 shows the efficiency of CT appearances that were demonstrated in both coronal and axial sections. Table 2 shows the account and percentages of PNS pathological finding by CT compare to sinuses area. Most common pattern of involvement was chorionic sinusitis (31.2%) followed by polyposis (26.9%), mucosal thickening (22.8%), acute sinusitis (11.8%), fungal (7.5%) and bone erosion (4.2%). In this study, maxillary sinus (39.9%) was the most commonly involved sinus followed by frontal sinus, sphenoid sinus and ethmoid sinus (29%, 16.7%, 14.5%) respectively. Deviated Nasal Septum DNS was noted toward right side in 43.7% cases and toward left side in 29.5% of cases. Bone erosion of sinus walls was noted in two cases (4.2%).

Table (1): The CT appearances that were demonstrated in both coronal and axial sections

Pathological findings	Appearances in coronal %	Appearances in axial %
Maxillary opacification	55	45
Frontal opacification	58	42
Sphenoidal opacification	50	50
Nasal septum deviation	60	40

Table (2): Frequency distribution of pathology compare to sinuses are

Disease	Affected sinuses area					
	Maxillary	Frontal	Sphenoid	Ethmoid	Total	Percentage%
Chronic sinusitis	19	15	13	11	58	31.2%
Acute sinusitis	8	7	4	3	22	11.8%

Fungal sinusitis	8	5	1	0	14	7.5%
Polyposis	19	15	8	8	50	26.9%
Mucosal thickening	20	12	5	5	42	22.6%
Total	74	54	31	27	186	
Percentage%	39.9%	29%	16.7%	14.5%		

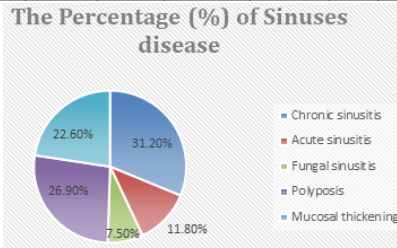


Figure (1): percentage of each pathology compare to sinuses area

DISCUSSION

This study included 45 patients, CT scanning was performed on two planes (axial, coronal) and were evaluated, the characteristic of all variables in the sample studied were described as frequencies and percentages. This study assessed and compared between two image planes (axial and coronal) by account the number of appearances that shown by coronal view and compared them with those which were appeared by axial section table 1. The visualization of any opacification in anterior ethmoidal sinuses, fluid level in maxillary sinuses or blockage of maxillary ostium, axial view has no role in detection of them and sensitivity of direct coronal view was 100% more efficient figure (a). While axial view played an important role if there is any opacification in posterior ethmoidal sinuses which are not shown in coronal section at all. figure (b). In diagnosing of acute sinusitis, the efficiency of coronal was 72.3% compared to axial that was 27.7%. In the chronic sinusitis and their associated complications such as, polyps and septal deviation figure (c). The sensitivity of the coronal section was 60% more efficient than axial section 40%. The fungal sinusitis diagnosed in coronal more efficient by 60% compared with axial, which was sensitive in diagnosed of fungal sinusitis by 40% figure (d). In 39.9% of total cases are affected in maxillary sinuses, similar result conducted by Smith and Brindley^[10]. while frontal, sphenoid and ethmoid sinuses are obtained a lower proportion (29%, 16.7%, 14.5%) respectively table 2. Both sides of paranasal sinuses are more affected in sample studied deviated nasal septum DNS was noted toward right side in 43.7% cases and toward left side in 29.5% of cases. These findings correlate well with results of Asruddin et al,^[11]. Most common pattern of involvement was chronic sinusitis (31.2%) followed by sinonasal polyposis (26.9%) In the present study, a good correlation was noted in cases of chronic sinusitis and polyposis, 90 % of cases that showed polyposis were diagnosed as chronic sinusitis. Acute sinusitis was diagnosed when there was air fluid level, enhancing mucosal thickening. Allergic fungal sinusitis there were characteristic findings of bilateral hyperdense polypoidal masses with expansion, remodeling and thinning of bony walls of sinuses fig d, similar characteristic reported by Mukherji et al.^[12]. He studied 43 patients of allergic fungal polyposis and concluded that it is more common in young male patients and commonly has bilateral involvement. In the present study CT detected bone involvement, i.e., erosion or destruction of sinus walls in two cases (4.2%). Kushwah et al^[13] also reported similar findings in their study.

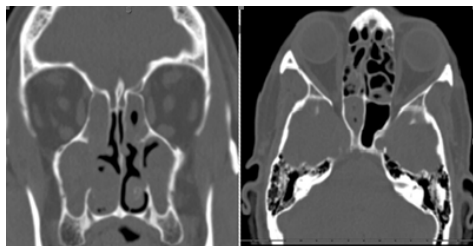


Figure (a) 37 years old male CT coronal view showing patient with complete opacification of PNS. Figure (b) 47 years old female CT axial view showing features of invasive fungal sinusitis in right frontal and posterior ethmoidal air cells.

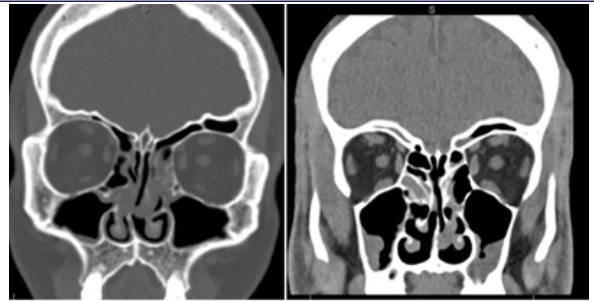


Figure (c) 41 years old male CT coronal view showing patient with sinonasal polyposis with nasal septal deviation to left side. Figure (d) 61 years old male CT coronal view showing patient with chronic sinusitis with features of invasive fungal sinusitis in left frontal and posterior ethmoidal air cells.

CONCLUSION

CT scan should be used as the gold standard method for the diagnosis of PNS pathologies, two image planes (axial, coronal) should be performed together for every patient complain of paranasal sinuses problem. Coronal has been shown to be the best imaging technique for accurate diagnosis of paranasal sinuses lesions, well trained radiologist and technologist are important for well medical service management.

REFERENCES

- Parsons C, Hodson N. Computed tomography of paranasal sinus tumors. *Radiology* 1979;132:641-5.
- Fagnan LJ. Acute sinusitis: A cost-effective approach to diagnosis and treatment. *Am Fam Physician* 1998;58:1795-802, 805-6.
- Bhattacharyya N. Clinical and symptom criteria for the accurate diagnosis of chronic rhinosinusitis. *Laryngoscope* 2006;116:1-22.
- Zinreich SJ. Paranasal sinus imaging. *Otolaryngol Head Neck Surg* 1990;103:863-8.
- Lund VJ, Savy L, Lloyd G. Imaging for endoscopic sinus surgery in adults. *J Laryngol Otol* 2000;114:395-7.
- Chopra H. Nasal polyps: A clinical, histopathological and radiological profile. *Indian J Otolaryngol Head Neck Surg* 2008;60:112-6.
- Duvoisin B, Landry M, Chapuis L, Krayenbuhl M, Schnyder P. Low-dose CT and inflammatory disease of the paranasal sinuses. *Neuroradiology* 1991;33:403-6.
- Hoang JK, Eastwood JD, Tebbit CL, Glastonbury CM. Multiplanar sinus CT: A systematic approach to imaging before functional endoscopic sinus surgery. *AJR Am J Roentgenol* 2010;194:W527-36.
- Fatterpekar GM, Delman BN, Som PM. Imaging the paranasal sinuses: Where we are and where we are going. *Anat Rec (Hoboken)* 2008;291:1564-72.
- Smith LF, Brindley PC. Indications, evaluation, complications, and results of functional endoscopic sinus surgery in 200 patients. *Otolaryngol Head Neck Surg* 1993;108:688-96.
- Asruddin, Yadav SP, Yadav RK, Singh J. Low dose CT in chronic sinusitis. *Indian J Otolaryngol Head Neck Surg* 1999;52:17-22.
- Mukherji SK, Figueroa RE, Ginsberg LE, Zeifer BA, Marple BF, Alley JG, et al. Allergic fungal sinusitis: CT findings. *Radiology* 1998;207:417-22.
- Kushwah APS, Bhalsar R, Pande S. CT evaluation of diseases of paranasal sinuses and histopathological. *Int J Med Res Rev* 2015;3:1306-10.