



Radio-Diagnosis

ANATOMICAL VARIATIONS OF PARANASAL SINUSES AND THEIR ASSOCIATION WITH SINUSITIS

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ABSTRACT

Aim and Methods: To evaluate the frequency of paranasal sinus variant anatomy and its association with chronic sinusitis using Multi Detector CT. **Background:** Sinusitis is a common clinic-radiological entity that we encounter in our practice. Most patients presenting with sinusitis exhibit some form of anatomical variation in paranasal sinuses and nasal cavity that warrant an evaluation into their association. MDCT is an excellent tool for evaluation of paranasal sinuses and the radiological changes associated with chronic sinusitis. **Results:** Gender Distribution: Males - 42%, Female - 58% Age Distribution: 1) <20 - 16%, 2) 20-30 yrs. - 21%, 3) 30-40yrs - 22%, 4) 40-50yrs - 22%, 5) 50-60yrs - 10%, 6) >60yrs - 9% Sinus involved: Maxillary-48%, Ethmoid-24%, Sphenoid-15%, Frontal-13% Variant Frequency: DNS-89%, Sino-nasal polyp-29%, Concha Bullosa-26%, Paradoxical Middle turinate-13%, Bony Spur-5%, Hypoplastic sinus-2%(frontal), Pneumatized Ant. clinoid process-1%, Haller cell-1%. **Conclusion:** Sinusitis is a prevalent entity and in most cases is associated with an anatomical abnormality. MDCT is vital in diagnosis and pre operative planning.

KEYWORDS : Sinus, Sinusitis, PNS, DNS

INTRODUCTION

Sinusitis is a common clinic-radiological entity that we encounter in our practice. Chronic sinusitis is defined as sinonasal infection lasting beyond 12 weeks. Patients usually present with nasal obstruction, nasal discharge, facial pain, headache, halitosis, anosmia, etc. Most patients presenting with sinusitis exhibit some form of anatomical variation in paranasal sinuses and nasal cavity that warrant an evaluation into their association. MDCT is an excellent tool for evaluation of paranasal sinuses and the radiological changes associated with chronic sinusitis. Pre-operative CT of Para nasal sinuses helps radiologists report essential information about anatomical variations necessary to plan interventions.

Aims and Methods

Our aim was to evaluate the frequency of paranasal sinus variant anatomy and its association with chronic sinusitis through a cross-sectional study of 110 patients who were referred to our Radiology department over a duration of 3 months.

Imaging was done using 16 slice GE Revolution CT scanner and evaluated in both soft tissue and bone windows. Subjects with facial trauma, pregnancy and immune compromise were excluded from the study.

Imaging parameters that were analysed in the study included the involved sinuses, Deviated Nasal Septum (DNS), Pneumatized Turbinate (Concha Bullosa), Paradoxical Middle Turbinate, Hypoplastic sinus, Sino nasal polyp, Pneumatized Anterior Clinoid Process and Haller Cells.

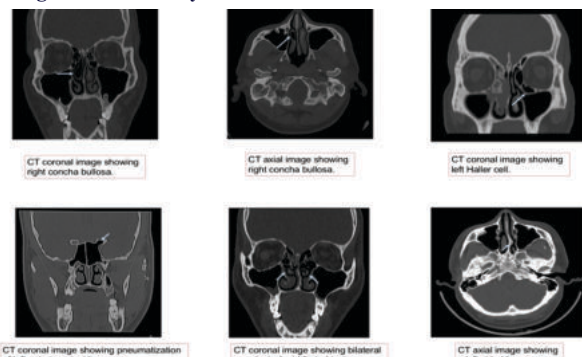
Images from the Study

Figure 1. CT images in bone window showing PNS and Nasal cavity anatomical variations.

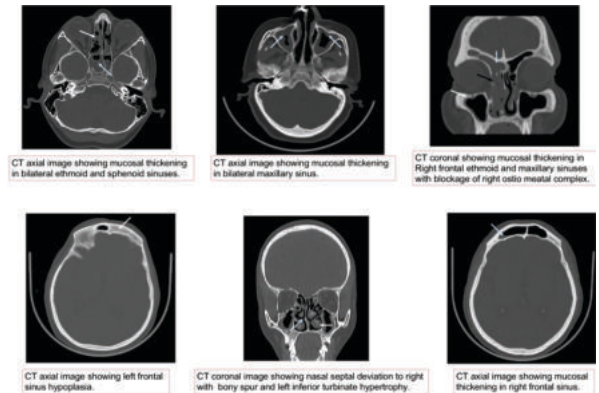


Figure 2. CT images in bone window showing PNS and Nasal cavity anatomical variations.

RESULTS

Gender Distribution: Males - 42%, Female - 58%

Age Distribution: 1) <20 - 16%, 2) 20-30 yrs. - 21%, 3) 30-40 yrs. - 22%, 4) 40-50 yrs. - 22%, 5) 50-60 yrs. - 10%, 6) >60 yrs. - 9%

Sinus involved: Maxillary-48%, Ethmoid-24%, Sphenoid-15%, Frontal-13%

Variant Frequency: DNS-89%, Sino-nasal polyp-29%, Concha Bullosa-26%, Paradoxical Middle turinate-13%, Bony Spur-5%, Hypoplastic sinus-2%(frontal), Pneumatized Ant. clinoid process-1%, Haller cell-1%.

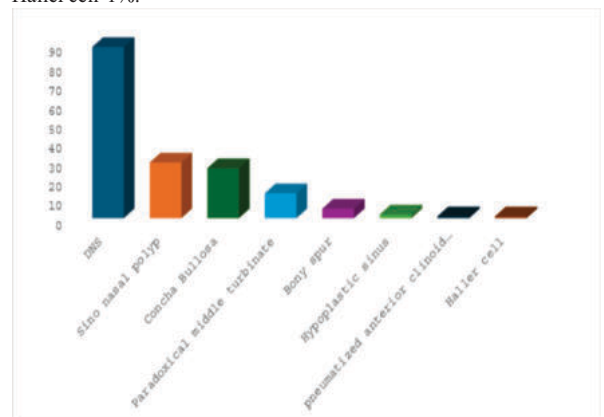


Figure 3. Frequency of PNS and Nasal cavity anatomical variations.

Inference

The study showed marginal female preponderance in the cases that presented with an almost uniform age distribution. Maxillary sinus was the most commonly involved entity followed by ethmoid sinus. Nearly one third of the cases showed more than two sinus involvement. Almost all cases displayed at least one anatomical variant. Deviated Nasal septum was present in almost all the cases with some degree of inferior turbinate hypertrophy which in most cases was unilateral and on the side contralateral to the deviation. Concha Bullosa and paradoxical middle turbinate was seen in nearly a quarter of the cases each.

CONCLUSION

Nasal septum deviation was prevalent in almost all cases showing a strong positive correlation and likely a vital factor in disruption of mucociliary clearance in para nasal sinuses and subsequent development of sinusitis. Concha bullosa and paradoxical middle turbinate either independently or in association with DNS further increased the risk of sinusitis by blocking the Ostia Meatal complex. Haller cell and Pneumatized anterior clinoid process appear to be incidental findings which nevertheless warrant routine reporting to assist surgeons to plan minimally invasive and endoscopic surgeries in accordance with patient specific factors.

Understanding these anatomical variations will help radiologists in executing a thorough report to better assist our surgical colleagues

REFERENCES

1. Shpilberg K, Daniel S, Doshi A, Lawson W, Som P. CT of Anatomic Variants of the Paranasal Sinuses and Nasal Cavity: Poor Correlation With Radiologically Significant Rhinosinusitis but Importance in Surgical Planning. *AJR Am J Roentgenol*. 2015;204(6):1255-60. doi:10.2214/ajr.14.13762 – Pubmed
2. Stallman JS, Lobo JN, Som PM. The incidence of concha bullosa and its relationship to nasal septal deviation and paranasal sinus disease. *AJNR Am J Neuroradiol*. 2004;25(9):1613-8. *AJNR Am J Neuroradiol* (full text) [pubmed citation]
3. Yousem DM. Imaging of sinonasal inflammatory disease. *Radiology*. 1993;188(2):303-14. *Radiology* (abstract) - Pubmed citation
4. Brunner E, Jacobs JB, Shpizner BA et-al. Role of the agger nasi cell in chronic frontal sinusitis. *Ann. Otol. Rhinol. Laryngol*. 1996;105(9):694-700. Pubmed citation
5. Smith KD, Edwards PC, Saini TS et-al. The prevalence of concha bullosa and nasal septal deviation and their relationship to maxillary sinusitis by volumetric tomography. *Int J Dent*. 2010;2010 doi:10.1155/2010/404982 - Free text at pubmed - Pubmed citation
6. Nair S. Correlation between symptoms and radiological findings in patients of chronic rhinosinusitis: a modified radiological typing system. *Rhinology*. 2009;47(2):181-6. Pubmed citation
7. Moulin G, Pascal T, Jacquier A et-al. Radiologic imaging of chronic sinusitis in the adult. *J Radiol*. 2003;84(7-8 Pt 2):901-19. Pubmed citation Wani AA, Kanotra S, Lateef M et-al. CT scan evaluation of the anatomical variations of the ostiomeatal complex. *Indian J Otolaryngol Head Neck Surg*. 2009;61(3):163-8. doi:10.1007/s12070-009-0059-8 - Free text at pubmed - Pubmed citation