

Study of Anatomical Variations on CT in Chronic Sinusitis

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Abstract This is a prospective cross sectional study comprising of 85 patients who were having symptoms of sinusitis for more than 12 weeks which were evaluated with the help of nasal endoscopy and computed tomography scan to screen the patients of chronic-rhinosinusitis for various anatomical variants and to find their percentage. The most common variant found to be deviated nasal septum being 88.2 % followed by concha bullosa being 76.4 %, paradoxical middle turbinate 9 %, agger nasi in 7 %.

Keywords Anatomical variations · Paranasal sinuses · Sinusitis · Computerised tomography

Introduction

Chronic rhinosinusitis is a common disease and a major cause of morbidity among patients. Its diagnosis relies

on clinical judgment based on a number of often vague physical complaints and symptoms and with help of conventional anterior and posterior rhinoscopic examination.

Few organs of human body are subject to remarkable inter and intra subject variations as paranasal sinuses. The range of anatomic variants that can interfere with the mucociliary drainage of ostiomeatal complex including concha bullosa, deviated nasal septum, uncinata process variations, ethmoid bulla, paradoxical middle turbinate, agger nasi and Haller cells [1].

Currently, computed tomography is the method of choice for assessment of paranasal sinuses, nasal fossae and their anatomical variants. Presumably, these variations might induce osteal obstruction, preventing mucus drainage and predisposing to chronic rhinosinusitis. Variations and tomographic signs of sinusal disease occurring on the same side reinforce the likelihood of interference with the mucus drainage process. Computed tomography offers detailed study of anatomical variations.

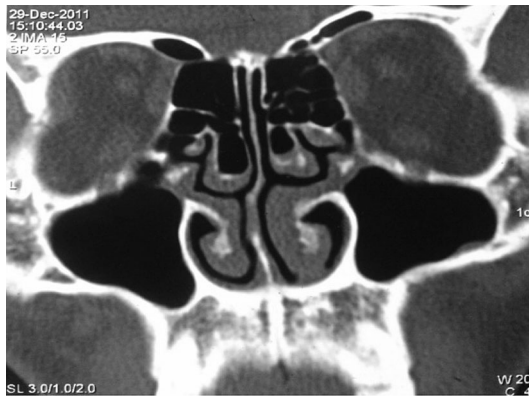
Materials and Methods

A prospective cross sectional was carried out in the Department of Otorhinolaryngology, People's Medical College, Bhopal (M.P.) from 1/1/2013 to 1/1/2014 and a total of 85 patients who were clinically and radiologically diagnosed as having chronic rhinosinusitis, were evaluated with (computed tomography) CT scan PNS coronal view and by nasal endoscopy. Patients with acute sinusitis or malignant disease or those who had previously undergone nasal or sinus surgery, either open or endoscopic, excluded from the study.

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CT scan PNS (coronal view) showing-bilateral concha bullosa

Observations and Results

A total of 85 patients of chronic rhinosinusitis were examined. Presence of various anatomical variants in relation to chronic rhinosinusitis were observed. Out of 85 patients 58 were males and 27 were females with male female ratio being 2.1:1. The various cases of chronic rhinosinusitis are divided into five age groups and the maximum number of patients were seen in age group 21–30 followed by age group 10–20 years, and least in age group >50 years (Figs. 1, 2).

Of the 85 patients of the study group; 75 had DNS either to left/right/bilateral side, 65 had concha bullosa, prominent ethmoidal bulla was seen in 54 cases. The abnormal uncinete process found in nine cases. Pneumatization of the

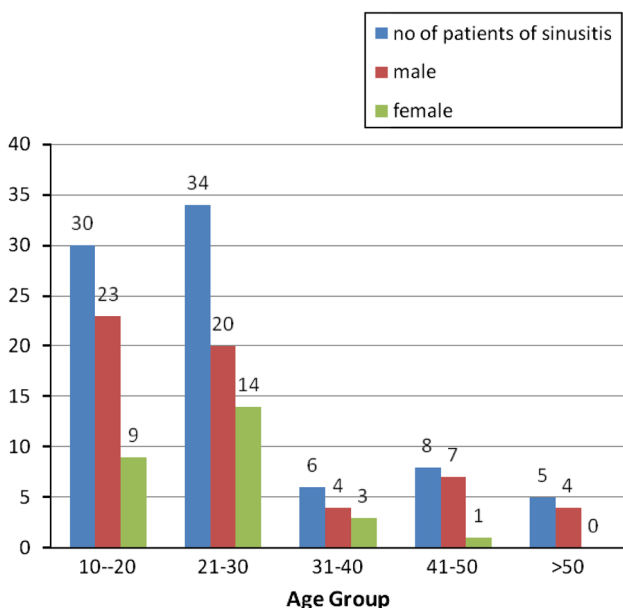


Fig. 1 Distribution according to age group in patients of chronic sinusitis

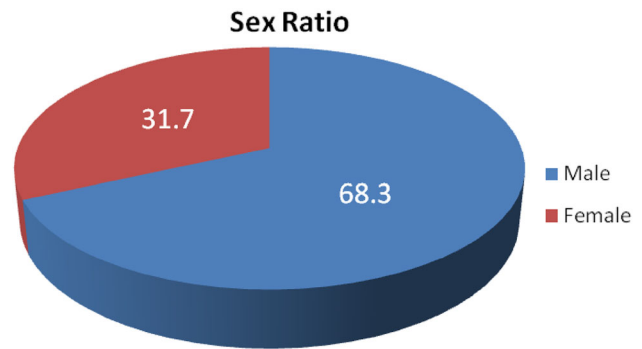


Fig. 2 Sex ratio in patients of chronic sinusitis

bony nasal septum was seen in seven cases, there were six cases who had agger nasi cells and three had Haller cells and one patient had onodi cell (Table 1).

The above table shows that the most common anatomical variant in association with chronic rhinosinusitis in CT scan analysis were DNS (88.2 %) followed by concha bullosa (76.4 %) and prominent bulla (63.5 %).

Discussion

Computerized tomographic imaging of sinonasal region has become the gold standard in the evaluation of patients with chronic sinusitis. Its ability to accurately map out the bony and soft tissue anatomy of the paranasal sinuses has proven invaluable to the endoscopic surgeon in the diagnostic workup.

Endoscopic examination in conjunction with CT has proven to be ideal combination in recent years and are already accepted as the “Standard of Care” for sinus diseases.

Anatomic variations like nasal septal deviation, spurs, concha bullosa, agger nasi cells, paradoxical middle turbinate, uncinete bulla, medially of laterally bent uncinete process, oversized ethmoidal bulla etc. These anatomic variants infringe on the patency of already narrow intricate ostiomeatal channels, thus, predisposing to sinusitis by interfering with mucociliary clearance of ostiomeatal area [1].

A cross sectional was carried out in the Department of Otorhinolaryngology, People’s Medical College, Bhopal (M.P.) comprising of 85 patients of chronic rhinosinusitis.

The percentage of concha bullosa in our study was 76.4 %. The prevalence of concha bullosa varies from 5 to 53 % noted in 9 % of the 1,000 lateral nasal specimens examined [2]. As per Turner [3] it was in 20 %. Bolger et al. [4] found the incidence to be 53.6 % and Maru et al. [5] found it out to be 41.3 % while only 15 % as found out by Bharathi et al. [6].

Table 1 CT scan evaluation: anatomic variations in chronic sinusitis

Anatomical variants	No. of patients	Percentage
Concha bullosa	65	76.4
DNS	75	88.2
Paradoxical middle turbinate	9	10.5
Prominent bulla	54	63.5
Agger nasi	6	7
Haller cells	3	3.5
Abnormal uncinate	9	10.5
Onodi cells	1	1.6
Septum pneumatization	7	8.2
Others	3	3.5

The prevalence of nasal septum deviation varies from 18 to 80 % according to various studies. Deviation of nasal septum was found out to 65 % by Bharathi et al. [6], 55.7 % by Maru et al. [5], 18.8 % by Bolger et al. [4], 44 % by Dua et al. [7]. In our study we found out the prevalence of nasal septum deviation to be 88.2 %.

Regarding the incidence of paradoxical middle turbinate in patients with chronic sinusitis, Bolger et al. [4] found it in 27.1 % cases on coronal CT scan findings, Calhoun et al. [8] found it in 12 % of the cases of sinusitis. Llyod [9] found it in 15 % of the patients of control series and observed that it is a variable feature depending upon the level of coronal CT section. Earwaker [10] found it in 25 % of the cases and in our study it was found to be 9 %.

The incidence of agger nasi cells in patients with chronic sinusitis on coronal CT findings, Bolger et al. [4] reported it to be 98.5 %, and Zinreich [11] found these cells in nearly all patients, while Llyod [9] described it in 3 %. It was 7 % in our study.

Haller cells were present in 3.5 % in our study, Bolger et al. [4] reported Haller's cells in 45.1 % of the cases. The 45.1 % prevalence of Haller's cells noted by Bolger et al. is significantly higher than that reported by Zinreich [11] that is 10 %.

Prominent ethmoidal bulla was present in 63.5 % in our study.

Conclusion

Chronic rhinosinusitis is fairly a common disease condition affecting most commonly the age group between 21 and 40 years.

Combination of CT scan PNS and fiber optic diagnostic nasal endoscopy is excellent for precise evaluation of nasal cavity.

Concha bullosa and deviated nasal septum are the *two most common anatomical variants* seen in patients with chronic rhinosinusitis.

The single detection of anatomical variant itself does not establish the genesis of disease; before the suggestion of a causal relationship between the anatomical variant and the sinusopathy, these conditions should be considered in conjunction with the clinical picture.

It was seen in this study that when a unilateral concha bullosa is present, there is *no statistical relationship* with any sinus disease. There is however, *a strong relationship* between the presence of unilateral concha and contra-lateral nasal septal deviation.

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