A Study of Anatomical Variations of Osteomeatal Complex in Correlation with Computed Tomography

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ABSTRACT *Aim of the study is to understand the anatomical variations in the osteomeatal complex that may affect normal drainage channels, thereby predisposing to chronic sinusitis and certain variations increasing the operative risk and the surgeon should be forwarded about these variations. Sinusitis, a common inflammatory disorder affecting the paranasal sinuses, the diagnosis and treatment of which have undergone revolutionary changes with the advent of modern imaging techniques. Computed tomography taken in the coronal plane with wide window settings shows optimally fine bone defects. For coronal sections, the patient are positioned prone with head hyper extended on the CT scanner bed. The study group consisted of 29 males and 21 females in the age group of 10 – 60 years who presented with symptoms of sinusitis. A precise knowledge of the anatomy of the nasal cavity and paranasal sinus is essential for the clinician. Conventional radiography does not permit a detailed study and has now been largely replaced by computed tomography imaging. This gives an anatomical view of the region and their variations that are very often found. The detection of these variations prevents potential hazards essential for the use of current endoscopic surgery techniques. To correctly interpret imaging studies of osteomeatal complex, it is essential to understand the anatomy of lateral nasal wall and its relationship to adjacent structures.*

ANATOMICAL VARIATIONS are Concha bullosa, Deviated Nasal Septum with or without spur, Paradoxical middle turbinate, Uncinate variations, Haller cells, Onodi cells, Giant ethmoid bulla, extensive pneumatization of the sphenoid sinus and aerated crista galli

MATERIALS AND METHODS
A total number of fifty patients of both sexes from the out patient department of Otorhinolaryngology & Radiology and Imaging sciences, SRMC & RI, Chennai were chosen for the study who presented with symptoms of sinusitis. The study group consisted of 29 males and 21 females in the age group of 10 – 60 years.

The age and sex distribution of the patients were as presented in the Table No. 1.

Table No.1

Age (Years)	Male	Female
Up to 10	0	0
11 to 20	2	0
21 to 30	11	6
31 to 40	9	9
41 to 50	3	4
51 to 60	4	2

When compared to conventional X-Ray techniques, the computed tomography provides a superior and more versatile picture.

Computed tomography is the current modality of choice in sinonasal problems (paranasal sinuses imaging) as

1. Fine bony anatomy is clearly identified
2. Mucosal thickening is effectively assessed
3. Extent of disease is accurately depicted
4. Anatomical variations that may predispose to sinusitis can be detected.

Computed tomography taken in the coronal plane with wide window settings shows optimally fine bone defects (Zinreich et al 1993). For coronal sections, the patient are positioned prone with head hyper extended on the CT scanner bed. The coronal plane approximates closest to the surgical field and best demonstrates the osteomeatal complex and the base of the skull. However when pathology is present in the posterior ethmoid and sphenoid sinus, axial views are required to show the optic nerve and the carotid. Slices of 3 mm thickness are taken. Following settings were made using a Siemens Somatron DR 3 scanner; kvp 125, mAs =80-160, scan time 3-5 sec with window width of +2000 Hounds field units, centered at 200HU. These parameters are optimal for the display of the regional anatomy of the paranasal sinuses and for the evaluation of patients with chronic inflammatory diseases. The study is almost always performed without the use of intravenous contrast.

OBSERVATIONS:
Anatomical variants affecting the middle meatus said to contribute to obstruction of drainage of sinus were present either singly or in combination. Out of 50 cases, Concha bullosa was observed in 16 cases and it was the commonest anatomical variant encountered. Deviated nasal septum was observed in 15 patients and was the second commonest. Other anatomical variant encountered were turbinate hypertrophy in 13 patients, Paradoxical middle turbinate in 3 patients, uncinate process variations in 2 patients. Normally enlarged turbinate should not be mistaken for the pathological condition.
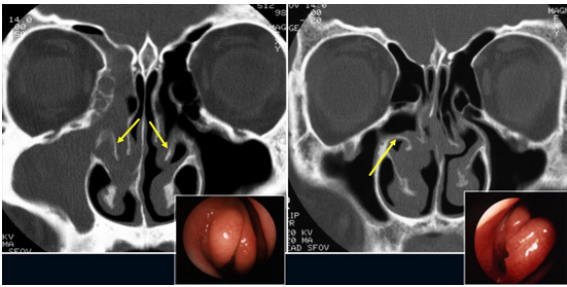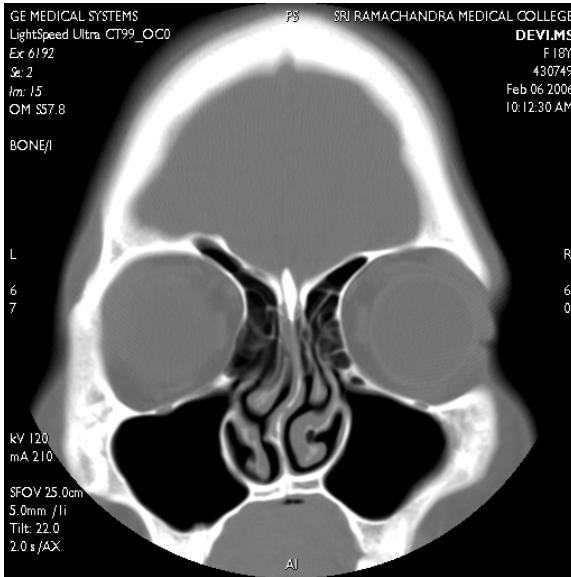
Concha bullosa
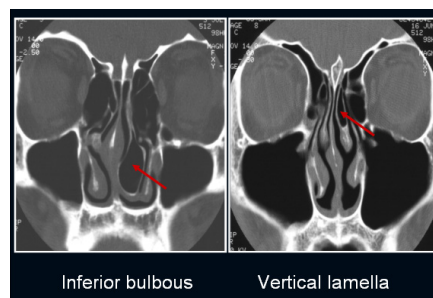
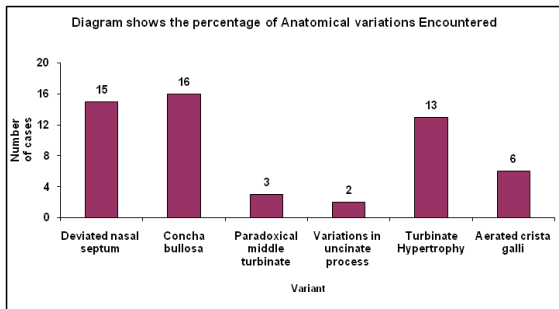Inferior bulbous   Vertical lamella

Medial curling of Uncinate process

Deviated Nasal Septum

The observations were shown here.

DISCUSSION

The anatomical variations of the osteomeatal complex will have a lot of clinical importance in the aetio-pathology of chronic sinusitis, which was studied radiologically in a study group consisting of 50 subjects in the age group of 10-60 years.

The study reports were compared with the previous studies.

The variations in the osteomeatal complex were as follows.

In this study, it was observed that the most common anatomical variation was Concha bullosa, which occurs in 32%, Deviated nasal septum, which is present in 30% of subjects, paradoxical middle turbinate is in 6% of subjects, variations of uncinate process is 4% and turbinate hypertrophy in 26%.

Arslan et al (1999) study showed that the incidence of concha bullosa is about 30%, deviated nasal septum 36%, paradoxical middle turbinate in 8%, variations in uncinate process is about 2%.

Liu et al (1991) study showed that the occurrence of concha bullosa is about 30%. paradoxical middle turbinate in 13%, variations in uncinate process is about 19.36%.

Clark et al (1989) study showed that the incidence of concha bullosa is about 30 %.

Jones et al (2002) study showing a low incidence of concha bullosa of about 20%, deviated nasal septum is about 24%, paradoxical middle turbinate 11%. variations of uncinate process 1%.

Zinreich et al (1987) study showed concha bullosa in 36%, paradoxical middle turbinate 15%. variations of uncinate process 0.4%. The anatomical variations of osteomeatal complex are common and it may be one of the causes of chronic sinusitis. The commonest anatomical variant plays a major role in the pathogenesis of chronic sinusitis.

These variations have a lot of clinical significance in all fields of medicine as they can define the etiology of sinusitis, one of the sinonasal diseases. The study reports were correlating with most of the previous studies.

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