

THE INCIDENCE OF CONCHA BULLOSA: A RETROSPECTIVE RADIOLOGIC STUDY

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ABSTRACT

Background: Middle nasal concha hypertrophy known as concha bullosa is caused by its pneumatization. Although it is the most common anatomical variation of the ostiomeatal complex, research on it in different populations is limited. It is uncertain whether concha bullosa prevalence varies across populations throughout the world.

Objective: To determine the prevalence of (superior, middle and inferior turbinate concha bullosa) in patients who visited an ENT clinic with various ENT symptoms.

Methods: The duration of this retrospective descriptive study was six months. The study was carried out between the period from June 2022 to November 2022 at Department of ENT and Head & Neck Surgery. We examined the axial and coronal planes of patients' computed tomography (CT) scans of nose as well as paranasal sinuses who reported headaches or nasal obstruction symptoms in addition to symptoms of chronic sinusitis.

Results: Concha bullosa was seen in 14% of the 100 scans examined. Six (42.8%) individuals had bilateral concha bullosa, whereas eight (57.1%) had unilateral concha bullosa. Out of the eight conchae, two (25%) were found on the right side while six (75%) on the left side.

Conclusion: Study concluded that concha bullosa is the most common anatomic variation. During the preoperative evaluation, the radiologist must pay close attention to anatomical variants. It is critical for surgeons to be aware of this variation.

Key words: Turbinate hypertrophy, osteomata, sinuses, concha bullosa

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INTRODUCTION

There are numerous sinonasal anatomic variances that can be identified on sinus computed tomography scans.¹ The most prevalent obstructive, morphological alteration of the osteomeatal complex region is concha bullosa.² The presence of air cells in the turbinate is represented by concha bullosa (CB), and the MT (middle turbinate) CB is a common anatomical variant in the nasal cavity.^{3,4} The precise mechanism behind

the pneumatization of nasal turbinates remains unclear. Pneumatization of the MT occurs because of variations in the development of the ethmoidal air cell system. Pneumatization of inferior turbinate, superior turbinate and uncinat process, are the examples of unusual extrasinusal pneumatizations. Among the turbinate structures, superior turbinate is the most neglected and least accessible. Symptomatic pneumatization of superior turbinate is extremely uncommon.⁵ Recent advancements in imaging diagnosis modalities, such as CT, made it possible to detect anatomical structures with ease.⁶⁻⁸ Identifying anatomical changes related to clinical findings can help in diagnosis and treatment. A paranasal sinus disease process can affect the CB, causing mucosal thickening, mucous emission retention, pyocele and mucocele with the concha

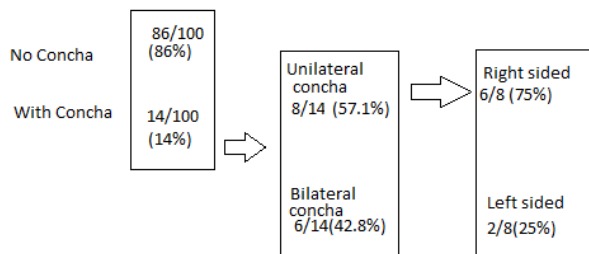
bullosa. The concha bullosa can lead to mechanical blockage of drainage channel, leading to the development of sinusitis. A comprehensive knowledge regarding the anatomical variations of concha bullosa⁹ enables the development of effective management planning.

METHODS

It was a radiological study in which retrospective descriptive study design was used.¹⁰ The duration of study was six months (from June 2022 to November 2022). The study was carried out at Department of ENT and Head & Neck Surgery, Lahore General Hospital, Lahore. During study 100 osteomeatal computed tomography scans were analyzed to determine the CB prevalence in paranasal sinus imaging of the patients with symptoms of headache or nasal blockage and chronic sinusitis features. The demographic data of patients, clinical presentation, as well as axial & coronal plane imaging scans of nose & paranasal sinuses with a thickness of 5 mm were recorded. The inclusion criteria for this study involved the presence of any form of middle turbinate pneumatization observed in the computed tomography scans of nose & paranasal sinuses. During study, a total of 100 patients underwent evaluation of their nose & paranasal sinus using CT scans. Among them, 14 patients were found to have concha bullosa during the imaging investigation.

RESULTS

Concha bullosa was seen in 14% of the 100 scans examined. Six (42.8%) individuals had bilateral concha bullosa, whereas eight (57.1%) had unilateral concha bullosa. Out of the eight conchae, two (25%) were found on the right side while six (75%) on the left side. Table 1: Summary of incidence, unilateral or bilateral occurrence of concha bullosa



DISCUSSION

Concha bullosa refers to the pneumatization of the middle concha¹¹ and, in rare instances, the superior and inferior conchae. Santorinus first observed pneumatization of the middle concha in 1739. Zinreich

et al.¹² published the first report of an inferior concha bullosa in the medical literature. Although the mechanism and origin of pneumatization of the middle turbinate are not clearly defined^{13,14}, however, majority of professionals believe it is caused by the anterior ethmoid sinus.¹



Fig-1 a) coronal and b) axial sections of computed tomography of the paranasal sinuses show the presence of multiple cells within the left concha bullosa and left inferior turbinate hypertrophy. Deviation of the nasal septum to the right side is noted.

The nasal turbinates, derived from embryological precursors known as maxilloturbinal and ethmoturbinal, begin to develop between the 8th and 10th weeks of the gestation. Middle turbinate, superior

turbinate and uncinate process all develop from the ethmoturbinal. The middle turbinate is formed by the medial portion of ethmoid bone. The ostia of ethmoidal air cells that extend in the sphenoid, frontal and maxillary paranasal sinus bones remain at the location of their initial evagination.¹⁶ Almost 55% of the cases involve pneumatization of middle turbinate by anterior ethmoidal cells originating from middle meatus. Generally, the drainage of these cells occurs in the frontal recess.¹⁷ About 45% of the cases demonstrate pneumatization of the posterior ethmoid cells originating from superior meatus and draining into retrobulbar recess. The primary route of drainage typically occurs through conchal ostium, which is situated in the region of frontal recess where frontal sinus is drained. The concha bullosa manifests itself at seven to eight years of life and persists to develop even after adolescence.¹⁸ The degree of pneumatization and inflammatory alterations inside the CB may be related to the onset and gravity of the symptoms. The CB participants' average age (30.3 yrs.) in this study was found similar with earlier studies carried out on same topic.¹⁹ The studies carried out by Aramani and colleagues (2014) and Koo and teammates (2017) demonstrated that the prevalence of concha bullosa was 53.7%.^{20, 10} Concha bullosa was found in 14% of the people in our study. Other studies find varying incidences that may be attributable to variations in the target group as well as racial variation.

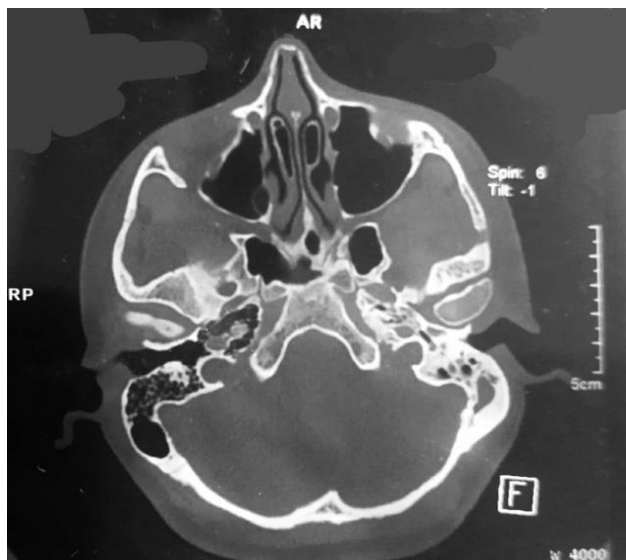


Figure – 2 Axial sections of computed tomography of the paranasal sinuses show the presence of multiple air cells within the bilateral concha bullosa.

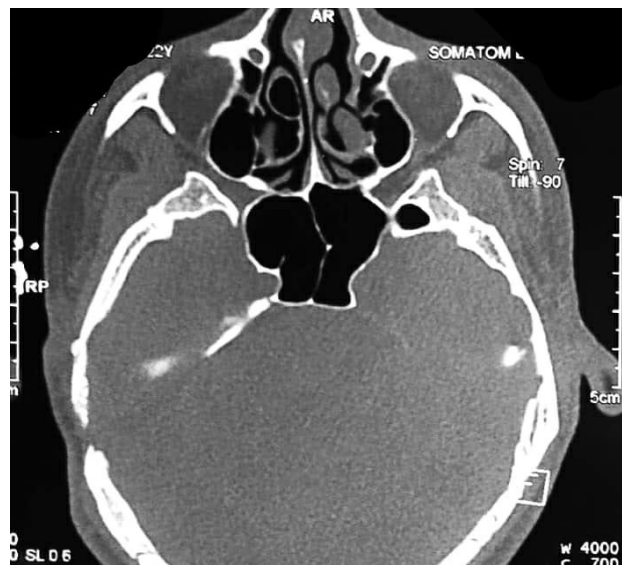


Figure – 3 Axial sections of computed tomography ii of the paranasal sinuses show the presence of multiple air cells within the right sided concha bullosa.

Normally, the CB comprises only one air cell. The presence of multiple air cells is considered uncommon in concha bullosa. A study carried out by Ceylan and coworkers (2012) demonstrated a massive complex concha bullosa wherein ethmoid bulla invaded the middle turbinate CB.²¹ In concha bullosa, we observed the ethmoidal air cells during our investigation, although the clinical significance of this finding is still unknown. Even in the absence of sinonasal infection, the turbinates extensive pneumatization with the mucosal contact might cause headaches.

CONCLUSION

Study concluded that concha bullosa is one of the most frequent anatomical variations in the CT scan of people presented to ENT department, so detailed knowledge of concha bullosa is crucial for both the radiologists and operating surgeons.

Ethical Approval: Submitted

Conflict of Interest: Authors declare no conflict of interest.

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