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Original Research Article

CT SCAN EVALUATION OF PREVALENCE OF CONCHA BULLOSA IN ADULT EASTERN INDIAN POPULATION

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ABSTRACT

Introduction: The middle turbinate may be pneumatized and ballooned up. This is called a concha bullosa. The concha bullosa may show isolated involvement with the disease process. It may compromise ventilation and drainage of secretions to produce chronic infections of the paranasal sinuses. This study aimed at determining the prevalence of concha bullosa in the adult Eastern Indian Population.

Materials and Methods: This was a retrospective study being conducted on 150 patients who presented to the Department of Radiodiagnosis, Bangur Institute of Neurosciences, Kolkata. Their CT scans were analysed for the presence of Concha Bullosa. The results were analysed as percentage and 'p' value was calculated using Fischer's Exact Test.

Results: Presence of Concha Bullosa was observed in 48 cases i.e. 32% in the present study, out of which 21 (14%) were present in males and 27 (18%) in females. 'p' value in this case was 0.162 on applying Fisher's Exact test.

Conclusion: Anatomical variations of the paranasal sinus region like concha bullosa are quite common and they must be searched for by the surgeons before planning any endoscopic sinus surgery. This study attempted to provide the prevalence of the Concha Bullosa which will definitely help the FESS surgery and its outcomes.

KEY WORDS: Middle Turbinate, Concha Bullosa, Functional Endoscopic Sinus Surgery.

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INTRODUCTION

The nasal cavity acts as a channel for passage of air for breathing as well as a sense organ for olfaction. It is exposed to the environment at the external nares and transmits conditioned, humidified and filtered air at the choanae (internal nares). The paranasal air sinuses (PNS) are pneumatic cavities within the cranial bones, particularly the bones of the facial skeleton. These cavities help to lighten the skull. The paranasal sinuses also help in humidification of inspired air and add volume and resonance to

the voice. There is a continuity between the lining mucosa of the nasal cavity and the PNS which allows the sinuses to share the pathology of the nasal cavity and respond with inflammation, thickening, ostial blockage and exuberant polypoid growth [1]. The nasal cavity contains three projections of variable size, the inferior, middle and superior nasal conchae (turbinates). The conchae curve generally inferomedially, each roofing a groove, or meatus, which is open to the nasal cavity. The middle concha is a medial process of the ethmoidal labyrinth and may be pneumatized. It extends back to articulate with the perpendicular plate of the palatine bone. The middle conchae may also curve inferolaterally, or may be expanded by an enclosed air cell to form a so called concha bullosa [2]. The concha bullosa may show isolated involvement with the disease process. It may have septations and therefore multiple cells may be found within it. It may compromise ventilation and drainage of secretions to produce chronic infections of the paranasal sinuses. The present study attempted to find out the prevalence of Concha Bullosa in patients who have sino nasal complaints and who underwent CT scan.

MATERIALS AND METHODS

It was a descriptive observational study conducted in the Department of Anatomy, IPGME & R, Kolkata. It mainly focused on the CT scan anatomy of the paranasal sinus region to find out the prevalence of concha bullosa. CT scans of 150 patients who attended the Department of Radiodiagnosis, Bangur Institute of Neurosciences, Kolkata were taken after studying their history and complaints. The CT scans of the patients fulfilling the inclusion and exclusion criteria were then collected for the present study to determine the variations.

Inclusion criteria: Patients with sinonasal symptoms who underwent CT scan.

Exclusion criteria: Patients whose CT plates revealed - Nasopharyngeal tumors, polyp, any other sinonasal disease causing bony deformity or bony destruction, H/O previous surgeries involving nasal cavity and paranasal sinuses (as obtained from the records), H/O trauma or injury (as obtained from the records).The scan was performed by keeping the patient in prone position. Axial sections were taken from tip of the nose to the roof of the frontal sinus. Coronal sections were taken from tip of the nose to the roof of sphenoid sinus perpendicular to the hard palate.

Prevalence of Concha Bullosa was seen on the CT scans and the results were analysed as percentages. Chi Square Tests were applied to calculate the 'p' value to find out any statistically significant difference between males and females.

RESULTS

We observed concha bullosa in 32% of cases, out of which 14% were present in males and 18% in females.

Table 1: Distribution of Concha Bullosa.

Gender	Study cases with CB (%)	Study Cases without CB (%)	Total (%)
Male	21 (14%)	58 (38.67%)	79 (52.67%)
Female	27 (18%)	44 (29.33%)	71 (47.33%)
Total	48 (32%)	102 (68%)	150 (100%)

'p' value in this case was 0.162 on applying Fisher's Exact test.

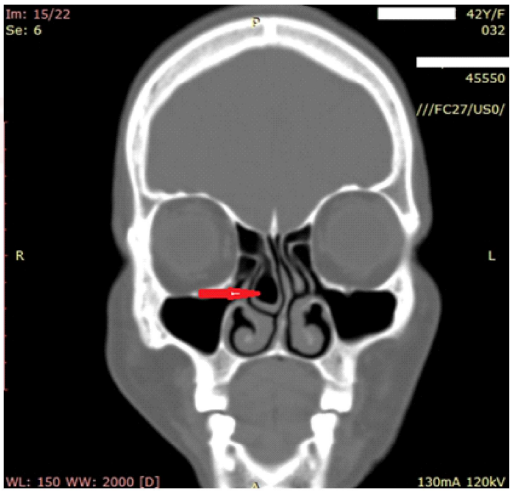

Fig. 1: CT scan of PNS - Coronal section showing Concha Bullosa on right side.

DISCUSSION

Concha Bullosa or the pneumatized middle turbinate was observed in 32% of the scans studied in the present study. Mazza D et al [3] in 2007 performed a 64-slice CT evaluation of some important anatomic variants of paranasal sinuses. 100 patients were selected among all those that had undergone a paranasal sinuses CT examination.

They were 45 caucasian women and 55 men, all aged between 18 and 70 years, mean age 46 years. This study was conducted using a 64-slice Siemens Somatom Volume-Zoom multidetector Spiral CT. CT examination was performed through a thin axial acquisition; the patient was lying on his back and the images were processed with multiplanar reconstruction. They noted concha bullosa in 29% cases. Liu X et al [4] in 1999 tried to find out the relation between the anatomic variations of osteomeatal complex and chronic sinusitis. They studied coronal CT scans of 297 individuals.They observed concha bullosa in 34.85% cases.

Benjaporn et al [5] conducted their study on a population of Thailand and noted concha bullosa in 34% cases. Robinson M et al [6] in 2010 observed the variations in the paranasal sinuses in a non-random sample of museum skulls of Melanesians. This racial group was not previously studied in this respect. They observed concha bullosa in 41.5% cases. Priyanko Chakraborty et al [7] in 2016 performed a study in Department of Otorhinolaryngology, Sir Sunderlal Hospital, Banaras Hindu University, Varanasi. 82 patients were included in the study. They were diagnosed as a probable case of chronic rhinosinusitis on the basis of history and nasal endoscopy and then subjected to CT scan. Thin slice coronal, axial and sagittal films were obtained both in soft tissue window and bone window for optimum visualization of all the structures. They noted concha bullosa in 30.48% cases.

Nitin V Deosthale et al [8] in 2014 conducted a cross sectional study at NKP Salve Institute of Medical Sciences, Nagpur to detect the prevalence of anatomical variations of nose and paranasal sinuses in Chronic Rhinosinusitis (CRS) on 'Nasal Endoscopy', and 'Computed Tomography' and correlated the two investigations modalities and studied association of anatomical variations of nose and paranasal sinuses in Chronic Rhinosinusitis. Diagnostic Nasal Endoscopy (DNE) and Computed Tomography of nose and Paranasal Sinuses of 122 patients of chronic rhinosinusitis were studied and results were statistically analysed using z-test and chi-square test. They observed concha bullosa in 27.87% cases. Arslan et al [9]in 1999 studied the CT scans for anatomic variations of paranasal sinus in patients who had to undergo endoscopic sinus surgery for chronic rhinosinusitis. CT scans of 200 patients with chronic sinusitis were analysed to determine the prevalence of anatomic variants. They noted concha bullosa in 30% cases.Chandel N S et al [10] in 2015 conducted the study in Bhopal to evaluate the anatomical variation of PNS by CT scan and compared and analyzed congenital anatomical variations of paranasal sinuses in male and female and assessed frequency of anatomical variation of PNS. All patients were included who were referred for CT scan of PNS. Paediatric ages, pregnant women, patients with history of sinonasal surgery or past history of surgery in the paranasal region were not included in the study. Anatomical variants were analyzed using a soft part window and bone density window. They observed concha bullosa in 32.5% cases.Perez Pinas et al [11] in 2000 studied 110 CTs of sino nasal region of Spanish patients who were suspected to have inflammatory sinus pathology. They noted concha bullosa in 24.5% cases.Kayalioglu G et al [12] in 2000 performed high resolution computed tomography images of paranasal sinuses on 82 adult patients without sinus pathology and on 90 adult patients with sinus disease. They observed concha bullosa in 26.83% cases. Mohammad Adeel et al [13] in 2013 conducted a study at the Aga Khan University Hospital, Karachi, and studied computed tomography scans of 77 patients. All the scans were reviewed using Picture Archiving Communication System computer software. They noted concha bullosa in 18.2% cases. Shpilberg KA et al [14] and Ahmed W et al [15] observed it in 26% cases, Kate Sarika P et al [16]in 2015 in 23% cases in a population of Pune.K Dua et al [17] in 2005 studied the variations of paranasal sinus on CT scan in chronic sinusitis. 50 patients of chronic sinusitis were evaluated by CT Scan. The anatomical variations and changes in osteomeatal complex on CT Scan were studied. They observed concha bullosa in 16% cases. A R Talaiepour et al [18] in 2005noted concha bullosa in 35% cases. These findings were almost corroborative with the present study. Sheetal D et al [19] in 2011 performed a study and correlated the CT findings and the endoscopic findings in FESS,

the anatomical abnormalities and the mucosal changes in patients with chronic rhinosinusitis (CRS) and the reliability and validity of CT scan in the management of CRS. A time bound cross sectional study was conducted. 45 patients with CRS underwent pre-operative CT PNS, followed by FESS. According to them, it was observed in 77% cases. Leipzig JR et al [20]in 1996 noted it in 76% cases, Chaitanya et al [21]in 2015 in 47% cases.

Table 2: Prevalence of Concha Bullosa in different population studied by different authors.

Authors	Prevalence of Concha Bullosa (%)
Present study	32%
Mazza D et al [3]	29%
Liu X et al [4]	34.85%
Benjaporn et al [5]	34%
Robinson M et al [6]	41.50%
Chakraborty P et al [7]	30.48%
Nitin V Deosthale et al [8]	27.87%
Arslan H et al [9]	30%
Chandel NS et al [10]	32.50%
Perez Pinas et al [11]	24.50%
Kayalioglu et al [12]	26.83%
Mohammad Adeel et al [13]	18.20%
Shpilberg KA et al [14]	26%
Ahmed W et al [15]	26%
Kate Sarika P et al [16]	23%
K Dua et al [17]	16%
A R Talaiepour et al [18]	35%
Sheetal et al [19]	77%
Leipzig JR et al [20]	76%
Chaitanya et al [21]	47%

CONCLUSION

In the growing field of Functional Endoscopic Sinus Surgery (FESS), the knowledge of normal anatomical variations has become very important. The surgeon cannot take a single step without knowing the different types of variations because that may lead to inadvertent injury to some of the vital structures. This study has attempted to find out the prevalence of a very important variation of paranasal sinus regioni.e. Concha Bullosa. This may get infected and may show isolated involvement of disease process. It may compromise ventilation and drainage of secretions to produce chronic infections of the paranasal sinuses. Thus, it can be concluded that this study will provide a baseline data for the prevalence of concha bullosa and will help the surgeons to plan for the surgery accordingly. It can also be concluded that the prevalence differs in the different parts of the country including different populations and ethnicities.

Conflicts of Interests: **None**

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