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Original Research Article

Incidence of concha bullosa and its role in chronic rhinosinusitis

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ABSTRACT

Background: Pneumatization of nasal turbinates is called concha bullosa. Most often it involves the middle turbinate and is one of the commonest variants of sinonasal anatomy. Bulbous and extensive type of concha bullosa may lead to narrowing or even complete blockage of osteomeatal complex. This alters the normal airflow and drainage pathways of mucous, resulting in mucosal edema which obstructs the ethmoidal infundibulum and osteomeatal obstruction leading to sinusitis. The aim of the study was to determine the incidence of concha bullosa and assess its role in causation of chronic rhinosinusitis. The objective was to determine the incidence of concha bullosa and assess its role in chronic rhinosinusitis.
Methods: A retrospective study of 120 patients suffering from chronic sinusitis of age group 18 years to 70 years old were taken between March 2018 to January 2021 at Malla Reddy institute of medical sciences (MRIMS) who had nasal symptoms significant enough to warrant a CT paranasal sinus (CT PNS) with positive findings. All PNSs involved were identified for sinus disease. Concha bullosa identified and graded into small, moderate and large. Patients with history of previous nasal surgeries were excluded.
Results: Our study showed 54% cases of chronic sinusitis with concha bullosa.
Conclusions: Concha bullosa may be one of the predisposing factors of chronic rhinosinusitis and hence surgical manipulation by functional endoscopic sinus surgery (FESS) is important to prevent recurrence of sinusitis.

Keywords: Paranasal sinus disease, Chronic sinusitis, Concha bullosa, Middle turbinate and CT PNS

INTRODUCTION

Pneumatisation of nasal turbinates is called concha bullosa. Most often it involves middle turbinate. It can also involve superior and inferior turbinate though less common. Concha bullosa is one of the most common variants of sinonasal anatomy. Concha bullosa can be seen either unilaterally or bilaterally. The air space within the concha bullosa is susceptible to the same pathologies as other sinuses may thus become infected, obstructed (mucocele, pyocele) or formation of polyp in concha bullosa. Although sinusitis is a clinical diagnosis, imaging studies are used to assess the extent of the disease and demonstrate sinonasal anatomy.[1]

Boulger classified concha bullosa of middle turbinate into 3 types: bulbous: pneumatization of bulbous segment; lamellar: pneumatization of vertical lamella of concha; extensive (total): pneumatisation of both lamellar and bulbous part.[2]

The relationship of concha bullosa to PNS disease continues to be debated.[3,4] The aim of the study was to determine the incidence of concha bullosa and assess its role in causation of chronic rhinosinusitis.

METHODS

Source of data

The study was conducted in the department of otorhinolaryngology and head and neck surgery, MRIMS, Hyderabad. CT PNS done in 120 patients suffering from chronic sinusitis between March 2018 to January 2021 were taken. All the PNS involved were identified for sinus disease. Concha bullosa are easily identified on CT PNS coronal image as a radiolucent air space in the centre of the middle turbinate surrounded by an ovoid bony rim.

We retrospectively reviewed CT PNS scans of 120 patients, 66 men and 54 women aged between 18 to 70 years.

Setting

The study was conducted in a tertiary referral hospital.

Period of study

The study was conducted from a period of March 2018 to January 2021.

Study design

The study design was a retrospective study.

Aim

The aim of the study was to determine the incidence of concha bullosa and assess its role in causation of chronic rhinosinusitis.

Inclusion criteria

Patients who had nasal symptoms significant enough to warrant a CT PNS with positive findings on CT PNS were included in the study. Aged of 18 years to 70 years old and all cases which were operated and followed up to 3 months were in the study.

Exclusion criteria

Age below 18 years and above 70 years with a history of previous nasal surgeries and all cases from present day to last 3 months were excluded.

Methodology

Institution ethics committee permission was obtained. This was a retrospective study conducted in a period of 3 years from March 2018 to January 2021 at MRIMS, Hyderabad. 120 patients suffering from chronic sinusitis of age group 18 years to 70 years old were selected after meeting the inclusion and exclusion criteria. All the PNS involved were identified for sinus disease. After thorough ear, nose and throat examination of the patients with positive CT PNS findings of co-existing concha and rhinosinusitis were subjected to conchoplasty. Informed and written consent was taken from such patients undergoing conchoplasty.

Operative technique

Conchoplasty

The operating field was prepared aseptically. The technique used for conchoplasty was removal of lateral half of concha under endoscopic exposure. Local anaesthesia (xylocaine 2% with 1:100000 adrenaline) was used to give 4 point infiltration over the concha. Sickle knife was used to cut into the concha and extension of the incision done superiorly and inferiorly. By using Blekesley forceps rotation cut of 180 degree was done to remove the lateral half of the concha and smaller pieces were removed using trucut forceps. FESS was done where ever needed.

Nasal packing done either with merocel or ribbon gauze and haemostasis achieved. In case of uncontrolled bleeding, hemostasis achieved was by cautery with bipolar and pressure packing done.

Post-op

Regular nasal douching done with normal saline and repeated nasal endoscopies was done for 6 weeks and patient follow up done upto 3 months.

Statistical analysis

Statistical analysis was done using SPSS version 21.0. Chi square test is used to calculate non parametric data analysis. The Chi square statistic was 17.1282. The p value was 0.000191. Hence the result of our study is significant at $p<0.05$.

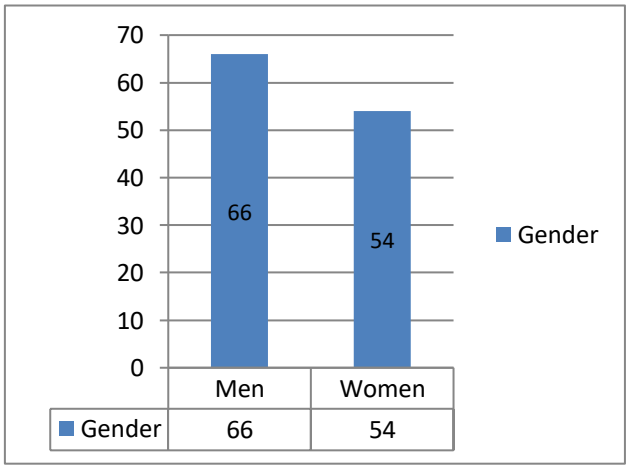

Figure 1: Sex predilection among patients.

RESULTS

In all 120 patients, concha bullosa was found in 54 patients (45%), of which 30 were unilateral and 24 were bilateral. In 30 unilateral concha bullosa, 19 on right side and 11 were on left side with right sided being more common.

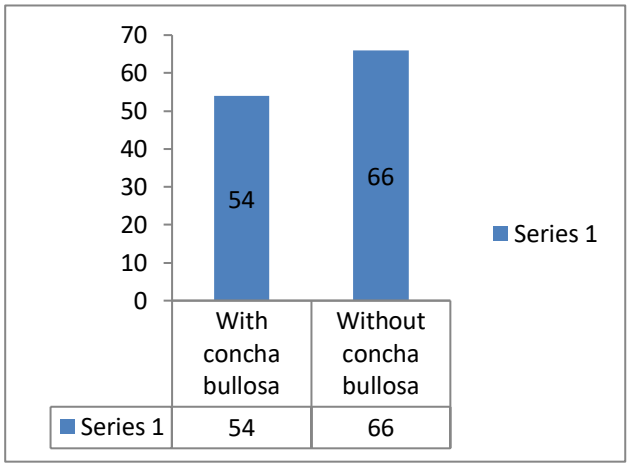

Figure 2: Patients with and without concha bullosa.

Of all 54 patients with 30 unilateral and 24 bilateral cases, there are 78 concha bullosa's of which 22 were large, 21 were moderate size and 35 were small.

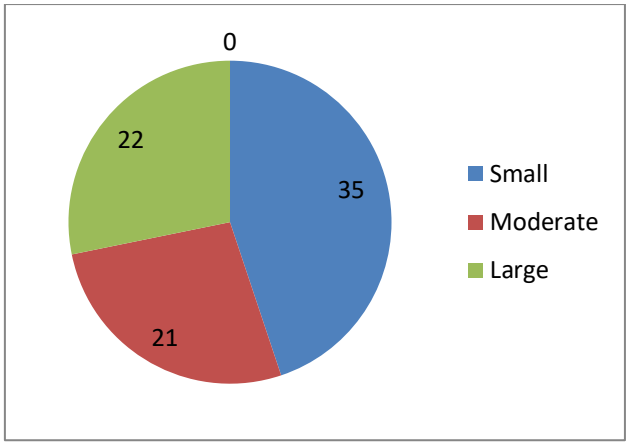

Figure 3: Size of concha bullosa among patients.

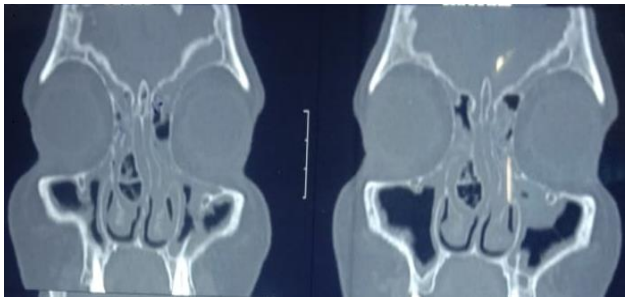

Figure 4: Unilateral infected extensive type of concha bullosa on the right side.

Table 1: Comparison between size of concha bullosa and % of sinusitis among patients.

S. no.	Size of concha bullosa	No. of concha bullosa	No. of concha bullosa causing sinusitis	% of sinusitis seen
1.	Small	35	8	23
2.	Moderate	21	12	61
3.	Large	22	17	79

Table 2: Comparison between type of sinus and % of sinusitis.

Type of sinus	Maxillary	Ant ethmoid	Frontal	Sphenoid	Posterior ethmoid
% of involvement	39	30	22	6	3

Table 3: Comparison between size of concha and its significance in causing sinusitis.

Comparison	Small concha	Moderate concha	Large concha	Row total
Sinusitis	8 (16.60) [4.46]	12 (9.96) [0.42]	17 (10.44) [4.13]	37
No sinusitis	27 (18.40) [4.02]	9 (11.04) [0.38]	5 (11.56) [3.73]	41
Column total	35	21	22	78 (grand total)

Among small size concha bullosa, majority were asymptomatic with only 23% associated with paranasal disease, that is, 8 out of 35.

Among moderate size concha bullosa, 61% associated with paranasal disease, that is, 12 out of 21.

Among large size concha bullosa, 79% associated with paranasal disease, that is, 17 out of 22.

Of all concha bullosa, number of concha bullosa causing sinusitis was found statistically significant in large size group with p value <0.05.

So among 21 moderate and 22 large concha bullosa, 29 of them are associated with sinusitis, that is, 67%.

The anterior PNS were more commonly involved than the posterior group of sinuses with maxillary sinus being most common then anterior ethmoid, frontal, sphenoid and last to be involved is posterior ethmoid sinus.

So there is a clear association between concha bullosa which are moderate to large in size and anterior group sinusitis. It is not mere presence of concha bullosa but the size of concha bullosa that should be considered.

The Chi square statistic is 17.1282. The p value is 0.000191.

Hence the result of our study is significant at $p<0.05$.

DISCUSSION

Our study serves to find out the incidence of concha bullosa in patients having sinusitis. Different studies have shown different incidence rates. Our study has shown incidence of 54%. CT PNS scans of patients with chief complaints and symptoms of chronic rhinosinusitis were taken and checked for the incidence of concha bullosa which can be easily identified with radiolucency in the middle turbinate.

Unilateral and bilateral concha bullosae were also identified. In this study concha bullosa was bilateral in 45% of the cases and unilateral in 55% of the cases and this agree with Zinreich et al 2003 and Tonai et al 1996 who stated that presence of bilateral concha bullosa ranges from 45% to 61.5%.1,5

While it has been suggested that abnormalities of the concha can predispose patients to obstruction of the sinuses, leading to chronic sinusitis, other studies with findings concluded that there was no correlation between the presence of concha bullosa and sinusitis.[6-9]

Some reports have suggested a relationship between the presence of a concha bullosa and sinusitis by compressing the uncinate process and obstructing or narrowing the infundibulum and the middle meatus.[1-4,9-11]

The number of patients with concha bullosa are identified and they are graded into small, moderate and large depending on the size of concha bullosa. The concha bullosa which are blocking the osteomeatal complex and causing sinusitis were identified. In our study just presence of concha bullosa has not caused sinusitis but severity of symptoms and disease is more related to the size of concha bullosa. Only 23% of small concha bullosa are associated with sinusitis. 61% of moderate sized concha bullosa associated with sinusitis. 79% of large sized concha bullosa associated with sinusitis. It was clear from this study that larger the size of concha bullosa, greater was the chance of osteomeatal block and sinusitis. We have also noted that maxillary sinus was more involved followed by anterior ethmoid, frontal, sphenoid and lastly posterior ethmoids.

The limitation of our study was that the interpretation of CT PNS and the management of concha bullosa causing sinusitis differed with every surgeon.

CONCLUSION

Mere presence of concha bullosa should not be considered pathologic. Majority of concha bullosa are asymptomatic, only which is large and big enough to block the osteomeatal complex resulting in sinusitis mostly confining to anterior group of sinuses should undergo treatment. Asymptomatic concha bullosa doesn't require any treatment. Definitive treatment of concha bullosa is surgical-conchoplasty, resection of lateral lamella of concha bullosa which is an effective procedure and most commonly used technique. Crushing of concha bullosa can also be done.

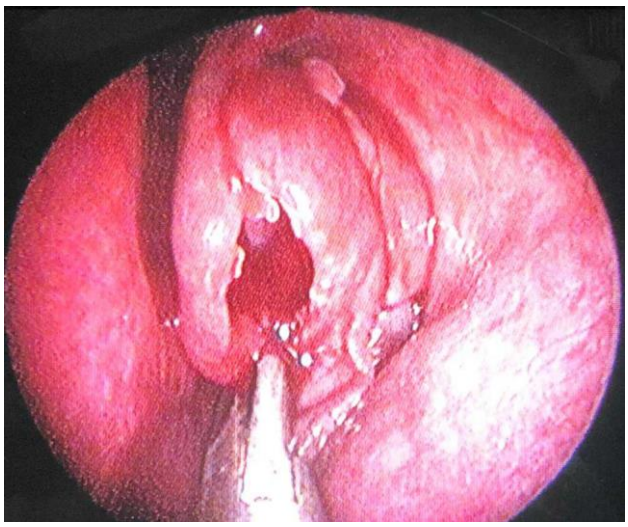

Figure 5: Intra operative picture of conchoplasty.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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