

Original Research Article

The role of concha bullosa in chronic rhinosinusitis: our experience at a tertiary care hospital

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Received: 10 April 2020

Revised: 14 May 2020

Accepted: 15 May 2020

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ABSTRACT

Background: Chronic rhinosinusitis (CRS) is a common and persistent illness that otorhinolaryngologists encounter commonly. It is an important cause of morbidity and accounts for major loss of income. Anatomical variations of the lateral wall of the nose have been reported which can predispose to CRS. The aim of the present study was to determine the percentage of concha bullosa in patients with CRS and to ascertain its relationship with chronic rhinosinusitis.

Methods: 100 patients attending the ENT outpatient department, Bangalore Medical College and Research Institute between December 2018 and 2019 were included in the study. Patients clinically diagnosed as CRS underwent diagnostic nasal endoscopy (DNE) and computed tomography (CT) scan of nose and paranasal sinuses, following which the relationship between concha bullosa and CRS was determined. The results were tabulated in excel sheet. Chi square test was applied for qualitative data.

Results: Of the 100 patients of CRS, 40 were males and 60 females. Of the 40 male patients, 16 showed presence of concha bullosa and of the 60 female patients, 28 showed concha bullosa. Headache (92%) was the most common presenting symptom in our study. A statistically significant correlation was noted between the presence of concha bullosa and chronic maxillary sinusitis (p value <0.05).

Conclusions: Concha bullosa is one of the most common anatomical variations of the lateral wall of the nose. The presence of concha bullosa plays a significant role in the development of chronic rhinosinusitis particularly in chronic maxillary sinusitis.

Keywords: Chronic rhinosinusitis, Concha bullosa, Diagnostic nasal endoscopy, Computed tomography

INTRODUCTION

Chronic rhinosinusitis is a very common ailment encountered by otorhinolaryngologists globally and it significantly accounts for morbidity and major source of income loss. The patients present with a variety of symptoms such as headache, nasal block, nasal discharge, facial pressure, halitosis etc.

Chronic rhinosinusitis (CRS) is defined as an infection of the paranasal sinuses that has persisted for more than

twelve consecutive weeks and characterized by inflammation of the mucosa and the underlying periosteum of the nose and paranasal sinuses. Sinus inflammatory disease affects over 31 million people in the United States of America each year.¹ In the USA the prevalence of CRS has been estimated to be 14% of the population. In 1979, Albegger calculated the prevalence of rhinosinusitis in general population to range from 32% in young children to 5% in adults.² However no conclusive studies are available about the prevalence of rhinosinusitis in India.

Chronic headache is one of the common symptoms which is distressing to both the patient as well as the physician. It becomes difficult to ascertain the nature of headache owing to multiple factors such as self-administered medications by the patient, vague nature of the headache etc. The investigative modalities for evaluation of headache available to an ENT surgeon are many, such as plain X-ray, CT scan of nose and paranasal sinuses (PNS) and diagnostic nasal endoscopy.

There are several anatomical variations associated with the lateral wall of the nose.³ These variations include septal deviation, concha bullosa, oversized bulla, uncinete process variations and paradoxically curved middle turbinate. Variations involving the middle turbinate are said to contribute to the middle meatal blockage.⁴ Among these middle turbinate variations the most commonly encountered variation is the concha bullosa.^{5,6}

Concha bullosa is defined as the pneumatisation of the middle turbinate. More commonly concha bullosa contains a single air cell. Multiple air cells are relatively rare. Based on the type of pneumatisation pattern they can be further classified as lamellar, bulbous and extensive.⁶ It has been suggested that the presence of concha bullosa may attribute to the development of CRS. Clark et al found a higher incidence of the bulbous portion of the middle turbinate in patients with chronic rhinosinusitis.⁷ On the contrary Yousem et al did not find any increase in the incidence of chronic rhinosinusitis in the presence of concha bullosa. Therefore, there is a need to study the relationship between concha bullosa in patients with chronic rhinosinusitis.⁸

Objectives

To determine the percentage of concha bullosa in patients with chronic rhinosinusitis and to determine the relationship between concha bullosa and chronic rhinosinusitis.

METHODS

This was a hospital based prospective one-year study done during the period from December 2018 to 2019 was conducted at the outpatient department of ENT, Bangalore Medical College and Research Institute, Bangalore. Sample size in this study were selected 100 patients.

Mode of selection

100 consecutive patients presenting with complaints related to CRS were selected for the study. Patients were clinically diagnosed as chronic rhinosinusitis based on the criteria set forth by the task force on rhinosinusitis.⁹

Inclusion criteria

Inclusion criteria were those who were consenting for the study, patients willing to undergo CT scan of nose and paranasal sinuses and nasal endoscopy, patients satisfying the clinical criteria by the task force on rhinosinusitis and patients above the age of 10 years.

Exclusion criteria

Exclusion criteria were history of previous nasal surgery, history of nasal trauma, patients with tumours of the nose and paranasal sinuses, pregnant women, patients not fit for CT scan and patients with allergy to xylocaine anaesthesia.

Method of data collection

After taking an informed written consent, 100 patients above the age of 10 years clinically diagnosed as chronic rhinosinusitis according to the criteria of task force on rhinosinusitis were included in the present study. Using 4% topical xylocaine as anaesthesia and decongestion using 1 ml topical adrenaline, DNE was done to study the presence of concha bullosa. These patients underwent a CT scan which enabled us to study the presence of concha bullosa radiologically (Figures 1 and 2).

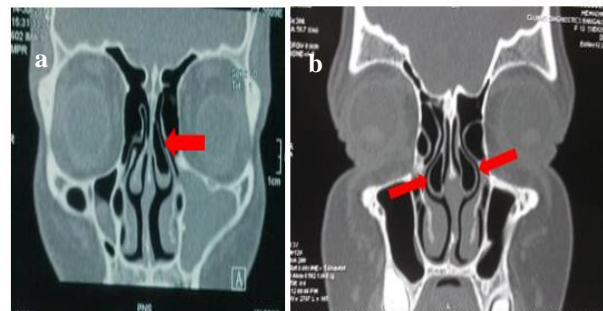


Figure 1: Computed tomography scans showing concha bullosa. (a) unilateral concha bullosa and (b) bilateral concha bullosa.



Figure 2: Endoscopic picture showing concha bullosa.

Ethical approval

All procedures performed in the study were in accordance with the ethical standards of the institutional and/or national research committee.

Statistical analysis

Data was collected and tabulated in an excel sheet. Results presented as proportions and percentages. Chi square test was applied for qualitative data. A p value <0.05 was considered statistically significant.

RESULTS

Of the 100 patients in our study, 40 were males and 60 were females with a male to female ratio of 2:3. Of these 40 male patients 16 showed concha bullosa and of the 60 female patients 28 showed concha bullosa on CT nose and PNS and DNE. The most common age group showing concha bullosa was 21-30 years (22 cases) (Table 1). The most common symptom found in our study was headache in 92%. The next commonly occurring symptom was nasal block (86%) followed by nasal discharge or nasal purulence (82%) (Table 2).

Table 1: Age distribution of patients with concha bullosa.

Age (in years)	Number of patients
11-20	6
21-30	22
31-40	10
41-50	4
>50	2
Total	44

Table 2: Symptomatology of patients.

Symptoms	Number of patients
Headache	92
Nasal block	86
Nasal discharge	82
Facial fullness	30
Cough	22
Halitosis	16

DNE and CT scan of nose and paranasal sinuses (coronal and axial) were studied for the evaluation of concha bullosa in our patients of CRS. Concha bullosa was noted in 44% patients having unilateral and bilateral presentations. The concha bullosa was noted more commonly on the right side as seen on nasal endoscopy and computed tomography.

Suitable statistical analysis was applied and the association between the presence of concha bullosa and occurrence of chronic rhinosinusitis was determined. A statistically significant correlation was noted between

presence of concha bullosa and chronic maxillary sinusitis (i.e. p value <0.05) (Table 3). No statistical significance was noted between presence of concha bullosa and chronic frontal and ethmoid sinusitis (Table 4 and 5).

Table 3: Association between concha bullosa and chronic maxillary sinusitis.

Variables	Chronic maxillary sinusitis present	Chronic maxillary sinusitis absent	Total
Concha bullosa present	38	18	56
Concha bullosa absent	42	2	44
Total	80	20	100

P value=0.00283 (statistically significant).

Table 4: Association between concha bullosa and chronic frontal sinusitis.

Variables	Chronic frontal sinusitis present	Chronic frontal sinusitis absent	Total
Concha bullosa present	34	10	44
Concha bullosa absent	36	20	56
Total	70	30	100

P value=0.159 (statistically not significant).

Table 5: Association between concha bullosa and chronic ethmoid sinusitis.

Variables	Chronic ethmoid sinusitis present	Chronic ethmoid sinusitis absent	Total
Concha bullosa present	24	14	38
Concha bullosa absent	42	20	62
Total	66	34	100

P value=0.638 (statistically not significant).

DISCUSSION

Nasal endoscopy in association with computed tomography of nose and PNS provides a more specific and accurate approach to sino nasal diseases. The success rate of FESS for treating CRS has been documented as 80% to 95% by various researchers.^{10,11} Such high rates are possible only by accurate preoperative localization of the disease. It is advisable to combine both these modalities in the preoperative diagnosis and ascertaining

the anatomical variations of lateral wall of nose which account for the sino nasal disease.

In our study of 100 patients with chronic rhinosinusitis, the proportion of female patients 60% was higher than male patients. A similar pattern was reported in several other studies.^{4,5,12,13} Although a similar pattern of gender distribution has been noted in these studies, no specific reason has been reported for the same.

The most common age group in our study was 21-30 years which included 22% patients. In a similar study conducted by Tuli et al on 50 patients, the most commonly affected age group was between 21-35 years 30%.¹⁴

Headache was the most common symptom noted in our study 92% followed by nasal block 86%. The next frequently occurring complaint was nasal discharge or nasal purulence present in 82% cases (Table 2). In a study by Wani et al, headache was the most common complaint seen in 90% of the patients, followed by nasal discharge 86.6% and nasal obstruction 85.33%.¹⁵ These results were in accordance with the results of our present study. Concha bullosa was seen in 44% of our patients showing unilateral and bilateral presentations. Our study showed higher incidence of concha bullosa in the age group of 21 to 30 years. In a study done by Hatipoglu et al the mean age of patients was 30 years.¹⁶

Our study showed a statistically significant association between presence of concha bullosa and maxillary sinusitis with a p value of <0.05 (Table 3). This could be attributed to the blocking of ostiomeatal unit resulting in obstruction to maxillary sinus outflow. No significant association was noted between presence of concha bullosa and chronic frontal and ethmoid sinusitis (Tables 4 and 5).

Stammberger et al state that pneumatization process apparently begins in middle age in some patients when there may be a renewed spurt of growth activity.¹⁷ Reda et al in his study showed inflammatory disease of the sinuses in 71.7% patients with concha bullosa and 57.7% patients without concha bullosa.¹⁸ Maru et al showed an association between sinusitis and concha bullosa in his studies especially with pneumatization involving anterior end of middle turbinate.¹⁹ In a study done by Prinja et al, a significant association was noted between presence of concha bullosa and occurrence of chronic maxillary sinusitis.²⁰ Our results were in accordance with these studies showing a statistical significance between presence of concha bullosa and chronic maxillary sinusitis.

CONCLUSION

Pneumatization of the middle turbinate which is referred to as concha bullosa, is one of the most common anatomical variations of the lateral wall of the nose. In

our study an attempt was made to study the percentage of CRS patients having concha bullosa and if this had any association with the occurrence of CRS. We found a statistically significant relation between the presence of concha bullosa and occurrence of CRS, particularly in chronic maxillary sinusitis. But no such association was noted for chronic frontal or ethmoid sinusitis.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Stackpole SA, Edelstein DR. The anatomic relevance of the Haller cell in sinusitis. *Am J Rhinol.* 1997;11:219-23.
2. Cauwenberge PV, Watelet JB. Epidemiology of chronic rhinosinusitis. *Thorax.* 2000;55(2):20-1.
3. Zinreich S, Albayram S, Benson M, Oliverio P. The ostiomeatal complex and functional endoscopic surgery. In: Som P, ed. *Head and neck imaging.* 4th ed. St Louis: Mosby; 2003; 149-173.
4. Bolger W, Butzin C, Parsons D. Paranasal sinus bony anatomic variations and mucosal abnormalities: CT analysis for endoscopic sinus surgery. *Laryngoscope.* 1991;101:56-64.
5. Weinberger D, Anand V, Rawi AM, Cheng H, Messina A. Surgical anatomy and variations of the onodi cell. *Am J Rhinol.* 1996;10:365-70.
6. Lloyd GA. CT of the paranasal sinuses: study of a control series in relation to endoscopic sinus surgery. *J Laryngol Otol.* 1990;104:477-81.
7. Arslan H, Aydinlioglu A, Bozkurt M, Egeli E. Anatomic variations of the paranasal sinuses: CT examination for endoscopic sinus surgery. *Auris Nasus Larynx.* 1999;26:39-48.
8. Basic N, Basic V, Jelic M. Pneumatization of the middle nasal turbinate: a CT study. *Lijec Vjesn.* 1998;120:200-1.
9. Kangaroo SK, White PS, Lee MS. A randomized control trial of surgical task performance in frontal recess surgery: zero degree versus angled telescopes. *Am J Rhinol.* 2002;16(1):33-6.
10. Stammberger H. Endoscopic endonasal surgery - concept in treatment of recurring rhinosinusitis. *Otolaryngol Head Neck Surg.* 1986;94:143-56.
11. Kennedy DW. Functional endoscopic Sinus surgery. Technique. *Arch Otolaryngol.* 1985;111:643-9.
12. Perez P, Sabate J, Carmona A. Anatomical variations in the human paranasal sinus region studied by CT. *J Anat.* 2000;197:221-7.
13. Zinreich SJ, Mattox DE, Kennedy DW. Concha bullosa: CT evaluation. *J Comput Assist Tomogr.* 1988;12:778-84.
14. Tuli IP, Sengupta S, Munjal S, Kesari SP, Chakraborty S. Anatomical Variations of Uncinate Process Observed in Chronic Sinusitis. *Indian J Otolaryngol Head Neck Surg.* 2013;65(2):157-61.

15. Wani AA, Kanotra S, Lateef M, Ahmad R, Qazi SM, Ahmad S. CT scan evaluation of the anatomical variations of the ostiomeatal complex. *Indian J Otolaryngol Head Neck Surg.* 2009;61(3):163-8.
16. Hatipoglu HG, Cetin MA. Enis Yuksel From the Departments of Radiology and Ear, Nose and Throat Surgery (M.A.C.), Ankara Numune Research and Training Hospital, Ankara, Turkey; 2005: 145-149.
17. Stammberger H. *Functional Endoscopic Sinus Surgery.* Philadelphia: B. C. Decker. 1991:161-9.
18. Reda M. Concha bullosa and other sino nasal variants: clinical and CT correlation. *Iranian J Radiology.* 2004: 31-6.
19. Maru YK, Gupta V. Anatomic variations of the bone in sino nasal CT. *Indian J Otolaryngol Head Neck Surg.* 2001;53:123-8.
20. Prinja S, Davessar J, Singh G, Kansal L, Kaur J. Role of concha bullosa in etiopathogenesis of chronic rhinosinusitis: a clinical study. *Int J Contemporary Med Res.* 2017;4(3):774-6.

Cite this article as: Fathima A, Arabhanvi R, Shamanna K, Joy L. The role of concha bullosa in chronic rhinosinusitis: our experience at a tertiary care hospital. *Int J Otorhinolaryngol Head Neck Surg* 2020;6:1326-30.