Original Research Article

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

Afshaa Fathima*, Ramappa Arabhanvi, Karthik Shamanna, Lyra Joy

Introduction

Chronic rhinosinusitis is a very common ailment encountered by otolaryngologists 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. 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. 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. These variations include septal deviation, concha bullosa, oversized bulla, uncinate process variations and paradoxically curved middle turbinate. Variations involving the middle turbinate are said to contribute to the middle meatal blockage. Among these middle turbinate variations the most commonly encountered variation is the concha bullosa.

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. 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. 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.

**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.

**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.

<table>
<thead>
<tr>
<th>Age (in years)</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-20</td>
<td>6</td>
</tr>
<tr>
<td>21-30</td>
<td>22</td>
</tr>
<tr>
<td>31-40</td>
<td>10</td>
</tr>
<tr>
<td>41-50</td>
<td>4</td>
</tr>
<tr>
<td>&gt;50</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
</tr>
</tbody>
</table>

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.

Table 2: Symptomatology of patients.

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>92</td>
</tr>
<tr>
<td>Nasal block</td>
<td>86</td>
</tr>
<tr>
<td>Nasal discharge</td>
<td>82</td>
</tr>
<tr>
<td>Facial fullness</td>
<td>30</td>
</tr>
<tr>
<td>Cough</td>
<td>22</td>
</tr>
<tr>
<td>Halitosis</td>
<td>16</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Chronic maxillary sinusitis present</th>
<th>Chronic maxillary sinusitis absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concha bullosa present</td>
<td>38</td>
<td>18</td>
<td>56</td>
</tr>
<tr>
<td>Concha bullosa absent</td>
<td>42</td>
<td>2</td>
<td>44</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

P value=0.00283 (statistically significant).

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

<table>
<thead>
<tr>
<th>Variables</th>
<th>Chronic frontal sinusitis present</th>
<th>Chronic frontal sinusitis absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concha bullosa present</td>
<td>34</td>
<td>10</td>
<td>44</td>
</tr>
<tr>
<td>Concha bullosa absent</td>
<td>36</td>
<td>20</td>
<td>56</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

P value=0.159 (statistically not significant).

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

<table>
<thead>
<tr>
<th>Variables</th>
<th>Chronic ethmoid sinusitis present</th>
<th>Chronic ethmoid sinusitis absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concha bullosa present</td>
<td>24</td>
<td>14</td>
<td>38</td>
</tr>
<tr>
<td>Concha bullosa absent</td>
<td>42</td>
<td>20</td>
<td>62</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>34</td>
<td>100</td>
</tr>
</tbody>
</table>

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. 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 pneumatisation 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 pneumatisation 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
