Relation of concha bullosa to sinusitis

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Abstract

Introduction: Although sinusitis is a clinical diagnosis, imaging studies are used to assess the extent of the disease and demonstrate sinonasal anatomy. Concha bullosa is the pneumatization of the middle turbinate and one of the most common variations of sinonasal anatomy. Concha bullosa may lead to narrowing or even complete blockage of the entrance to the middle meatus.

Objectives: This work aimed to detect the relationship between concha bullosa and incidence of sinusitis.

Subjective and methods: 100 subjects with age ranged from 20 to 50 years were included in this study. They were divided into study and control groups. All subjects were examined and C.T for all were performed.

Results: Significant difference was found between study and control groups as concha bullosa was found in 80% of patients with chronic rhinosinusitis in contrary to 10% of subjects not suffered from chronic rhinosinusitis.

Conclusion: Concha bullosa may be one of the predisposing factors of chronic rhinosinusitis and so surgical manipulation during FESS is important to avoid recurrence of the disease.

Keywords: concha bullosa, sinusitis, C.T.

Introduction

Sinonasal disease is a serious health problem commonly observed in the society. Although sinusitis is a clinical diagnosis, imaging studies are used to assess the extent of the disease and demonstrate sinonasal anatomy. Concha bullosa (CB) is the pneumatization of the middle turbinate and is one of the most common variations of the Sinonasal anatomy. A 14%-53.6% frequency of concha bullosa was reported by various studies.

Bolger et al. have classified pneumatization of the concha based on the location as lamellar concha bullosa (LCB), bulbous concha bullosa (BCB) and extensive concha bullosa (ECB).
The relationship of concha bullosa to paranasal sinus disease continues to be debated. (3, 4)

There are studies in the literature suggesting that CB may have a role in sinusitis etiology. Bulbous type concha bullosa, especially large ones, were considered to be predisposing to sinusitis by ear, nose, and throat (ENT) specialists. (5)

The aim of this prospective study was to assess the relationship between the concha bullosa and sinusitis.

**Subjects and methods**

This study was conducted on 100 subjects between the ages of 20 and 50 years chosen randomly from ENT outpatient clinic in Benha University Hospital from 1/9/2011 to 31/8/2012.

Subjects were divided into 2 groups, the first group included 50 patients with any of the following chronic rhinological complaints.

Nasal blockage /obstruction, nasal discharge (anterior/posterior nasal drip), facial pain/pressure (headache symptoms), diminution or loss of smell for a period of time longer than 12 weeks, and the 2nd group included 50 patients attended outpatient clinic for other diseases not related to chronic rhinosinusitis as control group.

Full ENT examination Including conventional anterior rhinoscopy, rigid endoscopic examination by Hopkins telescope 0 degree to confirm signs of chronic sinusitis as muco-pus, swollen turbinate, congested mucosa, tenacious mucous in middle meatous.

Computerized tomography study on the nose and paranasal sinuses for all participants in the study were performed Images were obtained in the coronal plane using 3 mm slice thickness from the anterior wall of the frontal sinus to the posterior wall of the sphenoid sinus. Scan parameters ranged between 120-160 kVp and 60-300 mA. Studies were interpreted in the bone window.

Coronal view CT scan on the nose and paranasal sinuses had been achieved by lying patient prone with the neck hyper-extended and a lateral computed radiograph obtained. The scanner bed and gantry are then tilted to set the scanning plane perpendicular to the bony palate.

Nasal vasoconstrictors were not administered.

Concha bullosa was defined as the presence of pneumatization of any size within the middle turbinate.
Pneumatization of the middle turbinate was classified depending on the pneumatization of the lamellar and bullous portions of the middle concha as lamellar and bullous, respectively. Pneumatization of both the lamellar and bullous portions of the middle turbinate was classified as the extensive type.

Computed tomography (CT) studies of patients diagnosed with concha bullosa (pneumatization of the middle turbinate) were reviewed. Scans were reviewed for any nasal cavity and/or paranasal anatomical abnormalities.

Radiological detection of mucoperiosteal thickening and opacification of the sinuses were regarded as evidence of sinus disease. Mucous retention cysts were spared.

The left and right sides of each of the frontal, ethmoid, sphenoid, and maxillary sinuses were assessed separately for the presence of mucosal disease. This disease was evaluated as either being present or absent.

If bilateral concha were present, they were assessed as being equal in size or one was designated as the dominant concha.

Statistical analysis were made using a dedicated software program

**Results:**

**Table (1):** Distribution of the main complaints of cases of 1st group

<table>
<thead>
<tr>
<th>Main complaint</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal obstruction</td>
<td>17</td>
<td>34</td>
</tr>
<tr>
<td>Nasal discharge</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>Headache</td>
<td>24</td>
<td>48</td>
</tr>
<tr>
<td>Hyposmia</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table (1) showed the distribution of the main complaints of cases, nasal obstruction 17 cases (34%), nasal discharge 9 cases (18%) headache 24 case (48%) and no complaint from Hyposmia (0.0%).

**Table (2):** Presence of concha bullosa in both groups.

<table>
<thead>
<tr>
<th></th>
<th>1st group sinusitis</th>
<th>2nd group control</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>50</td>
<td>50</td>
<td>100 subjects</td>
</tr>
<tr>
<td>concha bullosa</td>
<td>40</td>
<td>5</td>
<td>45</td>
</tr>
<tr>
<td>%</td>
<td>80%</td>
<td>10%</td>
<td>45%</td>
</tr>
</tbody>
</table>
Table (2) showed that the statistical difference between presence of concha bullosa between the 2 groups was highly statistically significant (p<0.05).

**Table (3): Extent of pneumatization of concha bullosa**

<table>
<thead>
<tr>
<th></th>
<th>1st group sinusitis</th>
<th>2nd group control</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>40</td>
<td>5</td>
<td>45 CB</td>
</tr>
<tr>
<td>Lamellar</td>
<td>8</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Bulbous</td>
<td>12</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Extensive</td>
<td>20</td>
<td>1</td>
<td>21</td>
</tr>
</tbody>
</table>

Table (3) showed the extent of pneumatization of concha bullosa, lamellar pneumatization in both groups was 10, bulbous pneumatization 14 and extensive pneumatization was 21. There was statistically significant increase of extensive pneumatization CB than other types (p<0.05).

**Table (4): Concha bullosa and different sinus affection among cases of the 1st group.**

<table>
<thead>
<tr>
<th></th>
<th>Frontal</th>
<th>Ethmoid</th>
<th>Sphenoid</th>
<th>Maxillary</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>12</td>
<td>28</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>%</td>
<td>30%</td>
<td>70%</td>
<td>12.5%</td>
<td>75%</td>
</tr>
</tbody>
</table>

Table (4) showed studying different sinus affection, we noticed that the most common sinus affected was "maxillary sinus" (75%), then "ethmoid sinus" (70%) and "frontal sinus" (30%).

. **Table (5):** showed Site or laterality of concha bullosa in the 1st group.

<table>
<thead>
<tr>
<th></th>
<th>Unilateral CB</th>
<th>Bilateral CB</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Rt</td>
<td>Lt</td>
<td>Equal sizes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rt</td>
<td>Lt</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>%</td>
<td>55%</td>
<td>20%</td>
<td>25%</td>
</tr>
</tbody>
</table>

The 2nd group, control group, showed 5 cases of unilateral concha bullosa one on the right side and the others were on the left side with no bilateral concha bullosa.
C.T. scans of the nose and paranasal sinuses (PNS), coronal view, bony window shows laterality of concha bullosa.

A) Bilateral extensive CB (dominant right). The right concha bullosa (red arrow) more larger than the left concha bullosa (yellow arrow), (case no. 2, male of 50 years old).

B) Bilateral extensive CB (dominant left). The left concha bullosa (yellow arrow) more larger than the right concha bullosa (red arrow), (case no. 45, male of 22 years old).

C) Bilateral extensive equal sized CB.

Both conchae are within the same size (red arrows), (case no. 29, male of 25 years old).

D) Right unilateral bulbous CB. Concha bullosa present in the right side only (yellow arrow), (case no. 12, male of 32 years old).

E) Left unilateral extensive CB.

Concha bullosa present in the left side only (red arrow), (case no. 17, male of 30 years old).
C.T. scan of the nose and PNS, coronal view, bony window show right unilateral CB (yellow arrow). No septal deviation (red arrow), preserved air channel between concha and system (dashed green line) bilateral maxillary and ethmoid sinus opacities (sinusitis), (case no. 12, male of 32 years old).

C.T. nose and PNS, coronal view, bony window show bilateral CB (dominant right). The right concha more larger (yellow arrow) than the left (red arrow). There is mucosal thickening in both maxillary sinuses and opacities in both ethmoids (sinusitis). No septal deviation, (case no. 20, male of 31 years old).
C.T. scan of the nose and PNS, coronal view, bony window show bilateral equal size CB (red arrow) both drain into air cells along basal lamella (dashed green line) opacities in both maxillary sinuses noticed (sinusitis). No nasal septal deviation (yellow arrow), (case no. 20, male of 31 years old).

**Discussion**

Total numbers of cases included in this study were 100 cases, 76% males and 24% females. The age distribution of cases ranged between 20 and 50 years with a mean 42.6±7.98, 48% mostly complained from headache, 34% nasal obstruction and 18% nasal discharge as a main complaint of the 1st group.

In this study, we defined CB as any degree of pneumatization of the middle turbinate, and this definition agree with Bolger, et al 2001 (2) and disagree with Zinreich, et al,2003(1) who have not included small sized or lamellar type conchae bullosa in their studies.

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(1) , Tonai , Baba ,1996(6). Who stated that Presence of bilateral conchae bullosa ranges from 45% to 61.5%.

In this study we divided the pneumatization of the middle concha into three groups: lamellar type which is the pneumatization of the vertical lamella of the concha, bulbous type which is the pneumatization of the bulbous segment, pneumatization of both the lamellar and bulbous parts is called extensive concha bullosa.
In this study the values for the extent of pneumatization were determined as 50% for extensive concha bullosa, 30.10% for bulbous concha bullosa and 20% for lamellar concha bullosa. These results to some extent in agreement with Tonai, Baba, 1996\(^6\) results which were 72%, 22% and 6% respectively.

While it has been suggested that abnormalities of the concha can predispose patients to obstruction of the sinuses, leading to chronic sinusitis\(^7,8\) , other studies with findings concluded that there was no correlation between the presence of concha bullosa and sinusitis\(^9,8,10\).

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\(^1,2,10,3,4,11,12\), but other reports have found no direct relationship\(^13,14\).

Lloyd et al\(^4\) have stated that when CB fills the space between the septum and the lateral nasal wall, there may be total obstruction of the middle meatus orifice\(^3,4\).

Comparative studies involving asymptomatic patients and sinusitis patients have reported that CB is more frequently encountered in patients with sinusitis\(^3,12\).

**Summary and conclusion:**

- There is a strong correlation between the presence of a concha bullosa and sinus disease.
- There is a strong relationship between the size of concha bullosa and incidence of sinusitis.
- Sinusitis most commonly occurred in maxillary sinuses and ethmoid sinuses.
- There is a strong relationship of right, left or bilateral concha bullosa compared to the presence of ipsilateral sinusitis.
- Management of concha bullosa during FESS is an important step to avoid possibility of recurrence of sinusitis.
References:


2-Bolger WE, Butzin CA, Parsons DS. Paranasal sinus bony anatomic variations and mucosal abnormalities: CT analysis for endoscopic sinus surgery. Laryngoscope. 2001; 101. 56-64.


