

# Concha bullosa- A retrospective computed tomographic study

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## Abstract

Anatomic variations that narrow the osteomeatal complex can predispose it to obstruction in the presence of inflammation. One such variation is the pneumatization of the middle concha or concha bullosa. Sinonasal CT examinations of 100 patients were reviewed to determine the anatomic variation. Among the aforesaid scans we found the presence of concha bullosa in 45% of the cases of which 18 were bilateral. Concha bullosa is a common anatomical variant and CT of the paranasal sinus region is therefore an essential prerequisite prior to sinonasal surgeries.

**Key words:** Concha bullosa, Anatomic, variations, Sinonasal CT, paranasal sinus

## Introduction

Osteomeatal complex (OMC) is often referred to the area encompassed by: (a) The ostium of maxillary sinus, the ostia of anterior and middle ethmoidal air cells, the frontonasal duct (frontal recess), the ethmoidal infundibulum, and the middle meatus and (b) The sphenoethmoidal recess and the superior meatus (Figure 1A) [1]. Although the anatomy of nasal cavity and paranasal sinuses differ subjectively, certain distinct variations are found most frequently and have been documented in literature [2]. Anatomic variations that narrow the osteomeatal complex can predispose it to obstruction in the presence of inflammation. One such variation is the pneumatization of the middle concha or concha bullosa (Figure 1B). A large bullosa when present may narrow the infundibulum and obstruct the drainage pathway of the antrum [3]. <sup>1</sup>Studying the frequency of occurrence

of these variations in a given population may be important planning surgeries on patients [4]. The aim of this study was to assess the relative frequency of concha bullosa in Indian population as determined with coronal CT in a series of 100 cases in patients older than 18 years.

## Materials & methods

Sinonasal CT examinations of 100 patients were reviewed to determine the anatomic variation. The study included CT scans of the nasal sinus region of patients with the age range of 18-80yrs, with or without symptoms suggestive of sinus disease. It is a cross sectional retrospective study of computerized tomography of paranasal sinuses. CT was performed on a High Speed General Electric (GE), CT scanner. Coronal scans were obtained by using a bone algorithm with a 2-mm contiguous

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scan. Gantry position was perpendicular to hard palate. The scanning parameters were as follows: 120 kilovolts peak (kVp), 150 millicoulombs (mAs), Matrix 512 x 512, Scan time 2 sec, Data reconstruction STD+, Scout view lateral.

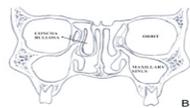
### Results

The images were analyzed and the presence or absence of concha bullosa was noted. The consecutive

CT scans of 100 patients which included 43 males and 57 females were evaluated. The age ranged between 18 to 80 years with a mean age of 49 years. Among the aforesaid scans we found the presence of concha bullosa in 45% of the cases of which 18 were bilateral (Figure 1). Amongst the unilateral conchae 13 belonged to the right side and 14 to the left side.

**Table 1. Incidence (in %) of concha bullosa by various authors**

Authors	Concha bullosa
Sang Min Lee et al (1995) <sup>9</sup>	13.80%
Pérez-Piñas et al (2000) <sup>10</sup>	24.50%
Zandi et al (2003) <sup>5</sup>	64.90%
Lerdlumet al(2004) <sup>11</sup>	14.30%
Zafer et al(2005) <sup>12</sup>	50%
Talaiepour et al(2005) <sup>4</sup>	35%
Ameri et al(2005) <sup>8</sup>	23.50%
Dua et al(2005) <sup>1</sup>	16%
Barandafar et al(2006) <sup>14</sup>	12.50%
Daghighi et al(2007) <sup>15</sup>	15.90%
Smith et al (2010) <sup>16</sup>	67.5%
<b>PRESENT STUDY</b>	<b>45%</b>



**Figure 1A. Osteomeatal complex. 1B. Concha bullosa. Figure 2. Bilateral concha bullosa (CT Scan)**

## Discussion

Concha bullosa is a pneumatized middle turbinate, when large can cause obstruction in the middle meatus or the infundibulum. In the present study we found concha bullosa to be a common anatomical variant, seen in 45%. Of these, 60% were seen unilaterally and were more common. Zandiet. Al [5]. in their study conducted in Iran, reported a very high incidence of concha bullosa in 64.9% of the cases of which 39.8% was bilateral and 60.2% were unilateral. They also reported significant correlation between concha bullosa and chronic sino nasal disease. Another study conducted in Iran by Talaiepour et. Al [4]. reported concha bullosa in 35% of the cases which were bilateral in 11.9% and unilateral in 23.1%. A study conducted in Thai patients, concha bullosa was detected in 34.1% cases of which unilateral cases were 30.7% and bilateral were 19.3% of the cases [6]. They reported no statistical significant association between concha bullosa and maxillary sinusitis. However Scribano et. al. [7]. concluded that in the presence of anatomic bony variations, a contact between the mucosal surfaces of the ostiomeatal unit is valuable in predicting the likelihood of a maxillary inflammatory disease. So does Liu X et. Al [8]. conclude that occurrence of ostiomeatal complex variation is common with significant correlation between the variations and sinusitis. Ameriet. al [9]. are of the opinion that anatomical variants of paranasal sinuses may be considered as predictors for the occurrence of chronic sinusitis. There is a wide variation in the prevalence reported by various investigators [1,4,6,9-16] ranging from 12.5% to 67.5% as seen in table 1. This can be attributed to the differences in the criteria for pneumatization. Some authors considered concha bullosa as any visible pneumatization of the middle turbinate [5] whereas few defined it as pneumatization of both vertical lamellar and horizontal bulbous portion of the middle turbinate [15]. Hatipogluet. Al [17]. in their study evaluated CT scans which showed pneumatization of middle turbinate in symptomatic patients. They concluded that concha bullosa is one of the commonest anatomical variant but they found no statistical significance between presence of concha bullosa and chronic sinusitis. However according to Zaferet. Al [13]. a large concha bullosa might exert pressure on the uncinate process, obstruct the

infundibulum and middle meatus and act as a predisposition in sinusitis. They studied the CT scans in patients with chronic otitis media and reported the presence of concha bullosa in 50% of the cases. They concluded that concha bullosa is a factor of predisposition of paranasal sinus infections and subsequent middle ear infections. Stallman et. Al [18]. evaluated concha bullosa in relation to nasal septal deviation in 1095 CT scans and found a significant relationship between concha bullosa and contralateral deviation of nasal septum. In literature there is a conflict among the data regarding the significance of concha bullosa predisposing to sinu nasal disease. According to Hatipogluet. Al [17]. such variances are due to differences in the study groups, differences in the pneumatization parameters and also the analytical methods used. Concha bullosa is a common anatomical variant. Therefore such anatomical variations which can lead to compromising of the mucociliary drainage and are frequently seen are best evaluated with Computed Tomography. CT of the paranasal sinus region is therefore an essential prerequisite prior to sinonasal surgeries.

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