ORIGINAL ARTICLE

Concha Bullosa in Chronic Sinusitis

S Subramanian, MS(ORL & HNS)*, G R Lekhraj Rampal, DRPH, E F M Wong, BSc.**, S Mastura, MMed***, A Razi, MCh(ORL & HNS)*****

*General Hospital Melaka, *Head of Epidemiology and Biostatistics Unit, Faculty of Medicine and Health Sciences, UPM, ***Department of Diagnostic Imaging, ****Department of Otolaryngology, Hospital Kuala Lumpur

Summary

Sinusitis is an important cause of morbidity and one of the major sources of income loss. Anatomical variations of the nose have been reported to predispose to sinusitis. These variations include concha bullosa, nasal septal deviation and oversized bulla. The aim of this study was to determine the proportion and the distribution of concha bullosa in patients with chronic sinusitis and to determine the relationship between concha bullosa and age, sex, ethnicity. A cross-sectional study was conducted at the Department of Ear, Nose and Throat in Kuala Lumpur Hospital (HKL). Data was collected retrospectively using a pretested proforma. All patients who underwent Sino nasal surgery between January 1999 and December 2000 and whose preoperative CT scans were available were included in the study. The CT scans were reviewed. Analysis was carried out using Statistical Package for Social Sciences. Out of 146 patients who underwent sinonasal surgery between January 1999 and December 2000, 101 (69.2%) preoperative CT scans of these patients were available and these were reviewed. The proportion of patients with concha bullosa was 49.5%. The results showed that there was significant relationship between presence of concha bullosa and age and sex. The overall mean age of patient with concha bullosa was 35.7 years (95% CI 32.1 – 39.3) and ranged from 11-years to 56-years. The mean age of respondents with concha bullosa was significantly lower than patients without concha bullosa 41.98 (95% CI 37.6 - 46.3; t-test=2.221; df=99; $p<0.05$). Concha bullosa was significantly more in females (66.0%) compared to males ($\chi^2=4.465$; df=1, $p<0.05$). There was no significant relationship between presence of concha bullosa and ethnicity.

Key Words: Concha Bullosa, Chronic sinusitis

Introduction

Sinusitis is a common cause of morbidity and loss of income. Sinus inflammatory disease affects over 31 million people in the United States of America each year [1]. Anatomical variations of the nose have been reported to predispose to sinusitis[2]. These variations include concha bullosa, nasal septal deviation, oversized bulla, paradoxical middle turbinate, medial or lateral deviation of the uncinate process, and pneumatization of the inferior turbinate and uncinate process bulla. Variations in the middle meatus are said to contribute to the middle meatal blockage[3] and among these, concha bullosa is the most common variation [4,5]. Concha bullosa is a term used for pneumatized middle turbinate or concha of the nasal cavity. It is a normal variant of anatomy of the nasal cavity and not a disease condition. Commonly the concha bullosa contains only single air cell. Multiple air cells in a concha bullosa are relatively rare. Concha bullosa can exist unilaterally or bilaterally and it can be further classified into three groups according to the location and size of pneumatization[5]. They are the lamellar-type, bulbous-type and extensive-type of concha bullosa. Disease process of the para nasal sinuses has the ability to affect the air cells interior to the concha bullosa. These can vary from the mucosal

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Corresponding Author: Lekhraj Rampal, Head of Epidemiology and Biostatistics Unit, Faculty of Medicine and Health Sciences, University Putra Malaysia, 43400 Serdang, Selangor

oedema to the formation of polyps, retention of thick mucous secretion, mucocele, pyocele and fungal infection[6]. Many studies on concha bullosa have been performed following Messerklinger's description of its association with sinusitis. Some of the findings supported the aetiological role of concha bullosa in sinusitis. Clark et al. (1989)[7] and Lloyd (1990)[3] found a higher incidence of pneumatization of the bulbous portion of the middle turbinate in patients with chronic sinusitis. However, Zinreich et al. (1988)[4] and Yousem et al. (1991)[8] did not find any associated increase in the incidence of ostiomeatal disease in patients with concha bullosa. Research in this area in Malaysia is scanty. The objectives of this study were to determine the proportion of concha bullosa in patients with chronic sinusitis who had nasal surgery and to determine the relationship between concha bullosa and age, sex, ethnicity and side of occurrence.

Materials and Methods

This retrospective cross-sectional study was conducted in the Department of Ear, Nose and Throat of Hospital Kuala Lumpur (HKL). The study population consisted of patients with chronic sinusitis admitted to the Department of ENT, HKL who had undergone FESS and/or nasal polypectomy between January 1999 and December 2000. All patients who had at least one high resolution CT scan on the coronal view that showed the structure of all sinuses from anterior to posterior were included. All of the patients included into this study were Malaysians. Patients who had any form of major surgery or accidents involving the maxillo-facial region before the CT scan was taken were excluded from this study. Other exclusion criteria included any congenital deformities or diseases of the nasal cavity, paranasal sinuses and its surrounding structures, which lead to severe abnormality. Such examples are cleft palate, harelip and also malignancy. An OT list of patients with chronic sinusitis was obtained. The data was recorded during review sessions along with a radiologist. A confirmation was obtained from an otolaryngologist surgeon whenever the information from the CT scans was not obvious. A pre-tested proforma was used to collect the data from CT scans and medical records. Initial proforma was adapted from Jorgensen (1991)[9] and was pre-tested on 10 cases. The revised proforma was used after modifications were made to suit this study. Variables included in this study were age, sex and race of patients. Concha bullosa was defined as pneumatization of the middle turbinate or concha of the nasal cavity to any degree was evident. Sinus disease was diagnosed if there were findings of either thickening of the sinus margin or opacification of the sinus or both. Healthy sinus was defined as a clear radiolucent cavity surrounded by a narrow margin of bony wall. The air in normal sinus appears to touch the adjacent bone. Whenever mucosa was detected on the CT scan the sinus was considered abnormal[10]. Nasal pneumatization was diagnosed if there was any degree of pneumatization occurring on the bony part of the nasal septum. Data was analysed using Statistical Package for Social sciences version 10.

Results

A total of 146 patients had undergone nasal surgery for chronic sinusitis, which included FESS and polypectomy, from Jan 1999 to Dec 2000 at the Department of ENT, HKL. Out of the 146 patients, CT scans of 101 patients were retrieved and reviewed giving the retrieval rate of 69.2%. The majority (83.16%) of records were retrieved from the clinic itself and 16.94% were from the Record Department. Out of 45 cases that were not retrieved, 5 patients were found to have no CT scan. Table I shows the distribution of respondents by age and sex. The overall mean age of the respondents was 38.88 years (95% CI 36.03 – 41.73). The age of the ranged from 11 years to 75 years. Fifty-five percent of the respondents were females. The mean age was significantly higher in the males (44.98 years; 95% CI 41.1 – 48.8) compared to 33.98 years (95% CI 30.3 – 37.7) in the females (t-test = 4.1, df = 99, $p<0.001$). Majority of the respondents consisted of Malays (40.6%), Indian (27.7%) and 26.7%) were Chinese (Table II).

Table III shows the percentage distribution of respondents with and without concha bullosa by age. The table shows that out of the 101 patients with chronic sinusitis, 50 (49.5%) had concha bullosa. The overall mean age of patient with concha bullosa was 35.7 years (95% CI 32.1 – 39.3) and ranged from 11-years to 56-years. The mean age of respondents with concha bullosa was significantly lower than patients without concha bullosa 41.98 (95% CI 37.6 - 46.3; t-test=2.221; df=99; $p<0.05$).

Table IV shows majority (66.0%) of the respondents with concha bullosa were females. There was a significantly higher proportion of concha bullosa in females (58.9%) as compared to males (37.8%) ($\chi^2=4.465$; df=1; $p=0.028$). The male: female ratio for concha bullosa was 1:1.94.

Table V shows the proportion of respondents with concha bullosa by ethnic group. Malays had the highest proportion (61%), followed by three Sikhs and two Orang Asli (60%) and Indians (50%). All of the patients included into this study were Malaysians. However, there was no association between presence of concha bulllosa and ethnicity (Fisher's Exact Probability > 0.05).

Table VI shows that the proportion of concha bullosa on the right and left sides were 33.7% and 34.7% respectively. There was no association between presence of concha bullosa and side of occurrence (left or right) (χ^2=0.022; df=; p=0.882).

Table I: Distribution of Respondents by Age and Sex

Age Group	Sex				Total
	Male		Female		
	No.	(%)	No.	(%)	
19 and below	2	4.4	9	16.1	11
20 to 29	4	8.9	12	21.4	16
30 to 39	6	13.3	11	19.6	17
40 to 49	14	31.2	17	30.4	31
50 and above	19	42.2	7	12.5	26
Total	**45**	**100**	**56**	**100**	**101**

Table II: Distribution of Respondents by Ethnic Group

Ethnic Group	Number	(%)
Malay	41	40.6
Chinese	27	26.7
Indian	28	27.7
Others	5	5
Total	**101**	**100**

Table III: Distribution of Patients With or Without Concha Bullosa by Age

Age Group	Concha Bullosa				Total
	Present		Absent		
	No.	(%)	No.	(%)	
19 and below	7	14.0	4	7.8	11
20 to 29	7	14.0	9	17.6	16
30 to 39	10	20.0	7	13.8	17
40 to 49	18	36.0	13	25.5	31
50 and above	8	16.0	18	35.3	26
Total	**50**	**100**	**51**	**100**	**101**

Table IV: Distribution of Patients With or Without Concha Bullosa According to Sex

Sex	No. with Concha Bullosa (%)	No. Without Concha Bullosa (%)	Total
Male	17 (37.8)	28 (62.2)	45
Female	33 (58.9)	23 (41.1)	56
Total	**50**	**51**	**101**

Table V: Percentage Distribution of Respondents with Concha Bullosa by Ethnic Group

Race	No. With Concha Bullosa (%)	No. Without Concha Bullosa (%)	Total
Malay	25 (61)	16 (39)	41
Chinese	8 (29.6)	19(70.4)	27
Indian	14 (50)	14 (50)	28
Others	3 (60)	2 (40)	5
Total	**50 (49.5)**	**51 (50.5)**	**101**

Table VI: Distribution of Patients With or Without Concha Bullosa According to the Side of Middle Turbinate Involvement

Side	Concha Bullosa		Total
	Present	Absent	
Right	34 (33.7%)	67 (66.3%)	101
Left	35 (34.7%)	66 (65.3%)	101
Total	**69**	**133**	**202**

Discussion

The mean age (38.8 years) of the respondents with chronic sinusitis in this study was consistent with other studies on concha bullosa [3,4,11,12]. The proportions of females were higher than males in patients with chronic sinusitis. A similar pattern was reported in several other studies [3, 4, 11, 12, 13, 14]. Although there was a similar pattern of distribution of gender with predominantly female, none had reported the reasons for this occurrence. Majority of the respondents were Malays and Indian in this study. The proportion of the study population does not reflect the ethnic distribution of Malaysian population, where the majority are Malays followed by Chinese and Indian. As the study population was only limited to this hospital, this could have allowed the bias on having a selected group of patients into the study. This could affect the outcome of certain parameters that was being investigated. The proportion of concha bullosa in patients with chronic sinusitis was 49.5%. In the studies on symptomatic patients, the percentages of patients with concha bullosa ranged from 34% to 53% [4,12,13,14]. There was a wide discrepancy of concha bullosa percentage in patients with chronic sinusitis because of different criteria of diagnosis, inherent differences and sensitivity of analysis [12]. Among the patients with concha bullosa, this study showed that they tend to have a lower mean age than patients without concha bullosa. The difference was found to be statistically significant. The reason for such findings was because concha bullosa may produce more symptoms earlier than other predisposing factors. Anatomical variants such as concha bullosa occur in all age group. This was the reason of finding bigger portion of concha bullosa in younger patients having sinusitis. Other predisposing factors require longer period of time before they produce symptoms. Females had a higher proportion of concha bullosa as compared to males with the ratio of males to females with concha bullosa was 1:1.94. The age factor could be influencing the finding of more female with concha bullosa because they also had a significant lower mean age. Nevertheless, gender may be an issue in relation to chronic sinusitis, as discussed above, rather than concha bullosa since no study has discussed the issue between gender and concha bullosa. Probably a controlled prospective study may be able to identify the association between gender and presence of concha bullosa. The distribution of patients with concha bullosa by ethnicity generally did not differ from the pattern of this study population. There was no significant association particularly for any of the three major races of having the predominance to get concha bullosa. Majority of them were Malays and Indians. The Chinese constituted the largest portion of symptomatic patients without concha bullosa. There was no significant difference between the left side and the right side of the middle turbinate of getting pneumatized. The response (retrieval) rate was 69.2% in this study was mainly due to the inability to retrieve

CT scan of these patients. This could lead to selection bias. There was only one radiologist who performed the reviewing procedure and it was not repeated or reviewed by another radiologist. There was no assessment performed to determine the sensitivity and specificity of this method in diagnosing concha bullosa. However, Jiannetto and Pratt[14] reported that the correlation of CT findings between the radiologist and operative findings was relatively high for the diagnosis of concha bullosa.

Conclusion

Concha bullosa is a common variant of the nasal cavity among those with chronic sinusitis (49.5%).

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