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Concha Bullosa and its association with nasal septal deviation and sinusitis among Filipinos

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ABSTRACT:
Background and Aim: Concha bullosa is the pneumatization of middle turbinate and a common normal variant. There has no study been done till date in the Philippines to evaluate the prevalence of concha bullosa and its relationship with sinus inflammatory disease and nasal septal deviation. This study is aimed to evaluate the prevalence of concha bullosa and its relationship with nasal septal deviation and sinusitis among Filipinos in Jose R.Reyes Memorial Medical Centre. **Methods:** Two hundred and five computed tomography images of the paranasal sinuses obtained from Jan 2010 to Dec 2011 were reviewed by a senior radiology resident and finally evaluated by two consultant radiologists fromThe Department of radiology of Jose R.Reyes Memorial Medical Center. All the CT scans were evaluated for the presence of concha bullosa, nasal septal deviation and sinus inflammatory disease. **Results:** Concha bullosa was seen as a common normal variant, witha prevalence of 29.8 %. There was significant association of concha bullosa and sinusitis as well as concha bullosa with nasal septal deviation proven by all p values <0.05.There was no significant relationship between nasal septal deviation and sinusitis. **Conclusion:** Concha bullosa is a common normal variant with theprevalence of 29.75 % .There is significant association of concha bullosa and sinus inflammatory disease as well as between concha bullosa and nasal septal deviation. There was no significant relationship between nasal septal deviation and sinusitis.
Key words- Concha bullosa , Nasal septal deviation, Sinusitis, CT scan.

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INTRODUCTION

CT Scan screening is now considered the primary imaging modality for evaluation of paranasal sinuses. Increasing use of CT scan screening has correspondingly increased the detection rate of normal variants of the paranasal sinuses, with the reported prevalence of haller cells (2- 45 %) , ager nasi cells (3 to 100 %) and onodi cells (3.4 – 51%).[1] Concha bullosa, pneumatization of the middle turbinate is also one of the common anatomic variant of the paranasal sinus. The prevalence of concha bullosa as detected on CT scan ranges from (14-53 %) [1].

Concha bullosa and nasal septal deviation have been described among the etiological factor for sinus inflammatory disease.[3,4] Likewise concha bullosa is also considered one of the detrimental factor for development of nasal septal deviation .Hence there is an entangled relationship among these three variables. Several authors have assessed the relationship betweenconcha bullosa and incidence of sinusitis and nasal septal deviation.

Studies showed clear association between concha bullosa and contralateral deviation of the nasal septum, however the association of concha bullosa and its role on potential contributor for the development of sinusitis still remains a debate with varying results.[1, 2] The purpose of this study is to determine the prevalence of concha bullosa and examine a possible relationship between concha bullosa to nasal septal deviation and sinus inflammatory disease.

METHODOLOGY:

A retrospective study was conducted .Two hundred and five (205) computed tomography images obtained for evaluation of the paranasal sinuses within two year period (January 1st 2010 to Dec 31st 2011) were randomly selected from emergency or OPD patients who consulted the Radiology department of Jose R.Reyes Memorial Medical Center .All the CT scan were performed on single machine (Hitachi Pronto single slice helical CT) using axial 5 mm and coronal 3mm thickness for evaluation of the paranasal sinuses and stored in PACS system. One senior radiology

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resident reviewed the images for the presence of concha bullosa with or without concomitant sinus inflammatory disease and nasal septal deviation .Further these images were assessed by two consultant radiologist having 10yrs experience for evaluating paranasal sinuses imaging.

The patientswere selected irrespective of their clinical symptoms, age and sex excluding the ones with a) prior history of sinus surgery, b) recent trauma and c) tumors in the nasopharynx extending to involve the nasal cavity and obstructing the osteomeatal unit.

Concha bullosa was defined as pneumatization of the middle turbinate extending caudally at least 50 % of vertical height of the middle turbinate estimated on coronal CT studies. Nasal septal deviation was defined as any bending of the nasal septal contour from the midline as evaluated on coronal CT studies[2]. The direction of the deviation will be defined by the side of the convexity of the curvature. Sinusitis or sinus inflammatory disease was defined as changes in the paranasal sinuses indicated by their mucosal thickening with /without air fluid level and with/ without sclerosis of the bony structures forming the wall of the sinuses. Likewise Frontal, ethmoidal, maxillary and sphenoid sinuses on both sides were evaluated for the presence of mucosal inflammatory changes again indicated by any mucosal thickening with / without air fluid levels and with/without sclerosis of the adjacent sinus wall .

A.   **B.**
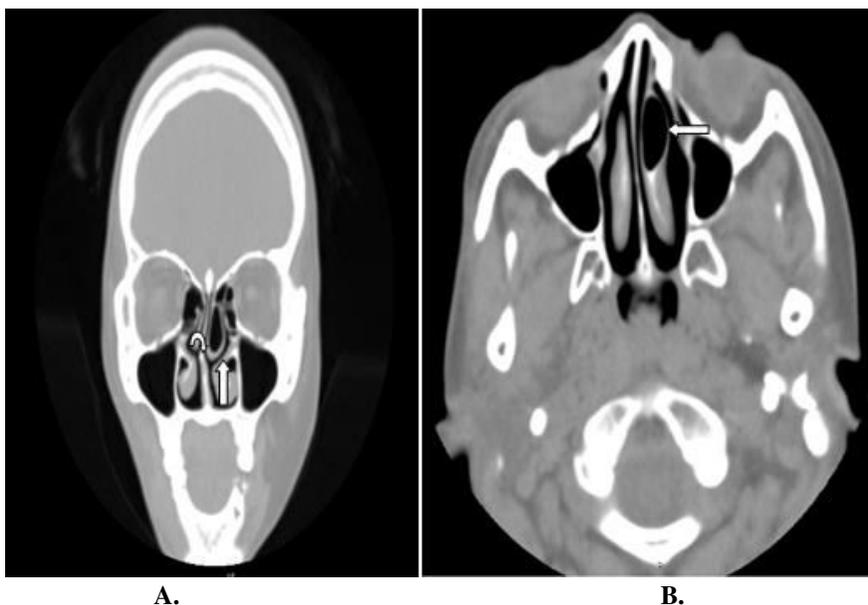
Figure A and B: Coronal and axial ct image of the paranasal sinus shows a left sided concha bullosa (white open arrow in fig A and B) with slight deviation of the nasal septum to the right (curved arrow in Fig.A)
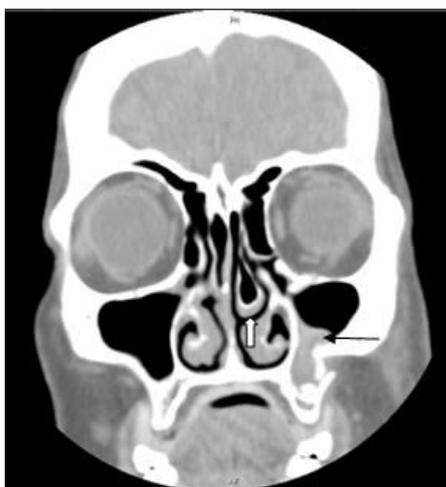
Fig C: CORONAL CT image of the paranasal sinus shows a left sided concha bullosa (white open arrow in fig c) with ipsilateral left sided maxillary sinusitis (thin black arrow in fig C.)

ANALYSIS OF DATA
Data were encoded and tallied in SPSS version 10 for windows. Descriptive statistics were generated for all variables. For nominal data frequencies and percentages were computed. For numerical data, mean ± SD were generated. Analysis of the different variables was done using the following test statistics:
Mc Nemar test – used to compare/associate nominal data that are dependent

RESULTS:
A total of 205 subjects were included in the study.

Table 1: Demographic Characteristics of Subjects

Characteristics	Frequency (n=205)	Percentage
Age in years		
11 – 20	3	1.5
21 – 30	25	12.2
31 – 40	49	23.9
41 – 50	37	18.0
51 – 60	48	23.4
61 – 70	40	19.5
Mean ± SD = 37.94 ± 14.28	3	1.5
Sex		
Male	130	63.4
Female	75	36.6

Table 1 shows the distribution of subjects according to age and sex. Their age ranged from 3 to 65 years with a mean age of 37.94 years.

Table 2: Distribution of Subjects According to Concha Bullosa, Nasal Septal Deviation and Sinusitis

	Frequency (n=205)	Percentage
Concha Bullosa		
Right	24	11.7
Left	18	8.8
Both	19	9.3
None	144	70.2
Nasal Septal Deviation		
Right	14	6.8
Left	30	14.6
None	161	78.5
Sinusitis		
Maxillary Right	22	10.7
Left	10	4.9
Bilateral	52	25.4
None	121	59.0
Ethmoid Right	7	3.4
Left	15	7.3
Bilateral	48	23.4
None	135	65.9
Frontal Right	9	4.4
Left	8	3.9
Bilateral	3	1.5
None	185	90.2

Table 3: Distribution of Subjects According to Over-all Concha Bullosa, Nasal Septal Deviation and Sinusitis

	Frequency (n=205)	Percentage
Concha Bullosa		
(+)	61	29.8
(-)	144	70.2
Nasal Septal Deviation		
(+)	44	21.5
(-)	161	78.5
Sinusitis		
(+)	112	54.6
(-)	93	45.4

Table 2 and 3 shows the distribution of subjects according to concha bullosa, nasal septal deviation and sinusitis. More than 20% have concha bullosa with the right side being the highest. More than 20% have nasal septal deviation toleft side as the highest and more than 50% have sinusitis.

Table 4: Association of Concha Bullosa with Nasal Septal Deviation

	Nasal Septal Deviation		Total
	(+)	(-)	
Concha Bullosa			
(+)	19 (31.1%)	42 (68.9%)	61
(-)	25 (17.4%)	119 (82.6%)	144
Total	44	161	205

P value = 0.05 (S) (Mc Nemar Test)

Table 4 shows the association of concha bullosa with nasal septal deviation. The results showed that there was a significant association noted as proven by the p value of 0.05.

Table 5: Association of Concha Bullosa with Sinusitis

	Sinusitis		Total
	(+)	(-)	
Concha Bullosa			
(+)	40 (65.6%)	21 (34.4%)	61
(-)	72 (50.0%)	72 (50.0%)	144
Total	112	93	205

P value <0.0001 (S) (Mc Nemar Test)

Table 5 shows the association of concha bullosa with sinusitis. The results showed that there was a significant association noted as proven by the p value of <0.0001.

Table 6: Association of Nasal Septal Deviation with Sinusitis

	Sinusitis		Total
	(+)	(-)	
Nasal Septal Deviation			
(+)	29 (65.9%)	15 (34.1%)	44
(-)	83 (51.6%)	78 (48.4%)	161
Total	112	93	205

P value >0.0001 (S) (Mc Nemar Test)

Table 6 shows the association of nasal septal deviation with sinusitis. The results showed that there was no significant association as proven by the p value of >0.0001.

Final Data analysis:
The results of the study showed that there was a significant association noted between concha bullosa and sinusitis as well as concha bullosa with nasal septal deviation proven by all p values <0.05.

DISCUSSION:
Concha bullosa is the pneumatizationof the middle turbinate and one of the most frequent variation of the sinonasalanatomy .The reported prevalence ranges from 14 -53 % [1]. In our study it was29.8 % which is consistent with majority of the studies done outside the Philippines [1,2].There are variations in defining concha bullosa .We adopted the similar criteria as Stallman et al[1],i.e.pneumatization of the middle turbinate extending caudally at least 50% of vertical height of the middle turbinateunlike Smith et al[2]where concha bullosa was defined as aeration of any of the nasal turbinate, hence had higher prevalence (67.5 %) in their study.Concha bullosa was further classified as unilateral or bilateral. It was not classified as small or large since no other study defined the size criteria except for Stallman et al[1].Concha bullosa was noted more on the right side (11.7%) as compared to the left (8.8%). Bilateral concha was noted in 9.3 % of the population.

Sinusitis which was earlier defined as changes in the paranasal sinuses indicated by their mucosal thickening. It was seen in more than 50% of the population. Sinusitis was seen in both the sides with and without concha bullosa. Maxillary sinus was the most frequent nasal sinus involved .Bilateral maxillary sinusitis was noted among 25.4 % of the population whereas among the ones with unilateralinvolvement,the right and left maxillary sinusitis

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was seen in 10.7 % and 4.9 % of the population respectively. Concha bullosa as mentioned earlier was seen more on the right side likewise overall the right side maxillary sinus was the most commonly involved.Lloydet al[9]in their study have stated that when CB fills thespace between the septum and the lateralnasal wall, there may be total obstructionof the middle meatus orifice.So it can be presumed that a concha bullosa when grown large may lead to obstruction of the osteomeatal unit and lead to development of sinusitis. Therefore concha bullosa could be an etiological factor for the development of ipsilateral sinusitis.This was in contradictoryto few of the studies like Stallman et al where it has been have shown to have no significant association between concha bullosa and development of sinusits[1,2,3,4].

Nasal septal deviation defined as any bending of the nasal septal contour from the midline was seen in 21.5 % of the overall population, whereas it was seen in 31.1 % of the population with concha bullosa.Left sided nasal septal deviation was noted to be the most common .So it can be presumed that mass effect due to the presence of concha bullosa may lead to development of nasal septal deviation. This was similar to the study Stallman et al[1] where 65% of the patient had nasal septal deviation .Fewother studies haddifferent result like by Smith et al[2] and Hatipoglu et al[3]where no significant association was found. Our study showed no significant association of nasal septal deviation and sinusitis similar to the study by smith et al[2] and Stallman et al[1].

The limitations during the study was that the CT scans performed were all with patients having symptoms related to the paranasal sinus .So this study actually determined the presence of concha bullosa in symptomatic patient .This would not actually represent the general asymptomatic population. Likewise the study was conducted among limited population presenting to Jose R Reyes Memorial Medical centre .So a larger study probably a multicentre study may be helpful to represent the entire population of the Philippines.

CONCLUSION:

Concha bullosa is a common normal variant of the sinonasal anatomy. When a concha bullosa ispresent, there is a statisticallysignificant relationship with sinus inflammatory disease. Likewise there isastrong relationship between the presence of a concha bullosa and contralateral nasal septal deviation. There was no statistically significant relationship between nasal septal deviation and sinusitis.

REFERENCES:

1. Jamie S. Stallman, Joao N. Lobo, Peter M. Som. The Incidence of Concha Bullosa and Its Relationship to Nasal Septal Deviation and paranasal Sinus Disease.Am J Neuroradiol October 2004; 25:1613–16184.
2. Kyle D. Smith, 1. P. (2010). The Prevalence of Concha Bullosa and Nasal Septal Deviation and Their Relationship toMaxillary Sinusitis by Volumetric Tomography. International Journal of Dentistry , 75-80.
3. HaticeGülHatipoğlu, Mehmet Ali Çetin, EnisYüksel. Concha bullosa types: their relationship with sinusitis, ostiomeatal and frontal recess disease. DiagnInterventRadiol 2005; 11:145-149.
4. Peter M.Som, Hugh D.Curtin: Sinonasal cavities .Head and neck imaging .St .Louis Mosby: Fourth Edition 2003 .3-374.
5. Lidov M, Som PM. Inflammatory disease involving a concha bullosa (enlarged pneumatized middle nasal turbinate): MR and CT appearance. AJNR Am J Neuroradiol 1990; 11:999-1001.
6. Sazgar AA, Massah J, Sadeghi M, Bagheri A, Rasool E. The incidence of concha bullosa and the correlation with nasal septal deviation. B-ENT. 2008; 4(2):87-91.
7. E S Vincent, B. S. (June 2010). The Association of Concha Bullosa and Deviated Nasal Septum with Chronic Rhinosinusitis in Functional Endoscopic Sinus Surgery Patients. Med J Malaysia , volume 2;108-111.
8. H.Ric.Harnsberger .Sinonasal imaging: Imaging issues in Sinusitis. Handbook of head and neck imaging .St.Louis: Mosby: Second edition 339-395.
9. Lloyd GAS. CT of the paranasal sinuses:study of a control series in relation to endoscopicsinus surgery. J LaryngolOtol1990; 104:477-481.
10. Yousem, D. M. (1993). Imaging of sinonasal inflammatory diseases. Radiology , 180:303-314.