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Original Research Article

An Observational Study to Investigate the Association between Concha Bullosa and Septal Deviation

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Abstract

Aim: The aim of the present study was to classify septal deviations according to the Mladina classification and to investigate the relationship between concha bullosa and septal deviation.

Methods: A total of 1660 patients aged 14-69 years consulting at department of ENT with septal deviation were identified for possible inclusion in the study. Patients with minor deviation, minimal concha bullosa, sinusitis and nasal polyps were excluded. The study included 200 patients (130 males, 70 females; mean age 31.8±12.6 years; range 14 to 69 years).

Results: There were more type 3 septal deviations (34%) than other types. In 96 patients with concha bullosa, 65 had unilateral and 31 had bilateral concha bullosa. Septal deviation was found at the opposite side in 84.62% of 65 patients with unilateral concha bullosa. There was a significant correlation between the presence of concha bullosa and the type of septal deviation ($p<0.05$). The deviation was type 3 in 47.91% of patients with concha bullosa.

Conclusion: In conclusion, concha bullosa and septal deviation may affect and cause each other. Concha bullosa is seen more with type 3 septal deviation than with other types. Following our results, when we found type 3 septal deviation on physical examination, we must keep concha bullosa in mind, although the relationship between septal deviation and concha bullosa is still under investigation and further studies are required.

Keywords: Concha bullosa; Mladina classification; septal deviation

Introduction

Mouth breathing secondary to nasal passage obstruction has a major effect on the formation of dento-facial structures. [1,2] Although enlarged adenoids are the primary cause of mouth breathing, nasal septal deviation (NSD), concha bullosa (CB) and inferior turbinate hypertrophy (TH) have also been implicated as other mechanical obstruction factors. [3] A significant association between CB and contralateral NSD has been reported by recent studies. [4] NSD is thought to enhance the pneumatization of the middle turbinate depending on the degree of deviation angle. [5] Nasal obstruction caused by NSD induces nasal airflow turbulence that leads to nasal dryness and recurrent sinusitis and turbinate thickening (TH). [6]

Nasal septal deviation (NSD) is another pathology of the nasal cavity that is common in the general population, with a reported pre valence of 18 to 57%. [7,8] Among its causes are trauma, developmental defects, congenital deformities, growth anomalies of facial structures, finger sucking, applying pressure with the tongue to the palate and breathing through the mouth. Trauma may damage the vomer and maxillary crest, especially if it occurs before the complete ossification of these structures. [9] The incidence of NSD is lower in neonates than in adults; moreover, in neonates, accompanying CB is not seen. With increasing age, however, the incidence of NSD increases; meanwhile. CB becomes apparent after the age of 7 years, and it continues to develop even after the adolescent period. [8,10]

In most cases, a pneumatic chamber remains asymptomatic. There is a classification of pneumatisation of concha bullosa based on its location- lamellar, bulbous and extensive. [11] Moreover the type of epithelium in an air-filled concha bullosa is the same as in rest of sinonasal tract. [12] Nasal septal deviation is described as an asymmetry of nasal septum. Both traumatic deviation and growth associated abnormalities of

nasal septum may lead to significant airway obstruction and also, cosmetic deformity. [13]

The aim of the present study was to classify septal deviations according to the Mladina classification and to investigate the relationship between concha bullosa and septal deviation.

Materials and Methods

A total of 1660 patients aged 14-69 years consulting at department of ENT,Nalanda Medical College and Hospital, Patna, Bihar, India for one year with septal deviation were identified for possible inclusion in the study. Patients with minor deviation, minimal concha bullosa, sinusitis and nasal polyps were excluded. The study included 200 patients (130 males, 70 females; mean age 31.8±12.6 years; range 14 to 69 years. The study was conducted in accordance with the principles of the Declaration of Helsinki.

On physical examination, decongestion was obtained with adrenaline-soaked cotton pledgets (1 mg/mL adrenaline diluted with 9 mL saline) inserted into the nasal cavity. Following anterior rhinoscopy, rigid endoscopic examination (with 4 mm diameter, 0 degree endoscope) was carried out. Paranasal sinus CT scans were obtained for patients who were clinically indicated for operation. Patient age, gender, type of deviation according to Mladina classification, side of deviation, side of bullous or extensive concha bullosa, and the dominant side in bilateral cases were recorded.

Statistical Analysis

Data obtained in this study was analyzed utilizing the IBM SPSS version 20.0 package software (IBM Corp., Armonk, NY, USA). Chi-square analysis was used to investigate the relationship of nominal variables between the groups. Fisher's exact test was used if the volume of expected values in the cells of 2¥2 contingency tables was not sufficient and Pearson's chi-square with Monte Carlo Simulation in RxC tables. Level of significance was set at $p<0.05$.

Results

Table 1: Frequency distribution of all variables

Type of septal deviation	N	%
1	20	10
2	40	20
3	68	34
4	10	5
5	52	26
6	8	4
7	2	1
Presence of concha bullosa		
Yes	96	48
No	104	52
Side relationship between concha bullosa and deviation		
Same	10	15.38
Different	55	84.62

There were more type 3 septal deviations (34%) than other types. In 96 patients with concha bullosa, 65 had unilateral and 31 had bilateral concha bullosa. Septal deviation was found at the opposite side in 84.62% of 65 patients with unilateral concha bullosa.

Table 2: Chi-square outcomes regarding the correlation between the presence of concha bullosa and types of septal deviation

Type of septal deviation	Concha bullosa (+)		Chi-square	*p*
	n	%		
1	12	12.5	58.152	0.001
2	18	18.75		
3	46	47.91		
4	5	5.20		
5	14	14.58		
6	1	1.04		
7	0	0		
Total	96	100		

There was a significant correlation between the presence of concha bullosa and the type of septal deviation ($p<0.05$). The deviation was type 3 in 47.91% of patients with concha bullosa.

Discussion

Aeration of the middle turbinate / concha bullosa is a common anatomical variant of intranasal anatomy. Concha bullosa is the cystic end of the middle nasal concha. Concha exists on all sides of the nasal cavity. The middle turbinate may be pneumatised by the spread of the ethmoid air cells-in which case it will be considered a concha bullosa. The incidence of middle turbinate pneumatisation or concha bullosa has been well described in literature. Most often, bone pneumatisation is located in the middle nasal turbinate and can occur either unilaterally or bilaterally. Air filled cavity in the superior turbinate can be present less frequently, whereas the aeration of inferior turbinate is hardly observed. [13]

There were more type 3 septal deviations (34%) than other types. In 96 patients with concha bullosa, 65 had unilateral and 31 had bilateral concha bullosa. Septal deviation was found at the opposite side in 84.62% of 65 patients with unilateral concha bullosa. There was a significant correlation between the presence of concha bullosa and the type of septal deviation ($p<0.05$). The deviation was type 3 in 47.91% of patients with concha bullosa. NSD usually leads to unilateral nasal obstruction. Biconvex NSD and contralateral inferior concha hypertrophy can lead to bilateral nasal obstruction in patients with NSD. [14] However, contralateral CB could also be the cause of this symptom. Keles et al[14] reported that 76.5% of patients with bilateral nasal obstruction had NSD and contralateral CB. Therefore, if there is no contra lateral concha hypertrophy or biconvex NSD in an NSD patient who complains of bilateral nasal obstruction, contralateral CB should be suspected.

In a study by Serter et al [15], the palatal depth was decreased in subjects with nasal polyps, but no clear reason was provided for the finding in this study. In the present study, there was a significant negative correlation between SDA and MPAA. In a study by Sapmaz et al [16], there was a positive correlation between SDA and the angulation of the hard palate. The difference in the results could be due to the method of determining the angulation. In the study by Sapmaz et al., the angulation of the hard palate was calculated using a reference line drawn parallel to the line joining the lesser wings of the sphenoid in the coronal CT section. The mechanism of concha bullosa, the most common anatomic variant of middle turbinate is not fully known. It may caused by the expansion of sinus pneumatization into the turbinate during the intrauterine period, fusion abnormality during intrauterine development or mucosal invagination of conchal bone micro fractures toward the bullosa cavity during late puberty. [17] Another theory suggests that anterior and posterior ethmoidal air cells lead to pneumatization of concha bullosa. [18] In a study by Yiğit et al [19] contralateral concha bullosa was found to be significantly more common in patients with septal deviation compared to those having no deviated septum. In their study, Uygur et al [20] demonstrated that the angle of septal deviation plays an important role in pneumatization of the concha on the opposite side.

Conclusion

In conclusion, concha bullosa and septal deviation may affect and cause each other. Concha bullosa is seen more with type 3 septal deviation than with other types. Following our results, when we found type 3 septal deviation on physical examination, we must keep concha bullosa in mind, although the relationship between septal deviation and concha bullosa is still under investigation and further studies are required.

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