

Original Research Article

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## The prevalence of middle turbinate pneumatization in patients of Southern region of Saudi Arabia

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### ABSTRACT

**Background:** The aim of the study was to determine the prevalence of middle turbinate pneumatization in patients of Southern region of Saudi Arabia.

**Methods:** This study used a retrospective radiological design to analyze computed tomography scans of 117 patients aged between 18 and 80 years of Southern region in Saudi Arabia were used in this study. Patients with altered anatomy (iatrogenic or pathological) were excluded, CT scans were analysed to determine the prevalence of middle turbinate pneumatization in patients of Southern region of Saudi Arabia.

**Results:** There were forty percent (40%) male cases and sixty percent (60%) female cases. Concha bullosa (CB) was discovered in 17 (14.5%) of the cases, with 4 cases (23%) being bilateral and 13 (76%) being unilateral. 7 (53%) of unilateral cases were on the right side, while 6 (47%) were on the left.

**Conclusions:** CB was discovered in 17 (14.5%) of the cases, in patients of Southern region of Saudi Arabia, most of them unilateral by 76%. That's indicate there is significant number of patients have CB and surgeon should consider it one of his differential diagnosis in patient with nasal obstruction.

**Keywords:** Concha bullosa, Computed tomography, Middle turbinate pneumatization

### INTRODUCTION

Pneumatization of the middle turbinate is known as concha bullosa (CB).<sup>1</sup> It is one of the most common anatomical variations of the nose. CB can be divided into three varieties based on the parts involved in normal pneumatization of ethmoidal air cells (a) lamellar: the vertical part of the middle turbinate; (b) bulbous: the horizontal part; and (c) mixed: the horizontal and vertical parts of the middle turbinate.<sup>2,3</sup> The exact mechanism of turbinate aeration is unclear. It may be unilateral or bilateral, very small or very large, and achieving a significant scale.<sup>4</sup> Nowadays, a basic method for

diagnosing pathologies is paranasal computed tomography (CT). As a result, endoscopic sinus surgeon roadmap offers an effective and efficient preoperative technique.<sup>5</sup>

CB is asymptomatic in most cases and is detected by CT by chance. Nasal obstruction, contact headache, deviated septum, and chronic sinusitis are all symptoms of an over-pneumatization.<sup>6</sup>

The ability to prepare effective management is made possible by understanding the anatomical variations of the CB.<sup>6</sup> If you have facial pain or a headache, it's important

to get a proper diagnosis and choose the right patients for CB surgery.<sup>7</sup>

Prior to ESS, the paranasal anatomy should be revealed in detail in order to develop recovery plans during the operation and to prevent possible complications. These differences should be noted during radiological and endoscopic examinations of the paranasal sinus anatomy.<sup>8</sup>

Although trauma, nasal septal deviation (NSD), and mouth breathing have all been linked to CB, the causes of pneumatization are unclear. The aim of the study was to demonstrate the prevalence of CB pneumatization in patients of Southern region in Saudi Arabia.

## METHODS

Following IRB approval, this retrospective study included 117 patients, both sexes, aged 18 to 80 years, who were referred for a paranasal sinus CT scan from the Aseer central hospital's department of otorhinolaryngology. The information was obtained between January 2018 and January 2020. The CT scans were studied. The images were collected in coronal and axial parts with a 3 mm thickness, using both the soft part window and the bony density window, to assess the prevalence of CB in the Southern region of Saudi Arabia.

### Inclusion criteria

Patients aged between 18 and 80 years, patients with hx of nasal obstruction, deviated nasal septum, nasal polyposis were included.

### Exclusion criteria

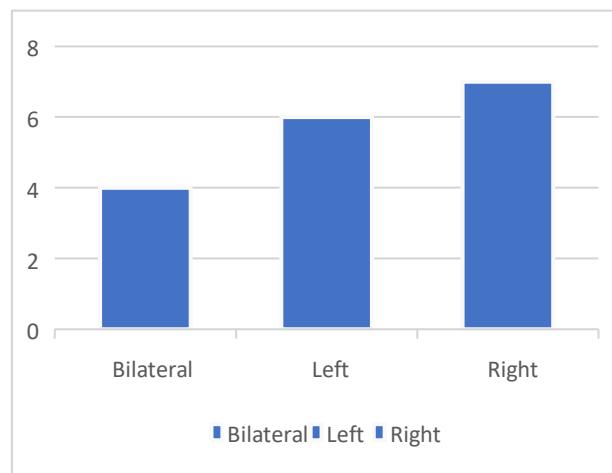
The research excluded patients with cystic fibrosis, immune deficiency, malignancy, metabolic disease, pregnant women, and men under the age of 18.

### Sampling technique and statistical analysis

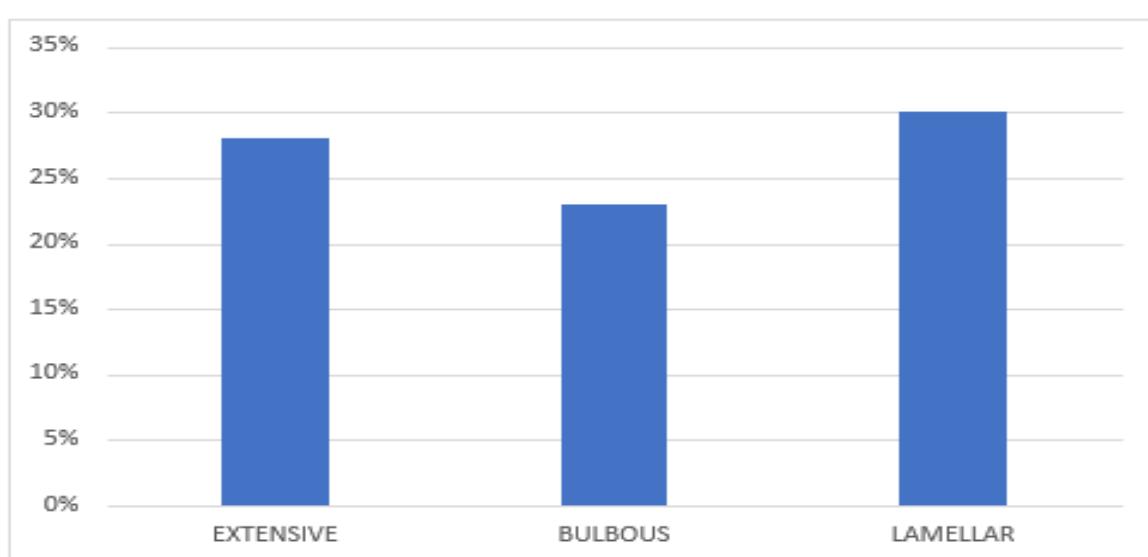
Regarding the CB, all CT scans of patients were registered. SPSS for Windows was used to conduct all statistical analysis (ver. 18.0; SPSS, Inc., Chicago, IL, USA). Chi-square or Fischer exact tests were used to determine the importance of the correlations. P values less than 0.05 were considered statistically significant.

## RESULT

There were forty percent (40%) male cases and sixty percent (60%) female cases. CB was discovered in 17 (14.5%) of the cases, with 4 cases (23%) being bilateral and 13 (76%) being unilateral. 7 (53%) of unilateral cases were on the right side, while 6 (47%) were on the left. Extensive concha form was found in 23 percent of unilateral conchas and 5.8% of bilateral conchas, bulbous concha form was found in 23% and lamellar concha form was found in 23% unilateral and 17% bilateral concha.



**Figure 1: Distribution of CB depending on side.**



**Figure 2: Distribution of concha bullosa depending on types.**



**Figure 3: Types of concha bullosa (A) bulbous; (b) lamellar; and (c) extensive.**

## DISCUSSION

CB is present in people of all ages, due to its embryological origins in the development of ethmoidal air cells. The combined effects of other variables such as the environment, allergies, trauma, and so on are most likely to blame for its later manifestations. CB is easier to diagnose radiographically since it appears as an air space covering the middle turbinates on a CT scan.<sup>9</sup>

Nasal turbinates are essential mechanisms for maintaining normal nasal functions, such as humidification, filtration, lubrication, and thermoregulation of air inhaled through the nose. The CB is an air-filled cavity inside the nasal turbinate, with an occurrence of between 13 percent and 53 percent.<sup>10</sup> The exact cause of nasal turbinate pneumatization is unknown, there have been two hypotheses suggested.<sup>11</sup> The first theory assumes that CB develops as a result of compensatory variations in airflow triggered by nasal septum deviation, whereas the second suggests that it is produced based on individual anatomical differences. variations.

In most cases, CB is considered a mild and asymptomatic variant, but it can cause problems in a few people due to its size, inflammation, and breathing or drainage impairment. The prevalence of middle turbinate CB was 53.7 percent in our sample (unilateral: 17.3 percent; bilateral: 36.4 percent). Aramani et al recorded a 53.7 percent (unilateral: 33.3 percent; bilateral: 20.4 percent) prevalence rate of concha bullosa in chronic rhinosinusitis patients, with findings that differed from Bolger et al, Yousem et al, Perez et al (73%), Scribano et al (67%).<sup>12-16</sup> Both of the experiments found differing rates of occurrence, which may be attributed to variations in population targets. Limitation of the study was it was based only on 117 patients.

## CONCLUSION

CB was discovered in 17 (14.5%) of the cases, in patients of Southern region of Saudi Arabia, most of them unilateral by 76%. That's indicate there is significant number of patients have CB and surgeon should consider it one of his differential diagnosis in patient with nasal obstruction.

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## REFERENCES

1. Tomblinson CM, Cheng MR, Lal D, Hoxworth JM. The Impact of Middle Turbinate Concha Bullosa on the Severity of Inferior Turbinate Hypertrophy in Patients with a Deviated Nasal Septum. AJNR Am J Neuroradiol. 2016;37(7):1324-30.
2. Stuck BA, Hummel T. Olfaction in allergic rhinitis: A systematic review. J Allergy Clin Immunol. 2015;136(6):1460-70.
3. Aktas D, Kalcioglu MT, Kutlu R, Ozturan O, Oncel S. The relationship between the concha bullosa, nasal septal deviation and sinusitis. Rhinology. 2003;41(2):103-6.
4. Prasad S, Ahlawat B, Kumar A, Naik SM, Agrawal A, Nagvanshi A. Concha Bullosa and Its Association with Chronic Sinusitis. IOSR J Dent Med Sci. 2016;15(2):27-32.
5. Vaid S, Vaid N. Normal anatomy and anatomic variants of the paranasal sinuses on computed tomography. Neuroimaging Clin. 2015;25(4):527-48.
6. Rak KM, Newell JD, Yakes WF, Damiano MA, Luethke JM. Paranasal sinuses on MR images of the brain: significance of mucosal thickening. AJR Am J Roentgenol. 1991;156(2):381-4.
7. Maraghy A, Abd AA, Yonis MAAM, Sharkawy MA, Zewail AGEE. Comparison between lateral partial turbinectomy and conchoplasty for concha bullosa. Egypt J Hosp Med. 2018;73(3):6348-53.
8. Unlu HH, Akyar S, Caylan R, Nalca Y. Concha bullosa. J Otolaryngol. 1994;23(1):23-7.
9. Sarna A, Hayman LA, Laine FJ, Taber KH. Coronal imaging of the osteomeatal unit: anatomy of 24 variants. J Comput Assist Tomogr. 2002;26(1):153-7.
10. Bolger WE, Parsons DS, Butzin CA. Paranasal sinus bony anatomic variations and mucosal abnormalities: CT analysis for endoscopic sinus surgery. Laryngoscope. 1991;101(1):56-64.
11. Stammberger H. Endoscopic and radiologic diagnosis. Funct Endosc Sinus Surg. 1991.

12. Aramani A, Karadi RN, Kumar S. A Study of Anatomical Variations of Osteomeatal Complex in Chronic Rhinosinusitis Patients-CT Findings. *J Clin Diagn Res.* 2014;8(10):1-4.
13. Bolger WE, Woodruff W, Parsons DS. CT demonstration of pneumatization of the uncinate process. *Am J Neuroradiol.* 1990;11(3):552.
14. Yousem DM. Imaging of sinonasal inflammatory disease. *Radiology.* 1993;188(2):303-14.
15. Perez PI, Sabate J, Carmona A, Catalina HCJ, Jimenez CJ. Anatomical variations in the human paranasal sinus region studied by CT. *J Anat.* 2000;197(2):221-7.
16. Scribano E, Ascenti G, Cascio F, Racchiusa S, Salamone I. Computerized tomography in the evaluation of anatomic variations of the ostiomeatal complex. *Radiol Med.* 1993;86(3):195-9.

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