CASE REPORT

# Pneumatized inferior turbinate (concha bullosa of inferior turbinate)

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## Abstract

The nasal cavity structures are prone to different anatomical variations; one of these is concha bullosa, which best known as pneumatization of the nasal turbinate. This pneumatization is a rare phenomenon to in the inferior turbinate. We report the case of an incidental finding of inferior turbinate concha bullosa in a 30- year-old female who presented with nasal obstruction and headache. While evaluating the patient's computed tomography image, a pneumatized right inferior turbinate accidentally found. Our patient treated medically without surgical intervention and showed good improvement in her symptoms. Physicians should be aware of the presence of such a rare variation that may lead to serious nasal symptoms if it is large enough, they should keep it in the differential diagnosis and with deal with it accordingly.

**Keywords:** concha bullosa, pneumatization, inferior turbinate.

## Introduction

The nasal turbinates are important anatomical structures located at the lateral wall of the nose. They usually consist of three turbinates (conchae): superior, middle and inferior turbinates, such turbinates are subjected to variable anatomical variations such as being pneumatized[1].

Pneumatization of the bony nasal concha which is termed concha bullosa is defined as the existence of air cells inside the nasal turbinates. Concha bullosa is mostly seen as an anatomical variant of the middle nasal turbinate which may be unilateral or bilateral and widely from 14% to 80% and in the superior nasal turbinate less frequently with a range from 12.2% to 50% and rarely in the inferior nasal turbinate and the etiology of such pneumatization is unknown[2].

## Case Presentation

A 30-year-old female patient presented to our otorhinolaryngology clinic with a complaint of right sided nasal obstruction associated with headache. She had no history of allergies, nasal surgery or trauma.

Nasal examination using endoscope was performed and it revealed inferior turbinate hypertrophy bilaterally, congested nasal mucosa and clear post nasal space. Patient was evaluated further with non-contrast computed tomography (CT) of the paranasal sinuses.

CT in the coronal plane showed a right inferior concha bullosa (ICB, white star), left hypertrophied inferior turbinate, bilateral para-doxical middle turbinates and sinusitis of the left ethmoids and both maxillary sinuses in the coronal plane (Figure 1). There was also a right ICB (white star), left hypertrophied inferior turbinate, and bilateral maxillary sinusitis on the axial plane (Figure 2).

Our patient was started on intranasal steroid (Fluticasone propionate), saline nasal and vasoconstrictive nasal sprays (Xylometazoline hydrochloride 0.1%), the vasoconstrictive nasal spray has been given three times daily being one week on medication and one week off medication. Patient's symptoms greatly improved at the two-week-follow-up visit. She was followed up monthly for a period of three months in which she showed complete resolution of her symptoms.

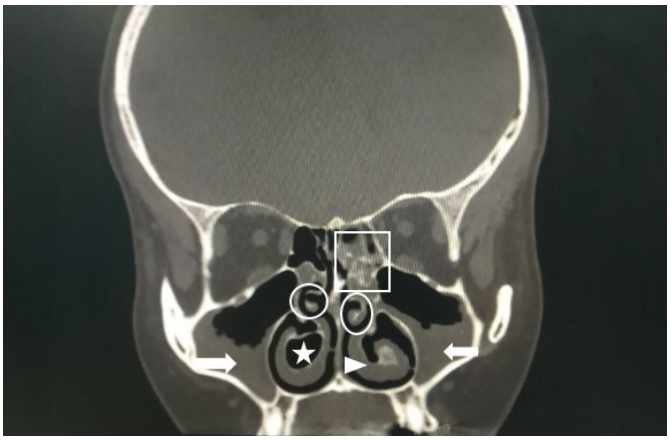

**Figure 1: Coronal CT section showing pneumatization of the right inferior turbinate (White star), para-doxical middle turbinates (white circles), left**

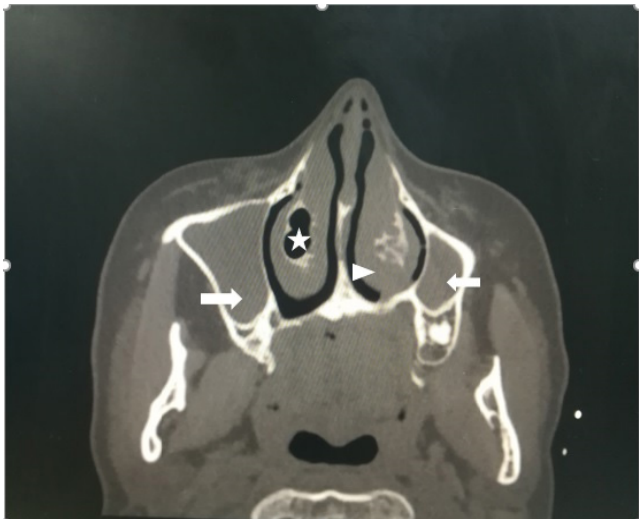

**Figure 2: axial CT section showing pneumatization of the right inferior turbinate (White star), left inferior turbinate hypertrophy (white arrow head)**



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## Discussion

From an anatomical point of view the superior and middle conchae are considered parts of the ethmoidal bone while the inferior concha being a separate bone. These turbinates are responsible for various nasal functions including lubrication, humidification, filtration, and thermoregulation of inspired air. The inferior turbinate compared to the other turbinates is considered the largest, and its responsible for most of the air humidification, heating, airflow direction, and filtration function of the inhaled air[3]. A swollen and huge inferior turbinate interferes with nasal breathing leading to obstruction. Such enlargement could be due to allergies, infections, or could be compensatory enlargement when a deviated nasal septum is present and rarely due to ICB[4].

Zinreich et al. were the first to recognize the pneumatizion of the inferior turbinate otherwise known as ICB in 1988. The physiopathology of ICB is not fully understood and various theories that explain their formation are related to the embryology of the inferior nasal turbinate. The first theory states that a mis-invagination of the epithelium in fetal life occurs during the ossification of the inferior turbinate chondral framework leading to a double lamella[5]. The second theory states that a diseased maxillary sinus results in air-filled cavities in the inferior concha. The third theory suggests that the pneumatization of maxillary sinus during fetal life extends into the inferior turbinate. Yang et al. found such correlations in 8 out of 18 ICB (44%)[6].

ICB can give rise to nasal obstruction, headache and rhinorrhea in patients. Moreover, it may affect the nasolacrimal duct if it is large enough to compress it. It is important to differentiate if the nasal obstruction is due to hypertrophied inferior turbinate or due to ICB and such definitive differentiation can be made using computed tomography of the paranasal sinuses. ICB is usually seen as incidental finding in CT images and its mainly asymptomatic. ICB incidence is 1% or less in the literature being mostly unilateral[7].

In the majority of the cases, no management is needed for asymptomatic ICB. The aim of treatment will be directed toward increasing the nasal airway passage, preserving nasal mucosa function with minimal complications[8]. When treatment is needed in the case of a symptomatic patient, medical management with intranasal steroids and vasoconstrictive drugs can be applied first. If such management does not alleviate the patient's symptoms, surgical management will then be the next option[9]. According to systemic review done in 2021, 54% of cases will need surgical intervention, 23% will need medical management, and 23% will need both medical and surgical intervention[3]. Various surgical procedures have been described to deal with ICB, including inferior turbinate out-fracturing, crushing of the concha itself, surgical removal of the turbinate free edge, turbinate submucosal diathermy and turbinoplasty using microdebrider[10]. Choosing which procedure is best for the patient depends on the size and extent of the ICB and if it is unilateral and bilateral. Medical treatment was initiated for our reported case, which yielded great symptom improvement.

## Conclusion

The pneumatization of the inferior nasal turbinate is a rarely seen anatomic variation which is mostly asymptomatic and discovered incidentally when CT is performed for the patient and in most of the times it needs no surgical intervention unless it is large enough and be the cause of patient symptoms.

## Conflict of interest

None.

## Funding

None.

## Consent

Written informed consent was obtained from the patient for the publication of this case report and accompanying images.

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