

## Concha Bullosa of the Inferior Turbinate: A Rare Anatomical Cause of Nasal Obstruction

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Cavity; Inferior turbinate; Concha bullosa; Case report; Variant

## 1. Abstract

**1.1. Background:** Cavity formation filled with air in the inferior turbinate is very rare. Hitherto, only 13 cases of inferior turbinate concha bullosa have been reported. I present an additional case discovered during the evaluation of a patient with chronic rhinosinusitis.

**1.2. Methods:** Case Report.

**1.3. Case Presentation:** A 62-year-old male presented with chief complaints of nasal obstruction and mucopurulent rhinorrhea in both nasal cavities. The patient had previously received medical treatment at a clinic. However, the medical treatment was ineffective. The patient had no history of nasal trauma, surgery, or allergic rhinitis.

The patient underwent a physical examination using anterior rhinoscopy, a skin prick test, and computed tomography. Physical examination revealed a large inferior turbinate adjoining the septum, and an allergy evaluation showed negative findings. Computed tomography represented the finding which were full-content of right maxillary sinusitis, inferior turbinate concha bullosa and middle turbinate concha bullosa of left nasal cavity, and partial bilateral ostio-meatal unit obstruction. The patient underwent functional endoscopic sinus surgery that resolved the lesions. After the right endoscopic sinus surgery, the procedure was performed on the opposite side of the nasal cavity. During surgery, an enlarged inferior turbinate concha bullosa was confirmed and the mucosa

of the concha bullosa was incised using a sickle knife. The inferior turbinate concha bullosa was removed using Blakesley-Wilde forceps. Thereafter, the surgical site healed well, and the patient's symptoms improved.

**1.4. Conclusion:** Inferior turbinate concha bullosa has rarely been reported. This case demonstrates that this anatomical variant is usually diagnosed on Computed tomography scans, and the recommended treatment is a surgical approach rather than medical treatment.

## 2. Introduction

The inferior turbinate is a scroll of bone that extends posteriorly from the nares anteriorly to the choanae posteriorly [1]. It constitutes the lower part of nasal cavity covering the inferior meatus, and is significant as it contains the nasolacrimal duct orifice opening. This structure primarily contributes to the humidification and warming of intranasal air. Moreover, the anterior portion of the inferior turbinate forms a part of the nasal valve area, which is the narrowest region of the nasal passage.

Concha bullosa is defined as pneumatization of the intranasal turbinates [2]. It can occur at any level (superior, middle, or inferior); however, the term is typically used to describe aeration of the middle turbinate because concha bullosa is the most common anatomic variant of the middle turbinate. Alternatively, the concha bullosa is relatively infrequent in the superior turbinate and rare in the inferior turbinate.

Only 13 cases of inferior turbinate concha bullosa have been reported in the English-language literature [3]. Here, I report a new case of unilateral inferior turbinate concha bullosa.

### 3. Case Presentation

A 62-year-old male presented with chief complaints of nasal obstruction and mucopurulent rhinorrhea in both nasal cavities. In addition to the chief symptoms, he had several other symptoms, such as postnasal drip, chronic cough and headache. The headache pain was rated at 6-7/10 of visual analogue scale. He reported occasional and gradual onset of the symptoms. The chief complaints and additional symptoms occurred persistently regardless of seasonal variation. The patient had previously received medical treatment at a clinic. Medical treatments (amoxicillin-clavulanate and fluticasone furoate nasal spray) were not effective. The patient had no history of nasal trauma or surgery. In addition, the patient was not diagnosed of allergic rhinitis.

Physical examination was performed using anterior rhinoscopy, skin prick test, and computed tomography. Physical examination revealed a large inferior turbinate adjoining the septum, and an allergy evaluation showed negative findings (Figure 1). Computed tomography represented the finding which were full-content of right maxillary sinusitis, inferior turbinate concha bullosa, middle turbinate concha bullosa of left nasal cavity, and partial bilateral ostio-meatal unit obstruction (Figure 2,3). I planned functional endoscopic sinus surgery for both the nasal and middle meatuses under general anesthesia. After right endoscopic sinus surgery, I performed a left middle meatal antrostomy and confirmed inferior turbinate concha bullosa. The mucosa of the inferior turbinate concha bullosa was incised using a sickle knife and the bone of the inferior turbinate concha bullosa was examined. The bone on the lateral side of the inferior turbinate concha bullosa was removed using Blakesley-Wilde forceps. The incision site was covered, and the operation was completed. The surgical site of the patient was checked at the clinic weekly for a month. The symptoms of nasal obstruction and rhinorrhea significantly improved.



**Figure 1:** Enlargement of the left inferior turbinate due to a concha bullosa.



**Figure 2:** Coronal computed tomography scan shows hypertrophic inferior turbinates with left concha bullosa and right maxillary sinusitis.



**Figure 3:** Axial computed tomography scan shows hypertrophic inferior turbinates with left concha bullosa and right maxillary sinusitis.

### 4. Discussion

The inferior turbinate is the largest turbinate and is primarily responsible for nasal airflow and humidification [4]. Inferior turbinate hypertrophy obstructs nasal breathing. Inferior turbinate concha bullosa rarely causes enlargement of the inferior turbinate. Discussion on inferior turbinate concha bullosa is lacking globally, because of only 13 reported cases. Theories regarding the etiology of inferior turbinate concha bullosa have been widely accepted. The first theory suggests that in the embryologic life, misinvagination of the epithelium occurs during ossification of the chondral framework of the inferior concha into a double lamella [2,5]. The second theory proposes that the maxillary sinus disease results in air-filled cavities in the inferior concha [6]. These two theories were proposed for noncommunicating-type inferior turbinate concha bullosa [7]. The third theory suggests that during fetal life, pneumatization of the maxillary sinus extends into the inferior concha, which can be easily observed on axial computed tomography [8].

Inferior turbinate concha bullosa are generally asymptomatic and are diagnosed incidentally on imaging. According to previous studies, the incidence of inferior turbinate concha bullosa is approximately 1% [9-11]. Symptoms associated with inferior turbinate concha bullosa are mixed and include nasal obstruction,

rhinorrhea, and postnasal drip. It is impossible to differentiate between inferior turbinate concha bullosa and inferior turbinate hypertrophy. Therefore, an exact diagnosis is made using computed tomography of the sinuses.

The treatment of inferior turbinate concha bullosa can be performed when patients are symptomatic. The aim of the treatment is to relieve the patient's symptoms, widen the nasal airway, and protect nasal mucosal surface. In previous studies, the treatment of inferior turbinate concha bullosa preferred surgical approaches to medical methods, because medical methods do not yield good outcomes. Many surgical techniques have been described, such as outfracture of the inferior turbinate, crushing of the inferior turbinate concha bullosa with forceps, excision of the free edge of the inferior turbinate using turbinectomy scissors, submucosal diathermy, and turbinoplasty using a microdebrider [10,12]. The inferior turbinate concha bullosa that is formed anteriorly can be treated with partial antero-turbinectomy, preserving as much of the posterior turbinate as possible. In the case of enormous pneumatization, lateral turbinectomy may be used. The surgical technique used was resection of the inferior turbinate concha bullosa, removing the lateral aspect of the inferior turbinate [13]. Although this method is easy and quick to perform, it is carefully performed because of the risk of communication between the inferior turbinate concha bullosa and maxillary sinus. I suggested making a vertical incision with a sickle knife along the anteroinferior surface of the turbinate. Subsequently, Blakesley-Wilde forceps use and crushing are effective to remove the inferior mucosa from the inferior turbinate concha bullosa. Crushing may be sufficient to relieve the nasal obstruction for a small concha bullosa [3]. In this technique, the turbinate is grasped with pituitary forceps or using a Freer dissector inserted between the septum and the turbinate and directed laterally to crush the turbinate against the lateral wall or the Freer dissector inserted lateral to the concha bullosa to crush it against the septum [15].

Total turbinectomy is contraindicated because it increases the risk of the patient developing atrophic rhinitis [14].

## 5. Conclusion

Inferior turbinate concha bullosa is a rare anatomical variation associated with sinonasal symptoms. Most patients with inferior turbinate concha bullosa present with nasal obstruction and is usually diagnosed using computed tomography. Treatment of inferior turbinate concha bullosa recommends surgical approaches rather than medical treatments, and there are diverse techniques for resecting inferior turbinate concha bullosa.

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