Author's response to reviews

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A presenting with concha bullosa in another concha bullosa: a case report

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Abstract

Introduction: Anatomic variations of the paranasal sinuses are very common. Paranasal sinus anatomy should be carefully examined prior to endoscopic sinus surgery (ESS) in terms of both existent pathologies and anatomic variations. Anatomy of the paranasal sinuses and their variations have gained importance along with advances in coronal paranasal sinus computed tomography (CT) and extensive use of ESS.

Case presentation: A 53 year old Caucasian female patient was admitted to our clinic with the complaints of nasal breathing difficulties and headache persisting for a long time. Another concha bullosa was detected in the middle concha bullosa on preoperative paranasal CT examination. It is known that the paranasal sinuses have a number of anatomical variations.

Conclusion: Herein, report of a rare case with review of the literature is presented in order to emphasize that a concha bullosa inside another concha bullosa should not be ignored.

Introduction

The importance of paranasal sinus anatomy and its variations have been emphasized more along with the extensive use of coronal paranasal sinus computed tomography (CT) and endoscopic sinus surgery (ESS). Paranasal anatomy should be exposed in detail prior to the surgery in order to develop treatment strategies in ESS and to prevent possible complications. Attention should be paid during radiological and endoscopic evaluation of paranasal sinus anatomy in terms of these variations. Concha bullosa is the pneumatization of the middle turbinate and is one of the anatomic variations of the paranasal region [1,2]. Concha bullosa can be either unilateral or bilateral, and is generally concurrent with a septal deviation to the contralateral side.
Although inferior and superior concha bullosa have been reported in the literature, this entity is quite rare. The ethmoidal bulla is an anterior ethmoidal sinus cell. Its size, shape and site of drainage may vary among subjects. The incidence of middle concha bullosa ranges between 13% and 53% [1,2]. The incidence of concha bullosa varies according to the type. The incidence of bilateral middle concha bullosa has been reported to vary between 45% and 61.5% [1-3].

Herein, we present a patient with a large ethmoid bulla, extending into a giant middle concha bullosa, which we designate as compound concha bullosa.

**Case presentation**

A 53-year-old Caucasian female patient was admitted to our clinic with the complaints of nasal breathing difficulties and headache, persisting for a long time. She did not have a previous history of hospital admission or examination for these complaints. Apart from these complaints, she had no other medical problem. On her anterior rhinoscopy, an appearance consistent with middle concha bullosa, obstructing bilateral nasal passages and a septal deviation to the right side was observed. Her coronal paranasal sinus CT scan revealed a giant middle concha bullosa and a large ethmoid bulla, extending into the middle concha bullosa on the left side (Figure 1,2). A deviation of the septum to the right and a large concha bullosa in the right nasal passage were identified. The patient underwent resection of the concha bullosa and ethmoidal bulla via ESS, and septoplasty was performed. Headache and nasal obstruction complaints were completely relieved within a short time after surgery.

**Discussion**
Significant improvements have been made in paranasal sinus surgery along with the advances in endoscopic techniques. However, frequent and miscellaneous anatomic variations of this region increase the risk for possible complications of ESS. Axial and coronal paranasal sinus CT imaging, in addition to endoscopic examination, is of great importance both for identifying the pathology and for defining regional anatomy and variations prior to the surgery. The ethmoid bone is undoubtedly one of the most complex anatomic structures, and the cells are generally referred to according to the site of drainage as the anterior and posterior ethmoidal cells. However, the anterior and posterior ethmoidal cells as well may show a number of variations. The anterior and posterior ethmoidal cells are considered responsible for the pneumatization of the middle concha in approximately 55% and 45% of concha bullosa cases, respectively [1,2].

Bolger et al. [2] classified pneumatization of concha bullosa into three groups. Pneumatization localized to the vertical lamella of the middle concha was referred to as “lamellar”, pneumatization localized to the inferior (or bulbous) pair of the concha was referred to as “bulbous”, and extensive pneumatization to both the vertical lamella and the bulbous part of the of the concha was referred to as “extensive” concha bullosa. The degree of pneumatization is directly proportional to the severity of symptoms. While lamellar and bulbous types are usually asymptomatic, extensive bulbous concha manifests symptoms [2]. While Bolger et al. [2] reported the incidences of extensive, lamellar, and bulbous concha bullosa to be 15.7%, 46.2% and 31.2%, respectively, Tonai et al. [3] reported the incidences of extensive, lamellar, and bulbous concha bullosa to be 52%, 28% and 19%, respectively.

Scribano et al. [4] reported a large ethmoidal bulla in 5.4% of the cases. Concha bullosa is the most common paranasal anatomic variation that causes nasal obstruction and sinusitis. Its prevalence ranges between 8% and 60% [1-4].

Based on intraoperative video images, Setliff et al. [5] classified 214 ethmoidal bullae in three main categories as simple (47%), compound (26%) and complex (27%) in reference to the association with other ethmoidal cells. Presence of another cell in the ethmoidal bulla was referred to as complex
bulla [5]. Due to the lack of a distinct posterior wall, Wright and Bolger [6] suggested that the ethmoidal bulla was not a separate cell but rather a bony lamella.

The present paper reports an extremely rare form of concha bullosa. This form of concha bullosa contains another structure inside (the ethmoidal bulla). The patient had both such a large concha bullosa in the right side that obstructed the nasal passage and a large ethmoidal bulla invaginating into the concha bullosa. Although the same variation was seen in the left side, another cell was observed in the giant concha bullosa.

Asymptomatic concha bullosa does not require surgical intervention; however, medical treatment is based on using antibiotics, antihistamines, and nasal sprays containing topical steroids. Topical decongestants can be given to provide short-term symptomatic relief.

The definite treatment of concha bullosa is surgical. Although asymptomatic concha bullosa does not require treatment, concha bullosa cases that cause obstruction of the ostiomeatal complex and disease in the paranasal sinuses, or that cause airway obstruction only are treated via ESS. Resection of the lateral lamella of the middle concha is an effective and the most commonly used surgical technique [7]. Bhatt [8] advocated being more conservative in concha surgery and recommended submucoperiosteal resection. In this case, the lateral segments of both bullous conchae were excised endoscopically, and septoplasty was performed. On her control visit 18 months postoperatively, it was observed that her nasal obstruction and headache complaints were completely relieved. Concha bullosa may not only progress asymptotically, but may also present with symptoms such as nasal obstruction, headache, and hyposmia by means of completely filling the nasal cavity. Such a large concha bullosa may impair ventilation and drainage of the ostiomeatal complex and thus, lead to sinus pathologies.

The relationship of concha bullosa with sinusitis and septum deviation has been a subject of many studies. Aktas et al. [9] established a significant relationship between unilateral concha bullosa and the frequency of nasal septal deviation. Uygur et al. [10] suggested that septal deviation did not give
rise to the formation of concha bullosa, but augmented the pneumatization of the middle turbinate depending on the degree of deviation angle.

Stallman et al. [11] as well found a strong association between the presence of a concha bullosa and contralateral deviation of the nasal septum, but did not demonstrate a causal relationship because of air passage between concha bullosa and the nasal septum. Moreover, the authors suggested that this association depended on neither the size of concha bullosa nor the degree of septal deviation.

Yousem et al. [12] reported that the size of concha bullosa, but not its presence, may cause sinusitis. Mucociliary transport of concha bullosa is often directed to the frontal recess, but rarely to the adjacent air cells and to the hiatus semilunaris. When two mucociliary surfaces contact with each other for any reason, mucociliary transport is inhibited in the area of contact. Various studies in the literature have shown that the obstruction of the ostiomeatal complex due to concha bullosa also plays a role as a predisposing factor in sinusitis development [13-15].

Conclusions

Anatomic variations of the paranasal sinuses are very common. Paranasal sinus anatomy should be carefully examined prior to ESS in terms of existent pathologies and anatomic variations. Nasal diagnostic endoscopy and paranasal CT are of great value in diagnosis. The treatment of such a massive compound concha bullosa, in which an ethmoid bulla has invaginated into a giant concha bullosa, is surgical. Therefore, we think that the present case should take part in the literature as a variation that should be considered in ESS applications.

Consent
Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Competing interests

The author(s) declare that they have no competing interests

Authors’ contribution

IC performed the diagnosis of the patient and performed the operation.

AY and MG collected data and performed statistical analysis.

OGY had a major contribution in writing the manuscript.

YK applied anesthesia.

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References


Figure Legends

**Figure 1,2.** Coronal paranasal computed tomography scan showing a concha bullosa inside the bilateral middle concha. (Arrows showing the inferior aspect of the middle conchae, from which bilateral concha bullosas were originated.)