

## Quadruple Concha Bullosa : A Very Rare Intranasal Turbinate Anatomical Variant

Sang Hoon Lee, MD<sup>1</sup>, Soo Kweon Koo, MD, PhD<sup>1</sup>, Ho Byoung Lee, MD<sup>1</sup> and Jong Duk Kim, MD<sup>2</sup>

<sup>1</sup>Department of Otolaryngology-Head and Neck Surgery; <sup>2</sup>Radiology, Busan Saint Mary's Hospital, Busan, Korea

### — ABSTRACT —

The nasal turbinates are important structures in the nasal cavity. Pneumatization of the turbinates, also known as concha bullosa, is a common anatomical variant of the nasal cavity. Concha bullosa usually arises from the middle turbinates and rarely in the superior and inferior turbinates. Pneumatization of the uncinate process, also known as an uncinate bulla, is very rare and most cases are asymptomatic, although it may cause nasal obstruction in some cases. Quadruple concha bullosa refers to case of triple concha bullosa (superior, middle, and inferior concha turbinates concha bullosa) accompanied by an uncinate bulla, although this has never been reported. Here, we report a case of quadruple concha bullosa and discuss it along with a review of the literature. (J Clinical Otolaryngol 2017;28:252-255)

**KEY WORDS** : Anatomy · Turbinates · Tomography · Nasal obstruction.

### Introduction

Nasal turbinate is usually three: Superior, middle, inferior turbinate, but in some cases supreme turbinate is present. On the lateral nasal wall, nasal turbinate takes a roll of maintenance of normal function of nasal cavity including thermoregulation, humidification, lubrication and filtration of inhaled-air through the nasal cavity.<sup>1)</sup> Pneumatization of the turbinate, also known as concha bullosa, is one of the most common anatomical variations of osteomeatal complex. Most of the concha bullosa occurs in middle turbinate, and rarely in the superior, inferior turbinates. Most of concha bullosa are asymptomatic, but over pneumatized

turbinates may cause nasal obstruction, headache and facial pain.<sup>1)</sup> A case of triple concha bullosa (pneumatization of superior, middle and inferior turbinate) is extremely rare.<sup>2)</sup> Uncinate process of ethmoid is a curved bony projection from the ethmoid bone to the ethmoid process of the inferior turbinates. The function of uncinate process is not known but some author writes a paper that the uncinate process is not just a vestigial remnant, but performs a obvious functional role in the ventilatory physiology of the nasal cavity and the paranasal sinuses such as being a barrier and pushing contaminated inhaled air from anterior sinuses.<sup>3)</sup> Pneumatization of the uncinate process (Uncinate bulla) is very rare anatomic anomaly. Most of uncinate bulla is asymptomatic, but in some cases uncinate bulla can narrowing the middle meatus and infundibulum. And narrowed the middle meatus and infundibulum may cause nasal obstruction and paranasal sinusitis.<sup>4)</sup> Quadruple concha bullosa refers to a case triple concha bullosa accompanied by uncinate bulla has never been reported. Herewith, we report a case of quadruple concha bullosa and discuss it with a review of literature.

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교신저자 : 구수권, 48575 부산광역시 남구 용호로 252번길 23  
부산성모병원 이비인후과

전화 : (051) 933-7214 · 전송 : (051) 956-1956

E-mail : koosookweon@naver.com

## Case Report

A 23-years old man was admitted with nasal obstruction and intermittent headache for several years. He denied any history of nasal surgery or medication. Under anterior rhinoscopy and nasal endoscopy, nasal septum was deviated to right and left inferior turbinate was hypertrophied. For further evaluation, non-enhanced computed tomography (CT) of the osteomeatal unit was performed. Coronal osteomeatal CT revealed that pneumatization the inferior, middle and superior turbinate and pneumatized uncinate process of the left side and a nasal septum slightly deviation to the right (Fig. 1, 2). Also, axial osteomeatal CT showed that nasal septum was deviated to left and left inferior turbinate was hypertrophied with pneumatization (Fig. 3, 4). We performed septoplasty, microdebrider-assisted inferior turbinoplasty and lateral out-fracture of left inferior turbinate. Three months after surgery, the patient recovered well without complications and did not complain nasal obstruction and intermittent

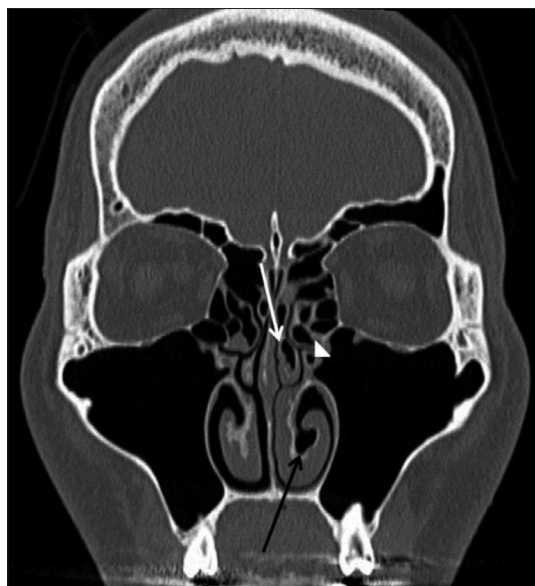
headache.

## Discussion

Anatomical variants of the osteomeatal complex are common in general population. Its incidence is vary-



**Fig. 2.** Coronal CT image of the osteomeatal complex shows the pneumatization of the left superior turbinate (arrow).



**Fig. 1.** Coronal CT image of the osteomeatal complex shows the pneumatization of the left middle turbinate (white arrow), left inferior turbinate (black arrow), and left uncinate process (arrowhead).



**Fig. 3.** Axial CT image of the osteomeatal complex shows that the nasal septum is deviated to the right and the pneumatization of the left middle turbinate (arrow).



**Fig. 4.** Axial CT image of the osteomeatal complex shows that the nasal septum is deviated to the right and pneumatization of the left inferior turbinate (arrow).

ing 64.9% from 93%.<sup>5,6)</sup> Concha bullosa is the most common anatomical variation of osteomeatal region and its incidence has been reported 13–53% by various studies.<sup>7)</sup> Recent developments of image diagnosis including CT allows easy to detect the anatomical structure and its variation. Getting to the anatomical variations associated with the pathological findings is very useful in diagnostic and therapeutic aspects. We adapted the definition of a concha bullosa as any aeration of the middle turbinate, even if the aeration is restricted to the upper non bulbous portion of the turbinate.<sup>7)</sup> Coronal view is generally useful to know the anatomical variations, but some cases may need the help of the axial view. In this case, we could diagnose through a coronal view and confirm middle turbinate concha bullosa and inferior turbinate concha bullosa through the axial view.

Although the developmental mechanism of concha bullosa is not still clear, some authors have been suggest several theories. The first is compensatory theory. Stallman et al. suggested that there is a strong relationship between concha bullosa (unilateral or dominant concha bullosa) and nasal septal deviation away from

the concha bullosa.<sup>7)</sup> According to the compensatory theory, the formation of the nasal septal deviation expanding opposite nasal cavity space occurs in the development of concha bullosa.<sup>7)</sup> Another congenital theory is that concha bullosa is another anatomical variants not correlated with nasal septal deviation, in other word, the nasal septal deviation away from the concha is not the result of the concha pushing the septum.<sup>7)</sup> Chaitayate et al.<sup>8)</sup> suggested that genetic factors may have influence on the pneumatization process by using CT in twins.

Most of concha bullosa are asymptomatic, but the symptoms may be caused by the degree of pneumatization including headache, nasal obstruction and unilateral facial pain, secondary inflammation of concha bullosa. But, relationship between Concha bullosa and sinusitis still debated.<sup>9)</sup> Treatment is not necessary for cases of asymptomatic case and should only be implemented when concha bullosa is symptomatic. The goals of treatment are to maximize the nasal airway and to minimize the symptoms and complications. The surgical techniques used include out-fracture, crushing and excision of concha bullosa.<sup>10)</sup> Our cases are associated with nasal septal deviation with inferior turbinate concha bullosa, they cause nasal obstruction and intermittent headache, so we performed surgical treatment such as septoplasty, turbinoplasty and out fracture of inferior turbinate.

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