CASE REPORT

Rhinology, 45, 248-250, 2007

Giant concha bullosa containing another concha bullosa inside: unique anatomic variation of the middle turbinate*

Ozan Bagıs Ozgursoy and Babur Kucuk

Department of Otorhinolaryngology-Head and Neck Surgery, University of Ankara, Faculty of Medicine, Ankara, Turkey

SUMMARY

Detailed knowledge of the anatomical variations of the lateral nasal wall is crucial for both the surgeon who is performing endoscopic sinus surgery and the radiologist who is involved in the preoperative work-up. Preoperative recognition of these variations will avoid possible complications during the surgery. In this report, we present a unique anatomical variant of the middle turbinate, a large concha bullosa inside a giant concha bullosa, which has never been reported before. Furthermore, we comment on the differential diagnosis of the variations of the middle turbinate and on the embryology of the nasal turbinates. This report also supplies additional aspects to rhinologists in the scope of middle turbinate pneumatization.

Key words: concha bullosa, middle turbinate, lateral nasal wall, endoscopic sinus surgery, anatomic variation

INTRODUCTION

A pneumatized middle turbinate, the so-called concha bullosa is the most commonly encountered anatomical variation of the lateral nasal wall[1]. The detailed anatomy of the pneumatized middle turbinate has first been described by Zuckerkandl[2]. In anatomical studies, concha bullosa has been noted in 5-20% of the nasal specimens[3]. However, after the advent of computed tomography (CT), pneumatization of the middle turbinate has been found to be more frequent, 33-36%, in patients with symptoms of sinusitis[3].

Even though concha bullosa of the middle turbinate is usually asymptomatic, it has been implicated in the cause of inflamatory sinus disease and of nasal obstruction[1,2].

Several anatomical variations of the lateral nasal wall have been described in the rhinological literature[3-5]. Different types of the middle turbinates including pneumatized, paradoxically curved, lateralized, hypertrophic or hypoplasic ones and those with grooves or fissures have been reported[4]. The purpose of this study was to present a unique variant of the middle turbinate as a cause of severely impaired nasal breathing. Furthermore, we commented on the differential diagnosis of variations of the middle turbinate respecting the existing body of literature on the subject.

CASE REPORT

A 52-year old woman presented to our outpatient clinic with severe nasal obstruction. The physical examination showed a nasal septal deviation to the left and a turbinate-like mass protruding from the middle nasal meatus into the nasal vestibule at the right nasal cavity. The mucosa overlying the mass was healthy. By rigid nasal endoscopy, the mass seemed to be a giant middle turbinate (Figure 1). More interestingly, a coronal plane CT further demonstrated that this mass was an extensively pneumatized middle turbinate containing another pneumatized middle turbinate (Figures 2A and B). In turn, the patient had a large concha bullosa inside a giant concha bullosa. The outer concha bullosa superiorly attached directly to the the skull base, whereas the inner one attached to the lamina papyracea (Figures 2A and B). Moreover, the outer concha bullosa had a lateral conchal ostium communicating with the

Figure 1. Endoscopic view of the giant middle turbinate.

*Received for publication: June 4, 2007; accepted: June 19, 2007

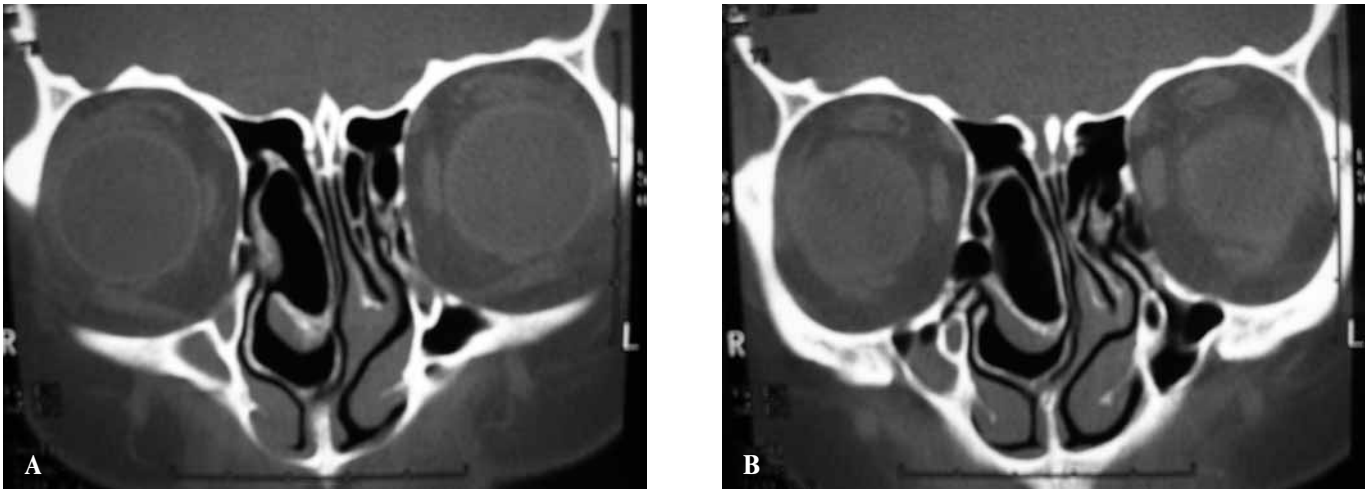

Figure 2. CT scan demonstrating the pneumatization, the drainage ostia and the attachments of the middle turbinates. A. Ostium of the inner concha bullosa, B. Ostium of the outher concha bullosa.

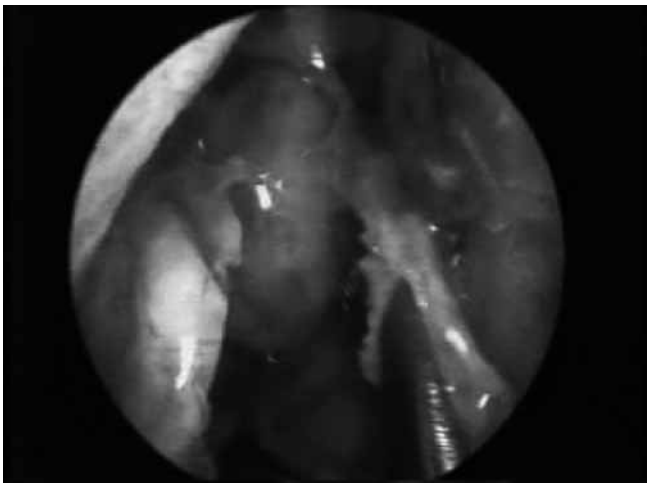

Figure 3. Intraoperative view of inner concha bullosa after the vertical incision that was made on the anterior wall of the outer concha bullosa.

middle nasal meatus, while the inner concha bullosa had a lateral conchal ostium communicating with the outer one (Figures 2A and B).

The patient underwent transnasal endoscopic surgery following septoplasty under general anesthesia. A vertical incision was made on the anterior wall of the outer concha bullosa and the inner concha bullosa emerged from the inside (Figure 3). This inner middle turbinate had a separate, but similar attachment to the lateral nasal wall. The bony shell of both the lateral and medial walls of the outer concha bullosa was extremely thin. Then, the outer concha bullosa was near-totally removed over the inner one, only a thin medial lamella remained. Subsequently, the lateral lamella of the inner concha bullosa was resected. The uncinate process and the ethmoid bulla were both normal.

Nasal breathing was significantly improved after the surgery and the patient was free of nasal complaints during 3-months of follow-up.

DISCUSSION

An accurate description of the embryological development of the nasal turbinates and the ethmoid is crucial to understand the sophisticated anatomy and the variations of the lateral nasal wall [6,7]. Nasal turbinates can be first identified during the 8-10th week of fetal life as outgrowths from the lateral nasal wall and these outgrowths form a series of ridges referred to as ethmoturbinals [2,7]. Initially, there are six ridges. Some of them develop into permenant structures on the lateral nasal wall, while the remaining ones fuse or disappear. The uncinate process forms from the first ridge and the ethmoid bulla forms from the second. The middle and the superior turbinates form from the third and fourth ridges, respectively. However, the inferior turbinate originates from a separate embryological structure. Thus, the pneumatization of the uncinate process and of the middle and the superior turbinates occurs in the ethmoid complex [2,7].

Pneumatization of the middle turbinate is the most frequent anatomical variant of the paranasal sinus system[2]. It has been demonstrated that pneumatization of the middle turbinate can originate from the middle nasal meatus, the frontal recess, the suprabullar or retrobullar recess, ethmoid infundibulum or the agger nasi region[8]. Furthermore, it has been reported that a special concha bullosa of the middle turbinate may be formed when the pneumatization originates from the superior nasal meatus. This form of concha bullosa has been called interlamellary cell and it has been mentioned that in this case, mucociliary drainage will go to the superior nasal meatus and posterior ethmoid. There can be different sources of pneumatization in one middle turbinate, resulting in two or three air cells within[2].

In this study, we presented a unique anatomical variant of the middle turbinate, a giant concha bullosa containing another large concha bullosa. Each of the middle turbinates had a regular shape and separate attachment points. The outer concha bullosa, the giant one, attached directly to the skull base and it

communicated with the frontal recess, whereas the inner concha bullosa attached to the lamina papyracea. Thus, the pneumatization of the outer concha bullosa seemed to originate from the frontal recess. On the other hand, the inner concha bullosa seemed to originate from the middle nasal meatus. Furthermore, the outer concha bullosa had a lateral conchal ostium communicating with the middle nasal meatus and the inner concha bullosa had a lateral conchal ostium communicating with the outer one. Regarding both conchal ostia, the outer concha bullosa seemed to drain into the middle nasal meatus, while the inner one seemed to drain first into the outer one, then into the middle nasal meatus via the ostium of the outer one. According to these anatomical details, the presented variant of the middle turbinate was neither an interlamellary cell nor a turbinate containing two air cells inside, like those described above. In addition, the uncinate process and the ethmoid bulla were both normal. Thus, the inner concha bullosa was not an enlarged bulla ethmoidale. We considered that this anatomical variant consisted of an extensively pneumatized middle turbinate containing a completely separate concha bullosa inside.

Coronal plane CT is generally used for detailed analysis of the pneumatization of the middle turbinates. Bolger et al.[3] have found pneumatization of the vertical lamella of the middle turbinate in 46,2%, of the inferior segment in 31,2%, and of both the vertical lamella and the inferior segment in 15,7% of their patients. More recently, four types of pneumatization of the middle turbinate were defined[4] namely Type I: pneumatization of the bullous portion of the middle turbinate, Type II: pneumatization of the vertical part of the basal lamella, Type III: pneumatization of the horizontal part of the basal lamella, and Type IV: extensive pneumatization of the entire middle turbinate. The presented variant of the pneumatized middle turbinate did not properly fit any of these types. Nevertheless, it may be included in extensively pneumatized type, type IV.

Secondary middle turbinates that originated from the lateral nasal wall have been reported in different studies[5,9,10]. The authors have described all of these secondary middle turbinates as additional turbinates projecting medially and then turning superiorly from the root of the basal lamella in the middle nasal meatus. Furthermore, all of the them were bilateral and none of them was pneumatized. We, therefore, did not consider that any of the middle turbinates that was presented in this study was a pneumatized secondary middle turbinate.

An accessory middle turbinate is defined as a medially bent uncinate process, which may give the impression that two middle turbinates are present[6,11]. The presented variant of the middle turbinate consisted of two real middle turbinates and it could be easily distinguished from an accessory middle turbinate because our patient had a normal uncinate processes in both nasal cavities.

Concha bullosa is usually asymptomatic[1]. However, an extensively pneumatized middle turbinate may constitute space-occupying mass, and thus, it may cause nasal obstruction and impaired nasal breathing[2]. In our patient, there was a giant concha bullosa that almost completely obstructed the right nasal cavity. Additionally, she had a nasal septal deviation, which caused cessation of nasal airflow in the left side. As a consequence, she was suffering from severe nasal obstruction. After the surgery, nasal breathing was significantly improved.

To the best of our knowledge, we reported a unique variant of the middle turbinate, a large concha bullosa inside a giant concha bullosa, which has not been reported yet. We consider that our presentation is of value because we believe that preoperative recognition of the anatomic variations of the lateral nasal wall will guide surgeons during endoscopic sinus surgery and also will lower the rate of complications. Furthermore, this report will supply additional aspects to rhinologists in the scope of middle turbinate pneumatization.

REFERENCES

1. Bahadir O, Imamoglu M, Bektas D. Massive concha bullosa pyocele with orbital extention. Auris Nasus Larynx. 2006; 33: 195-198.
2. Braun H, Stammberger H. Pneumatization of turbinates. Laryngoscope. 2003; 113: 668-672.
3. Bolger WE, Butzin CA, Parsons DS. Paranasal sinus bony anatomic variations and mucosal abnormalities: CT analysis for endoscopic sinus surgery. Laryngoscope. 1991; 101: 56-64.
4. Krzeski A, Tomaszewska E, Jakubczyk I, Galewicz-Zielinska A. Anatomic variations of the lateral nasal wall in the computed tomography scans of patients with chronic rhinosinusitis. Am J Rhinol. 2001; 15: 371-375.
5. Kantarci M, Karasen RM, Alper F, Onbas O, Okur A, Karaman A. Remarkable anatomic variations in paranasal sinus region and their clinical importance. Eur J Radiol. 2004; 50: 296-302.
6. Aksungur EH, Bicakci K, Inal M, Akgul E, Binokay F, Aydogan B, Oguz M. CT demonstration of accessory nasal turbinates: secondary middle turbinate and bifid inferior turbinate. Eur J Radiol. 1999; 31: 174-176.
7. Stammberger H. Functional endoscopic surgery. Philadelphia: BC Decker, 1991.
8. Stammberger HR, Kennedy DW. Paranasal sinuses: anatomic terminology and nomenclature. The Anatomic Terminology Group. Ann Otol Rhinol Laryngol Suppl. 1995; 167: 7-16.
9. Khanobthamchai K, Shankar L, Hawke M, Bingham B. The secondary middle turbinate. J Otolaryngol. 1991; 20: 412-413.
10. Aykut M, Gumusburun E, Muderris S, Adiguzel E. The secondary nasal middle concha. Surg Radiol Anat. 1994; 16: 307-309.
11. Lin YL, Lin YS, Su WF, Wang CH. A secondary middle turbinate co-existing with an accessory middle turbinate: an unusual combination of two anatomic variations. Acta Otolaryngol. 2006; 126: 429-431.

Ozan Bagıs Ozgursoy
Bascavus Sok, 91/A-10,
Kucukesat, Ankara
Turkey

Tel: +90-532-782-1788
E-mail: ozanozgursoy@yahoo.com