

Rare Anatomic Variation: Pneumatized Secondary Middle Turbinate

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ABSTRACT: The nasal turbinates adhere to the lateral nasal wall and are subjected to various morphological variations. A common variation is concha bullosa, the pneumatization of a nasal turbinate. Another possible variation is the secondary middle turbinate (SMT) which originates from the lateral wall of the middle nasal meatus. Pneumatized SMTs were previously found only twice in Computed Tomography (CT) studies. It is hereby reported the third such evidence, gathered in a 44 y.o. male patient which was scanned in Cone Beam CT (CBCT) for routine dental medical procedures. In the present case the superior turbinates were pneumatized and were found bilateral SMTs. The left SMT was unpneumatized and projected medially and the right SMT was pneumatized and projected infero-medially. The right pneumatized SMT was communicating through a narrow isthmus with the ethmoidal bulla; beneath these two, a large ethmoidal infundibulum opened medially through a narrow semilunar hiatus. Such extremely rare anatomic variations could impede on the normal drainage of the ostiomeatal unit and could lead to inadvertent surgical corridors if they are not documented in CT or CBCT.

KEYWORDS: Nasal turbinates; accessory turbinates; middle nasal turbinate; nasal concha; concha bullosa.

Introduction

The nasal turbinates, or nasal conchæ, are attached to the nasal fossa lateral and/or superior walls [1].

The concha bullosa media and the paradoxical curvature of the MT are common anatomic variations [1].

Firstly reported by Khanobthamchai et al. (1991) [2], the secondary middle turbinate (SMT) is a rare anatomical variation of the lateral nasal wall and consists of a bony projection originating from the lateral wall of the middle nasal meatus [3].

The accessory middle turbinate (AMT) is a medially bent and anteriorly folded uncinat process, and is developmentally distinctive to the SMT [3,4].

The SMT and AMT could co-exist, although rarely [4]. The SMT is usually bilateral [5].

Pneumatized SMTs were reported, to our knowledge, only twice [5,6].

We hereby report such a rare anatomic variation.

Material and Method

At a routine anatomic evaluation in CBCT of the scan of a male patient of 44 y.o., a rare anatomic variant of the lateral nasal wall was found.

The subject has been evaluated in CBCT with an iCat machine (Imaging Sciences

International, Hatfield, PA, USA), with the settings detailed elsewhere [7,8].

The DICOM file was analysed with the Planmeca Romexis Viewer 3.5.0.R software. Relevant details were exported as image files. The patient has given a written informed consent for its medical data to be used if anonymized. The responsible authorities („Dr. Carol Davila” Central Military Emergency University Hospital, Bucharest, Romania) approved the study (approval no.372/18.03.2020).

Results

In the reported case there were identified agger nasi cells located bilaterally in the frontal processes of maxilla and expanded posteriorly beneath the nasolacrimal canals. All three pairs of nasal turbinates were identified on coronal planar reconstructions and further documented on three-dimensional volume renderizations (Figure 1).

The superior turbinates were pneumatized, each one containing two pneumatic chambers separated by a septum. The normal middle turbinates (MTs) had each a lamellar concha bullosa media. Beneath these MTs we identified bilateral SMTs. The left SMT projected medially and was unpneumatized. The right SMT projected infero-medially and was pneumatized, appearing as an expansion of the ethmoidal bulla and communicating with it through a narrow isthmus.

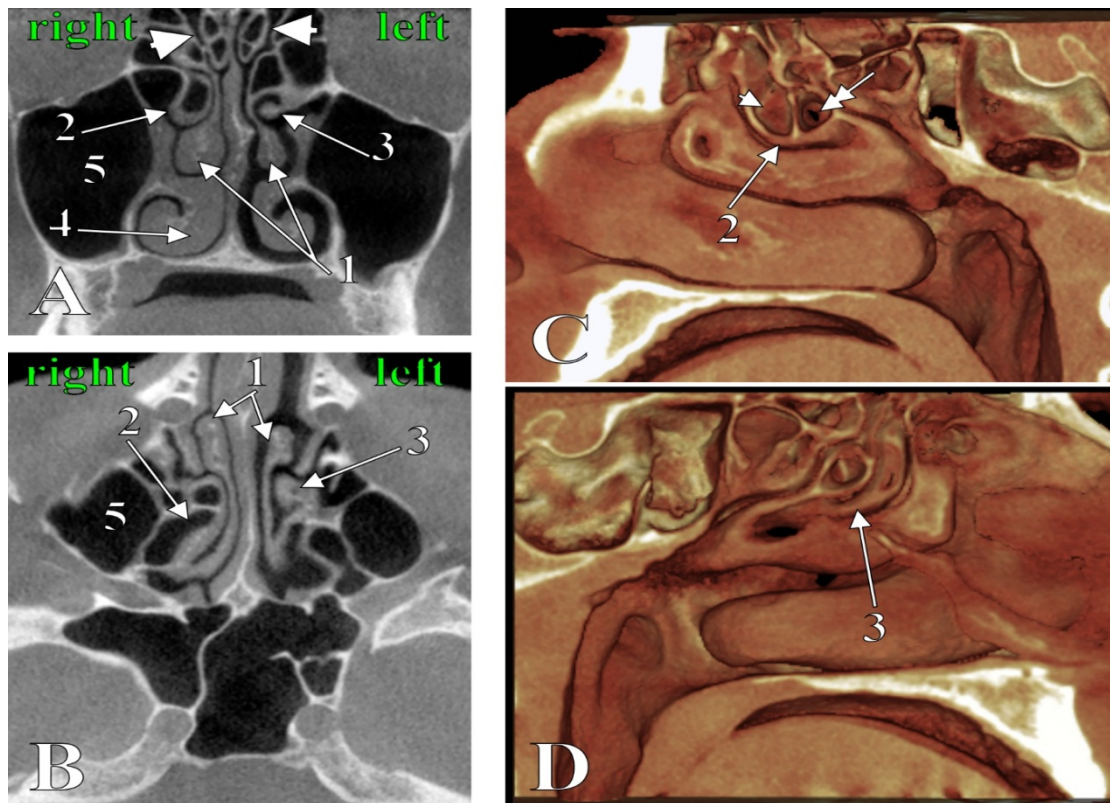


Figure 1. Bilateral presence and unilateral pneumatization of secondary middle nasal turbinate.
A: coronal MPR; **B:** axial MPR; **C:** three-dimensional volume renderization, medial view of the right lateral nasal wall; **D:** three-dimensional volume renderization, medial view of the left lateral nasal wall. 1. middle nasal turbinates; 2. right pneumatized secondary middle turbinate (SMT); 3. left unpneumatized SMT; 4. right inferior nasal turbinate; 5. right maxillary sinus. The right pneumatized SMT contains anterior (C, arrowhead) and posterior (C, double-headed arrow) chambers separated by a septum. The arrowheads in (A) indicate bilateral and septated concha bullosa superior.

Discussion

A concha bullosa defines the pneumatization of a nasal turbinate. Although the term is commonly used to indicate the pneumatization of the middle turbinate, other nasal turbinates (inferior, superior, and supreme) have also been found to be pneumatized [3,9-21]. Superior conchæ bullosæ seem aerated through the posterior ethmoid cells [22]. According to Toplu et al (2013), “pneumatization of the middle turbinate is common, whereas rare in the superior and especially inferior turbinate” [21]. A superior concha bullosa, such as we report here, could represent a rare cause of headache [23].

Accessory nasal turbinates are assumed to occur during morphogenesis of the lateral nasal wall [24]. The SMT is a rare variation of the middle nasal turbinate [2,11,24-26], while the secondary superior turbinate is an extremely rare one [27]. The SMT and AMT can mimic the real MT [28]. Interestingly, there was reported a duplicate SMT, described as first and second SMTs, which were associated also with an AMT

on that side, being assumed then that the respective variant determined frontal sinusitis [28].

Pneumatized SMTs were found previously in CT studies [5,6]. Apaydin et al reported bilateral infero-medially projecting SMTs, one pneumatized and another unpneumatized, different from usual SMTs, which project supero-medially and do not obstruct, or narrow, the ostiomeatal unit [5]. In our case, the unpneumatized SMT had a common projection, thus not being obstructive. The opposite pneumatized SMT we found was related to a large ethmoidal infundibulum with a narrow semilunar hiatus.

As in our case, Jung et al found a pneumatized SMT which attached a polyp and projected infero-medially from the lateral wall of the ethmoidal bulla [6].

Conclusions

We report here a CBCT evidence of pneumatized and unpneumatized SMTs, which could be silent and could be observed serendipitously. In these regards, the real occurrence

of such anatomic variants could be higher than indicated by the few available reports. Such extremely rare anatomic variations could impede on the normal drainage of the ostiomeatal unit and could lead to inadvertent surgical corridors if they are not documented in CT or CBCT.

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Conflict of interests

None to declare.

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