



Case series

Endoscopic appearance of duplicated middle turbinate, case series and literature review

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ABSTRACT

Introduction and importance: Duplication of the middle turbinate is an extremely rare condition encountered in rhinology clinic. Knowledge and awareness of the nasal turbinates' variations are important to perform a safe endoscopic surgery and evaluate patients with inflammatory sinus diseases.

Case presentation: Case series of two patients who visited rhinology clinic in academic university hospital. Case 1: presented with 6-month history of nasal blockage. Nasal endoscopy revealed bilateral duplication of the middle nasal turbinates. Computed tomography scans showed bilateral medially curved and anteriorly folded uncinate process, and right middle turbinate concha bullosa and its superior end of the middle turbinate was turned medially.

Case 2: A 29-year-old gentleman presented with nasal obstruction mainly to the left side for several years. Nasal endoscopy showed bifid right middle turbinate and severe deviated nasal septum to the left. Upon imaging, a sinus computed tomography scan demonstrated a duplication of the right middle turbinates in the form of two middle nasal concha.

Clinical discussion: Different rare anatomical variations can occur at different points during the embryological development. These rare variations include double middle turbinate, accessory middle turbinate, secondary middle turbinate, and bifid inferior turbinate. The appearance of double middle turbinate can be encountered in rhinology clinic only 2 % of the time. Upon reviewing the literature, only few case reports were found regarding the double middle turbinate.

Conclusion: A double middle turbinate has important clinical implications. Anatomical variation may lead to narrowing in the middle meatus which makes the patient vulnerable to sinusitis or maybe associated with secondary symptoms. We report rare cases of middle turbinate duplication. Awareness of the nasal turbinates' variations is important for detection and management of inflammatory sinus diseases. Further studies are needed to identify the association of other pathology.

1. Introduction

The nasal turbinates are important anatomical structures in the nasal cavity that arise from the lateral nasal walls and extend through the nasal cavity. There are three nasal turbinates in the nasal cavity, and they are: the superior turbinates, middle turbinates (MT), and inferior turbinates [1]. The development of the nasal turbinates is a complicated

process that occurs during the embryological life, and different anatomical variations can occur during this process [2,3]. Rare variations of the nasal turbinates include double MT, accessory middle turbinate (AMT), secondary middle turbinate (SMT), and bifid inferior turbinate (BIT) [4]. The knowledge and awareness of the nasal turbinates' variations are important to perform safe endoscopic surgeries and evaluate patients with inflammatory diseases of the sinuses [2]. The

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objective clinical findings can be obtained during physical examination, by anterior rhinoscopy, endoscopy, and radiological studies such as a computed tomography (CT) scan [5]. These anatomical variations of the MT are rare. Upon reviewing the literature, most of the publications regarding the double MT were case reports [4]. According to El-shazly et al., the double MT can be seen in rhinology clinic 2 % of the time [6].

Some anatomical variations are well-known and frequently encountered in rhinology clinic such as the concha bullosa and the paradoxical MT. However, variations include double MT, AMT, SMT, and BIT are extremely rare [4]. The work has been written in line with the SCARE guidelines [7]. In this study, we presented a case series and literature review of endoscopic appearance of double MT presenting as a case of chronic rhinosinusitis.

2. Methodology

This is a case series that describes the clinical and radiological findings of patients who presented with double MT appearance during endoscopic examination who are following up in rhinology clinic at King Fahad University Hospital (KFUH). The data was collected from the clinical encounter of patients and from the hospital database system (Quadrant). Images were obtained from endoscopic examination of the nasal cavities by nasal endoscopy and CT scan of the sinuses. Written informed consent was obtained from the patients for publication of this case series and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request. Ethical Approval was waived by the authors institution. Research Registration (for case reports detailing a new surgical technique or new equipment/technology): researchregistry8514, <https://www.researchregistry.com/browse-the-registry#home/>.

3. Presentation of case

3.1. Case 1

A 36-years-old Saudi female patient presented to rhinology clinic in KFUH complaining of bilateral alternating nasal obstruction, occasional facial pain, and heaviness mainly around the eyes and cheeks. She gave a history of hyposmia post COVID-19 infection 6 months ago. She did not have any history of nasal discharge, post-nasal drip, epistaxis, or head trauma. She is medically free with no history of medication use or allergies. No previous surgeries. Family history is negative. She is a non-smoker, non-alcoholic, and had no drug use.

Nasal endoscopy, done by an otolaryngologist, showed no significant findings except for bilateral duplication of the MT (Fig. 1) and right inferior turbinate hypertrophy. A CT scan was done by a radiology consultant. It showed no opacification of the paranasal sinuses or the

olfactory cleft. But it showed right inferior turbinate hypertrophy associated with right MT concha bullosa. Additionally, it showed bilateral complete duplication of the MT evident by the uncinate process (UP) which was curved medially and folded anteriorly in both sides (Fig. 2). She was diagnosed to have chronic rhinosinusitis, for which she was treated with saline nasal irrigation and fluticasone propionate intranasal spray (2 puffs in each nostril) twice daily for 2 months.

3.2. Case 2

A 29-year-old Saudi gentleman presented to rhinology clinic in our hospital complaining of nasal obstruction mainly to the left side for several years. He also complains of nasal deformity. He has no other symptoms. The patient had a history of road traffic accident (RTA) in 2012 with acquired traumatic cerebrospinal fluid leak which healed spontaneously. He is medically free and not on any medications. Patient had no allergies. Family history is negative. He is a non-smoker, non-alcoholic, and had no drug use. Nasal endoscopy and paranasal CT scan were planned to be done by an otolaryngology specialist and a radiology consultant, respectively. Nasal endoscopy showed bifid right MT and severe deviated nasal septum to the left (Fig. 3). Upon imaging, a sinus CT scan demonstrated an abnormal duplication of the right MT in the form of two middle nasal concha (Fig. 4).

4. Clinical discussion

The anatomical variations of the MT are rare. Upon reviewing the literature, most of the publications regarding the double MT were case reports [4]. According to El-shazly et al., the double MT can be encountered in rhinology clinic only 2 % of the time [6].

The nasal turbinates develop from precursors known as ethmoturbinal and maxilloturbinal that appear between the 8th and 10th weeks of fetal life. The ethmoturbinal gives rise to the superior turbinate, MT, UP, and the supreme turbinate if it was present. Where the maxilloturbinal forms the inferior nasal turbinate [3,8]. Different anatomical variations can occur at different points during this development [2,3]. Some of these variations are well-known and frequently encountered in rhinology clinic such as the concha bullosa and the paradoxical MT. Other rare variations include double MT, AMT, SMT, and BIT [4].

Diagnostic nasal endoscopy can aid the detection of these anatomical variations of the nasal turbinates, such as the detection of a double MT [8]. Double MT has been defined by AlQudah in 2015 as “an additional bony plate in the sagittal plane of the MT, located in the middle meatus lateral to the MT and anterior to the basal lamella which can narrow the ostiomeatal complex”. AlQudah had reported 3 cases of unilateral double MT in his study [4]. Other studies stated that the appearance of

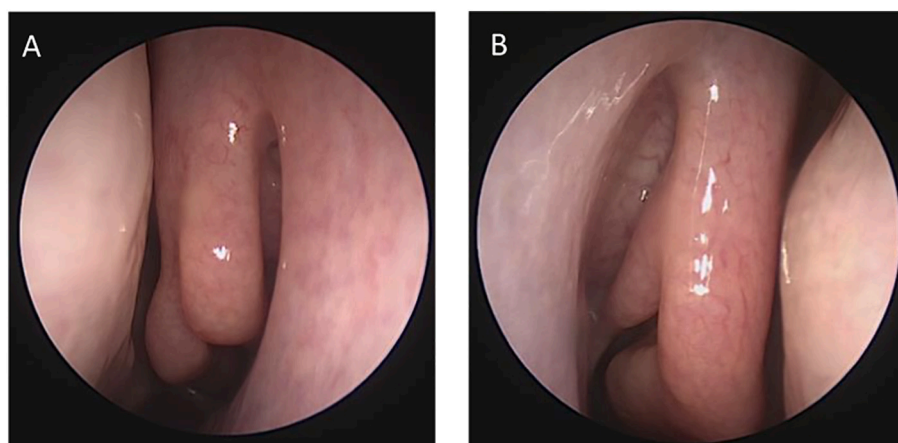


Fig. 1. Endoscopic view of first case showing bilateral duplication of the middle turbinate. The right (A) and left (B) nasal cavities.

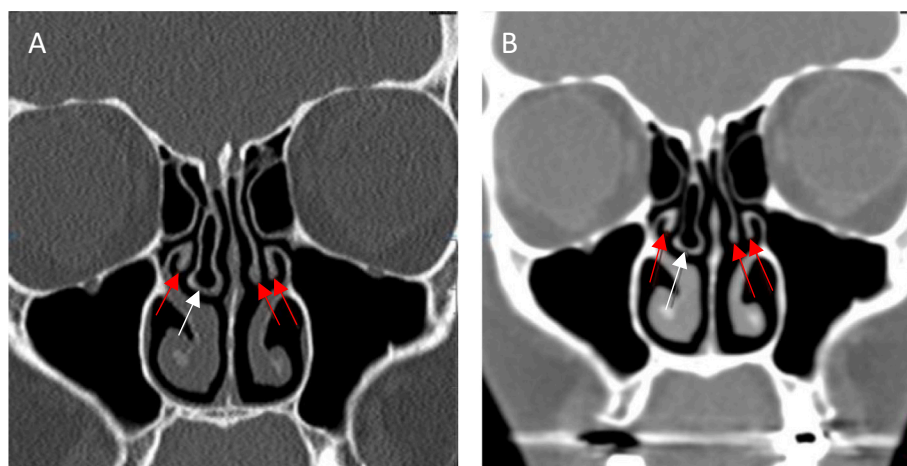


Fig. 2. Coronal reformatted images [bone (A) and soft tissue (B) windows] of paranasal sinus demonstrates complete duplicated bilateral middle turbinates [Red arrows]. While the lateral [accessory] appears paradoxical in configuration. Note the large noninfected concha bullosa at the right middle turbinates [White arrow]. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

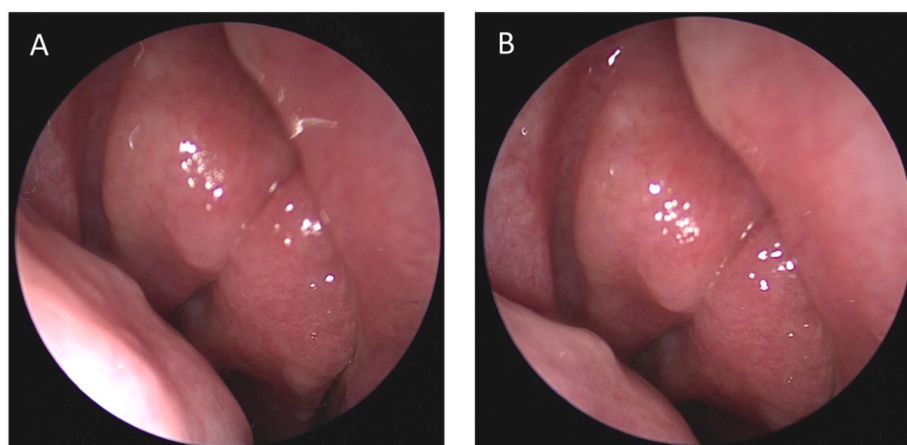


Fig. 3. Endoscopic view of the right nasal cavity (A and B). Endoscopic examinations show bifid right middle turbinate.

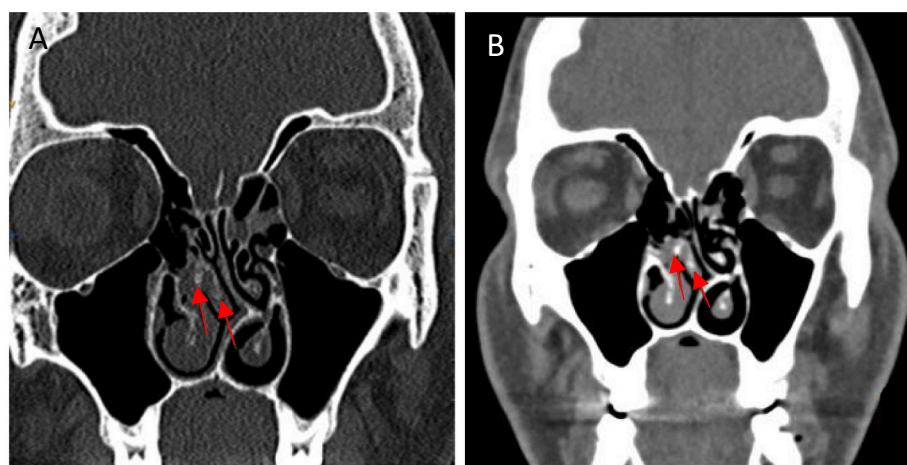


Fig. 4. Coronal reformatted views for paranasal sinuses study [bone (A) and soft tissue (B) windows]. Demonstrates a duplication of the right middle turbinates in form of two middle nasal concha [arrows].

double MT may indicate the presence of AMT, SMT, or BIT [2,3,6]. In 2019, Jae-Hoon Lee and Dam Ho Lee reported a case of a patient who presented with rapid loss of smell. Endoscopic examination showed

unilateral right double MT associated with left MT hypertrophy. The authors found that the double MT appearance was an AMT based on endoscopic and radiological findings [8]. AMT has been defined in the

literature as UP that is medially bent and anteriorly folded [3,4,8]. Khanobthamchai was the first to describe SMT [10]. The SMT has been described as a bony projection that arises from the lateral wall of the middle meatus, specifically from the lateral wall of the bulla ethmoidalis, and it is covered by a soft tissue and extends superiorly and medially [3,8,9]. The SMT had not been reported to obstruct the ostio-meatal complex [4,9]. Adil Ozturk et al. reported the first case of unilateral first SMT that is projecting inferiorly and laterally [11]. The term BIT is used when the UP is inferiorly and medially displaced [3,4]. Clinical examination by nasal endoscopy and radiological assessment by CT scan images can make a clear distinction between these anatomic variations [4]. Based on the clinical and radiological findings of the patient in the first case, we found that this is a case of bilateral AMT presenting as bilateral MT duplication during endoscopic examination.

A study conducted by El-shazly et al. in 2012 aimed to study the clinical presentation of patients who were diagnosed with the appearance of double MT. The symptoms that were investigated were nasal obstruction, nasal discharge, postnasal drip, headache, sneezing, cough and hyposmia. The investigators found that 92.8 % of patients mainly complained of refractory frontal headache, and this was followed by nasal obstruction [6]. In another study done by Jeong Choi in 2013, a case of frontal sinusitis was reported in a patient who presented with AMT co-occurring with first and second SMT. The patient presented with a history of severe left frontal pain and nasal blockage for 10 days duration. Nasal endoscopy showed three turbinate like structures in the middle meatus. Paranasal CT scan showed second and first SMT with an AMT obstructing the frontal recess and causing frontal sinusitis [3]. Only few case reports were found in the literature reporting duplication of the MT.

5. Conclusion

We reported a rare case series and literature review regarding MT duplication. A double MT anatomical variation has significant clinical value in sinus nasal disease. Awareness of the nasal turbinates' variations is important to perform safe endoscopic surgery. Further studies are needed to identify the association of other pathology.

Declaration

This manuscript was not presented at any meeting.

Consent

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

Ethical approval

Ethical approval is exempt at our institution.

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Declaration of competing interest

No conflicts of interest.

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