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# Chronic Rhinosinusitis in a Patient with a Rare Anatomical Variation of Middle Turbinate: A Case Report

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**Abstract-** A secondary middle turbinate is considered a rare anatomical variation of the middle turbinate. Here, we present a case of young lady who presented to our clinic with signs and symptoms of chronic rhinosinusitis and headache. On nasal endoscopy and CT sinuses, she was found to have a left secondary middle turbinate, obstructing the left osteomeatal complex. Functional endoscopic sinus surgery was performed to the patient with excellent postoperative results and no evidence of recurrence of her symptoms during a three month follow up.

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## I. INTRODUCTION

There are usually three nasal turbinates in each nasal cavity. The middle and superior turbinates are part of the ethmoid bone, while inferior turbinate is a separate bone. Rarely the fourth supreme turbinate may also present above the superior turbinate [1]. The precursor structures of nasal turbinates appear between the 8th and 10th weeks of fetal life and are the ethmoturbinal and maxilloturbinal {2,3}. Nasal turbinates are derived from several outgrowths of the foetal lateral nasal wall. These outgrowths form a group of ridges known as "ethmoturbinals". The middle turbinate develops from the third one [4]. Its anterior portion inserts into the ascending process of the maxilla and the posteromedial margin of the agger nasi cells. Its superior insertion is to the lateral edge of the cribriform plate. The posterior portion is oriented horizontally and attaches to the ethmoid crest of the perpendicular plate of the palatine bone {5}. The middle turbinate plays a functional role in the nasal physiology, including lamination of airflow, humidification of inspired air and its deflection superiorly towards the olfactory epithelium. Nasal and paranasal sinus mucosal lining produce secretions that are moved to the nasopharynx along the surface of middle turbinate. Thus surface and dimensions of middle turbinate are crucial for maintenance of normal nasal physiology [6]. There are

different anatomic variations of the middle turbinates, including paradoxical curvature, pneumatized, bifurcate, trifurcate, secondary and accessory [4-7]. The anatomical variations may cause specific sinonasal symptoms such as migraine-like headache, smell disorders and nasal obstruction [8]. Here we report a case of a patient who presented with signs and symptoms of chronic rhinosinusitis without nasal polyposis and found to have a secondary middle turbinate.

## II. CASE PRESENTATION

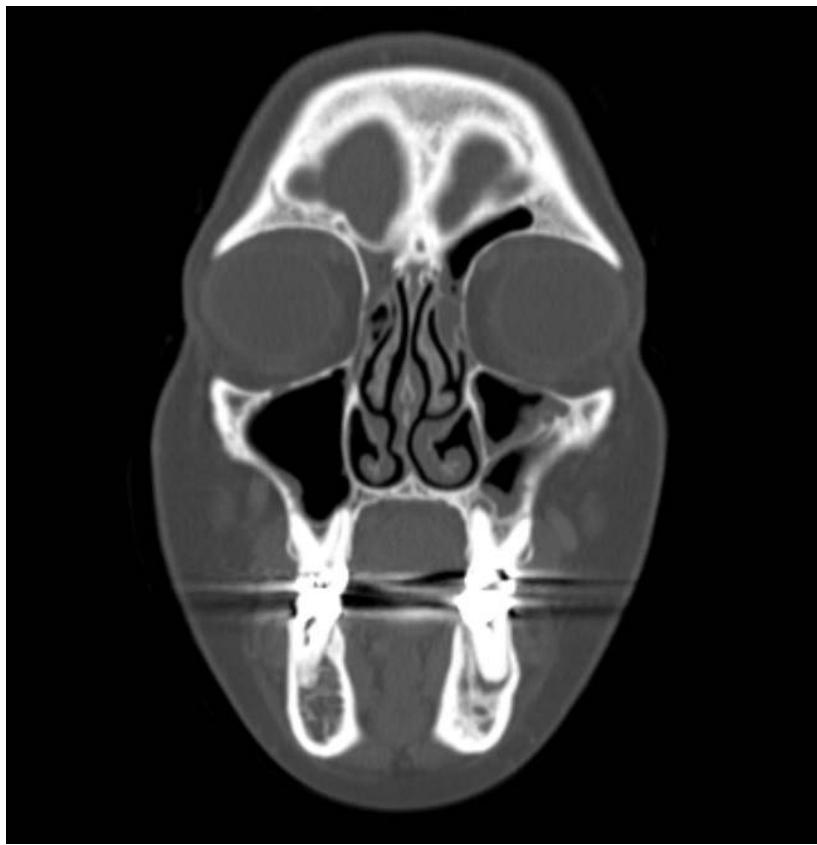
The present case is a 28 years old female who is known to have allergic rhinitis. She presented to our clinic with symptoms of chronic rhinosinusitis, specifically nasal obstruction, decrease smell and facial pain. Nasal examination revealed congested nasal mucosa with mild deviated nasal septum (DNS) and hypertrophy of the left middle turbinate. However, no nasal polyps were seen. A diagnosis of chronic rhinosinusitis with DNS has been made and the management plan was discussed with the patient. It included a medical therapy consisted of normal saline nasal spray and mometasone furoate nasal spray. However, no improvement has been noticed subjectively by the patient after a three months of the medical therapy. Therefore, a CT paranasal sinus has been ordered to the patient. It showed mildly deviated nasal septum, mucosal thickening of the maxillary and ethmoid sinuses, in addition to a secondary middle turbinate in the left side obstructing the osteomeatal complex (**Figure 1**). The patient then underwent limited functional endoscopic sinus surgery (FESS), in addition to septoturbinoplasty. During the intraoperative examination, the left secondary middle turbinate was identified (**Figure 2**) and then with the use of microdebrider, it was resected to improve the drainage of the osteomeatal complex. Postoperatively, the patient's symptoms improved significantly with no recurrence of her symptoms during a three months follow up period.

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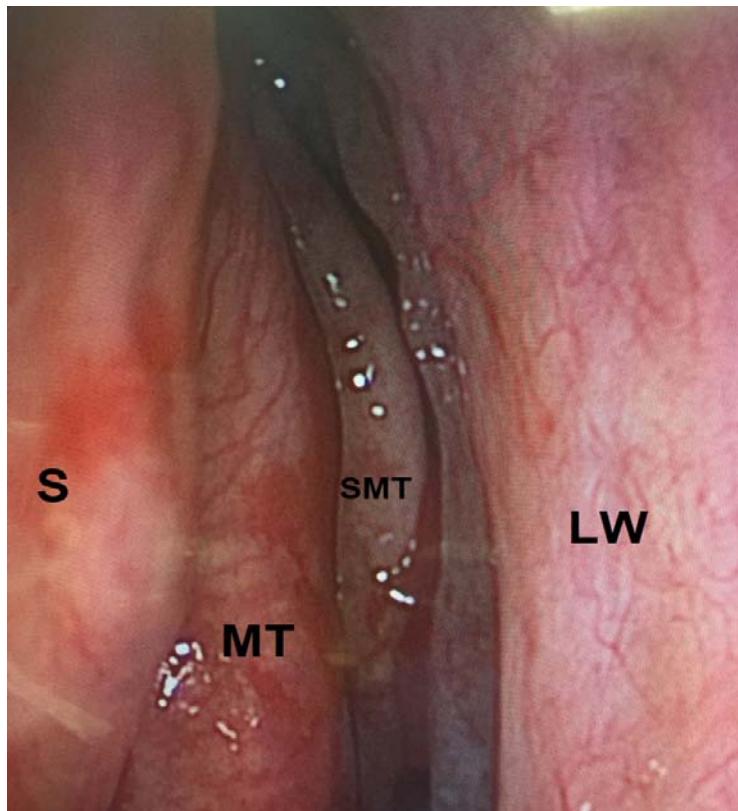
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*Fig. 1:* A coronal CT scan of paranasal sinuses shows mucosal thickening of the left maxillary sinus, partial opacification of the ethmoid sinuses, and a secondary middle turbinate in the left side obstructing the left osteomeatal complex



*Fig. 2:* An intraoperative view of the left nasal cavity shows the Septum (S) medially, Middle Turbinate (MT), Secondary Middle Turbinate (SMT), and the Lateral Wall of Nasal Cavity (LW)

### III. DISCUSSION

Middle turbinate forms the medial wall of the ethmoid sinus, there are different types of middle turbinates, including pneumatized (concha bullosa), paradoxically curved, bifurcate, trifurcate, secondary and accessory. Accessory middle turbinate is known as an uncinate process that is medially bent with an anterior fold to an extend greater than usual, this makes it look like two middle turbinate [7]. It is different from the secondary middle turbinate because of its distinct developmental origin [7]. According to Bae S and Lim S if the normal uncinate process is present in a patient with a doubled middle turbinate, the term accessory middle turbinate is appropriate. in contrast, if a turbinate like structure originates from the inferior turbinate and the uncinate process is absent, the term bifid inferior turbinate is appropriate [9].In a study by Murat Ozcan et al the incidence of accessory middle turbinate was found to be 6.8% [2]. Accessory middle turbinate may appears as an additional middle turbinate during endoscopic examination. Symptomatic accessory middle turbinate in adult commonly reported but in pediatric has not been reported until Andrew Chang, Seckin O Ulualp (2016) reported their case [10].secondary middle turbinate is a projection of part of bone which is covered by soft tissue from the middle meatus lateral wall [11]. It is generally located posterosuperior to infundibulum and then curves medially and superiorly. Occasionally, it might protrude inferomedially and be mistaken for an accessory middle turbinate [12-13]. Khanobthamchai et al (1991) were the first to describe that secondary middle turbinate, was an incomplete anterior wall of bulla ethmoidalis [14]. The incidence has been reported to be 1.5% by Khanobthamchai et al [14], 6.8% by Aykut et al [15] and 0.8% by Aksungur et al [16] Aksungur et al suggested that secondary middle turbinate might be an additional turbinate originating embryologically from a section of a frontal ridge [16]. The secondary middle turbinate can be mistaken for a polyp or an osteoma at endoscopical examination [17]. Usually SMT is reported to be bilateral in allcases. But in dr.Nebil ARK, SMT was detected unilaterally {18}. According to Apaydin et al., superomedially projected secondary middle turbinate has no clinical significance. However, inferiorly projected secondary middle turbinate, especially if hypertrophied and pneumatised, may narrow the ostiomeatal unit and predispose to inflammatory sinus disease it is a rare nasal cavity variation, where it accounts for 0.8% to 6.8% of cases [11-16-19]. In other hand some studies revealed that complaining of frontal headache in association with sensation of nasal obstruction were frequently observed in 92.8% of their patients with such a variation [16]. The theory behind developing symptoms in SMT like frontal headach and rhinosinusitis. Frontal and periorbital headacheis due to

pressure points within the nose and suggested that headaches and facial pain could occur due to contact between the turbinate and other regions of the nasal cavity. Wolff's results showed that stimulation of various intra-nasal mucosal regions caused pain which was felt in the cutaneous distribution of the ophthalmic (V1) or maxillary (V2) division of the trigeminal nerve [20]. Stammberger and Wolf found that mucosal contact could cause headache via substance P (SP), a neuropeptide released from the nasal mucosa. [21] And for rhinosinusitis, Sinonasal anatomical variants of middle turbinate and nasal septum, being more common in the osteomeatal complex OMC region, are responsible for predisposing to recurrent attacks of rhinosinusitis [22].

In the present case, a secondary middle turbinate leading to chronic rhinosinusitis and headache was diagnosed based on nasal endoscopy and CT sinuses and managed successfully by functional endoscopic sinus surgery.

### IV. CONCLUSION

Although secondary middle turbinate is considered a rare anatomical variation, it might lead to the development of chronic rhinosinusitis which has a significant impact on the patient. Surgeons should be aware of this entity before performing endoscopic sinus surgery to ensure a safe and effective surgery.

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