



Case Report

Rare anatomical variations in paranasal sinuses

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ABSTRACT

Paranasal sinuses are known to demonstrate large anatomical variations. The hypoplasia or aplasia of paranasal sinuses is a rare clinical condition referring mainly to the frontal and maxillary sinuses. The combined aplasia of sphenoid, frontal and maxillary sinuses with the hypoplasia of ethmoid sinuses are overly among rarely encountered entities. Here, we present a 38-year-old woman without any syndromes or skeletal disease, combining the aplasia of sphenoid, maxillary and frontal sinuses with the hypoplasia of ethmoid sinuses.

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1. Introduction

Paranasal sinuses are air-filled spaces surrounding nasal cavity, the walls of which are lined with respiratory epithelium. Among the most important contributory factors affecting the maintenance of normal physiology of paranasal sinuses and their mucous membrane linings are mucous secretion, cleaning and ventilation.¹

CT imaging is known to be used in order to diagnose easily various pathologic entities, congenital abnormalities and anatomic variations. In addition to obtaining an accurate diagnosis, paranasal sinus CT imaging is incredibly significant in planning preoperative surgery in order to avoid surgical complications.²

Agenesis of paranasal sinuses is a rarely encountered condition, and mostly seen in maxillary and frontal sinuses when they are observed.³ Combined aplasia of maxillary, frontal and sphenoid sinuses with the hypoplasia of ethmoid sinuses is reported among extremely rare cases in literature.

2. Case report

We present the case of a 38-year-old woman with complaints of headaches and dizziness, and admitted to the department of otolaryngology of Konya education and Research Hospital. Patient's history revealed that these challenges had been present for a long time and exacerbating at intervals. The physical

examination revealed no findings, and the results of laboratory tests were within normal limits. The patient had no disorders that could lead to a craniofacial abnormality and involved her skeletal system.

Nasal cavities and septum were found to be within normal limits on the endoscopic investigation. The patient had experienced no previous attacks of sinusitis, trauma or nasal surgery, and had no chronic diseases or congenital abnormalities. As a result of coronal and axial CT scans (Philips Healthcare, Best, The Netherlands) investigating the nose and paranasal sinuses performed with 5-mm slice thickness and 1-mm increment, no development in frontal, maxillary and sphenoid sinuses, and no hypoplasia of ethmoid sinuses were observed (Fig. 1).

3. Discussion

Paranasal sinuses are built up during prenatal development through the excavation of bone by air-filled sacs from the nasal cavity led by the invagination of the nasal capsule within the third fetal month. The formation of the paranasal sinuses begins at 3rd week after gestation, and their expansion goes on from the birth to early adulthood.⁴

As to the development of paranasal sinuses, maxillary sinuses are the first to develop, beginning as an outpouching of the lateral nasal wall at 10th fetal week and then from posterior to the developing uncinatate and superior to the developing inferior turbinate. Maxillary sinuses are allowed to enter into the developing maxillary process via nasal capsule resorption. These sinuses develop within two phases. The first period occurs during the first 3 years of life, followed by a final period from ages of 7 to 17 to 18 years.⁵

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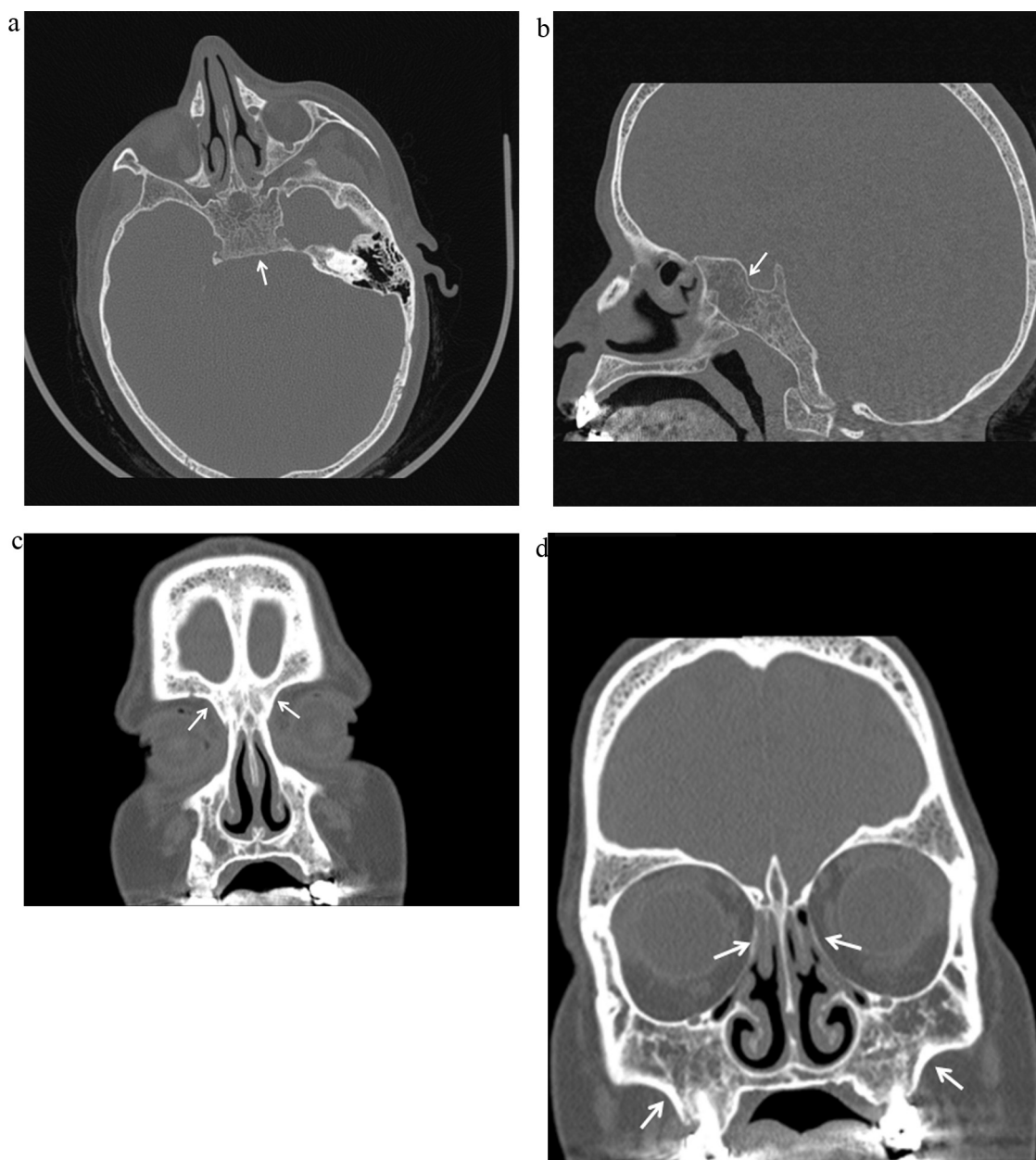


Fig. 1. Axial, coronal and sagittal CT scans shows aplasia of the maxillary, frontal and sphenoid sinuses, and the hypoplasia of ethmoid sinuses (white arrows).

Formed from several discrete air cells within the ethmoid bone between the nose and eyes, ethmoid sinuses first appear during 3rd fetal month as an evagination of the lateral nasal wall. Three or four cells of the ethmoid sinuses are, in general, present at birth, and their growth lasts until the late part of puberty.⁴

Developing via upward extension, frontal sinuses are formed on the anterior portion of the nasal capsule in the region of the frontal recess within about 4-month gestation. The development of frontal sinuses lasts, starting at around age 4 and is seen on X-rays at about ages 7 or 8 by not fully developing until adolescence. In other words, the development of these sinuses continue to grow until about age 20.⁶

However, sphenoid sinuses commence to be formed during 3rd fetal month as an evagination of the nasal capsule of the embryologic nose. The pneumatization of sphenoid bone begins shortly after 2nd year of age, while occurring during the middle childhood period by proceeding rapidly after 7 years of age to its final form.⁵

Based on literature, paranasal sinuses are reported to exhibit great structural variations. In a study performed by Kaygusuz et al. in 99 patients, nasal septal deviation was reported to be the most frequently encountered anatomic variation and was followed by concha bulloza as the second most commonly seen variation.⁷ In another study performed by Dasar et al. in 400 patients, the first and second most frequently seen variations of paranasal sinuses were reported to be concha bulloza and nasal septal deviation, respectively.⁸

The absence of sphenoidal sinuses is extremely rare at the rate of 1 to 1.5% and usually accompanied by syndromes, such as craniosynostosis, osteodysplasia and Down's syndrome.⁹ Of normal adults, however, the aplasia of frontal sinuses is witnessed unilaterally in 15% and bilaterally in 5%. In a study, while the aplasia of maxillary sinuses is extremely rare, the hypoplasia of these sinuses is a well-known clinical entity. The same study reports that the hypoplasia of maxillary sinuses was seen in 1.7 to 10.4% of patients with sinonasal symptoms.⁴ The combined aplasia of

maxillary, frontal and sphenoid sinuses with the hypoplasia of ethmoid sinuses has been reported in only a few reports in literature.^{3,4}

Although the variations of paranasal sinuses are among the most commonly encountered entities, the total agenesis of paranasal sinuses are rarely seen. CT scanning is the most important monitoring method to demonstrate the anatomic detail and determine the variations. We consider that healthcare professionals should be aware of these rare and abnormal formations to avoid diagnostic failures.

Conflict of interest

Author declare that there is no conflict of interest.

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