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Short Communication

Sphenoid Sinus Aplasia: A Case Report and Review of Literature

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Abstract: The paranasal sinuses are air-filled spaces which begin developing prenatally. The sphenoid sinus is a paired paranasal sinus located within the sphenoid bone's body. It represents one of four pairs of paranasal sinuses. A sphenoid sinus septum separates the pair of sphenoid sinuses in the middle. Each sphenoid sinus connects with the nasal cavity via the sphenoidal sinus aperture. The size and shape of the two sphenoid sinuses vary and are frequently asymmetrical. The paranasal sinuses start to develop as evaginations of mucosa during the 3rd and 4th fetal months; however, they expand after birth to reach their normal size. The underdevelopment or agenesis of the paranasal sinuses is an infrequent occurrence; if found, it is more frequently in the frontal sinus and seldom concerns the sphenoid sinus. The authors thus present a case of sphenoid sinus aplasia detected incidentally on cone-beam computed tomography (CBCT) and believe it will be a valuable addition to the literature.

Keywords: Agenesis; Aplasia; Cone-Beam Computed Tomography; Sphenoid Sinus

1. Introduction

The sphenoid sinus development begins in the third month of gestation with the penetration of the cartilaginous nasal capsule by nasal mucosa, forming a cavity that later attaches to the body of the sphenoid bone. After the age of three years, sphenoid bone invasion accelerates, and by the age of seven, the sinus extends posteriorly towards the sella turcica [1, 2]. Sphenoid pneumatization completes by the age of 12 as it reaches its adult size; usually, the pneumatization is limited to the sphenooccipital synchondrosis, but it has been found to extend into the occipital bone occasionally [3].

2. Case Report

A 23-year-old female patient was referred for airway analysis on CBCT. On inspection of the CBCT scan, the absence of the sphenoid sinus was noted (Figures 1 and 2). The other paranasal sinuses were present on CBCT evaluation. No variations of other paranasal sinuses were noticed. Severe mucosal thickening was seen in the left-sided frontal, maxillary, and ethmoidal sinuses. Moderate mucosal thickening was seen in the right frontal sinus.

Upon retrospectively asking, the family history was not significant for any bony malformation or congenital disorder.

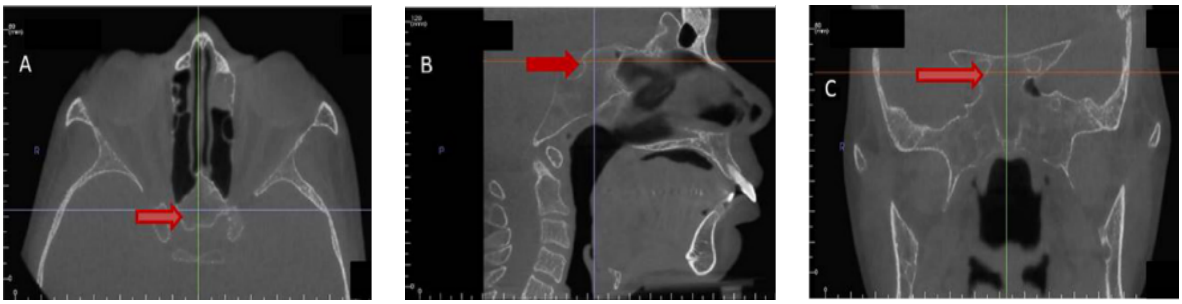

Figure 1. MPR (**A**: Axial, **B**: Sagittal, **C**: Coronal) views focused on sphenoid sinus.

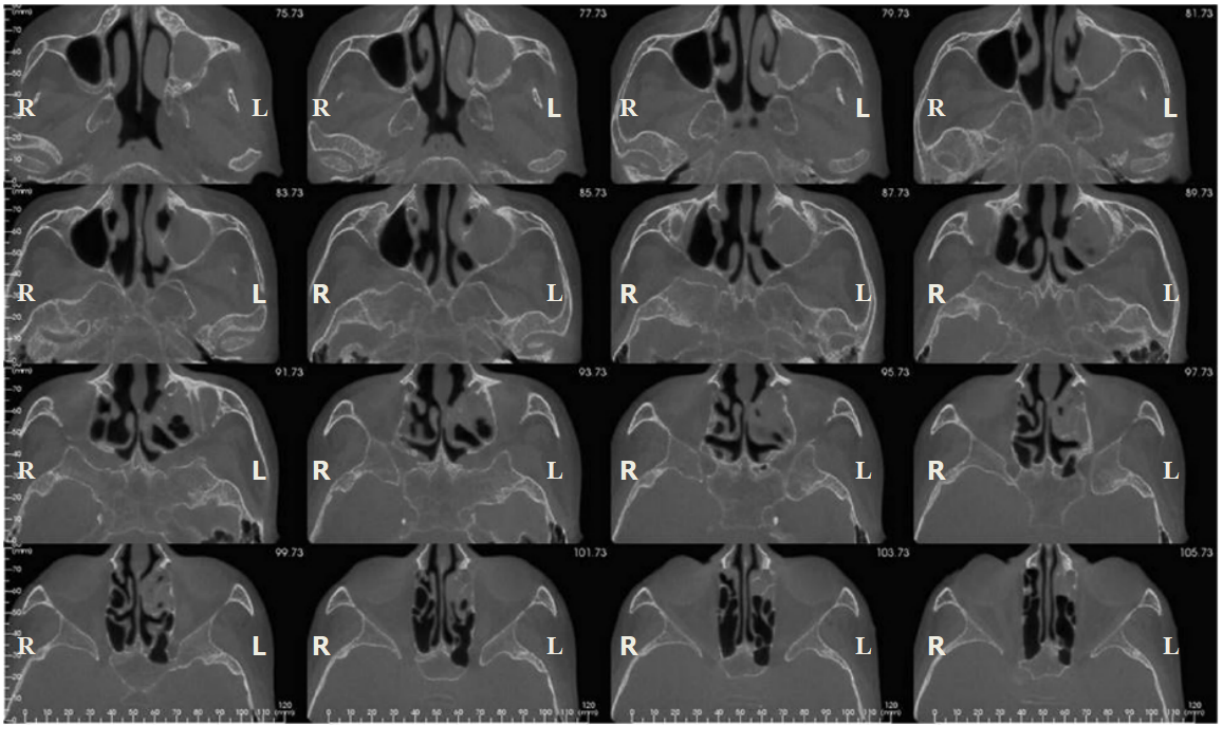

Figure 2. Axial sections (sectional interval at 1 mm) covering complete paranasal sinus region.

3. Discussion

Development of paranasal sinuses usually starts in the third and fourth fetal months as mucosal folds start to emerge, which during the process regress to form recesses that later pneumatize during the first decade of life [1]. The sphenoid sinuses are corresponding spaces surrounded by the body of the positioned in the midline and anteroinferiorly to the sella turcica communicating with the nasal cavity through the in its anterior wall [4, 5]. Bilateral sinuses usually remain separated by a midline septum. Important structures lying adjacent to the sphenoid sinus can comprise the pituitary gland, optic nerve, and located in ridges and depressions around the sinuses [6, 7].

Agenesis of the sphenoid sinuses is a rare phenomenon with an estimated prevalence of 1–1.5% [8]. During the literature search, we came across six research studies and four case reports with six cases of sphenoid sinus agenesis (Tables 1 and 2) [4, 8–15].

Table 1. List of research/case studies reported with agenesis of sphenoid sinuses.

Author	No. of CT Scans Observed	Cases with Sphenoid Sinus Agenesis	Prevalence of Agenesis
Jaworek-Troć et al. [8]	300	3(2 females,1 male)	1%
Eggesbø, H.B et al. [9]	126	0	–
Çakur B et al. [10]	384	1 unilateral	0.26%
Degirmenci B et al. [12]	4500	3	0.06%
Earwaker J [14]	800	13	1.625%
Aydinlioğlu A, Erdem S [15]	1526	2 cases of unilateral sphenoid sinus agenesis, no cases of bilateral sphenoid sinus agenesis	0.13%

Table 2. List of case reports with agenesis of sphenoid sinus.

Author	Age/Gender	Any Symptoms Associated	Radiographic Diagnosis
Antoniades K et al. [4]	32 years/Male	hand- schuller - christain disease	Sphenoid sinus agenesis
Keskin G et al. [11]	50 years/Female	Cushing's disease	Sphenoid sinus agenesis
Degirmenci B et al. [12]	45 years/Female	Chronic sinusitis,	Bilateral sphenoid sinus agenesis, maxillary sinusitis
Khanduri S et al. [13]	54 years/Female	Persistent headache , nasal blockage	Collective aplasia of bilateral frontal, sphenoid sinus; also underdevelopment of maxillary and ethmoid sinus bilaterally

Interestingly in the case report by Keskin et al. [11], the author states that before 2001, there was only one case of sphenoid sinus agenesis associated with Hand–Schuller-Christain disease. While Degirmenci et al. [12] in his study also confirmed having found only two cases of sphenoid sinus agenesis before 2005. Since then, occasional studies and case reports have been published, and most of them are associated with syndromes such as craniosynostosis (Melnick-Needles syndrome) as well as Down's syndrome (underdevelopment of frontal sinus) [2, 6].

4. Conclusions

The report highlights the importance of such rare variants for medical professionals frequently performing transsphenoidal surgical procedures and emphasizes the need for studies with larger sample sizes to understand the prevalence of agenesis of sphenoid sinuses and correlate it with any associated symptoms or complications.

Author Contributions

Concept—O.S., S.M.; design—O.S., S.M., O.J.; supervision—S.M., A.D.; resources—O.J., A.C.; materials—S.M., O.S.; data collection and/or processing—O.S., O.J., A.C.; analysis and/or interpretation—S.M., O.S.; literature search—O.S., S.M.; writing—O.S., S.M.; critical review—S.M., A.D.

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Informed Consent Statement

Written informed consent was obtained from the patients/patient who agreed to take part in the study.

Data Availability Statement

No new data were created or analyzed in this study. Data sharing is not applicable to this article.

Conflicts of Interests

The authors have no conflicts of interest to declare.

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