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**Case Report**

# AGENESIS OF FRONTAL SINUSES IN ASSOCIATION WITH KINDLER SYNDROME: A RARE CASE REPORT

## ABSTRACT

Kindler syndrome, as a rare subtype of Epidermolysis Bullosa, sets in motion a series of genetic conditions causing minor traumas and blisters on skin and making the skin susceptible to sunburn. The present study presented a case report of a 32-year-old female diagnosed with Kindler syndrome. Coronal and axial cone-beam computed tomography (CBCT) images clearly exhibited the agenesis of frontal sinuses. The condition was completely obvious in the images, which is a rare occurrence and has not been previously reported. The underdevelopment or aplasia of the paranasal sinuses is a rare phenomenon, which relates primarily to the frontal sinuses (12%) and secondarily to the maxillary sinuses (5-6%). Similarly, the agenesis of the sphenoid sinuses is an extremely rare condition. Therefore, raising our awareness about the paranasal sinus anomalies associated with the Kindler syndrome can lead to new discoveries about this syndrome. Further, with respect to the other patients suffering from Kindler syndrome, obtaining the basis of such knowledge together with evaluating CBCT or CT images in order to detect abnormalities can facilitate the management of the problems arising from paranasal sinus abnormalities.

**Keywords:** Frontal sinus, epidermolysis bullosa, syndrome.

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## INTRODUCTION

Kindler syndrome is a rare autosomal recessive genetic disorder induced by mutation in the KIND1 or FERMT1 genes (fermitin family homolog 1).[1] The first case of this syndrome dates back to 1954 and was described by the pediatrician Theresa Kindler, reporting the case of a 14-year-old female English patient who had developed blisters on her feet, legs, arms, and hands, along with changes in skin pigmentation, after exposure to the sun. Kindler syndrome is considered as a rare subtype of Epidermolysis Bullosa which sets in motion a sequence of genetic conditions responsible for the development of blisters on skin as well as minor traumas, and render the skin prone to sunburn.[2]

In addition, this syndrome can affect various mucous tissues, such as the mouth and eyes, and can lead to other health problems as well. The oral manifestations of Kindler syndrome include multiple painful oral ulcers in the mucosa, severe periodontitis with spontaneous bleeding, angular cheilitis, and desquamative gingivitis (i.e. red, shedding, and ulcerated appearance of the gums). Furthermore, poor dentition with premature loss of teeth, leukokeratosis of the lips (i.e. severely keratinized or ulcerated leukoplakia), xerostomia, caries, halitosis, gingival bleeding, and fragility of mucosa are considered as the other signs of the syndrome. These manifestations may impair proper nutrition intake and might cause growth and development problems.[3,4]

## CASE REPORT

A 32-year-old female diagnosed with Kindler syndrome was referred to a private oral and maxillofacial radiology center in Mashhad, Iran. Her chief complaint was headache and she had already been examined by an ENT specialist, advising the referral. The patient signed a written informed consent for publication of this rare case report.

She had no previous history of facial trauma, irradiation, or systemic disease affecting the skeletal system such as Paget's disease, osteopetrosis, or fibrous dysplasia. No abnormality or cystic fibrosis was found in her clinical and laboratory examinations. During further oral examination, pathological skin involvement and a blister were observed, which were believed to be associated with the syndrome (Figure 1).

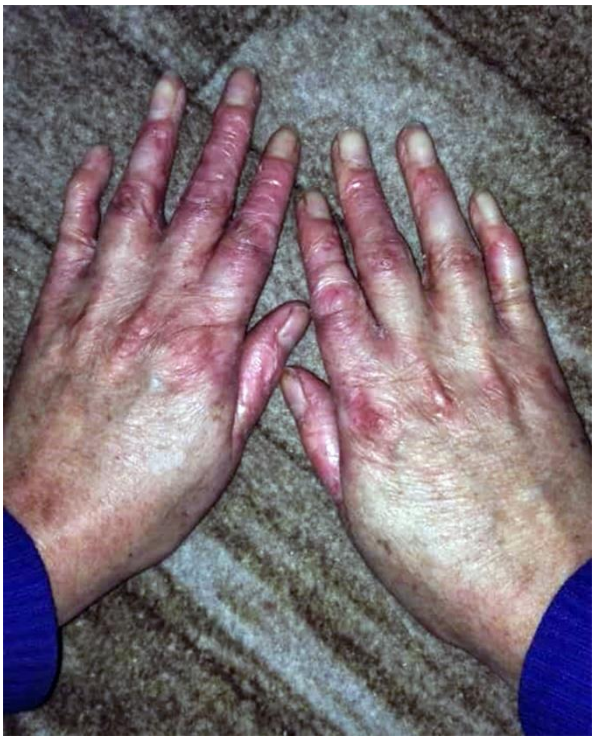

**Figure 1:** Skin involvement and blister related to kindler syndrome.

CBCT-based findings revealed the agenesis of frontal sinuses in coronal and axial views (a 3mm-thick slice). Nasal turbinates appeared normal and there was no sign of pneumatization in bilateral frontal sinuses (Figures 2-3).

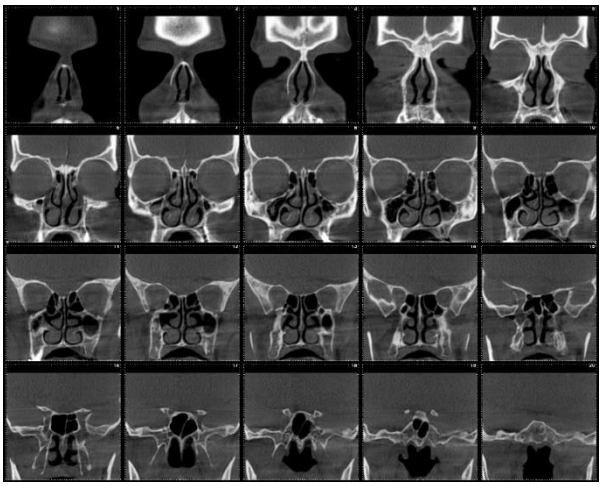

**Figure 2:** Coronal views in CBCT showed agenesis of frontal sinuses.

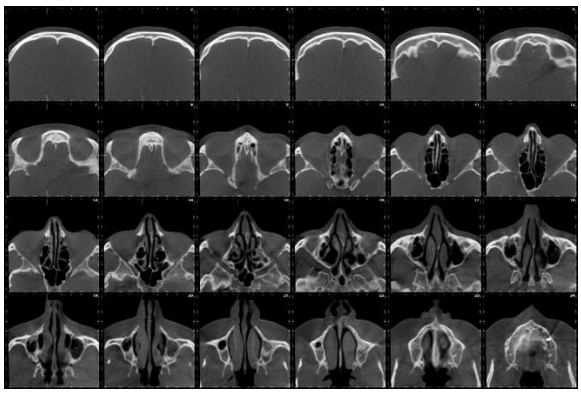

**Figure 3:** Axial views in CBCT showed agenesis of frontal sinuses and maxillary sinus hypoplasia.

Further, the hypoplasia of maxillary sinuses and deviated nasal septum were observed in the axial view (Figure 3).

## DISCUSSION

Kindler syndrome, as a rare type of Epidermolysis Bullosa, sets a series of genetic conditions which causes the skin to blister, experience minor traumas and be prone to sunburn. Among the oral manifestations of this syndrome, multiple painful oral ulcers in the mucosa, periodontal attachment loss, gingival bleeding, and fragile mucosa are considered as the most significant signs. They may lead to poor intake of nutrition and improper growth and development.[3]

Paranasal sinuses develop as an evagination of the mucosa from the nasal cavities during the third and fourth fetal months. The frontal sinus is absent at birth and starts to develop after the age of 2. The growth of the sinus increases at the age of 6 and continues until the late teenage years. The frontal sinus is the last one to develop among the paranasal sinuses. However, this sinus is reported to be bilaterally absent among 3-4 to 10% of the population. All paranasal sinuses undergo major pneumatization after birth, along with the development of the facial cranium and teeth.[5] As a rare condition, the underdevelopment or aplasia of the paranasal sinuses is mainly associated with the frontal (12%) and then maxillary sinuses (5-6%). In the same vein, another extremely rare condition is the agenesis of the sphenoid sinuses. The agenesis of the paranasal sinuses occurs more frequently in craniosynostosis, osteodysplasia (Melnick-Needles), and in the case of Down's syndrome (the hypoplasia of the frontal sinus).[6]

Although the above Downs syndrome, Osteodysplasia and Craniosynostosis are considered as the differential diagnosis for the agenesis of paranasal sinuses, other characteristics can also help to differentiate them. For instance, in craniosynostosis radiographic features are restriction of skull growth is perpendicular to the affected suture line. dysmorphic head shapes are associated with each type of craniosynostosis.[7] The radiographic characteristics of osteodysplasia are noticeable in the skull, where the bones of the cranial vault irregularly thicken with the sclerosis of the base, especially in the anterior/mid fossa and mastoids.[8] The physical characteristics of the Down's syndrome appear at birth, which include an epicanthic fold, brachycephaly, flat nasal bridge, upward angle of the eyes, single palmar crease, and increased nuchal skin.[9]

However, none of these characteristics were observed in the case of the present study. Accordingly, the agenesis of frontal sinuses in the patient's CBCT may be related to the Kindler syndrome. Therefore, by evaluating the frontal sinuses in CT or CBCT of the other patients with kindler syndrome, it can be found out whether the absence of the frontal sinus is associated with this syndrome.

The developmental anomalies of paranasal sinuses among patients with cystic fibrosis are significantly prevalent compared to the normal population. Developmental pathologic abnormalities may be misdiagnosed as sinusitis or neoplasm.[5,10] Further, paranasal air sinuses neoplasms are a rare condition and only 0.2% of which are malignant. Squamous cell carcinomas (SCC) are the most common neoplasm in paranasal sinuses.[11,12]

In addition, the configuration and development of frontal sinus in each person depends on the constitutional factors such as age, gender, hormones, and craniofacial configuration along with the environmental factors including climatic conditions and local inflammation.[13,14,15]

Based on previous studies, the frequency of bilateral frontal sinus aplasia is extremely low and this aplasia occurs more commonly in young women compared to men.[14,15]

The case reported in the present study can be considered unique since the patient is a female diagnosed with kindler syndrome, combined with the aplasia of bilateral frontal sinuses and hypoplasia of maxillary sinuses. These conditions could be related to her syndrome. Previously reported cases have been associated with other syndromes such as primary ciliary dyskinesia.[16]

To the best of our knowledge, there is no study on Kindler syndrome which reported paranasal sinus abnormalities. Therefore, it is recommended to check the new findings of the present study across a wide range of patients with Kindler syndrome.

## CONCLUSIONS

Increased awareness about the paranasal sinus anomalies associated with the kindler syndrome can provide the opportunity to make new findings related to this syndrome. In addition, with regard to the other patients suffering from the kindler syndrome, gaining the required knowledge, along with checking CBCT or CT images for abnormalities, can be very useful for managing the problems originated from paranasal sinus abnormalities. The significance of this issue can be seen, for example, in a case which the pathological cause of a headache may be associated with this condition.

## ACKNOWLEDGEMENTS

None

## CONFLICTS OF INTEREST STATEMENT

None

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