

## **Bilateral Absence of Frontal Sinus and Unilateral Mandibular Hypoplasia**

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### **Abstract**

*Absence of frontal sinus is usually associated with various syndromes such as craniosynostosis, osteodysplasia, down syndrome etc. Geographically, absence of frontal sinus is seen usually in areas with cold climate. This paper reports a case of 18-year old Indian woman suffering from bilateral absence of frontal sinuses which was non-syndromic in conjunction with unilateral mandibular hypoplasia. The paper also highlights the clinical significance of frontal sinus which was non-syndromic absence and its rarity in warm climate such as in South East Asian regions and the treatment options of unilateral mandibular hypoplasia.*

**Keywords:** Frontal sinus, Hypoplasia, Non-syndromic.

### **Introduction**

Soft and bone tissue facial asymmetry is seen in patients with and without facial cosmetic alterations. The etiology is believed to be related to congenital, developmental, or acquired factors.

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In some cases, asymmetry may be secondary to condylar hyperplasia or hypoplasia, ankylosis, or hemifacial microsomia. The importance of the head of the condyle as the main growth centre of the mandible was first fully realized by Wilson Charles (1925). Its significance in producing facial deformity when there is interference with this growth centre due to trauma or infection has been fully described by Rushton (1944) and Greer Walker (1957).

The growth of the skull, maxilla, and mandible are closely related. If growth is decompensated in one of these areas, the asymmetric growth and development of part of the craniofacial skeleton may result in a chin deviated from the mandibular midline. Patients with deviated chins usually present asymmetries in other portions of the facial skeleton. Genetic and trauma-related asymmetries may involve muscles, produce excessive unilateral growth, or adversely affect mandible development.

Facial asymmetry is considered to be present even in normal craniofacial complexes, and a cant of 0-3 mm may be deemed normal in healthy unaffected patients. The structures on the lower third of the face are usually more asymmetric than those in the middle third. According to the literature, the left side of the face is usually more affected due to genetic predisposition.

Frontal sinuses are pneumatic cavities that become radiologically evident at the age of five or six years and develop fully by the age of 20 years. Studies have suggested that the frontal sinuses are slightly bigger in males than in females, and the presence of a metopic suture is associated with the absence of the frontal sinuses. Paranasal sinuses are prone to a great diversity of anomalies.

The underdevelopment or aplasia of the paranasal sinuses is a rare phenomenon that refers mainly to the frontal (12%) and secondarily to the maxillary sinuses (5–6%). This occurs more frequently in syndromes of craniosynostosis, osteodysplasia (Melnick-Needles), as well as in cases of Down's syndrome (hypoplasia of the frontal sinus). It is important for surgeons to be aware of variations that may predispose patients to increased risk of intra operative complications and help avoid possible complications and improve success of management strategies.

Bilateral absence of frontal sinus is rare. The aim of this article is to report a case of unilateral mandibular hypoplasia with bilateral absence of frontal sinus which was non syndromic.

### Case Report

An 18-year-old Indian woman reported to the department of Oral Medicine and Radiology, Dental College, MM University, India with a complaint of a deviated chin. Patient's history revealed that the patient first noticed facial asymmetry 10 years back, which has gradually increased with time. Since then, the patient also complained of pain in the region of the ear occasionally, on the same side. The pain was dull, intermittent in nature, radiated towards the region of head and eye and relived upon itself. On examination, there was no intra oral finding except class III malocclusion and the presence of facial asymmetry with chin deviated towards the right side (Figure 01).



Figure 01: Presence of facial asymmetry with chin deviated towards the right side.

On radiographic examinations, Panoramic radiograph revealed hypoplasia of mandibular body and ramus including mandible condyle on right side. There was also presence of prominent antegonial notch on right side (Figure 02).



Figure 02: Panoramic radiograph revealed hypoplasia of mandibular body and ramus including mandible condyle on right side with prominent antegonial notch.

Water's view revealed that the patient had mandibular asymmetry and presence of bilateral absence of frontal sinus (Figure 03).



Figure 03: Water's view revealed the patient had mandibular asymmetry and presence of bilateral absence of frontal sinus.

CT scan revealed mandibular hypoplasia on right side with hypoplasia of mandible condyle and resultant retrognathism (Figure 04). Mild flattening of right condyloid fossa and articular eminence was also present. Bilateral frontal sinuses were absent (Figure 05).



Figure 04: CT scan revealed mandibular hypoplasia on right side with hypoplasia of mandible condyle and resultant retrognathism.



Figure 05: Mild flattening of right condyloid fossa and articular eminence was also present. Bilateral frontal sinuses were absent.

## Discussion

A hypoplastic mandible can occur as an isolated entity or as part of the following first arch syndromes: (Pierre Robin anomaly, Treacher Collins, cri du chat, trisomies, and Goldenhar's). In our case, hypoplastic mandible was present with bilateral absence of frontal sinuses.

Unlike teeth with periodontal-related lesions, teeth with endodontic-related lesions mainly feature extensive restorations. In contrast to teeth with endodontal lesions, periodontal lesions are often visible in combination with local factors (plaque/calculus). Whereas periodontal-related lesions which generally involve increased exploratory depth, endodontal related lesions as in the case mentioned; during probing, at one particular aspect of the tooth, the probe 'disappears' into a deep, narrow, fistula-like defect.

Three systemic factors, i.e. the craniofacial configuration, the thickness of frontal bone and growth hormone levels influence frontal sinus morphology. According to Koertvelyessey, who studied the frontal sinus of 153 Eskimo crania, the degree of pneumatization correlates positively with the degree of environmental coldness in which the population lives.

Frontal sinus patterns have a potential to be used as aids for personal identification, age estimation, and sexual dimorphism. They have been found to have individual morphological variations. Thus, the reliability of comparing ante- and post-mortem radiographs of the frontal sinus for identification is well founded.

Owing to anatomic variability of the frontal sinuses, the neurosurgical approach to the orbit by the anterior cranial fossa in a patient with an inflammatory nasal pathology may jeopardize the sterility of surgical field.<sup>6</sup> In patients with large pneumatization, the possible inadvertent entry into the frontal sinus may occur during a peritoneal craniotomy for the microtomy for the microsurgical clipping of aneurysms. This situation may require a frontal sinus cranialization or an osteoplastic frontal sinus operation with fat obliteration.

Therefore, the preoperative recognition of the frontal sinuses is a prerequisite for any successful surgical procedure because of individual anatomic variations. Patients with class III malocclusion combined with facial asymmetry in which the mandibular midline does not match the chin midline require mandibular bilateral sagittal osteotomy. However, the patient's perceptions over their condition must be taken into account as suggested in our case.

## Conclusion

The aim of this paper was to present a case of unilateral mandibular hypoplasia which was idiopathic in nature in conjunction with absence of bilateral frontal sinuses. Absence of frontal sinuses shows racial differences. Environmental factors, i.e a warm climate, might also be related to the low frequency of frontal sinus aplasia. Lower frequency might be appropriate as an identification procedure. On the other hand, neurosurgeons should be prepared for the inadvertent entry during the surgical interventions as mentioned earlier.

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