

A Rare Case of Autosomal Dominant-Craniometaphyseal Dysplasia, Wormion Bone Type

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Abstract: ***Background:** Craniometaphyseal dysplasia (CMD) is a rare hereditary disorder characterised by hyperostosis and sclerosis of craniofacial bones, dental malocclusion, and flared metaphysics of long bones. We present a case of autosomal dominant form of CMD, wormion bone type. **Case Report:** A 22-year-old male patient visited Otolaryngology department of our institute with complaints of bilateral hearing loss and frequent nasal obstruction. Radiological assessment showed diffuse sclerosis and hyperostosis of calvaria, under tubulation of long bones with multiple wormion bones. Provisional diagnosis of AD-CMD was made which was confirmed by genetic analysis. **Conclusion:** CMD is a rare disease falling under the spectrum of Craniotubular Dysplasias. Establishing correct diagnosis requires multidisciplinary approach with final diagnosis confirmed by genetic analysis.*

Keywords: Craniometaphyseal Dysplasia, Craniotubular Dysplasia, Erlenmeyer Flask Deformity, Wormion Bone, Ankh Mutation, Hyperostosis

1. Introduction

- Craniometaphyseal dysplasia (CMD) is a rare genetic bone disorder characterised by hyperostosis and sclerosis of craniofacial bones, dental malocclusion and flared metaphysics of long bone. CMD can be sporadic or inherited as, relatively mild, autosomal dominant (AD) and rare, severe autosomal recessive form. Mutation in ANKH on chromosome 5p15.2-p14.1 is thought to be the culprit gene.
- We present a case of wormion type of AD-CMD with typical clinical and imaging features.

2. Case Report

- A 22-year-old male patient visited the Department of Otolaryngology of our institute with complaints of bilateral hearing loss and frequent nasal blockage. There was history of delayed eruption of permanent teeth. Birth history was normal. There was no history of consanguineous marriage between his parents. His father had similar history and died at age of 22 years.
- On examination, the following were noted:
 - Hypertelorism, frontal and paranasal bossing, a broad and flat nasal bridge [Figure 1] with a saddle deformity and prominent zygoma.
 - Narrowing of bilateral external ear and right nasal cavity.
 - Dental malocclusion. [Figure2]
 - Bilateral sensorineural hearing loss
 - Genu valgum with prominent clavicles.
 - Height, weight, thyroid profile, and IQ were within normal limits.



Figure 1: Hypertelorism with a broad and flat nasal bridge is seen.



Figure 2: Dental malocclusion is seen.

- He was referred to the Department of Radiology for radiological assessment. A skeletal survey and HRCT of bilateral temporal bones revealed diffuse sclerosis and

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hyperostosis of calvaria and facial bones including skull base [Figures 3, 7], which narrowed the bilateral internal acoustic canals, external auditory canals, middle ear cavities, skull base foramina, both choana with prominent right sided nasal spur [Figure 4], significantly occluding the nasal cavity. Reduced pneumatization of bilateral mastoid air cells with non-pneumatization of sphenoid and frontal sinuses were seen [Figure 5]. Multiple small wormian bone were noted with widely gaping metopic suture [Figure 6, 7]. Plain radiographs of the long bones showed undertubulation giving the Erlenmeyer flask deformity [Figure 8]. Visualised clavicle and scapula showed marked widening.

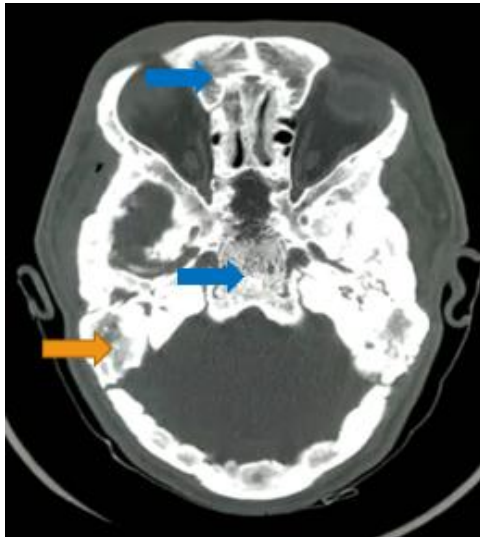


Figure 3: Axial CT of the skull base shows diffuse sclerosis and hyperostosis of the calvaria with narrowing of the skull base foramina. Orange arrow shows reduced pneumatization of bilateral mastoid air cells. Blue arrows show non-pneumatization of the sphenoid and frontal sinuses.

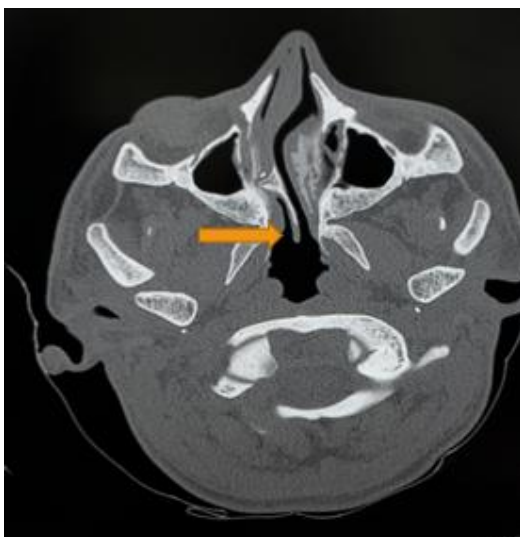


Figure 4: Axial CT at the level of nasopharynx shows narrowing of both choana (orange arrow) with prominent right-sided nasal spur significantly occluding the nasal cavity.

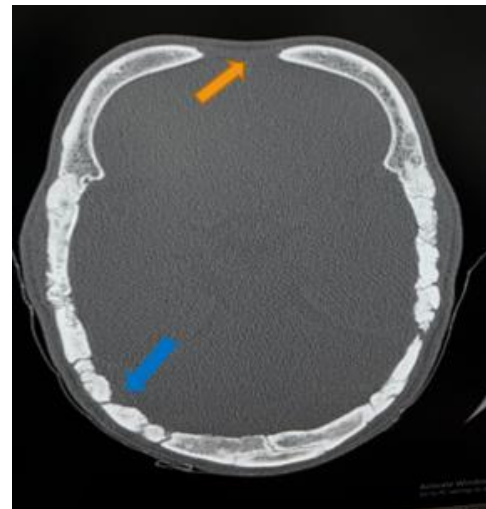


Figure 5: Axial CT section of the head shows multiple small wormian bones (orange arrow) with widely gaping metopic suture (blue arrow).

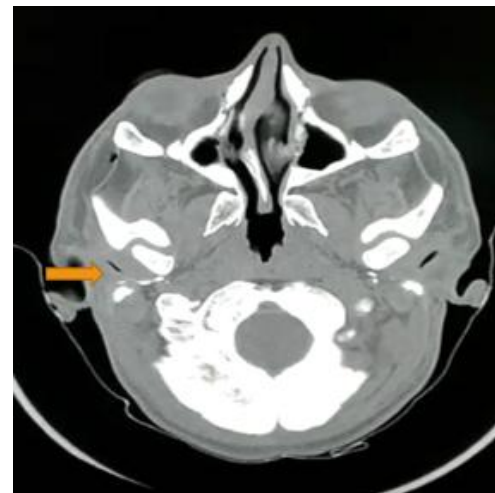


Figure 6: Axial CT section shows marked narrowing of both the external auditory canals (orange arrow). Foramen magnum is normal in calibre

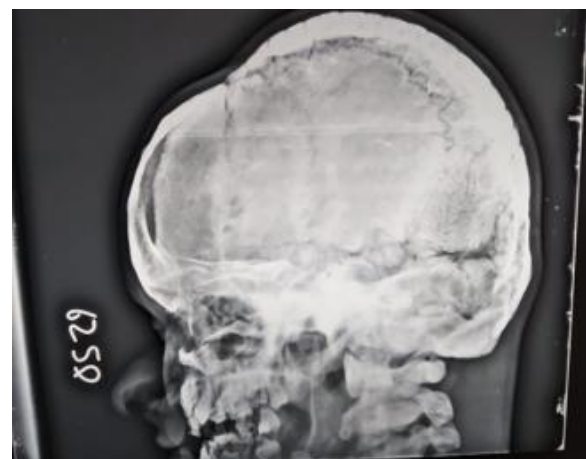


Figure 7: Lateral skull radiograph shows diffuse thickening and sclerosis of skull bones with multiple wormian bones.



Figure 8: Plain radiographs of the long bones shows undertubulation giving the Erlenmeyer flask deformity

- With multidisciplinary approach, a provisional diagnosis of AD CMD was made which was subsequently confirmed by gene testing showing mutation in ANKH gene.

3. Discussion

- The term craniometaphyseal dysplasia was coined by Jackson et al.² in 1954, and refers to a genetic bone disease with overgrowth of craniofacial bones and metaphyseal widening of long bones. CMD falls under the spectrum of craniotubular dysplasias.³
- As in our instance, the majority of CMD cases are AD. Rarely, when unaffected parents have more than one affected child, CMD is thought to be inherited by autosomal recessive (AR). Mutations in the progressive ankylosis protein homolog (ANK) human gene (ANKH) gene cause AD CMD, and a candidate locus for AR CMD on chromosome band 6q21-22 has been identified⁴.
- The most prominent radiographic alteration is in the skull and craniofacial region, where there is generalised thickening and sclerosis of the skull vault as well as deformity and obliteration of the paranasal sinuses⁵. In two thirds of instances, people have ear and nose complaints.
- The tubular bones show progressive thinning of cortex, widening of medulla and splaying of metaphyses, described as the *Erlenmeyer Flask* deformity.^{5,6}
- Apart from all the classical findings, multiple wormion bones with widely gaping metopic suture were also noted in our case suggesting the wormion bone type of the CMD.
- Medical and surgical treatments can be considered for management of CMD. Medical regimens consist of therapy with calcitonin⁷ or low calcium diet combined with calcitriol⁸. Surgery can be considered for palliative purposes to relieve severe symptoms by cranial nerve compression. In our case, the patient is managed conservatively with routine follow up.

4. Conclusion

- CMD is a rare disease which requires early differentiation from other craniotubular-dysplasia. Establishing correct diagnosis requires multidisciplinary approach with final diagnosis by genetic analysis.

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