Scholars Journal of Medical Case Reports
OPEN ACCESS
Abbreviated Key Title: Sch J Med Case Rep
ISSN 2347-9507 (Print) | ISSN 2347-6559 (Online)
Journal homepage: https://saspublishers.com/journal/sjmcr/home

Cleidocranial Dysplasia: A Clinico-Radiological Spectrum

Naveena Kondabolu[1*], Borra Siva Nagendra[2], B. Anjiaiah[3]

[1,2]Resident, Department of Paediatrics, Katuri Medical College and Hospital, Chinakondrupadu, Guntur, Andhra Pradesh, India
[3]Professor and Head of the Department, Department of Paediatrics, Katuri Medical College and Hospital, Chinakondrupadu, Guntur, Andhra Pradesh, India

***Corresponding author:** Naveena Kondabolu
| **Received:** 27.02.2019 | **Accepted:** 05.03.2019 | **Published:** 30.03.2019
DOI: 10.36347/sjmcr.2019.v07i03.004

Abstract **Case Report**

Cleidocranial dysplasia (CCD) is also known as Marie-Sainton disease. It is an Autosomal Dominant/Sporadic pattern(40%). It affects bones derived from both Intra membranous and Endochondral ossification.with skeletal dysplasia characterised by abnormal clavicles, Patent sutures and Frontanelles, supernumerary teeth and a variety of other skeletal abnormalities. It is rare with probable incidence of 1 in 100,0000.We report a rare case of Cleidocranial Dysplasia in a 7 year old male child born to 3rd degree consanguineous couple with negative family history probable sporadic inheritance presented with recurrent Upper respiratory tract infections and Short Stature and Dental abnormalities. On examination increased shoulder girdle mobility, Failure to dislodge deciduous teeth and depression over forehead and top of skull. Even though it is genetically associated but the diagnosis made by Clinical and Radiographic features. Molecular genetic testing such as sequence analysis and deletion analysis can be used in CCD. Treatment of these patients include a multi-disciplinary approach which include Paediatrician, Orthopaedic and Dental corrections along with Genetic counselling.

Keywords: Cleido Cranial Dysplasia, Marie- Sainton disease.

INTRODUCTION

Cleido Cranial Dysplasia (CCD) is rare disease itself but with normal life expectancy every physician should know the importance of this disease because of complications like risk of Sleep apnea, Sinus infections. Characterised by shortstature, most striking feature is aplastic or hypoplastic clavicles, Late closure of Frontanelles, Open skull sutures and Multiple Wormian bones.

CASE REPORT

History

A 7 year old male child presented to paediatric outpatient department born out of 3rd degree consanguineous couple belonging to lower class presented with symptoms of mouth breathing and sneezings, previous history of hospitalization for Lower Respiratory Tract Infection for 1 week, and Failure to dislodge deciduous teeth. The child had Recurrent Upper respiratory Tract Infections 7 attacks/yr and Failure to thrive. Antenatal, Natal and Family history: Not Significant.

Physical examination

WT:12 KGS,(less than 3rd centile) HEIGHT:102 cm .US:LS=1:1.1.(less than 3rd centile). BMI:11.5 kg/m^2(less than 3rd centile).

On examination shows large brachycephalic head with Frontal bossing and mild hypertelorism and mid-face deficiency, with wide open anterior frontanelle.

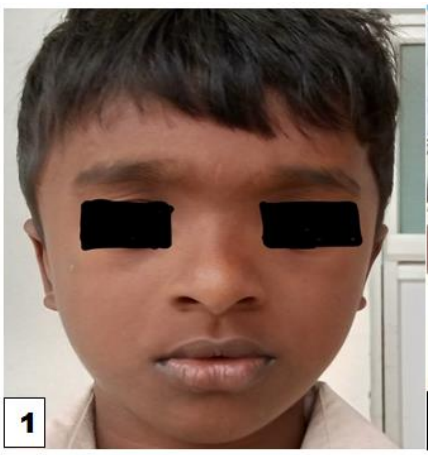

Fig-1: Large brachycephalic head with hypertelorism and mid-face deficiency

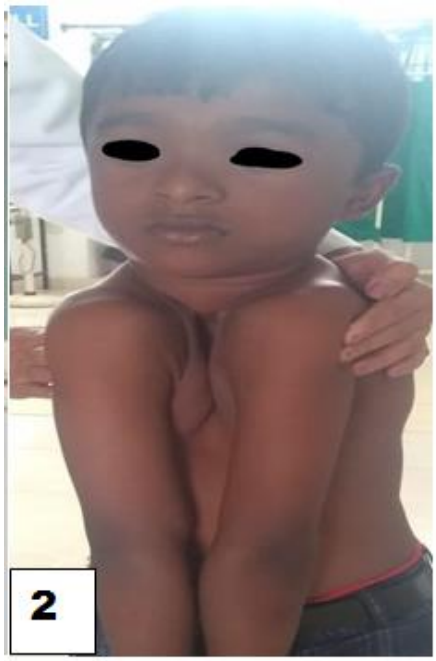

Fig-2: Drooping shoulders with increased shoulder girdle mobility

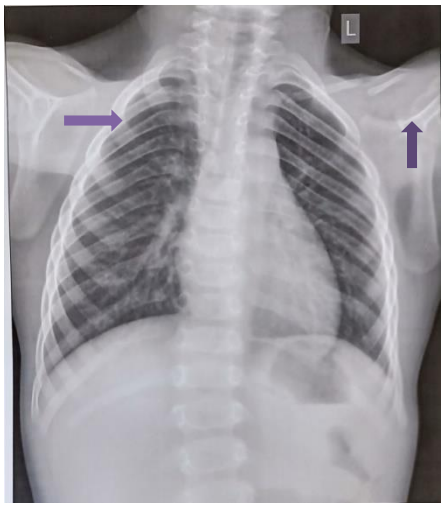

Fig-3: Shows aplastic right clavicle andHypoplastic left clavicle with Bell shaped Rib cage and scoliosis

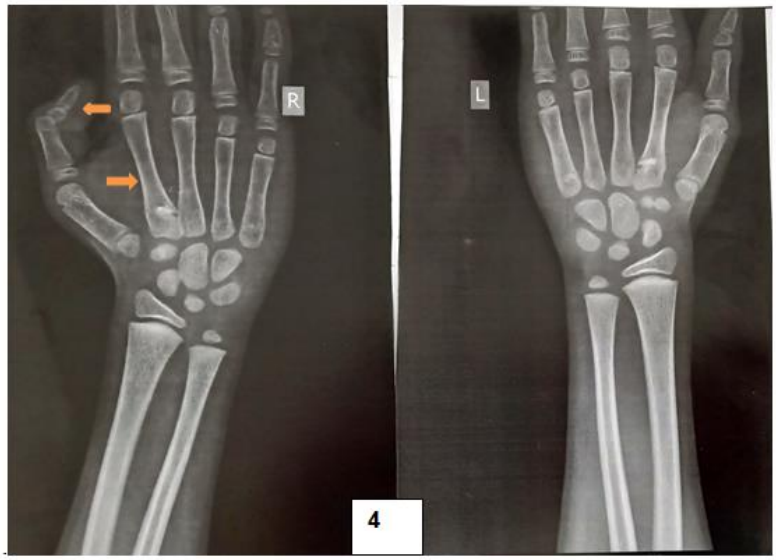

Fig-4: Wrist radiographs shows long, slender metacarpals with tapered distal phalynx

Fig-5: Shows failure to dislodge deciduous teeth with caries and high arched palate

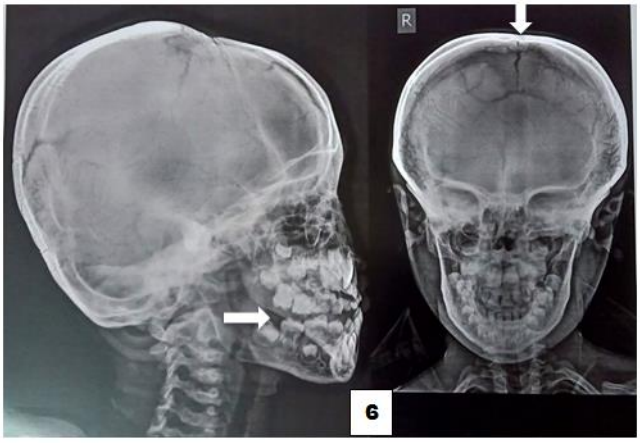

Fig-6: PA and Lateral view of skull shows widened sutures with wormian bones, parietal and Frontal bossing and Hypoplastic Mid-face structures. Absent pneumatisation of para nasal sinuses

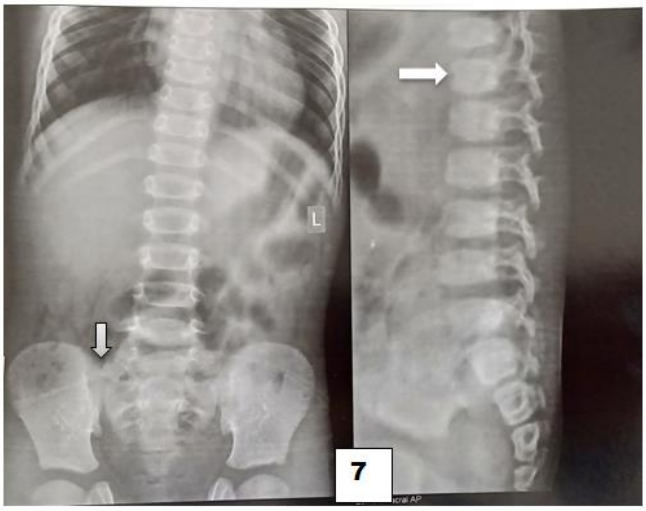

Fig-7:-Pelvic radiograph with Dorso lumbar spine shows scoliosis and hypoplastic iliac bones with poorly formed sacrum with anterior notching of vertebral bodies

Ophthalmological examination: VA:6/6, Fundus-normal
Cardiac examination: shows normal findings.

Further Evaluation

Routine laboratory invetigations in Normal range, ortho consultation done at present no active intervention needed. Dental examination shows failure to erupt permanent teeth along with failure to dislodge deciduous teeth with caries and hypoplasia of maxilla is noted. Genetic screening with sequence analysis and deletion analysis to be awaited counselling done

DISCUSSION

Cleidocranial dysplasia is rare in occurrence with an incidence of 1:10,00,000 [2]. It is caused by mutation in the gene on 6p21encoding transcription factor Core Binding Factor Subunit Alpha1 (CBFA1) or Runt related transcription factor 2 (RUNX2) [1].

RUNX2 is a part of the Fibroblast Growth Factor (FGF) and Bone Morphogenetic Protein (BMP) signaling pathways in tooth and bone development respectively [4]. FGF and BMP4 induce both Msx1 dependent and Msx1-independent signalling pathways in early tooth development. RUNX2 is a major regulator of differentiation and maturation of osteoblasts and chondrocytes [5]. Here, son presented with similar skeletal and dental abnormalities. All clinical and radiographic features suggestive of CCD. This supports the fact that CCD is transmitted by sporadic occurrence has been reported in about 40% of cases [6] and autosomal recessive inheritance has also been reported [7]. Sporadically transmitted in this child. Diagnosis is mostly made on the basis of clinical and radiographic features. Molecular genetic testing such as sequence analysis or deletion analysis can be applied in CCD for genotypic evaluation. Mutations have been detected in 60%-70% of individuals with clinical diagnosis of CCD [8].

The phenotypic spectrum of CCD ranges from mildly affected individuals with dental anomalies only, to severely affected patients with syringomyelia [6]. Though bones formed by endochondral ossification can also be affected, CCD most predominantly affects bones derived from intramembranous ossification, such as the cranium and the clavicles [8]. Individuals are usually short in stature. This is a proportionated dwarfism.

The most striking skeletal defects are hypoplastic or aplastic clavicles, late closure of the fontanelles, open skull sutures and multiple wormian bones [2]. Partial hypoplasia commonly involves the acromial end of the clavicles [7]. Complete absence of clavicles is seen in 10% of cases as seen here in Case [1]. The thoracic cage is small and bell or cone shaped with short, oblique ribs making the individual prone to chest infections. Scapulae are sometimes hypoplastic [7]. Muscle attachments to the clavicles may also be dysplastic, leading to distortion of the neck [3].

Cranial abnormalities include wide-open sutures, patent fontanelles, and the presence of wormian bones as seen in both reported cases. Delayed closure of cranial sutures and fontanelles leads to frontal, parietal and occipital bossing. Additionally, there may be poor or absent pneumatisation of paranasal, frontal and mastoid, sphenoid sinuses [9]. Facial features include depressed nasal bridge, hypertelorism with possible exophthalmos, hypoplastic mid-facial region and relatively prognathic mandible.

The palate is often high arched [9].Pelvic features are delayed ossification with wide pubic symphysis, hypoplastic iliac wings, widened sacroiliac joints and a large femoral neck resulting in coxa vara (a condition in which the angle between the head and neck of the femur and its shaft isdecreased, usually defined as $\leq$ 120º). Hand and wrist radiographs show

pseudoepiphyses of the metacarpal and metatarsal bones resulting in characteristic lengthening of the second metacarpal. Hypoplastic and pointed digital phalanges can also be seen [9]. Dental changes occur frequently and are very characteristic of CCD. Retention of the deciduous dentition with delayed eruption of the permanent teeth is a relatively constant finding. Delayed eruption of permanent teeth is probably attributed to generalized reduction in bone resorption and paucity of cementum [10]. The presence of multiple supernumerary teeth has been hypothesized to result from incomplete or delayed resorption of the dental lamina. Morphologically, supernumerary teeth resemble their normal counterparts [7].Hypoplasia of the masseter muscles is another feature, which may be due to discontinuity of the zygomatic arch. Hypofunction of the masseter muscle eventually leads to compensatory hyperfunction of the temporal muscles. This makes the anterior border of the mandibular ramus parallel to the posterior border, and the coronoid process is directed upwards and backwards in such cases.

The differential diagnosis of CCD includes Crane-Heise syndrome, mandibuloacral dysplasia, pycnodysostosis, Yunis Varon syndrome, CDAGS syndrome (Craniosynostosis, anal anomalies, and porokeratosis) and hypophosphatasia, Hajdu-Cheney syndrome etc. These conditions may share some characteristics with CCD; however, all these are autosomal recessive disorders and have other specific features.

The patient presented to our department was routinely monitored for complications. The child was examined for following conditions

- Assessment of Growth and Development
- Blood pressure monitoring
- Evaluation of Skeletal system
- Orthodontic corrections
- Scoliotic and Maxillofacial surgical abnormalities follow up
- CardioRespiratory evaluation

Conclusion

The clinical findings of CCD are present at birth. But, they are often diagnosed at a much later time. Most cases are diagnosed as an incidental finding by Paediatricians and dentists while treating patients for unrelated conditions. Family history, pathognomonic clinical and radiographic findings play a central role in the diagnosis of CCD. Treatment of these patients requires a multidisciplinary approach which includes Paediatrics, orthopaedic and dental corrections along with management of any complications of CCD.

Ethical approval

Necessary approval taken from the institution and the patients for carrying out this work.

References

1. Toptanci IR, Colak H, Koseoglu S. Cleidocranial dysplasia:Etiology, clinicoradiological presentation and management. J Clin and Exp Invest. 2012; 3 (1):133-136.
2. Garg RK, Agrawal P. Clinical spectrum of cleidocranial dysplasia: a case report. Cases Journal. 2008 Dec;1(1):377.
3. Farronato G; Maspero C, Farronato D, Gioventu S. Orthodontic treatment in a patient with cleidocranial dysostosis. Angle Orthod. 2009; 79:178-185.
4. James M J, Jarvinen E, Wang XP, Thesleff I. Different roles of Runx2 during early neural crest-derived bone and tooth development. J Bone Miner res. 2006; 21(7):1034-1044.
5. Bei M, Maas R. FGFs and BMP4 induce both Msx1-independent and Msx1-independent signalling pathways in early tooth development. Development 1998; 125:4325-4333.
6. Amresh Reddy P. Cleidocranial dysplasia. A case report and review of literature. NMJ 2012; 1(1):35-37.
7. Mundlos S. Cleidocranial dysplasia: clinical and molecular genetics. J Med Genet 1999; 36:177-182.
8. Londono RM, Lee B: University of Washington, Seattle. GeneReviews™ [Internet]. [Cited 2006 Jan 3].
9. Dixit R, Dixit K, Paramez AR. Cleidocranial dysplasia. Lung India. 2010; 27:176-177.
10. Jensen BL, Kreiborg S. Development of the dentition in cleidocranial dysplasia. J Oral Pathol Med. 1990; 19:89-93.