Photo Essay

Oculodentodigital dysplasia

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Oculodentodigital dysplasia is a rare, autosomal dominant disorder with high penetrance and variable expressivity, caused by mutations in the connexin 43 or gap junction protein alpha-1 gene. It has been diagnosed in fewer than 300 people worldwide with an incidence of around 1 in 10 million. It affects many parts of the body, particularly eyes (oculo), teeth (dento), and fingers and/or toes (digital). The common clinical features include facial dysmorphism with thin nose, microphthalmia, syndactyly, tooth anomalies such as enamel hypoplasia, anodontia, microdontia, early tooth loss and conductive deafness. Other less common features are abnormalities of the skin and its appendages, such as brittle nails, sparse hair, and neurological abnormalities. To prevent this syndrome from being overlooked, awareness of possible symptoms is necessary. Early recognition can prevent blindness, dental problems and learning disabilities. Described here is the case of a 21-year-old male who presented to the ophthalmology outpatient department with a complaint of bilateral progressive loss of vision since childhood.

Key words: Clinodactyly, connexin 43, hypodontia, microcornea, microphthalmia, oculodentodigital dysplasia, syndactyly

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Oculodentodigital dysplasia (ODDD), also known as Meyer-Schwickerath syndrome,[1] is a condition that occurs due to mutations in the connexin 43 (Cx43) gene or gap junction protein alpha-1 gene located on chromosome 6q22-q24 which leads to disruption of Cx43-mediated cell-to-cell communication, resulting in disrupted morphological patterning during development and altered functioning of cells in mature tissue. Most cases of ODDD are inherited in an autosomal dominant pattern with a high penetrance and variable expression.[2] Less commonly, ODDD can be inherited in an autosomal recessive pattern. This rare developmental multisystem disorder was first described by Lohmann in 1920.[3] Meyer-Schwickerath introduced the term "dysplasia oculodentodigitalis" in 1957.[3] Gorlin established the acronym of ODDD syndrome in 1963.[3] Approximately 300 such patients have been reported worldwide so far, the incidence being around 1 in 10 million.[4] To our knowledge, no such case report has been published in any ophthalmology journal in India.

Case Report

A 21-year-old male presented to the ophthalmology outpatient department of our institute with a complaint of bilateral progressive loss of vision since childhood. We did a complete anterior and posterior segment evaluation of this patient. Both eyes had a best corrected visual acuity of perception of light present, projection of rays accurate in all four quadrants, Intraocular pressure of 20 mmHg, normal eyelids and conjunctiva, microphthalmia, microcornea with band shaped keratopathy, brown flat iris with posterior synechia (more in right eye), shallow anterior chamber, semi dilated fix pupil which was not reacting to light and complicated mature cataract [Figs. 1 and 2]. The fundal glow was absent, so B-scan ultrasonography was done which showed vitreous degeneration with the axial length of 18 mm in both eyes.

General examination of the patient showed following features: Normal gait, well-built and vital signs were within normal limits for his age. Sparse and brittle scalp hairs were seen. Eyebrows were sparse and absent laterally. Parrot-beaked nose, hypoplastic alae nasi, small anteverted nares and prominent columella were seen [Fig. 3]. Oral examination showed hypodontia, microdontia, dental caries and partial anodontia [Fig. 4]. The prominent mandible was seen. Both hands showed camptodactyly, clinodactyly and brachydactyly of 5th finger; more on the left side as compared to the right [Fig. 5]. Both feet showed syndactyly of 2nd and 3rd toes [Fig. 6]. A dental opinion was taken which confirmed our findings. Furthermore, a physician opinion was taken which revealed no systemic or neurological abnormalities. X-ray radiography and radiological consultation were done. X-ray skull showed cranial hyperostosis and bilateral, symmetrical widening of the ramus of mandible [Fig. 7]. No intracranial calcification was seen. X-ray chest showed widening of both clavicles and mildly widened anterior aspects of ribs bilaterally. X-ray of both hands revealed flexion deformity of proximal interphalangeal joints of 5th fingers (camptodactyly) (left > right), flexion deformity of distal interphalangeal joint of 5th fingers (clinodactyly), hypoplastic middle phalanx of 5th finger (brachydactyly

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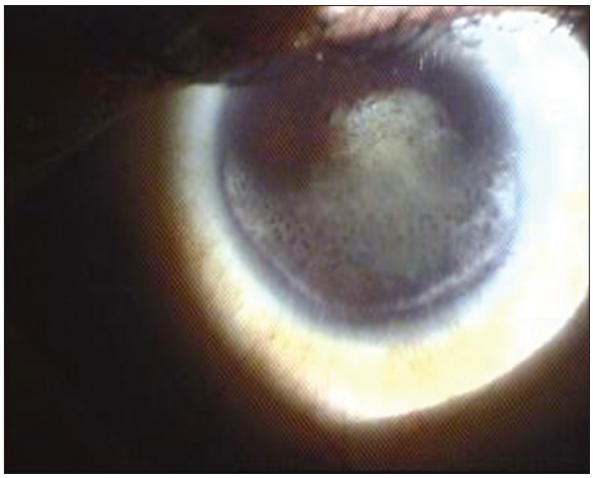

Figure 1: Right eye-diffuse light examination

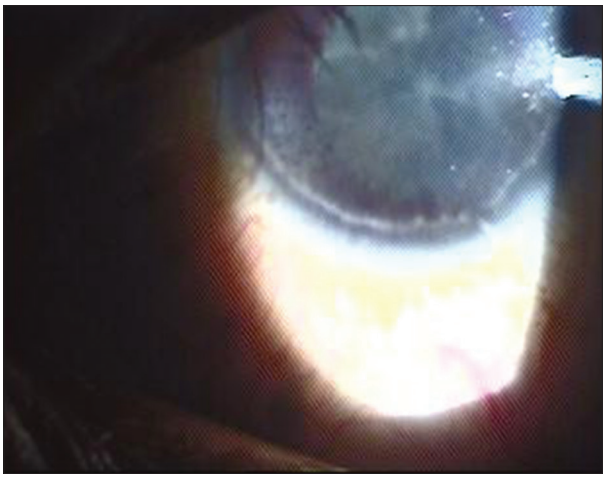

Figure 2: Left eye-diffuse light examination

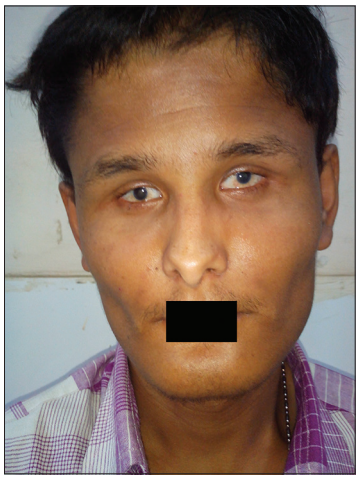

Figure 3: Face photograph: Parrot-beaked nose, hypoplastic alae nasi, small anteverted nares, prominent columella, sparse facial and scalp hair, microphthalmia with microcornea, prominent mandible and sparse, laterally absent eyebrows

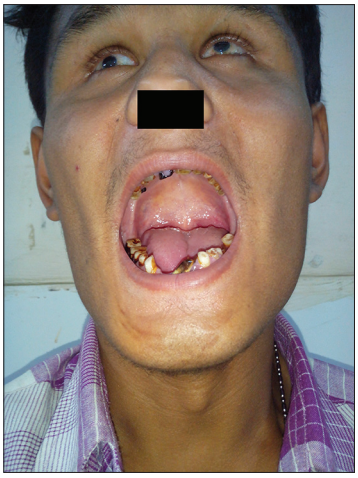

Figure 4: Dental features: Hypodontia, microdontia, dental caries and partial anodontia

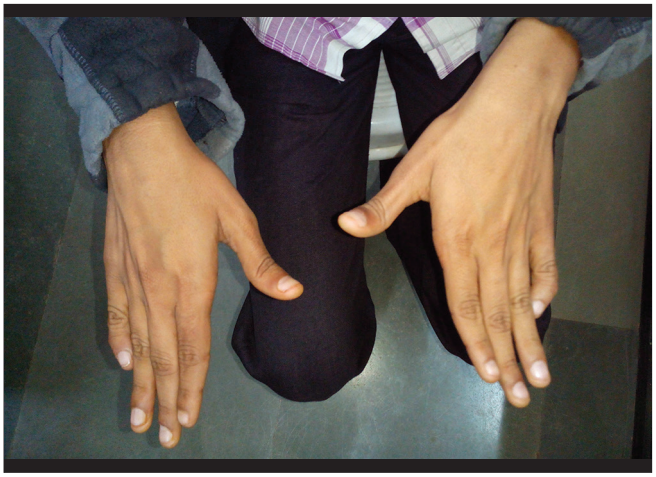

Figure 5: Hand features: Camptodactyly, clinodactyly and brachydactyly of 5th finger; more on left side as compared to right

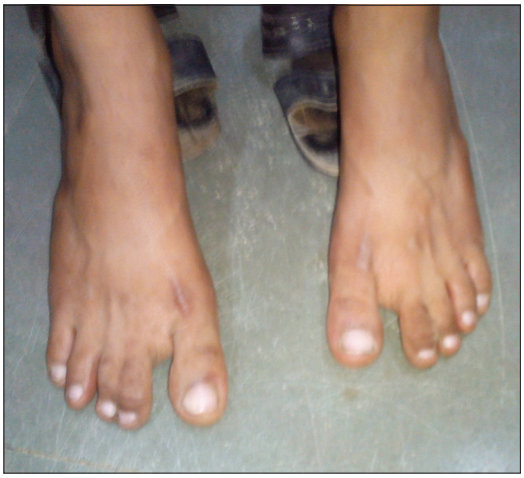

Figure 6: Feet abnormalities: Both feet showed syndactyly of 2nd and 3rd toes

type A3), flexion deformity of metacarpophalangeal joint of thumbs and broadening of metacarpals [Fig. 8]. X-ray of both feet showed soft tissue fusion of 2nd and 3rd toes (simple syndactyly), bilateral widening of tarsals and metatarsals with aplasia of middle phalanx of 5th toe was seen [Fig. 9]. Ultrasonography of abdomen, electrocardiogram and other

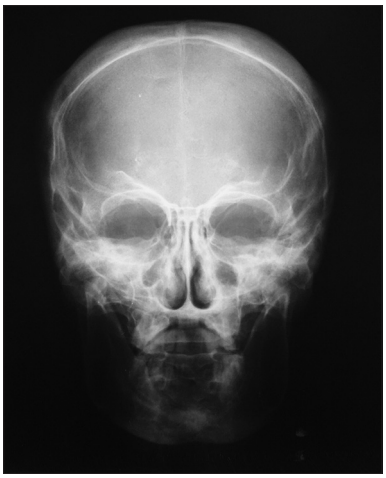

Figure 7: Anteroposterior view skull X-ray: Ghost like appearance (alien look) with cranial hyperostosis and broadening of mandible

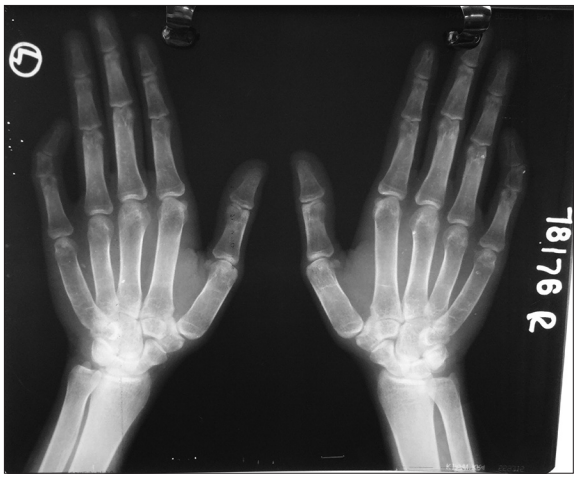

Figure 8: X-ray wrist and hand: 5th finger camptodactyly, clinodactyly and brachydactyly type A3 with flexion deformity of metacarpophalangeal joint of both thumbs and broadening of metacarpals

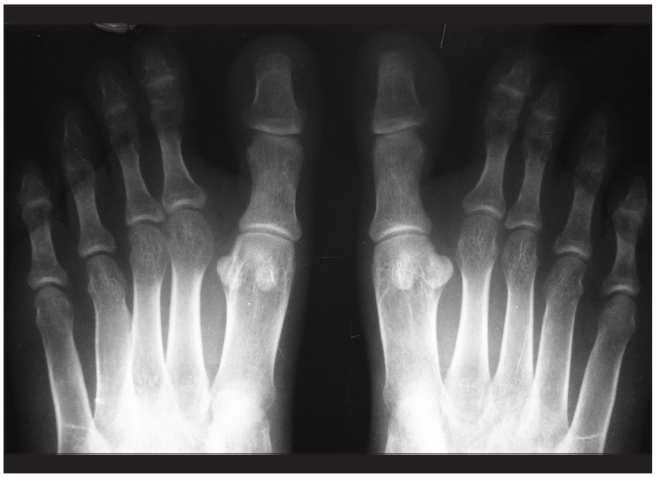

Figure 9: X-ray anteroposterior view of feet: X-ray of both feet showed soft tissue fusion of 2nd and 3rd toes suggesting syndactyly on both sides. Bilateral widening of tarsals and metatarsals with aplasia of middle phalanx of 5th toe seen

routine blood investigations were normal. There was a positive family history; his father had similar ocular and physical features although pictures or papers were not available as he had passed away. After summing up the clinical examination, radiological evaluation and dental examination, a diagnosis of ODDD was made. Genetic testing was offered but declined by the patient. For initial management, we advised the patient to undergo cataract surgery with intraocular lens implantation in both eyes with guarded visual prognosis.

Discussion

ODDD is a rare autosomal dominant congenital disorder mainly affecting the development of the face, eyes, skeletal system and dentition. Typical craniofacial anomalies include a thin nose with hypoplastic alae nasi, small anteverted nares, prominent columella and microcephaly.[3,4] Some cases have dysplastic ears, conductive hearing loss, brittle nails, hair abnormalities such as hypotrichosis and slow growth are present.[3,4] Ophthalmic findings include microphthalmia, microcornea, fine porous spongy iris abnormalities, cataracts, glaucoma and optic atrophy.[3,4] The majority of cases have abnormal primary and permanent dentition with microdontia, partial anodontia, enamel hypoplasia, numerous dental caries and early tooth loss.[3] Hand and foot abnormalities in ODDD include syndactyly involving the 3rd, 4th and 5th fingers and 2nd to 4th toes, camptodactyly and clinodactyly owing to hypoplasia or aplasia of the middle phalanges.[3,4] Other skeletal abnormalities are cranial hyperostosis, mandibular overgrowth with the wide alveolar ridge and broad tubular bones.[3,4] Neurological symptoms are inconsistent and include dysarthria, neurogenic bladder disturbances, spastic paraparesis, ataxia, anterior tibial muscle weakness and seizures. Literature mentions the variability in the clinical features. This includes the studies published by Vingolo *et al*.,[5] Vitiello *et al*.[6] and Gabriel *et al*.[7]

Our patient had characteristic facial features of sparse and brittle scalp hairs, sparse and laterally absent eyebrows, parrot-beaked nose, hypoplastic alae nasi, small anteverted nares and prominent columella. X-ray shows prominent mandible and cranial hyperostosis. Dental abnormalities include hypodontia, microdontia, dental caries and partial anodontia. Both hands showed camptodactyly, clinodactyly and brachydactyly of 5th finger. Both feet showed syndactyly of 2nd and 3rd toes and the absence of middle phalanx of 5th toe.

Differential diagnoses include Hallermann–Streiff syndrome,[8] orofacial digital syndrome Type II,[3] ectrodactyly ectodermal dysplasia clefting (EEC) syndrome[3] and keratitis ichthyosis deafness syndrome.[3]

Management is multidisciplinary. Regular follow-up should include complete ophthalmic, neurological, hearing and oral examination. Plastic or orthopedic surgery is indicated for severe limb malformations. Early recognition of the syndrome is of crucial importance in the prevention and treatment of various clinical manifestations. Meticulous systemic examination and genetic counseling help in identifying the disorder and preventing complications.

Conclusion

Microphthalmia and microcornea may be an isolated finding, associated with other ocular malformations or as a part of the

multisystem syndrome. ODDD is one such rare syndrome; this being the first case report in any Indian ophthalmology journal as per our knowledge. Recognizing this rare entity requires a complete ocular as well as systemic evaluation.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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