# A Family with Oculodentodigital Dysplasia

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Oculodentodigital (ODD) dysplasia is the term coined by Meyer-Schwickerath (*1*). The syndrome is characterized by the presence of unusual facial features demonstrated by a thin nose with hypoplastic alae and thin anteverted nostrils, microphthalmos with anomalies of the iris and bilateral epicanthic folds, syndactyly and camptodactyly of the fourth and fifth fingers and bony anomalies of the middle phalanges of the fifth fingers and toes, and hypoplasia of the enamel resembling amelogenesis imperfecta.

A review of the literature revealed numerous sporadic cases (*1, 2, 3, 4, 5, 6*) and a number of familial cases (*7, 8, 9, 10, 11, 12*).

We have recently studied a family with this syndrome. The typical features were present in the proposita and her brother. The father was reported to show digital abnormalities, and the affected children were said to resemble their father. The mother had an isolated cleft of the palate. This pedigree confirms the autosomal dominant inheritance pattern (Figure 1).

**Report of a Case**

The patient (Figure 2) is a 21 year old white female who was the product of a full-term, normal pregnancy. Her parents were non-consanguineous. Her birth weight was 2910 gm. She was referred to one of the authors (HMP) for diagnosis and genetic counselling. At birth, numerous malformations of the face, including a cleft palate, and limbs were noted. The cleft of the palate was repaired at 19 months of age, and the soft tissue syndactyly between the fingers was corrected at 2 years of age.

Physical examination: At 20 years of age the patient was 155 cm. tall and weighed 43.5 kg. (both below the tenth percentile). Her head circumference was 52 cm. Her pulse and respiration rate were within normal limits. Her blood pressure was 120/80 mm. Hg. Her hair was fine, but she did not feel it was slow in growing or hard to manage. She had bilateral epicanthic

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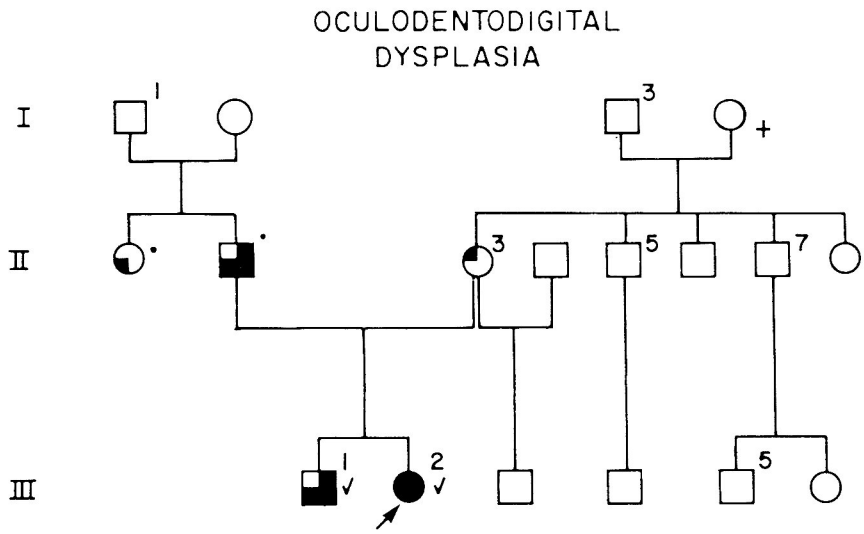


FIGURE 1. Pedigree of the family being reported. The symbols used are as follows: nonshaded square = normal male; nonshaded circle = normal female; shading of upper right quadrant of square or circle = male or female with ocular and/or facial manifestations; shading of the upper left quadrant = presence of a celft palate; shading of lower right quadrant = dental manifestations; shading of the lower left quadrant = digital manifestations; cross = deceased; arrow = proposita; check mark = evaluated by staff; and a dot = evaluation done by reviewing the medical chart.

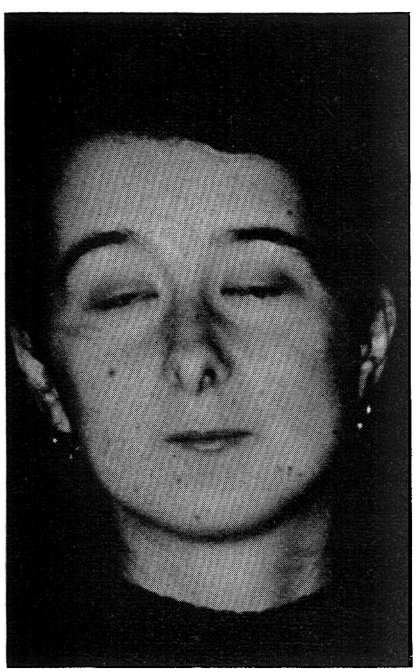

FIGURE 2. Full face view of the proposita.

folds. The inter-inner canthal distance was 2.5 cm., and the inter-outer canthal distance was 8.0 cm. (both below the third percentile).

Vision was always good in the right eye and poor in the left eye. The patient developed a left esotropia at the age of 2 years which was surgically corrected at age 12 years. Glasses have been worn since age 5 years.

Her visual acuity was 20/25 in the right eye with correction and 20/400 in the left eye, uncorrectable. Refraction revealed +1.50 sphere +1.25 cylinder axis 15 in the right eye and +4.00 sphere in the left eye. The corneal diameter was 9.0 mm. in each eye. The corneal stroma showed a fine speckled appearance in each eye as in corneal farinata. Applanation tonometry revealed 22 mm. Hg. in the right eye and 24 mm. Hg. in the left eye. The anterior chamber was moderately deep in each eye. The iris revealed atrophy of the collarette with strands of iris tissue at the pupillary margin. In the right eye these strands crossed the pupil as remnants of an pupillary membrane. The pupils were 4 mm. in diameter in each eye and reacted briskly to light and the near reaction. The remainder of the ocular examination including the fundus was within normal limits.

Her nose was very narrow with hypoplastic alae nasi and small nares. She had a surgically repaired palate which appeared to be short. The palate showed no movement on phonation, and there was no excursion of the lateral and/or posterior pharyngeal walls during phonation. Her speech exhibited a moderate to severe persistent nasal tone explained by the marked degree of velopharyngeal incompetence secondary to the motionless repaired short palate.

All her teeth showed evidence of hypoplastic enamel with extreme carious breakdown and abrasion. They were small in size (microdontia), and on roentgenogram there were generalized horizontal bone loss and haziness of the lamina dura. A more detailed review of the intra-oral findings of the ODD dysplasia will be reported separately.

There was camptodactyly of the fourth and fifth digits bilaterally with missing terminal phalanges of the fifth digits. There were scars on the fourth and fifth digits where the soft tissue syndactyly had been corrected. Her feet showed lateral deviation of the terminal phalanx of the first toe on the right.

The chest was clear to auscultation. Palpation of the abdomen showed no organomegaly. Her muscle tone and deep tendon reflexes were within normal limits. Her intelligence was normal.

Roentgenographic examination of the head and sinuses was normal.

A speech Cine with television tape recording showed a short soft palate with complete lack of motion. Very minimal motion of the posterior wall and slight motion of the lateral walls of the nasopharynx were noted.

Roentgenograms of the hands showed slight flexion contracture of the proximal interphalangeal joints of all the fingers but more marked in the distal interphalangeal joints of the fourth and fifth digits. Hypoplasia of the middle phalanx of the fifth digits was noted.

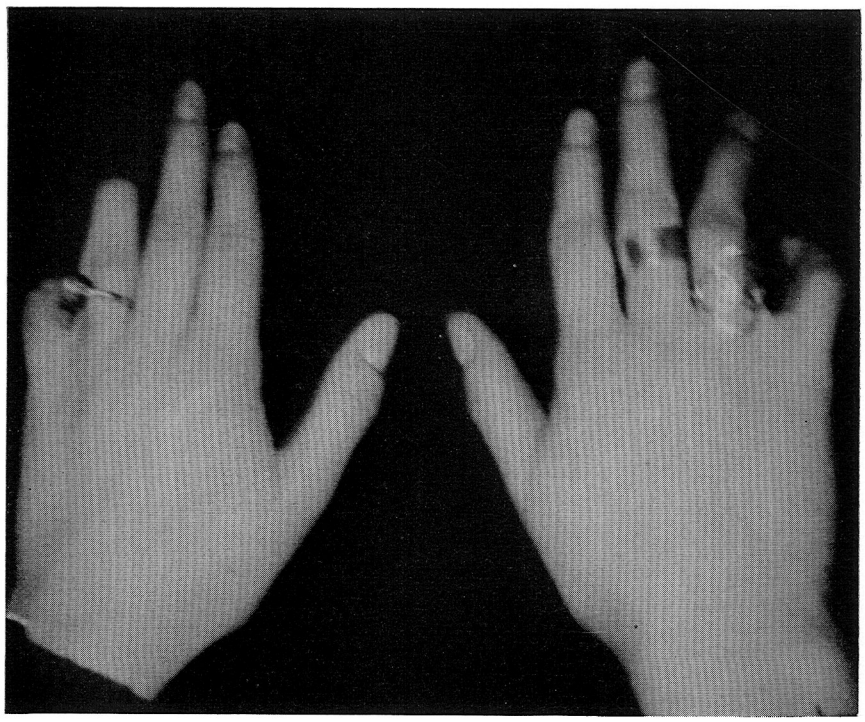

FIGURE 3. Dorsal view of the hands of proposita.

Roentgenograms of the feet showed absence of development of the distal interphalangeal joint of the third, fourth, and fifth toes bilaterally.

Other Family Members: The pertinent physical characteristics of the proposita, her brother (Figure 3), father, and mother are presented in table form (Table 1).

## Comment

Patients with ODD dysplasia have a characteristic facies. The eyes appear small and sunken with a reduced distance between the inter-inner canthi (hypotelorism), epicanthic folds, and narrow palpebral fissures. There is variable degree of loss or reduced vision and abnormalities of the iris, glaucoma, and microphthalmia. Our patient was lost to follow-up before a glaucoma work-up was initiated. The pupils were normal in our case but have been reported to be eccentric in some cases (*6*). The hair is usually dry and lusterless and fails to grow at a normal rate.

The oral manifestations are generalized hypoplasia of the enamel, microdontia, and the teeth are often yellowish due to exposure of the dentin. The alveolar ridge of the mandible is sometimes reported to be wide. A cleft of the soft and part of the hard palate is a frequent finding.

The most constant findings of the limbs are clinodactyly and campto-

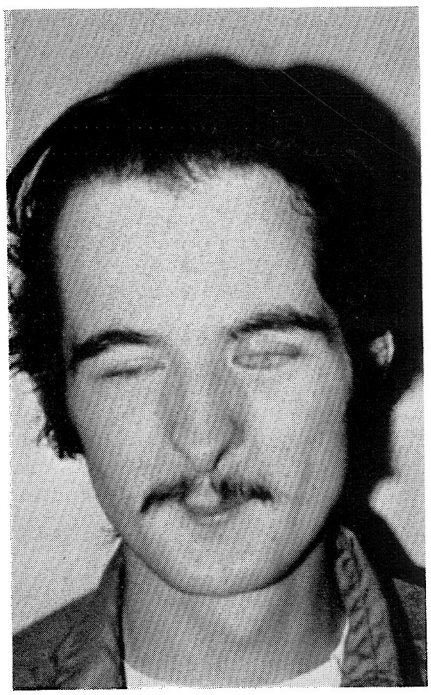

FIGURE 4. Full face view of the proposita's brother.

dactyly of the fifth digits and hypoplastic middle phalanx of the fifth digits. The feet appear relatively normal but on roentgenographic examination demonstrate aplasia or hypoplasia of the middle phalanx of one or more toes.

Genetics: The majority of the cases reported in the foreign and English literature are sporadic. Affected sibs were reported by Gillespie et al (*10*) and by Eidelman et al (*12*). However, their parents were reported to be phenotypically normal. Littlewood and Lewis (*9*) were the first to report a case demonstrating male to male transmission, and Rojec et al (*11*) reported affected members in three generations but none showed male to male transmission.

In the presented family both proposita and her brother demonstrate the ocular, facial, dental, and digital manifestations. It is noted that the brother is totally blind and has been from infancy. The proposita showed abnormalities of the iris and reduced vision. The proposita was also born with a cleft of the soft palate and part of the hard palate. Her mother had an isolated cleft of the palate but lacked the other features of the ODD dysplasia syndrome. As a multifactorial trait the mother would have a 2% risk of passing the trait to the proposita. By history the father had syndactyly, camptodactyly, and other digit abnormalities. He was edentulous as an adult, and both children resembled him. Although he himself did not have a cleft of the palate the chances of his passing the gene responsible for all

TABLE I. Pertinent physical characteristics of the proposita and her family

| *clinical features* | *patient* | *brother* | *father* | *mother* |
|---|---|---|---|---|
| Pedigree No. | III-2 | III-1 | II-2 | III-3 |
| Sex | F | M | M | F |
| Age when last seen, year | 21 | 28 | 56 | 48 |
| Height (cm.) when last seen | 155 | 153.7 | .... | .... |
| Weight (kg.) when last seen | 43.2 | 45.9 | .... | .... |
| Head circumference (cm.) | 52 | 54 | .... | .... |
| Face: | | | | |
| Epicanthic folds | + | + | ? | − |
| Inter-inner canthal distance (cm.)%* | 2.5 (3%) | 3.0 (50%) | .... | .... |
| Inter-outer canthal distance (cm.)%* | 8.0 (3%) | 10.0 (50%) | .... | .... |
| Poor vision | + | + | ? | − |
| Iris abnormalities | + | + | ? | − |
| Very thin nose | + | + | ? | − |
| Colobomata of the alae nasi | + | + | ? | − |
| Hypoplastic nares | + | + | ? | − |
| Intra-oral Cavity: | | | | |
| Cleft palate or high arched palate | + | + | − | + |
| Microdontia | + | + | ? | .... |
| Wide alveolar ridge (mandibular | + | + | ? | .... |
| Hypoplastic enamel | + | + | ? | − |
| Extremities: | | | | |
| Hands: | | | | |
| Syndactyly | + | + | + | − |
| Camptodacyly | + | − | + | − |
| Hypoplastic or missing phalanges (by roentgenogram) | + | + | ? | .... |
| Clinodactyly of fifth digits | + | + | + | − |
| Short digits | + | + | + | − |
| Feet | | | | |
| Hypoplastic or missing phalanges (by roentgenogram) | + | + | ? | .... |

Symbols: + indicates present
− indicates absent
? indicates not known for sure
.... indicates no information.

* (Reference 13).

or a few of the clinical manifestations of the ODD dysplasia syndrome (variable expressivity) is 50% (or 1 in 2) for every one of his children. Our proposita would, therefore, have a much higher chance of having a cleft palate as part of the ODD syndrome.

Based on the above findings, this family shows an autosomal dominant mode of inheritance as documented by father-to-son transmission. Chromosomes were done on the proposita and reported to show 46 XX normal female karyotype.

A review of the old hospital records revealed a paternal aunt who had syndactyly of the fourth and fifth digits, clinodactyly, camptodactyly, and

short fingers. There was no record of her facial, ocular or oral findings. She, however, probably had the syndrome. A positive history of the paternal grandparents could not be documented.

**Summary**

Three members of a family present definite features of the oculodentodigital (ODD) dysplasia and one presents only a few features. The mother shows no clinical evidence of the syndrome but does have an isolated cleft of the palate.

The syndrome is compatible with Mendelian autosomal dominant inheritance with father-to-son transmission. The variable expression of the gene in the three affected members is clearly demonstrable.

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