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Brief Clinical Report

Autosomal Dominant Inheritance of Tetramelic Monodactyly

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We report on tetramelic monodactyly with autosomal dominant inheritance. The propositus and all affected relatives had only digital malformations as determined by physical examination or history. Since it could not be determined that the involved digits of the propositus or relatives were fifth fingers and toes, we conclude this to be the first report of this type of hand and foot malformation with autosomal dominant inheritance.

KEY WORDS: **single digits, digital malformations, hand and foot abnormalities**

INTRODUCTION

Reports of monodactyly in the literature are rare with most cases reported in association with other anomalies, e.g., radial or ulnar agenesis/dysplasia, or as part of a syndrome, e.g., ectrodactyly, ectodermal dysplasias, and cleft lip/palate (EEC) or Smith-Lemli-Opitz syndrome (SLOS). Tetramelic monodactyly seems to be even rarer.

We report on tetramelic monodactyly with a pedigree suggestive of autosomal dominant inheritance. The hand and foot malformations are the only abnormalities detected. We think this case to be the first documented of this type of malformation with autosomal dominant inheritance.

CLINICAL REPORT

The propositus was first referred at age 11 months. He was born to a 23-year-old G5P4AB1 mother. Pregnancy was normal. The propositus was delivered one month preterm with a birth weight of 1,871 g, length of 45.6 cm, and head circumference (OFC) of 30.5 cm (10th, 40th, and 15th centile for 36 weeks gestational age, respectively).

On examination, weight (9,440 g) and length (77.1 cm) were recorded at the 25th and 75th centile, respectively. OFC was 44.5 cm (5%). A single digit arose from the middle of the hindfoot with absence of the forefoot and one single digit of a hand was present bilaterally near the ulnar side with flexion capabilities (Figs. 1, 2). The craniofacial appearance was normal and no abnormalities were detected on examining the cardiorespiratory system. The abdomen and external genitalia were normal. There were no neurophysiological deficits noted and limbs were normal except for the previously described digits. Growth and development have been normal and psychomotor development is appropriate. The child began walking at 14 months and is currently able to walk well in firm shoes. He is of normal intelligence.

A renal ultrasound study (to detect any genitourinary anomalies) and chest, rib, and pelvis roentgenograms (to detect any vertebral or rib anomalies) were obtained and were normal. Roentgenograms of the upper limbs showed 2 metacarpals with phalangeal development in only a single digit (Figs. 3, 4). The radius, ulna, and humerus were bilaterally normal. Lower limb roentgenograms demonstrated bilaterally normal femur, tibia, and fibula with absence of 4 metatarsals and associated phalanges and development of only a single digit (Fig. 5).

The mother of the propositus was examined and found to have malformations identical to those of her son (Figs. 6, 7). By history, it was found that several other relatives of the propositus had the same malformations: one brother, who died of prematurity, an older sister, and two maternal aunts and 3 of their offspring (Fig. 8). According to the mother of the patient, the maternal grandparents were normal with no malformations of the limbs.

DISCUSSION

McKusick's *Catalog on Mendelian Inheritance in Man* [1990] contains a category for tetramelic monodactyly with autosomal recessive inheritance (entry # 273410). A literature search documented 5 reports of monodactyly and 18 reports of ectrodactyly of which 2 involved cases of monodactyly (excludes those articles not related to the genetics of monodactyly). All but 2 of these reports involved ectrodactyly/monodactyly with other major anomalies including ulnar, radial, or tibial agenesis or

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Fig. 1. Index patient demonstrating foot anomalies.

dysplasia. Bujdoso and Lenz [1980], in his review of original investigations of monodactyly, reported that monodactyly is a sign of at least 3 different types of autosomal dominant ectrodactyly. In this review, several cases of tetramelic monodactyly were listed. Schultze [1904] described a propositus with only one digit on each hand and foot with the same malformations present in a sister, mother, and maternal grandfather (designated as 5th fingers and toes). Several other authors reported individuals with only 5th fingers and 5th toes and similar malformations in family relatives, some suggesting autosomal dominant inheritance [Scheffen, 1911; Hegdekatti, 1939; Bindseil, 1942; Birch-Jensen, 1949; Werthemann, 1952; Warkany, 1971; David, 1972; Svejcar et al., 1976; Temtamy and McKusick, 1978]. For the individuals described in this case report, it cannot be ascertained with certainty that the involved digits are the 5th fingers and toes.

In a report of identical tetramelic monodactyly involving the 5th fingers and toes in 2 brothers, Svejcar et al. [1976] described 2 individuals with no other abnormal-

Fig. 2. Index patient showing hand abnormalities and normal face.

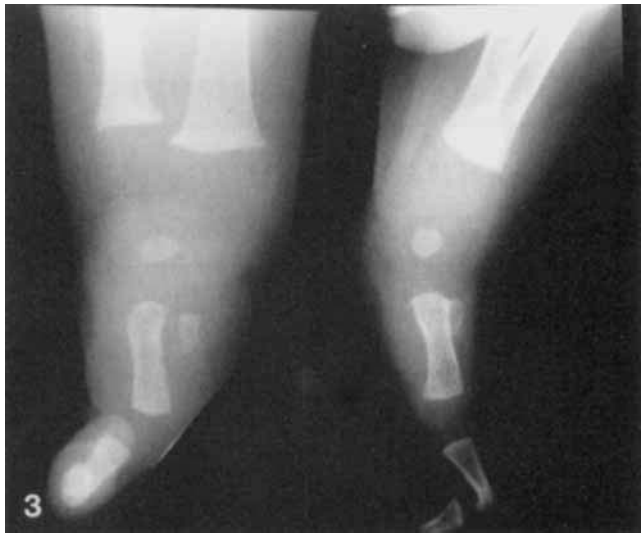

Fig. 3. Roentgenogram of left hand of index patient.

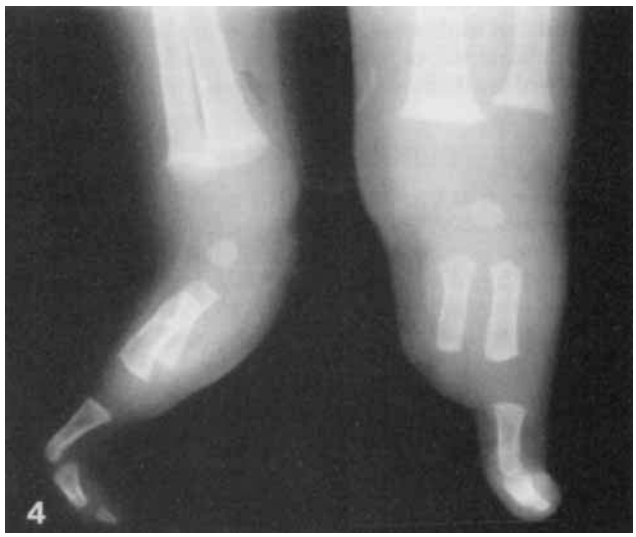

Fig. 4. Roentgenogram of right hand of index patient.

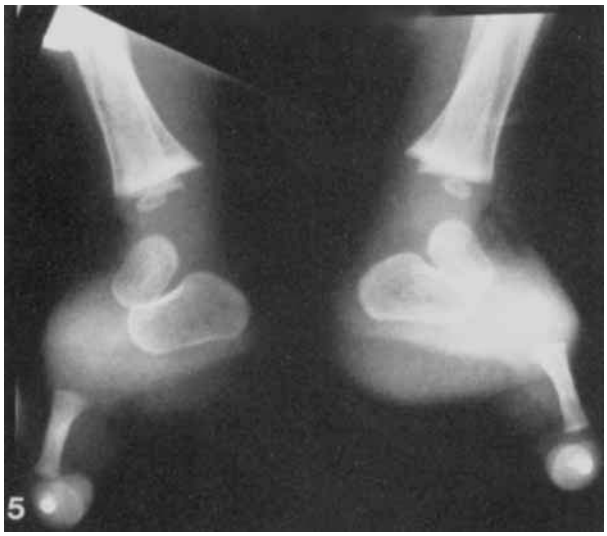

Fig. 5. Roentgenogram of both feet of index patient.

Fig. 6. Hands of mother of index patient.

ities except for malformed hands and feet. This pedigree suggested autosomal recessive inheritance. Svejcar et al. [1976] cited other rare cases of tetramelic monodactyly: 3 cases reported by Werthemann [1952], 2 being father and child, Birch-Jensen [1949] reported 2 sporadic cases, and Temtamy and McKusick [1978] reported 2 generation monodactyly. Furthermore, David [1972] described 2 families with quadrilateral monodactyly, one case involving 2 generations, the other 4 generations demonstrating autosomal dominant inheritance.

The mechanism responsible for the de novo appearance of 3 individuals in the first affected generation is unknown. However, possible explanations as espoused by David [1972] include germinal mosaicism, delayed mutation, and single autosomal dominant gene mutation under the epistatic effect of a 2nd mutant gene at a separate locus protecting a carrier parent. Germinal mosaicism is thought to be the most likely explanation of these cases [David, 1972].

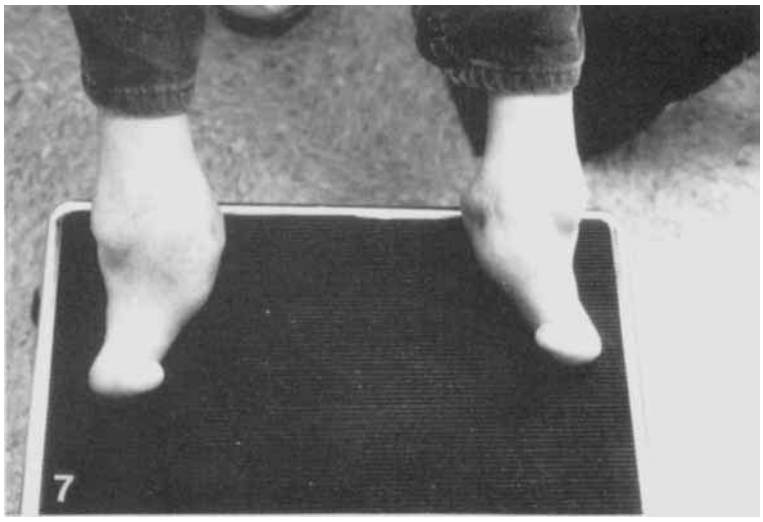

Fig. 7. Feet of mother of index patient.

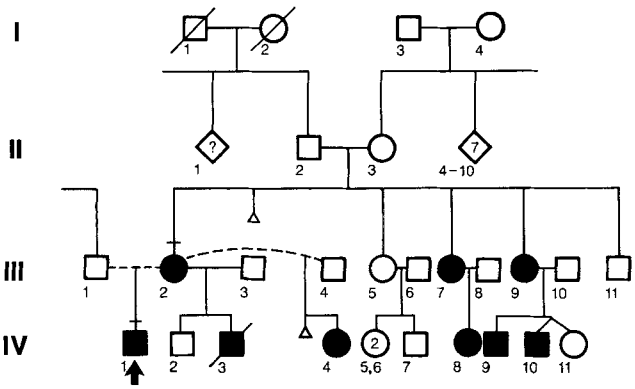

Fig. 8. Family pedigree: tetramelic monodactyly affected individuals indicated by dark symbols; bar over top of individual, examined personally.

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