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Sporadic familial ulnar hexadactyly of all four limbs

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Abstract

Background: Polydactyly belongs to skeletal anomalies and may be a symptom of more complex genetic syndromes.

Main observation: We observed an index case of ulnar hexadactyly of all four limbs in a 20-year-old man from India with three more brothers affected in his family. No additional anomalies were observed. The diagnosis of a sporadic (ulnar) postaxial hexadactyly was made.

Conclusion: Sporadic postaxial hexadactyly is one of the most common polydactylies in humans. In contrast, in the dermatologic literature the condition has only rarely been described.

Conclusion: Presence of supernummary digits or toes, i.e. polydactyly, is seen occasionally in the dermatologic practise. The present case is extraordinary since all limbs were involved and the same was true for three of his brothers. If treatment is asked, hand surgery would be necessary.

Introduction

Polydactyly, the development of supernumerary digits or toes, is one of the more common skeletal abnormalities. In a retrospective case-control study in Mexico the prevalence of polydactyly among 26,670 births was 1.73 in 1,000 live newborns with postaxial polydactyly of the hand as the most common type.[1] In Chile, the prevalence of polydactyly has been estimated as 1.33 in 1,000 live newborns.[2]

Polydactyly can be a feature of complex genetic syndrome or occur isolated (Table 1). The isolated polydactyly has a normal karyotype but this does not exclude genetic aberrations.[3] An autosomal dominant inheritance pattern has been outlined in some Indian and Turkish families.[4,5] In addition, a sporadic familial polydactyly within one family generation has been described.[6]

Postaxial hexadactyly is the presence of six digits on one hand or six toes on a foot. In postaxial hexadactyly the fifth digit is duplicated. Postaxial hexadactyly is the most common polydactyly observed in large registries like the Latin-American Collaborative Study of Congenital Malformations (ECLAMC) and the Spanish Collaborative Study of Congenital Malformations (ECEMC). Among more than 3.2 millions live births the prevalence of postaxial polydactyly was 150.2/ 100,000 (ECLAMC) and 67.4/ 100,000 (ECEMC), respectively. Postaxial hexadactyly was observed altogether in 5,345 cases, however, the vast majority of cases showed the involvement of a single or two limbs only. In a study of more than 1 million live birth enrolled in the ECLAMC registry 1967-1993 postaxial polydactyly of the hand had a prevalence of 1.1/ 1,000 live births higher than that of the foot with a prevalence of 0.2/ 1,000 live births.[7,8]

Here we present a case of sporadic familial postaxial hexadactyly of four limbs in an Indian family (ulnar hexadactyly).

Table 1. Genetic syndromes which can be associated with postaxial hexadactyly.

Syndrome	Associated symptoms	Reference
Bardet-Biedl syndrome	Abdomonal obesity, metabolic syndrome, mental retardation, syndactyly, brachydactyly or polydactyly, retinal dystrophy or pigmented retinopathy, hypogonadism or hypogenitalism (in males), kidney, structural abnormalities or functional impairment.	Iannello *et al.* 2002 [13]
Basal cell nevus syndrome with hexadactyly	Multiple basal cell carcinomas of the skin, odontogenic cysts, skeletal abnormalities.	Hermes *et al.* 2002 [11]
De novo t(12;17)(p13.3;q21.3) translocation with a breakpoint near the 5' end of the HOXB gene cluster	Severe mental retardation, funnel chest, bell-shaped thorax translocation with a breakpoint near the 5' end of the HOXB gene cluster.	Yue *et al.* 2007 [14]
Ellis-van Crefeld syndrome	Short ribs, growth retardation, polydactyly, dysplastic finger nails, abnormal teeth, narrow thorax, heart defects.	Baujat *et al.* 2007 [15]
Fryns syndrome	Craniofacial anomalies including atresia of the auditory canals and cleft lip and palate, callosal defects, eye coloboma, persistent truncus ateriosus, interrupted aortic arch, asplenia, complex central nervous system midline malformations, multiple pterygias, intestinal atresias.	Ramsing *et al.* 2000 [16]
Joubert syndrome	Hypotonia, developmental delay, truncal ataxia, cognitive impairment, cerebellar vermis hypolasia, molar tooth sign, oculomotor apraxia, retinal coloboma, ptosis, nephronophtisis or cystic dysplastic kidneys.	Valente *et al.* 2008 [17]
McKusik-Kaufman syndrome	Hydrocolpos, cardia abnormalities, only females affected.	Gaucherand *et al.* 2002 [18]
Nager's syndrome	Micrognathia, zygomatic hypoplasia, external ear malformations, cardiomomyopathy, brachydactyly.	Kahrom *et al.* 2006 [19]
Polysyndactyly, complex heart malformation, and hepatic ductal plate anomalies	Complex cardiopathy, hepatic cysts, eyelid ptosis, hypertelerorism, malformations, and hepatic antevereted nares, large fontanel, long philtrum, ungeal hypoplasia, ductal plate anomalies polysyndactyly, single transverse crease, bilateral pelvis dilatation.	Stoll *et al.* 2003 [20]
Oral-facial-digital syndrome type VI	Hypoplastic cerebellas vermis & hemispheres, hypothalamic, hamartoma, molar tooth sign, frontal bossing, breathing abnormalities.	Poretti *et al.* 2008 [21]
Seidel syndrome	Microcephaly, facial dysmorphism, anteverted dysplastic ears, mental retardation, adipose-gigantism.	Seidel *et al.* 2003 [22]
Weyer's syndrome	Acrofacial dysostosis, double epiglottis, dental deformities, mandibular hypolasia, small and deeply set nails.	Wittig *et al.* 1998 [23]

Case report

We report a case of a 20-year-old male patient. His family history was positive for a similar condition in three of his brothers. His own medical history was free of comorbidities. He did not show any associated symptom of skin or internal organs. On examination he had supernumerary 5th digits on all four limbs (Fig. 1). Bony structures could be palpated, but X-ray was not possible for the family. The diagnosis of sporadic familial postaxial hexadactyly of all four limbs was made.

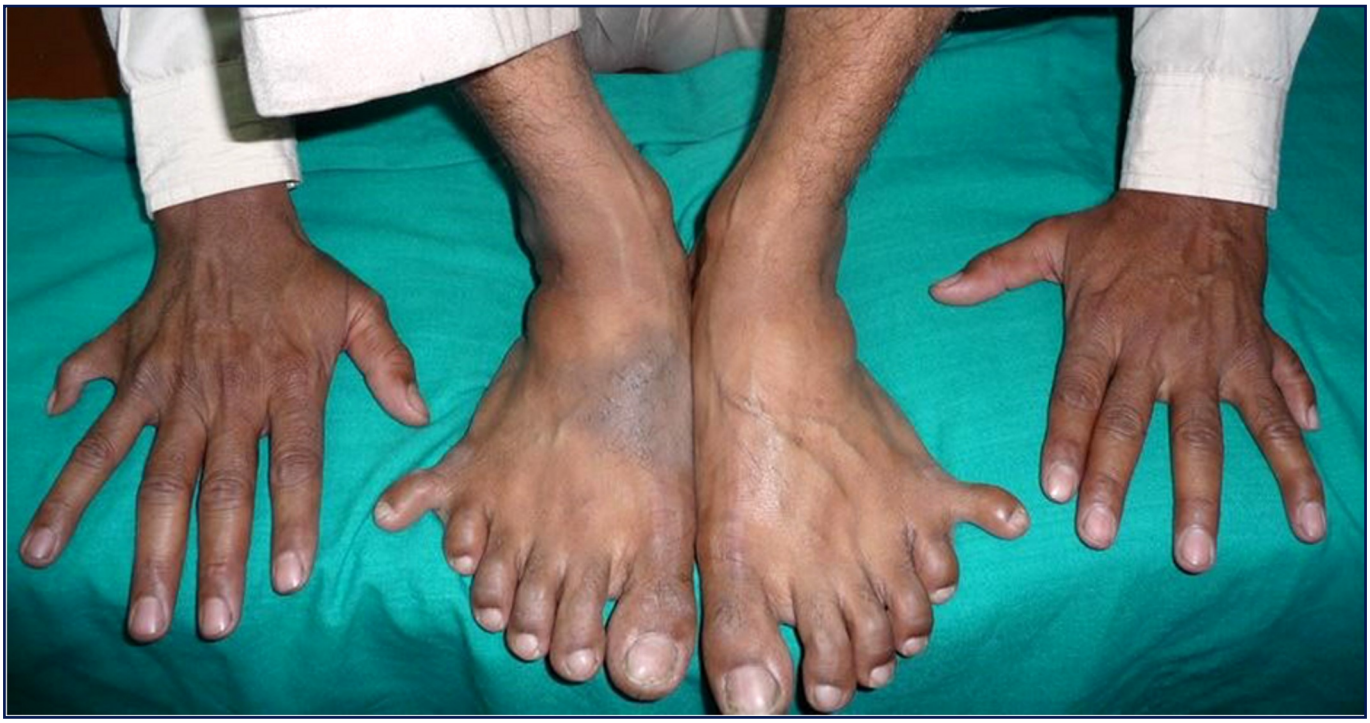

Figure 1
Index patient with ulnar postaxial hexadactyly of all four limbs.

Discussion

The genetic background of polydactylies is heterogenous. Table 2 provides an overview of familial polydactyly type A and B. Genetic analysis has shown involvement of the human transcription regulators gene GLI3, HOXD13, ROR2, SALL1, SALL 4, ZRS of SSH, and TBX5.[9]

Hexadactyly of four limbs is a very rare skeletal malformation. The case of Villa *et al.* (2006) showed duplication of the fifth finger but of the 4th toes in a female Caucasian neonate. In her paternal and maternal family malformations were reported. Her karyotype was normal and no other associated malformations were found.[10] Another report from Germany described a 35-year old man with Gorlin-Goltz

Table 2. Clinical classification of familial postaxial polydactyly and genetics.

Type	Clinical findings	Genetics
Type A	the extra digit is well formed and articulates with the fifth or an extra metacarpal	
A1		inherited as a dominant trait with high penetrance, linkage to 7p15-q11.23, most common mutations: GLI3, HOXD13, ZRH of SSH [10,24,25]
A2		linkage to markers from 13q21-q32 [26]
A3		autosomal dominant, high penetrance, linkage to 19p13.2-p13.1 [27]
Type B	the extra digit is not well formed and is frequently in the form of a skin tag	variable expressivity and reduced penetrance or autosomal dominance have been observed, GLI3 gene, 7q21–q34 but also t(4;7)(p15.2;q35) [28]

syndrome (multiple basal cell carcinomas with skeletal abnormalities). He showed hexadactyly of one hand and two feet.[11]

The index case presented here is a member of a family without history of skeletal abnormalities including polydactyly. Since three of his brothers were affected like him with a four limb postaxial hexadactyly the diagnosis of sporadic familial postaxial hexadactyly is confirmed. That is different form inherited cases within several generations of a family what has been reported from India and Turkey.[4,5]

In the Turkish family reported by Karaaslan *et al*. (2003) three of four members of the same generation in a family presented with different types of polydactyly. However, one of the parents had polydactyly as well.[6] In contrast to this, in the family presented here only a single generation was affected and all affected members had the same clinical type of hexadactyly.

According to the classification of polydactyly of hands and feet of Blauth and Olason (1988) our index case shows a proximal phalanx hexadactyly of the 5th digit of all four limbs.[12] To the best of our knowledge this is the first case description in multiple members of the same generation in a single family.

In case of treatment surgical removal of the supernumerary digits is the only option. In our case functionality was not impaired and treatment not requested.

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