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Case Report

A unique pattern of finger lengths

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ABSTRACT

The congenital malformations of hand include number of deformities and they have been classified by earlier researchers. However we came across a unique new pattern of finger length which could not be placed in any of the earlier mentioned categories. The finger length pattern is derived due to role of multiple HOX genes and is specific for fingers and toes. In the present case a rare and new numerical pattern of fingers was found, presenting succession decrease of finger length from index to little finger. Such normal variance of finger lengths on visual and radiological measurements has not been reported earlier.
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1. Introduction

There are number of congenital deformities of hand but here we report a rare case of finger length pattern and discuss its possible embryological and genetic basis.

2. Method

A 45 year old lady visited OPD of a private medical centre for general malaise and fever. While performing physical examination on her, we came across an unusual pattern of finger lengths of hands. The finger lengths were measured from both palmar and dorsal aspect of each hand. The palmar length was taken as the distance from the midpoint of crease at the base of the finger to the tip of the finger.[1] The dorsal finger length was measured as the distance between the highest points of knuckle to the tip of the fingers. The hands were radio imaged and images were assessed on Kodak Point-of-Care CR 120 140 system, to assess the skeletal length which was taken as a measure between the base of proximal phalanx to the tip of terminal phalanx.[2,3] The results were tabulated and analyzed.

3. Result

The gross clinical examination of hand depicted succession decrease in length of fingers from index to little finger in both the hands (Table 1). Each hand appeared as a mirror image of the other (Fig. 1).

The radiographic images (Fig. 2) were used to assess the skeletal length of each finger. The measurements are depicted in Table 2. The phalangeal lengths alone did not coincide with

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Table 1 – Measurement of fingers (in cms).

Hand	Aspect	Index finger	Middle finger	Ring finger	Little finger
Right	Palmar	4.5	4.3	4.1	3.5
	Dorsal	6.2	6.0	5.6	4.8
Left	Palmar	4.2	4.1	3.6	3.5
	Dorsal	5.0	4.5	4.2	3.5

the pattern of succession decrease of finger length as seen on physical examination/measurements, however when the metacarpal lengths were added to the finger lengths the results were again the succession decrease of finger length as on physical measurements.

4. Discussion

Most of the human activities involving hand are power prehensile in nature. The hand, with its three independent functioning elements—the palm (metacarpals), the fingers and thumb (phalanges) act in different combinations to provide the grasp as per the object. The role of tendons, ligaments, aponeurosis and muscles is complimentary to the bony skeleton. During power grip, especially in dynamic phase, the palm acts like a changeable platform while the fingers act as tong to provide the necessary grip. The manner of grasp or grip changes as per the shape, size and nature of the object. During spherical grip the tip of the fingers must reach the equator of the object to obtain the desired grasp on the object[4] (Fig. 3).

The congenital anomalies of hand, which in itself include myriad deformities, apart from carrying cosmetic implications, are also a major element of functional compliance to the patient. In 1982, Lamb published the report of Congenital Malformations Committee of the International Federation of Societies for Surgery.[5] The most common anomalies of hand include, brachydactyly, syndactyly, polydactyly, and radial club hand.[6] These anomalies can occur as solitary findings or may be associated with various other medical conditions like Poland's syndrome, Down's Syndrome, Cushing's Disease, Chondroplasia etc.[7–9] However in the present case there were no physical or laboratory investigations suggestive of associated disease, hence this case was categorized as a case of Isolated Brachydactyly. The extensive work of Temtamy & McKusick[10] had earlier proposed a classification of isolated brachydactyly categorizing it from Type A to Type E forms but we were unable to assign our patient into any of the above mentioned types. Therefore we propose that present case should simply be considered as a normal variant of the finger lengths.

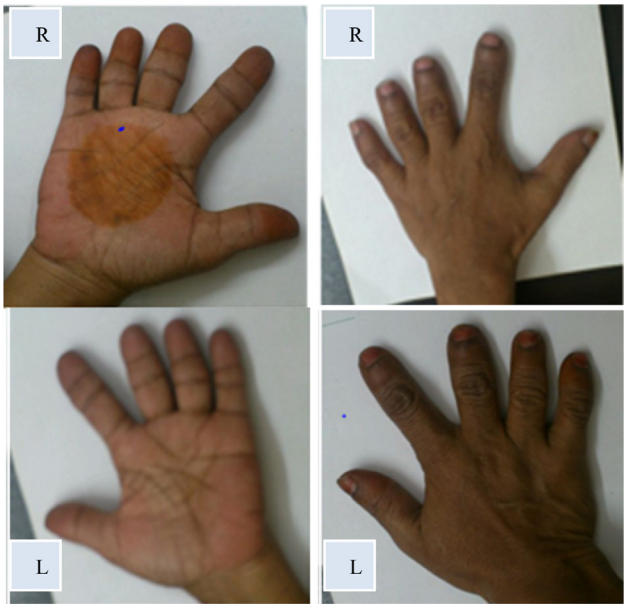

Fig. 1 – Palmar and Dorsal aspect of hands; R-Right, L-Left.

Fig. 2 – Radiographic image of hand.

The length of the fingers is regulated by the HOX genes which are specific for the fingers and toes respectively.[11,12] In case of toes generally the length pattern is suggestive of decrease from second to last toe but in case of hands this decreasing pattern is not followed. But in the present case there may have occurred representation of same HOX genes which otherwise would have been responsible for toe length.

5. Conclusion

In the present case a rare and new numerical pattern of fingers was found. There was a gradual decrease of finger length from lateral to medial side (i.e. index finger-longest, middle finger-second longest, ring finger-third longest, thumb-fourth longest and little finger-smallest). Such normal variance of finger lengths on visual and radiological measurements has not been reported earlier. The length of digits is regulated by HOX genes implicating morphogenetic proteins (BMP5 and BMP7) the growth factor Gdf5, and other signaling molecules. The present case could be due to new and variant pattern of HOX genes.

Table 2 – Radiographic skeletal length of fingers (in cms).

Hand	Index finger		Middle finger		Ring finger		Little finger	
	P	M + P	P	M + P	P	M + P	P	M + P
Right	4.72	10.03	4.83	9.04	4.96	8.18	3.87	7.75
Left	4.68	9.66	4.89	8.74	4.93	8.49	3.76	7.78

P = phalangeal length; M + P = phalangeal and metacarpal length.

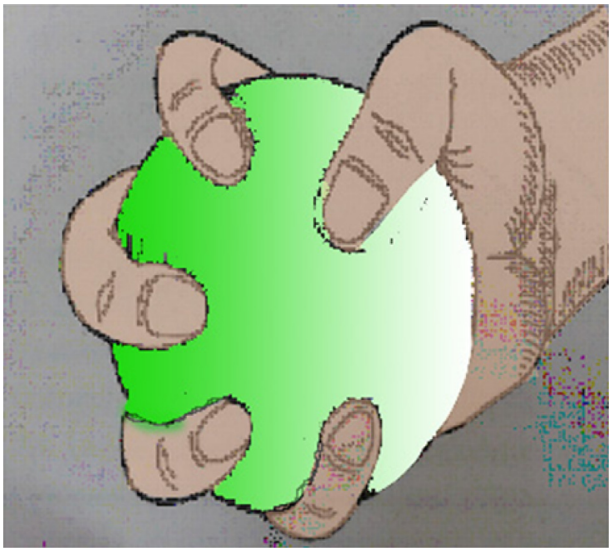

Fig. 3 – Spherical grip depicting the tong like action of fingers.

Conflicts of interest

All authors have none to declare.

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