

Bilateral metatarsal hypoplasia of 4th toe: A case report

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Abstract

When one or more of the person's metatarsal bones are unusually small is known as hypoplastic metatarsal or Brachymetatarsia. Metatarsal are 5 miniature bones which present between the tarsal bones and the phalanges of the foot. This may cause significant pain and the toes appear to be short abnormally. Incidence of brachymetatarsia is one in 2,000 people. Women are affected more. Down's syndrome and other genetic conditions may also increase the incidence of brachymetatarsia. To treat brachymetatarsia surgeons have two choices-corrective footwear or surgery. In the present case we found shortening of fourth toe of both foot in 45 year old male without any complaints or similar familial incidence.

Keywords: Brachymetatarsia, Metatarsal hypoplasia, Bilateral 4th toe shortening, Short fourth toes, Congenital brachymetatarsia.

Introduction

Metatarsal are 5 miniature long bones which present between the phalanges and the tarsal bones of the foot. Brachymetatarsia is a condition in which metatarsal bone become small abnormally, resulting in shortened toes which result from either congenital or acquired disorder. Most commonly the fourth toe is affected in this condition usually occurs bilaterally. Brachymetapody is a condition in which more than one toe affected.

The toes are gradually longer lateral to medial i.e. 5th toe to 1st toe (hallux). Weight is transferred to the forefoot from the fifth toe to first toe (hallux) i.e. lateral to medial; the next longest toe receives the weight. Brachymetatarsia (metatarsal hypoplasia) disturb this process. If the third toe is smaller than the fourth toe, it can't assume the body weight and never transfer it to the second toe properly. As a result, the fourth and second toes receive more weight and pain develops in those areas. These people often have difficulty with footwear because a hypoplastic toe also tends to tenor upward.

When one of the metatarsal bones stops growing while the other metatarsals continue growing, hypoplastic metatarsal occurs and usually manifest during the young age. Hypoplastic metatarsal can be caused by infection or trauma to the metatarsal but hereditary or genetic defects are the reason in most of cases. The fourth metatarsal bone affected the most in metatarsal hypoplasia. Metatarsal hypoplasia is not merely cosmetic issue but more than it. As mentioned earlier, weight is usually shifted from the fifth toe to the fourth and so on up to the first. Metatarsal hypoplasia break this process and causes inappropriate weight transmission. As weight is not being distributed evenly, feet may experience significant discomfort and pain. People suffering with foot pain and discomfort may obviate important life activities like walking, exercising, and other. Besides pain issues, hypoplastic

metatarsal have a tendency to move upward, which can make difficult to find properly fit shoes. The cosmetic factor of the condition causes distress/ depression in many people, as they found difficulties in getting comfortable footwear.

Case Report

A 45yrs old male presented with bilateral shortening of fourth toe since childhood. The family history was unremarkable with no evidence of any congenital malformation. There was no history of trauma. Physical examination revealed intact normal vascular & neurological system. Orthopedic examination revealed dorsally displaced bilateral 4th toe (Fig. 1). Skin was noted normal on dorsal aspect of 4th metatarso-phalangeal joint on both the side. Hypoplastic 4th metatarsal bilaterally was noted on radiological investigation (Fig. 2). Left Toe may appear telescoped upon itself. Patient has two sibling younger brothers who do not have similar concern. Review of family history reveals no brachymetatarsia of any other family members.



Fig. 1: Photograph showing shortening of 4th toe of both foot



Fig. 2: Radiograph showing bilateral 4th metatarsal shortening

Discussions

Hypoplastic metatarsal or Brachymetatarsia is defined as an abnormal shortening of metatarsals.¹ Most commonly the first and fourth metatarsals are affected in brachymetatarsia. It can be iatrogenic, acquired or most commonly congenital. Usual presenting complaint is cosmetic though it is associated with many conditions and syndromes which have presentation of pain and deformity. The presence of a hypoplastic metatarsal is a difficult case to the surgeons.

First metatarsal is to be the most commonly involved metatarsal in congenital shortening or (Morton's syndrome).² Incidence of brachymetatarsia of first metatarsal was 1 in 10,000 reported in Japanese^{3,4} while other researchers have found a higher incidence of hypoplastic fourth toe.⁴⁻⁸ Short third or fifth metacarpals along with fourth brachymetatarsia were reported in 14% of patients while bilateral shortening was found in 72% of congenital cases by Urano Y. et. al.⁶ They also reported the incidence of 0.022% (1 in 4586) in 4-15 yrs old Japanese children with a female predominance of 25:1.⁶ Mah et al reported the incident of hypoplastic metatarsal to be 1:1820 in US.⁸ Some families showed the hereditary linkage⁶ and may occur as recessive traits that have leap many generations.⁹

The secondary center of ossification exists in the base in the first metatarsal while in the head for the lesser metatarsals.¹⁰ Kite proposed that it result from premature fusion of epiphyseal plate at the end of distal aspect of metatarsal most frequently at 4th metatarsal may be unilateral or bilateral,¹¹ it may result from hereditary, traumatic or environmental factors.

Various reasons of brachymetatarsia¹² are: (a) Congenital: 18p syndrome, Langer-Giedion syndrome, Aarskog syndrome, Apert syndrome, Brachiodactyly type E, Carpenter's syndrome, Killian/Teschler-Nicolas

syndrome, De Lange syndrome, Down syndrome, Rett syndrome, Ectrodactyly, Grebe syndrome, Hypochondroplasia, Hajdu-Cheney syndrome, Hand-foot-genital syndrome, Jeune's thoracic dystrophy, Leri-Weill dyschondrosteosis, Majewski type short rib-polydactyly, Mohr syndrome, Multiple synostosis syndrome, Orofacial-digital syndrome, Pfeiffer syndrome, Poland's anomaly, Robinow's syndrome, Rothmund-Thomson syndrome, Ruvalcaba's syndrome, Weill-Marchesani syndrome, Werner's syndrome X syndrome. (b) Endocrinopathies: Multiple epiphyseal dysplasia, Pseudo-hypoparathyroidism, Diastrophic dysplasia, Pseudo-pseudo-hypoparathyroidism. (c) Acquired: Iatrogenic injury, Trauma, epiphyseal fracture, Thermal burns, Radiation, Juvenile rheumatoid arthritis, Sickle cell crisis, polio.

Brachymetatarsia manifest itself in two forms with or without pain and it can affect both psychologically & physiologically. This abnormal metatarsal length pattern results in abnormal weight bearing & painful hyperkeratotic lesion which is an appropriate indication for brachymetatarsia surgery in a properly well informed patient.

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