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CASE REPORT

Brachymetatarsia of The First Metatarsal

ABSTRACT

Brachymetatarsia, also known as hypoplastic metatarsal, is a rare skeletal anomaly characterized by the abnormal shortening of the metatarsal bones. This condition can be congenital, idiopathic, or secondary to surgery, trauma, or other underlying conditions. Radiographic findings typically reveal a shortened and underdeveloped metatarsal. The clinical manifestations of brachymetatarsia can vary significantly, influenced by various factors. The fourth metatarsal is most commonly affected, followed by the first metatarsal.

The current report presents a unique case of congenital unilateral brachymetatarsia with radiographic findings in the first metatarsal of a young adult male. Understanding the anatomical and clinical implications of brachymetatarsia is crucial for radiologists, orthopedic surgeons, and other medical professionals, as it informs diagnosis, management, and potential surgical interventions.

Keywords: Brachymetatarsia, short toe, deformity, metatarsal bones, skeletal anomaly

CASE REPORT

A 32-year-old male presented to the emergency department with a chief complaint of a recent inversion injury to his left foot. His medical history was unremarkable, with no documented chronic ailments or prior surgical interventions. On clinical examination, localized tenderness was identified over the fifth metatarsal region of the left foot. Notably, a distinct discrepancy in length was observed between the first digits of the bilateral feet, with the left appearing shorter. The patient reported this anatomical variation as congenital, emphasizing that it had neither posed any functional limitations nor elicited cosmetic concerns throughout his life.

Diagnostic imaging, comprising anteroposterior and lateral oblique radiographs of the left foot, corroborated the clinical observation, revealing a shortened first metatarsal. In contrast, the morphological attributes and numerical count of the remaining metatarsals, phalanges, and tarsal bones in both feet were consistent with standard anatomical presentations (Figure 1 a, b).

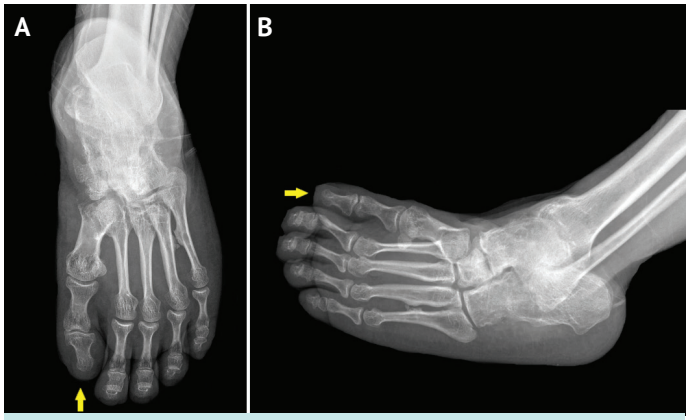

Figure 1. Anteroposterior (A) and lateral oblique (B) radiographs of the left foot, showing that the first metatarsal is shorter than others (yellow arrows).

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DISCUSSION

Brachymetatarsia is defined as the atypical shortening of one or more of the metatarsal bones, specifically when a metatarsal concludes more than 5mm proximally relative to the alignment of the metatarsal heads (1,2). This foot anomaly has a documented incidence ranging between 0.02% and 0.05%, exhibiting a pronounced gender predilection with a female-to-male ratio of approximately 10.53:1 (3). The etiology of brachymetatarsia is multifaceted. While some cases are congenital, others are acquired due to various reasons, including iatrogenic interventions. Furthermore, brachymetatarsia has been associated with a spectrum of medical conditions and syndromes, such as Apert syndrome, Down's syndrome, Albright's osteodystrophy, dystrophic dwarfism, sickle-cell anemia, poliomyelitis, pseudohyperparathyroidism, and certain malignancies (1,4).

Congenital brachymetatarsia originates during embryogenesis and persists as the child matures, leading to a retardation in the overall developmental trajectory of the affected metatarsal (5). The precise etiological factor prompting the premature cessation of the growth plate remains elusive, but current hypotheses suggest a potential association with specific genetic markers (1). While the anomaly can be discerned during early childhood when the growth plates (physes) are still patent, its manifestation typically becomes pronounced just prior to the definitive fusion of the metatarsal growth plate (5).

The clinical manifestations of brachymetatarsia can be diverse. In adults, common complaints include pain, skin irritation at the toe adjacent to the respective commissure due to footwear, and ambulatory challenges (6). A notable consequence of the shortened metatarsal not bearing weight is that the associated digit fails to contact the ground, leading to an unstable digit presentation, colloquially termed the "floating toe syndrome" (1). Particularly during adolescence, the condition can engender a skewed self-perception, occasionally culminating in psychological distress. This is particularly poignant given that the maturation of metatarsal growth plates typically transpires around the age of 14, coinciding with the adolescent phase (5).

The diagnosis of brachymetatarsia is primarily established through radiographic evaluations, which typically reveal a metatarsal that is not only shortened (terminating more than 5mm proximal to the alignment of the metatarsal heads) but also underdeveloped (2). It's imperative to note that brachymetatarsia, when concomitant with various conditions and syndromes, necessitates a comprehensive multidisciplinary assessment. Contemporary literature underscores the significance of gauging the emotional and psychological resilience of patients when considering diverse therapeutic interventions (6). Therapeutic strategies for brachymetatarsia can be bifurcated into conservative measures, such as the adoption of accommodative footwear, and more invasive surgical interventions (4).

CONCLUSION

In this report, we presented a rare case of congenital unilateral brachymetatarsia in a 32-year-old male, emphasizing the radiographic findings in the first metatarsal. While brachymetatarsia is a known entity, its occurrence in the first metatarsal, especially in males, is uncommon. This case underscores the importance of comprehensive radiographic evaluation in patients presenting with foot deformities. Furthermore, it highlights the need for individualized patient assessment, considering both physical and psychological aspects, to determine the most appropriate therapeutic approach.

Informed Consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

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