

## **Brachymetatarsia (short metatarsal) and brachymetapody (multiple short metatarsals)**

**The Basics:** Hypoplastic conditions that result from premature closure of the growth center of a metatarsal (most commonly the 4<sup>th</sup>) or metatarsals, the exact congenital cause is unknown. Brachymetatarsia can also result from trauma or iatrogenic causes. It can be associated with congenital anomalies such as Down syndrome and Turner syndrome, various osteodystrophies and hypoparathyroid conditions. Sometimes, it is concurrent with brachymetacarpia. Deformity usually not evident at birth, become visible between the ages 4-15 years old.



**Statistics:** Almost exclusively a female condition (25:1 ratio), commonly found bilaterally (>70% of congenital cases), prevalence of about 2.2/1000 individuals

**Biomechanics:** According to McGlamry's, the short metatarsal bears no weight. Consequently, its flexor plate fails to load on weight bearing, and the result is an unstable and floating digit. The adjacent metatarsals may present with metatarsalgia and plantar keratosis in the adult patient. A deep sulcus is usually found beneath the involved short metatarsal. Adjacent toes tend to migrate into the space vacated by the floating toe.

**Radiology:** Findings include a short, underdeveloped metatarsal, at times with deficient bone content in general and with osteoporosis of the metatarsal head in particular. The toe is usually straight but in an extended position, and it floats above the weight-bearing plane.



**Surgical Procedures:** Syndactylization, **bone graft**, implants and auto-implants, **step-up osteotomies**, **callous distraction (Ilizarov technique)**, amputation. (Most common techniques in bold, McGlamry's authors prefer the Ilizarov technique.)

- Bone graft procedures: Many donor sites have been used over the years, including iliac crest, tibia, fibula, navicular tuberosity, calcaneus, and other metatarsals
- Step-up osteotomies: One step Z-plasty to lengthen the short metatarsal or a two-staged Z-plasty which uses external fixators to stretch the soft tissues, then perform the Z-plasty
- Callous distraction: Proximal metaphysis is the location of choice to perform the osteotomy, distraction process begins about 7 – 10 days post-op, distraction rate of 0.25mm bid to 0.25mm qid (McGlamry's authors prefer 5/8mm per day), followed by a 4-5 week ossification period

**Possible Complications:** Patient compliance, pin tract infections, under and over correction, malunion and non-union, neurovascular compromise



### **References:**

“McGlamry's textbook of foot and ankle surgery” 4<sup>th</sup> Edition, chapter 72, pages 1036-1055

“Lengthening of the fourth brachymetatarsia by three different surgical techniques” The Journal of bone and joint surgery (Br), W.C. Lee, J.H. Yoo, J.S. Moon, 2009