

What is Brachymetatarsia?

Brachymetatarsia is a foot condition where one of the five metatarsal bones of the foot is peculiarly short. The shortened metatarsal results in a smaller toe. Although it may occur in any metatarsal, it is seen most prevalent in the 4th and bilateral cases are not uncommon. When there is shortening in more than one metatarsal and multiple digits are clinically short, this condition is then called Brachymetapodia.

Causes

This disorder occurs when metatarsal growth shuts down at an early stage. The growth plate closes and the bone cannot grow. Underlying factors may be due to hereditary or by external trauma to the foot.

Physiology

Proper functioning of the foot is affected the most. The smaller toe due to a short metatarsal may lead to several problems. In individuals with metatarsals having normal length, the weight of the body is distributed from the 5th to the 1st metatarsal head during gait. Brachymetatarsia interrupts this normal process of weight distribution on the metatarsal bones. Since the 4th metatarsal is shorter in length than the 5th one, it cannot take the weight of the body properly. As a result, the 3rd and the 5th metatarsals are weighed down by excessive pressure. This increased weight-bearing load may lead to pain, skin lesions, and fractures of the metatarsals. Problems related with footwear are also observed.

Treatment

This disorder has very limited treatment options. One way to address the discomfort is by using orthotics and or by wearing shoes that

accommodate the shortened toe. One can make use of padding to reduce the pressure.

Conservative means to address the problem may not be satisfactory to the patient. Surgery is then a viable option to increase the length of the shortened metatarsal bone. One way is by Bone grafting the shortened metatarsal in order to add bony length. During the post-op period, attention is made that the graft is incorporating well with the metatarsal bone.

Another surgical method is Callus distraction with the use of an external fixation device. Pins of the external fixation is drilled into the short metatarsal that is cut, and the external fixation is manipulated gradually over time allowing lengthening of the metatarsal as the bone heals and strengthens. Callus distraction is commonly known as callostasis or callus osteogenesis. This involves manipulating the bone callus during recovery. Bone callus is hard connective tissue made of calcium salts that makes up a major part of the skeleton in humans. In this technique, the bone callus is manipulated in stead of the bone itself. The callus is lengthened by putting gradual pressure on the tissue as well as surrounding soft tissues. In due course of time, the length of the complete bone can be increased using this technique.