

In-Toeing Gait

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In-toeing refers to a foot that appears twisted such that the toes point inwards. The twisting or torsion may be at any level in the leg, from the hip (femoral anteversion) to the tibia (tibial torsion) or the foot (metatarsus adductus - C shaped foot appearance). In the previous article we looked at how a pathological increase in femoral anteversion creates a toe-in position in the extremity. This article will further investigate the other two forms of torsional deformities (tibial torsion and metatarsus adductus) which may be responsible for In-Toeing Gait.

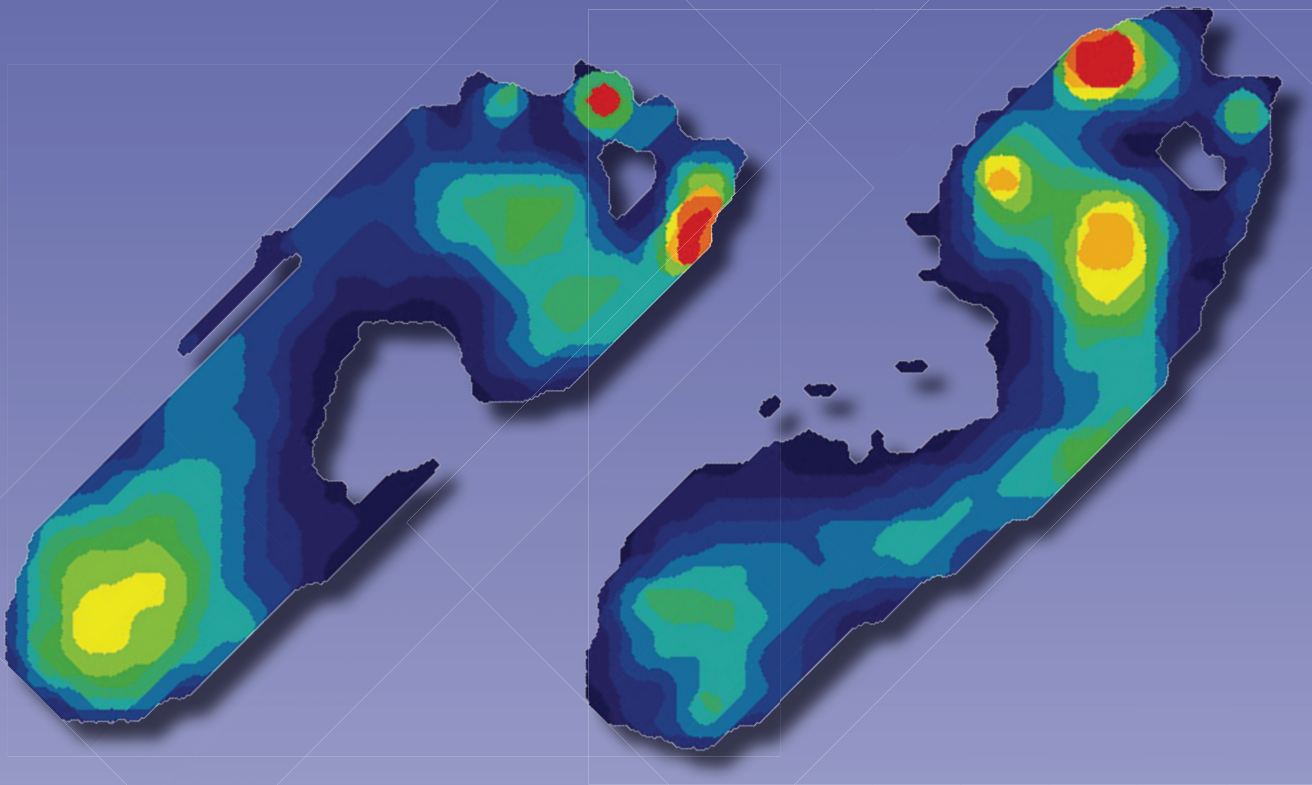
External rotation of the tibia increases with age and developmental changes produce an external rotation of 20° in the normal tibia (Hutter & Scott, 1949). The average angle of the transmalleolar axis is 4° of medial rotation in a newborn baby. Lateral rotation then gradually increases throughout childhood until the mean rotation is 23° in normal adults. Any measurement from 0° to (+) 40° is consistent with normal appearance and function. Individuals who present with internal tibial torsion (-) or severe external tibial torsion ($>40^{\circ}$) are considered abnormal (Thackeray & Beeson, 1996). In their study of lower extremity rotational problems in children, Staheli et al (1985) concluded that the vast majority of rotational variations fall within the normal range and require no treatment.

In contrast, Staheli et al (1972) stated that torsional abnormalities of the lower extremity in the children is a very common clinical problem and is due to tibial torsion. Hutter & Scott (1949) examined 1500 school children between the

ages of 5 and 7.5 years. They found that 10% of boys and 8.5% of girls showed internal tibial torsion whereas only 4% of adults examined showed internal tibial torsion. Similar trends were obtained by Svenningsen (1990) in their paper on hip rotation and in-toeing. They proposed that 30% of children have in-toeing gait at the age of 4 although the condition persists in only 4% of adults. The above two papers thus indicate that the incidence of in-toeing could be the consequence of hip or tibial abnormality. The last torsional deformity that may be responsible for in-toeing gait is the foot structure more specifically metatarsus adductus (Benjamin Jacobs, 2010).

Treatment for metatarsus adductus is often controversial and should be based on the severity of the condition (Pam Baxter, 2010). Some of the literature recommends only observation without intervention for mild cases and active intervention in severe cases or by two months of age, if the condition has not resolved. Other literature advocates treatment as soon as possible involving gentle mobilisation of the foot and/or the use of splints.

If the child is under 4 months old, some stretching can be attempted to restore the foot's normal shape. If stretching does not yield positive results, splinting and casting may be offered to the child between 4-12 months old. Most metatarsus cases (85-90%) identified at birth resolve by one year of age with only about 5% remaining at the age of 16 (Pam Baxter, 2010).



Treatment methods for in-toeing range from monitoring and observation; manipulation and cross legged sitting; use of corrective footwear such as gait plates and orthotics as well as serial casting and operative techniques (Thackeray & Beeson, 1996). Treatment does not only depend on the cause of in-toeing but also on the level at which the abnormality originates. Secondary harmful compensations occurring at other joints as a result of in-toeing also need to be taken into account during treatment or rehabilitation. Treatment and management of in-toeing varies greatly from one practitioner to the other. The general consensus amongst practitioners is that in-toeing will often resolve spontaneously by 12-14 years of age (Svenningsen et al, 1989). The recommendation is that operative techniques should be performed only for severe functional and cosmetic disability and not as a prophylactic measure (Thackeray & Beeson, 1996) 🌈

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