

Metatarsus Adductus

Key Points:

- Medial deviation of the forefoot on the hindfoot
- Almost always self-resolving for mild, flexible deformities
- Classified by heel-bisector line and flexibility
- Treatment is usually stretching, occasionally serial casting, and very rarely surgery

Description:

Metatarsus adductus, the most common foot deformity of infancy, involves medial deviation of the forefoot relative to the hindfoot. This deformity is usually mild, flexible and self-correcting, however, moderate to severe deformities may require treatment.

Epidemiology:

The incidence may be in the range of 1/1000 births but is more common with a positive family history. (Wynne-Davies 1964) Other studies have suggested that the incidence may be as high as 12% in term infants (Hunziker 1988). The condition has been associated with torticollis and developmental hip dysplasia (DDH). The reported incidence of DDH with metatarsus adductus ranges from 1.5 to 10%, however, not all studies have confirmed this association. (Kumar 1982, Jacobs 1960, Paton 2009, Gruber 1991, Kullmer 1991).

Clinical Findings:

Metatarsus adductus primarily involves medial deviation of the forefoot on the hindfoot. Secondary characteristics include prominence of the 5th metatarsal base, a neutral to slightly valgus hindfoot, a slightly supinated forefoot and a medial crease. There may be widening of the space between the 1st and 2nd toes. Additionally, related to the age at diagnosis, many of these patients will also have internal tibial torsion.

Metatarsus adductus should be distinguished from a skewfoot deformity with fixed hindfoot valgus with lateral subluxation of the navicular on the talar head.

Imaging Studies:

X-rays or other imaging studies are generally not needed, as the natural history for most cases is benign with spontaneous resolution. However, with persistent deformity, a standing or simulated weight-bearing view may show a trapezoidal shape of the medial cuneiform and medial deviation of the metatarsals.

Etiology:

The cause of metatarsus adductus remains unknown, although it has been thought to be related to intrauterine compression similar to the other "packaging" problems, torticollis and developmental hip dysplasia. Studies of fetal specimens suggest multiple pathologic factors including medial deviation of the medial cuneiform distal articular surface, subluxation of the tarsometatarsal joints, and muscle contractures.

Classification

There are 2 classification systems described by Bleck. The heel bisector classification describes the relationship of the axis of the heel relative to the forefoot. A line through the axis of the heel is drawn extending to the forefoot and the bisector line moves laterally across the forefoot as the severity increases.(Bleck 1983) The other system classifies metatarsus adductus according to flexibility. As the heel is held with a fulcrum over the base of the 5th metatarsal, the forefoot is pushed laterally to determine to what degree the lateral border of the foot can be corrected. A foot that can be overcorrected is said to be “flexible”. One that can be corrected to the midline is “partly flexible”, and one that cannot be passively corrected to midline is “inflexible”.

Treatment:

Most cases of metatarsus adductus with mild, flexible deformity will spontaneously correct without treatment. Passive stretching exercises are routinely recommended although some believe that stretching by parents does not help and may be harmful, particularly if not performed correctly.

Mild, passively correctable deformity can be expected to resolve up to age 3 or 4. (Ponseti 1966) and mild residual deformity is benign.(Farsetti 1994, Rushforth 1978) If the foot is only partly flexible or inflexible, manipulation and serial casting or bracing can be effective, usually between the ages of 6 months and 1 year. A prospective randomized trial of casting compared with orthotic treatment for resistant metatarsus adductus demonstrated that the orthotic group had greater improvement in the heel bisector measurement. However, footprint and radiographic improvement was noted with both methods without the development of hindfoot valgus. The orthotic program required more active parental participation but was less expensive.(Herzenberg 2014)

Surgical treatment is rarely indicated, but may involve release of the abductor hallucis, medial capsulotomy, or osteotomies. These surgical treatments, however, are not supported by robust outcome data and high failure rates have been described .(Stark 1987, Kendrick 1970, Berman 1971, Gamble 1982) In the uncommon situation of an older child with persistent disabling deformity, options include an opening wedge osteotomy of the medial cuneiform with or without a closing wedge osteotomy of the cuboid or osteotomies of the bases of metatarsals two through four (Lincoln 1976, McHale 1991, Anderson 1991, Conklin 1991)

Complications:

Manipulation and serial casting of metatarsus adductus can lead to iatrogenic hindfoot valgus or skewfoot. This can be avoided by holding the heel neutral and stationary during the manipulation. Following surgical treatment, release of the abductor hallucis may contribute to the development of hallux valgus.

References:

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