



Dorsiflexed First Ray/Metatarsus Primus Elevatus

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A dorsiflexed first ray or metatarsus primus elevatus (MPE) describes a structural deformity in which the first ray lies in a dorsiflexed position relative to the lesser. The deformity is also characterised by the first rays greater range of dorsiflexion than plantarflexion.

ANATOMY

The first ray is made up from the first metatarsal and the medial cuneiform. The ray facilitates movement in all three planes however predominantly produces the frontal and sagittal plane movements of dorsiflexion coupled with inversion and plantarflexion with eversion. This is due to its axis being 45° to both of these planes (Figure 1).

CLASSIFICATION

Metatarsus primus elevatus can be described as being congenital or acquired and can be further classified as a rigid, semirigid, mobile or hypermobile deformity. A normal range of motion usually indicates a congenital deformity whilst an acquired MPE is characterised by an abnormal range of motion. This may be due to tibialis anterior contraction or associated with a forefoot supinatus

ASSESSMENT

Clinical assessment of MPE involves the evaluation of the sagittal plane position of the joint. The patient is to be evaluated in a non-weight bearing position with the subtalar joint in its neutral position and the midtarsal joint maximally pronated to lock it on the rearfoot. Assessment for a MPE involves the following:

- Maintain the subtalar joint in its neutral position
- Place one hand around the lateral side of the forefoot with the thumb on the plantar surface to load the lesser rays (top in figure 2)

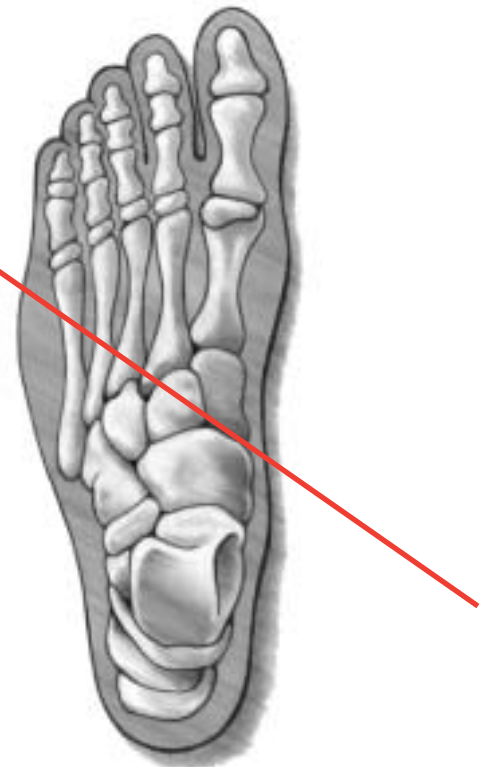


Figure 1: 1st Ray Axis

- Place the other hand around the first metatarsal head and move the first ray through its full range of motion (bottom in figure 2)
- Note the positions of maximal dorsiflexion, plantarflexion and the neutral position of the first ray In a normal foot the first ray is able to dorsiflex above the transverse plane of the lesser metatarsal the same extent as it can plantarflex below. However in a patient with MPE the first ray will lie dorsally to the lesser metatarsals and will have a greater amount of dorsiflexion.



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Figure 2: Evaluation of first ray position
(Merriman and Tollafield, 1995)

PATHOMECHANICS

The dorsiflexed position of the first ray may effect gait and foot mechanics. An MPE reduces the amount that the first ray is able to plantarflex during propulsion. The dorsiflexed position of the ray also reduces its ability to weight bear and may overload the lesser rays. Furthermore it may restrict normal MPJ dorsiflexion which leads to dorsal joint impingement. Thus predisposing the patient to hallux limitus and rigidus.

TREATMENT

Conservative management of the condition involves correcting the biomechanics of the foot by using orthotics. Orthotics protect overloaded areas of the foot and enable the first ray to accept more weight bearing force during propulsion.#

REFERENCES

1. Merriman, L.M. and Tollafield, D.R. (1995) *Assessment of the Lower Limb*. Churchill Livingstone, Singapore

