Tendon Transfers for Equinovarus Deformity in Adults and Children

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KEYWORDS

- Tendon transfer • Foot deformities • Equinovarus deformity
- Pediatrics • Adults

Strictly defined, an equinovarus foot deformity positions the foot and ankle in both equinus and varus. However, triplanar joint axes, coupled joint motion, and secondary contractures result in deformity within in the sagittal, transverse, and frontal planes. This complex deformity pattern results in a foot and ankle posture that makes it extremely difficult to ambulate correctly, stand at ease, or even allow appropriate orthotic/prosthetic fitting (**Fig. 1**A). In a series of 177 patients who sustained hemiplegic stroke, the positive impact of tendon transfer surgery for equinovarus deformity included improved foot position, a faster gait, and improved propulsion.[1] This article describes the etiologies, evaluation, and operative management of equinovarus deformity in adults and pediatric populations by tendon transfer and ancillary soft tissue releases.

TENDON TRANSFERS FOR EQUINOVARUS DEFORMITY IN ADULTS

A complete review of the protagonist-antagonist relationships and electrophysiologic activities of the lower extremity musculoskeletal units during gait is beyond the scope of this article. However, in the equinovarus foot and ankle, it should be reinforced that the primary deforming forces include the posterior tibial tendon (PTT), the gastrocnemius-soleus complex, the flexor hallucis longus tendon (FHL), and the flexor digitorum longus tendon (FDL) (in decreasing order of magnitude). These motor units overpower their antagonists, either because of weakening or complete loss of the latter. Secondary soft-tissue contractures then maintain or even exacerbate the deformity.

In addition to equinus, a substantial amount of varus deformity can develop through the ankle and subtalar joints, and to a lesser extent through the midfoot distal

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Fig. 1. (*A*) Posture of the equinovarus foot. Note the lateral column overload from shoe pressure and limited attempted weight bearing. (*B*) Radiographs of a mild-moderate equinovarus foot. Note the varus and adducted position of the foot, overcoverage of the talonavicular joint, ankle equinus, heel varus, and "stacking" of the metatarsals.

to the transverse tarsal joint. Additionally, both the equinus and varus deformities may be static, dynamic, or combinations thereof, depending on the etiology of the deformity. As discussed later, the time course at which these etiologies progress into an equinovarus deformity vary. Compounding the clinical presentation, a lower motor neuron (LMN) or upper motor neuron lesion may occur in the face of a preexisting neurologic condition. These lesions may result in secondary deformities, the natural history of which needs to be considered in order to provide long-lasting deformity correction without compromising existing lower extremity power. Thus, the history

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