

# PREVENTION AND CORRECTION OF FIXED EQUINUS DEFORMITY IN MID-FOOT AMPUTATIONS

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## INTRODUCTION

Mid-tarsal and tarso-metatarsal amputations are often followed by equinus and equino-valgus deformity to a degree incompatible with comfortable function (Fig. 1 and 2). Muscle imbalance progressively deforms the remaining foot, thus creating difficulties in fitting a prosthesis. The amputee is required to bear excessive weight anteriorly oftentimes across an area of scarred, adherent, tender skin.

While fixed equinus deformity is not encountered with every mid-foot amputation, its occurrence is so frequent that elective amputation at this level has been largely discarded. Nevertheless the inherent values of this amputation level, i.e., full limb length, serviceable total end bearing, and simplicity of prosthetic replacement combine to make the mid-foot amputation desirable under suitable circumstances particularly in individuals doing heavy work. A painless mid-foot amputation has been referred to as a "laborer or farm hand" amputation. It has, in fact, been most often encountered in crush injuries of the forefoot, usually industrial. The frequency of crushed forefeet in certain occupations has prompted the widespread use of workshoes with steel-cap toes as a safety requirement in certain occupations.

A number of reconstructive operative procedures have been devised to prevent and correct the ankle equinus. These include a variety of arthrodesing technics with anterior wedge osteotomy; tendon transfer utilizing peroneal and posterior tibial tendons as a sling anteriorly; anterior tibial tendon tenodesis with or without the toe extensor tendons; and astragalectomy. Certain of these operations are combined with lengthening of the tendo calcaneus. Some surgeons when confronted with this problem summarily amputate at a higher level.

During and shortly after World War II, the author had occasion to see and treat a number of young male patients with traumatic and frostbite mid-foot amputations with fixed equinus deformity and pain. It was decided to remove muscle imbalance by simple tendo calcaneus section, then manually correct the deformity and evaluate the nature of the healed

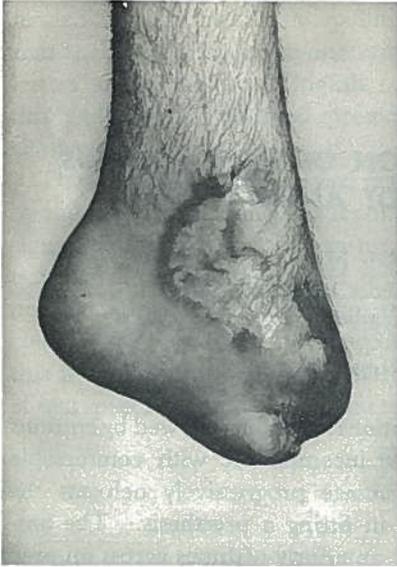


FIGURE 1. Lateral view of mid-foot amputation illustrating fixed equinus deformity.



FIGURE 2. Anterior view illustrating scar line and adverse effects of anterior weight bearing.

stump thereafter. In several cases, the response to this simple procedure was prompt, satisfactory, and permanent. It has been used occasionally in the ensuing years with continuing satisfaction. Recently, Professor B. Oscar Barry, Department of Orthopedic Surgery, Haile Sellassie I University, has advised by personal communication of his use of this simple technic in many cases of neurotrophic forefoot amputation with equinus deformity due to leprosy. He is now preparing a report of his experience.



FIGURE 3. Lateral view showing correction of equinus deformity and weight bearing during stance.



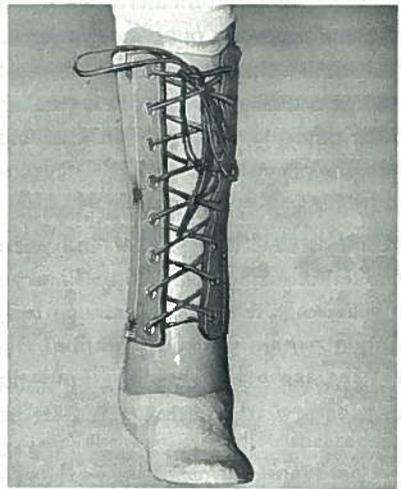
FIGURE 4. Anterior view showing correction of equinus deformity.

**TECHNIC**

Under sterile precautions, the tendo calcaneus is divided subcutaneously a short distance above its insertion. The ankle and hind foot are then stretched into sufficient dorsiflexion to allow the heel to rest squarely on the floor. The stump is immobilized in a cast extending to just below the knee for a period of ten days to two weeks. A walking button can be applied, and the patient may bear weight during this time if there are no contraindications. Following removal of the cast, a forefoot shoe filler or prosthetic cushion is worn in the usual manner. By this means, the equinus is corrected, and weight is borne, as it should be, on the plantar skin of the heel and remaining portion of the sole of the foot (Fig. 3 and 4). Recurrence of the equinus deformity has not been a problem. Slight calcaneus deformity may develop but will cause no difficulty either in shoe fit or as a source of pain. While push-off is, of course, eliminated, the stump even with an intact tendo calcaneus is not the source of a significant push-off in the presence of fixed equinus deformity. By this simple method, skin problems, pressure irritation, and pain associated with excessive weight on the end of the stump are largely eliminated. The weight is borne properly on the plantar heel skin and over the entire broad remaining sole area (Fig. 5 and 6).



**FIGURE 5.** Lateral view of patient wearing prosthesis.



**FIGURE 6.** Anterior view of patient wearing prosthesis.