

## FUNCTIONAL PARTIAL-FOOT PROSTHESIS

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### INTRODUCTION

It is the purpose of this article to present a simple, easily fabricated, functional prosthesis for the partial foot amputee.

The absence of the forefoot following, for example, Chopart amputation (Fig. 1), reduces the foot lever to the level of inadequacy. As a result, push-off is absent and stability is impaired. Previous prosthetic

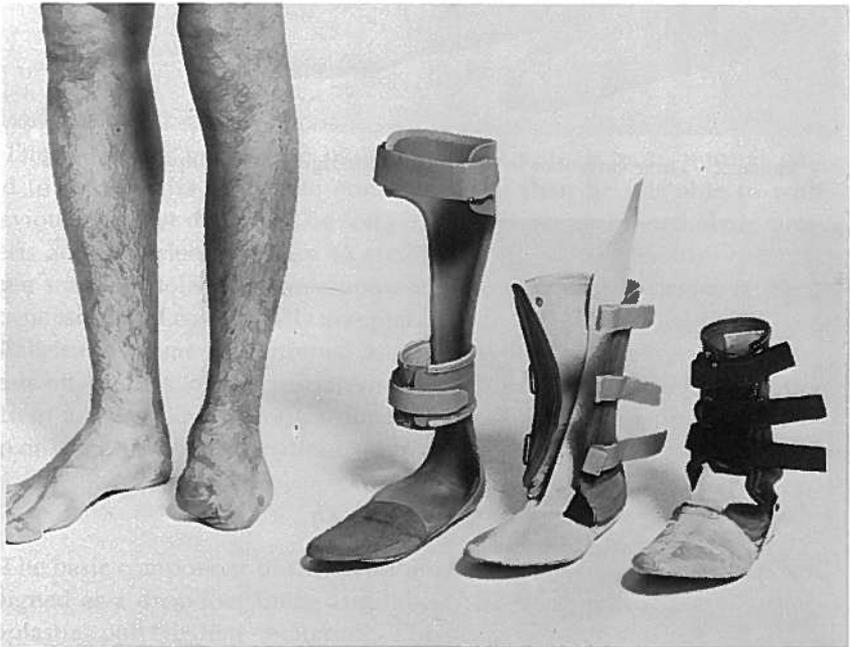


FIGURE 1.—Chopart amputation with the three prostheses the patient has most recently worn. The VAPC Ortholene Functional Prosthesis is the one nearest the patient.

devices have been directed toward providing maximum stability by total immobilization of the ankle, as with the frequently used plastic laminate Chopart (Fig. 2), or toward allowing ankle motion at the expense of stability (Fig. 3).



**FIGURE 2.**—Three variations in plastic laminate rigid ankle Chopart prostheses.



**FIGURE 3.**—Prosthesis with free motion ankle joint.

A newly developed Ortholene Functional Prosthesis (Fig. 4 and 5) provides stability and, by virtue of the elasticity of the plastic component, not only permits ankle plantar flexion on heel strike, but also, late in stance phase, allows ankle dorsiflexion followed by "toe-break." Dorsiflexion of the ankle and toe-break flex the ortholene prosthesis. This provides a spring effect during push-off.



**FIGURE 4.**—VAPC Ortholene Functional Prosthesis.



**FIGURE 5.**—Rear view of Figure 4.

These features enable the patient to walk with a more normal gait and to climb stairs in a more normal fashion than he was able to with previous Chopart designs. The long upright lever of the ortholene prosthesis adds sufficient stability to enable the patient to balance securely when standing solely on the amputated extremity. This device is light, inexpensive, and cosmetically acceptable.

Fabrication time is shortened and it is possible to deliver this prosthesis on the day of the initial visit—a significant convenience to both patient and fabricator. Conventional Chopart prostheses usually require two or three visits by the patient.

### **FABRICATION**

The basic component of this prosthesis is the Teufel brace<sup>a</sup> which was designed as a drop-foot brace and fabricated from "Ortholene," a thermoplastic polyethylene material. This can be heat-worked or cold-worked, i.e., hammered to provide modifications. There are three sizes

<sup>a</sup> Manufactured by Wilh. J. Teufel, Stuttgart, West Germany.

of the Teufel brace presently available—small, medium, and large—but each is oversized and intended for modification to permit anatomical fitting.

In addition to the established fitting procedures for the Teufel brace (1), the following features require special attention:

1. Distal to the stump end the Ortholene is retained and extended to the full length of the shoe innersole as shown in Figures 4 and 5, but it is thinned out slightly. The extent of thinning aids in controlling the flexibility at the "toe-break," and the spring resistance for push-off.

2. The cork toe filler (Fig. 4 and 5) should be built  $\frac{1}{2}$  in. distal to the end of the stump to allow room for flexion during push-off.

3. Velcro straps are attached to the calf band by rapid rivets to form the calf cuff, and an ankle cuff is riveted above the ankle to hold the leg more securely to the prosthesis (Fig. 4 and 5).

### **PATIENT'S COMMENTS**

The patient who has been fitted with this prosthesis, R.W., is a 25-year-old office worker and a Vietnam-era veteran. The following notes were abstracted from the clinic record: "The patient has been fitted with the Teufel brace modified for a Chopart amputation. He is extremely pleased with this, and indicates that he can now balance on one foot, whereas he could not before, with the prosthesis he had previously had. He is also pleased with the fact that he now has 'toe action' which he did not have before. He feels that he is more stable on the stairs than before, and he was put through a trial on stairs. All in all the patient is very happy with the new prosthesis."

### **SUMMARY**

We have described a cosmetic, lightweight, inexpensive, simply fabricated Chopart prosthesis which provides stability and permits the simulation of normal gait from heel strike to push-off. It is a prosthesis that is readily adaptable to other levels of partial foot amputation as well as to the Chopart without equinus contracture.

### **REFERENCE**

1. Teufel Drop-Foot Brace, Draft Manual. VA Prosthetics Center, New York, N.Y.