The Management of Amputations of the Leg Using a New Rigid Foam Plaster* for Prosthetic Fitting

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Summary. This paper describes the use of a rigid polyurethane foam to construct a stump socket for immediate or early prosthetic fitting in 15 patients with amputations through the leg.

The foam plaster is poured into a prepared cotton sleeve, with a zip incorporated, and rolled out to a layer 4 mm thick. The filled sleeve is put around the stump and the zip closed, moulding the sleeve firmly to the stump. The closed sleeve hardens into a rigid polyurethane shell within 20 min. Afterwards the skeletal prosthetic components are fixed with the same rigid foam.

The polyurethane foam socket is quickly and cleanly prepared, only one third of the weight of a plaster of Paris cast and is easily removed by means of the zip, allowing access to the stump.

Résumé. Cet article décrit la fabrication d'une emboîture faite de mousse de polyuréthane, destinée à l'appareillage précoce ou immédiat et qui a été utilisée chez 15 amputés de jambe.

Le produit est coulé dans un manchon de coton muni d'une fermeture éclair et ensuite aplati jusqu'à ce qu'il forme une couche de 4 mm d'épaisseur. Le manchon est ensuite fermé et le manchon sur le moignon. Le manchon ainsi fermé durcit en vingt minutes et forme une coque rigide de polyuréthane. Les composants de la prothèse sont ensuite fixes avec le même matériau.

L'emboîture en mousse de polyuréthane peut être réalisée rapidement et proprement, elle ne pese que le tiers d'un plâtre classique et peut être aisément retirée grâce à la fermeture éclair, permettant d'accéder au moignon.

Key words: Lower extremity amputation, Artificial limbs, Rigid foam plaster, Prosthetic fitting, Vascular disease

Immediate or early prosthetic fitting after lower extremity amputation improves postoperative rehabilitation in elderly patients. Some surgeons have been hesitant to use a temporary prosthesis immediately following operation because it required a plaster of Paris socket. With such a cast the stump wound cannot be examined without cumbersome replastering and thus failure of wound healing may not be recognized in time.

We have developed a special rigid polyurethane foam plaster system for medical use [3], which has been successfully used on 5000 patients for normal orthopaedic purposes such as simple forearm splints, splint apparatus, Burry joint supports, abduction splints and hip corsets.

We have also used this system in the management of early prosthetic fitting after lower extremity amputations [15, 16].

Material and Methods

Fifteen patients underwent major amputation of the lower extremity during the period of February 1977 to August 1978 in the Department of Surgery of the St. Barbara General Hospital, Gladbeck, West Germany. Fourteen amputations were performed because of peripheral vascular disease. In one patient we carried out below knee amputation as advocated by Burgess [4, 5], while in the other 13 patients a knee disarticulation as described by Baumgartner [1]. The remaining patient underwent above knee amputation secondary to ascending infection after severe crush injury to the soft tissue of the leg, including rupture of the popliteal artery, and fracture of the femur. The amputation followed initial
Fig. 1. Filling of the cotton sleeve with the polyurethane polymer

Fig. 2. Dressing of the filled cotton sleeve to the desired thickness of 4 mm

Fig. 3. Fitting of the cotton sleeve to the stump

Fig. 4. Forming the socket to insure a snug fitting while the polyurethane hardens

Fig. 5. Cutting of the socket to the desired length

Fig. 6. The pattern which is used to achieve a correct fitting to the ischial tuberosity after above-knee amputation

Fig. 7. The shell for the stump after above-knee amputation has hardened