

## THE RUBBER SLEEVE SUSPENSION FOR BELOW-KNEE PROSTHESES

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In various areas of the world there seem to be preferences for just one of the many types of prosthetic devices that have been developed to solve a given problem. This we can attribute to "human nature." Perhaps we ourselves may be from the same mold, and therefore would like to share one of our experiences with you.

In spite of the various auxiliary suspension aids that have been developed for below-knee prostheses (6) friction between the amputee and the prostheses still remains a problem. Aids such as stump socks, shoulder straps, fork straps, thigh lacers, condylar straps (6), condylar wedges (2, 5) and suction (4) with valves (3) have been used and all with very good results. We have one other: the rubber-sleeve suspension.

### THE RUBBER SLEEVE SUSPENSION

The rubber sleeve for suspension of the below-knee prosthesis was conceived and developed at the Orthotic and Prosthetic Facility, University of Michigan Medical Center, Ann Arbor, Michigan.<sup>2</sup> On a below-knee prosthesis, a rubber sleeve is applied so that it extends from the prosthesis to the patient, and in a manner that a negative pressure is developed (1) to create a suction-type below-knee prosthesis. Well over 450 patients have been fitted with this type of suspension here during the past six years.

The rubber sleeve can be adapted to any below-knee prosthesis that does not have mechanical joints or straps attached.

The first reactions and comments from patients that have worn other suspension aids

before using the rubber sleeve are that piston action is absent or minimal, the prosthesis feels lighter in weight, and it seems to be more of an intimate part of him.

The rubber sleeve should be applied to the prosthesis so that the bulge of the rubber is in the area of the patella. It should be rolled or pulled up (Fig. 1) onto the flesh to cover approximately 5 to 10 cm. of the upper thigh, well above the stump sock (Fig. 2). The patient is taught to expel all of the air that is captured within the sleeve so that it fits snugly with no creases or wrinkles (Fig. 1). This constitutes a suction-type below-knee prosthesis (7).

The rubber sleeve is available in three sizes



Fig. 1. Application of the rubber-sleeve suspension for a BK prosthesis.

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Fig. 2. The rubber-sleeve suspension in place.

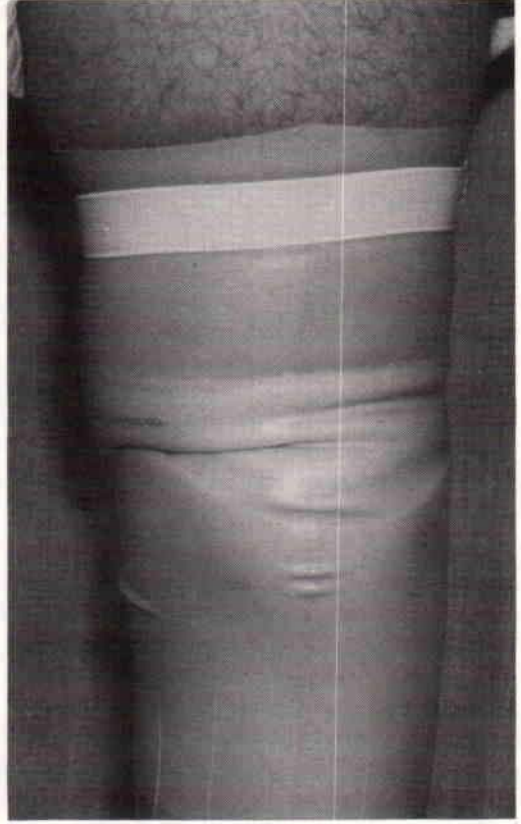


Fig. 3. A lightweight elastic garter with Velcro tabs may be used if the sleeve is oversize.

The patient should have several rubber sleeves on hand. Three or four should cost no more than a "U" strap and waist belt. When the rubber sleeve is torn or punctured, the only suspension remaining is due to the elasticity of the rubber and there will be some slippage and piston action.

Good hygiene is necessary. The rubber sleeve that comes in contact with the flesh, should be cleaned with rubbing alcohol and powdered with talcum. When an insert is used and becomes damp with perspiration, it should be dried by taking it out of the prosthesis and set out to dry in the air.

Because the patient is fitted with stump socks as in conventional methods, bony prominences and hypertrophy are of little problem. The patient's prosthesis can be padded in the usual method and with the rubber sleeve suspension still be a suction prosthesis.

We have yet to see an edematous condition caused by the rubber sleeve and suction. Heat and perspiration give no more problems than do suction socket prosthesis for the above-knee amputees when kept clean.

We hope this article will help many prosthetists in their prosthetic suspension and fitting problems, and thus many patients.

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