

## Technical note

### A low profile paediatric partial foot

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#### Abstract

A low profile prosthesis was designed using a flexible liner in conjunction with a rigid shell, with a toe extension. Thus far, two paediatric patients have been fitted with the device, at the University of Virginia Medical Center. One patient is a five year old with a Lisfranc level amputation and the other, a sixteen year old with a Chopart level amputation. Both patients have successfully worn their prostheses, full time, for over two years. The prostheses these children have been wearing are comfortable, functional and cosmetic. The prostheses provide excellent suspension, a good weight-bearing surface and an anterior lever arm for push-off during late stance phase.

#### Introduction

Many of the various types of partial foot prostheses have historically proven to be less than ideal in term of cosmesis. While considerations of comfort and function are quite often met, the partial foot prosthesis is often clumsy and unwieldy in appearance. In an effort to satisfy all three considerations of comfort, function and cosmesis, a low profile prosthesis has been designed using a Dow Corning Silastic Elastomer liner, in a co-polymer polypropylene shell with a toe extension serving as the anterior lever arm.

#### Method

An impression of the residual limb is taken, with Alginate, under partial weight-bearing conditions. Upon removal of the limb, the negative cast is immediately filled with moulding plaster and a pipe is inserted for ease of

handling. Once the plaster has set, the Alginate is removed from the positive model. The positive cast requires very little modification other than light screening to smooth and slight plaster removal to form rectocalcaneo dimples, which aid in the suspension and positive purchase of the prosthesis.

The positive model is then coated with a cast sealer and PVA foil is stretched over the model. A layup of five to seven sewn nylon stockinettes has been used. This may be increased or decreased depending on the size and activity level of the child. An outer PVA bag is applied and the lamination proceeds in the normal fashion, using Dow Corning Silastic Elastomer #382 (Fig 1, top).

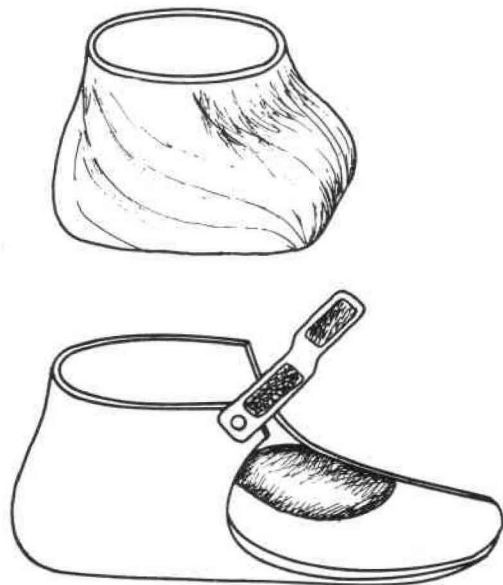


Fig. 1. Top, Dow Corning Silastic Elastomer liner. Bottom, co-polymer polypropylene exterior shell with longitudinal arch pad and elastic suspension strap in place.

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When the laminate has cured, moulding plaster is used to extend the model to match the size and shape of the sound side foot. A nylon stockinette is pulled over the model, to act as a separator, and  $\frac{3}{16}$ " co-polymer polypropylene is used to vacuum form the exterior shell and toe extension (Fig 1, bottom).

The proximal trimline of the shell is kept low – at or below the level of the malleoli. The medial and lateral trimlines of the toe extension determine the toe break and should be established during fitting. The trimline of the Silastic liner is 0.5 – 1 cm. superior to the co-polymer shell. Plastazote is used to fill the toe extension (Fig. 2, top). After sanding to the proper size, a thin layer of leather is glued and stretched over the Plastazote toe filler. A longitudinal arch pad is cemented in place and a one inch elastic instep strap is attached. The completed prosthesis is shown in Figure 2, bottom.

Donning of the prosthesis is quick and simple. The Silastic liner is pulled over the residual limb. The limb is then pushed into the co-polymer shell and finally the strap is tightened.

### Discussion

The prosthesis has been successfully applied to two paediatric patients. It has met the requirements of comfort, function and cosmesis, as well as having been well received by both the patients and their parents. The low profile design functioned well not only with the Lisfranc level, but also with the Chopart level, which is frequently fitted with a higher profile prosthesis. The thermoplastic toe extension is effective as an anterior lever arm for push-off. The Silastic

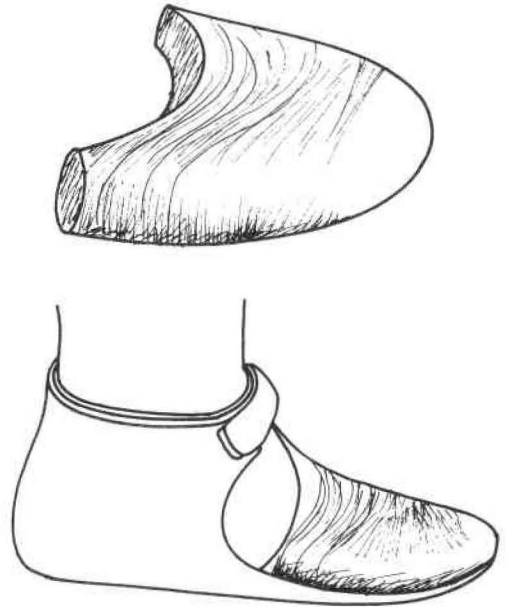


Fig. 2. Top, Plastazote toe filler. Bottom, lateral view of completed prosthesis.

liner adds a measure of comfort, while the low profile design improves the overall cosmesis. This appears to provide a useful prosthesis for these levels of amputation in children.

### Acknowledgement

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