Orthotics and Prosthetics, Vol. 32, No. 3, pp. 21-24, September 1978

Spenco-Lynadure Soft Inserts

MICHAEL T. WILSON, C.P.O.[1]

Soft interfacing material for prosthetic sockets have been used routinely for years when the mechanical and physiological condition of the residual limb is incompatible with the rigid properties of the prosthetic socket necessary to maintain dimensional stability. The primary function of soft interfacing is to dissipate resultant pressures on the limb during weightbearing. Secondary functions are to accommodate or compensate for minor discrepancies in socket design, to assist in donning supra-condylar sockets, and to allow for skeletal growth.

A comprehensive description of fabrication techniques and clinical applications has been presented by Radcliffe and Foort (1) in 1961. The interface suggested then consisted of a rather firm expanded rubber (Kemblo) and horsehide glued together. During the last decade, this type of insert has been replaced largely by expanded thermoplastics because they are lighter, are easier and quicker to use in fabrication, and are easy to keep clean. However, some of the physical properties of the thermoplastics are inconsistent with the physical requirements of the insert, the main problem being "cold flow" of the material. Some types of thermoplastics present less problems than others, but to one degree or another, all are susceptible to gradual dimensional changes caused by sustained and prolonged pressure. This problem is aggravated by the heat given off by the body.

With this in mind, the evaluation of new insert materials and techniques that would combine the favorable qualities of both Kemblo inserts (dimensional stability) with thermoplastic inserts (lightness and hygiene), seemed appropriate. The result of this evaluation is an insert made of expanded neoprene lined with nylon on the inside (Spenco), and laminated to nylon stockinet impregnated with a RTV urethane elastomer (Lynadure) on the outside. The combination of these materials results in an insert that is not only as structurally stable as Kemblo, and as light and hygenic as thermoplastics, but has several other favorable qualities with respect to use as an interface material. Unlike thermoplastics, neoprene is not heat sensitive, and is virtually 100 per cent resilient. There are no cold flow problems, and yet neoprene is remarkably soft and forgiving. Expanded neoprene (Spenco) also has an incredible capacity to absorb shear forces generated between the limb and socket, a property particularly appropriate in the fitting of dysvascular or burn patients. Spenco-Lynadure liners are very light in comparison with Kemblo inserts. They are extremely hygienic because they can be removed from the prosthesis, and washed by machine.

Fabrication

The type of Spenco to be used should be closed-cell 1/8-inch thick, with tex-

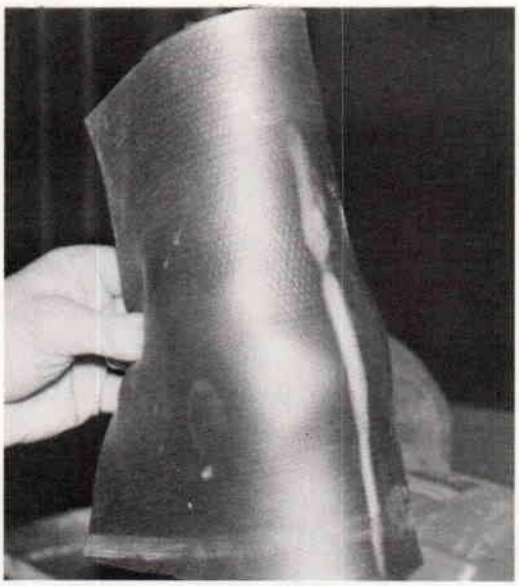

Fig. 1. The Spenco material is wrapped around the positive model, anterior to posterior, and the anterior centerline is marked with chalk.

Fig. 2. The posterior centerline is marked on both flaps of the Spenco material.

tured backing. The Spenco material is draped around the plaster positive, anterior to posterior, and the anterior centerline is marked with chalk (Fig. 1). Without the use of Yates clamps, the posterior centerline of the positive model is located and marked on either fold of the Spenco sheet (Fig. 2). The Spenco is removed from the positive model, and is folded in half along the chalk marking on the anterior part. A four-stitch-per-inch seam is used to sew along the posterior marking. Oil or Vaseline will help in feeding the material through the machine (Fig. 3).

After the Spenco has been sewn, it is pulled over the positive model. No longitudinal or peripheral tension should be present. The Spenco is sanded with wet-and-dry sandpaper dipped in TGW neoprene primer until the neoprene becomes rough and sticky from abrasion and chemical decomposition (Fig. 4). Closed-cell 1/4-inch neoprene is glued over the distal end of the Spenco for additional padding. Both surfaces must be primed and sanded before glueing. Figure 5 illustrates a supracondylar type insert with the attached distal pad, and with several layers of Kemblo glued together proximal to the medial condyle. Electrician's tape is used over the seam so that the Lynadure cannot seep between the stiches. Directly over the Spenco, the distal pad, and the Kemblo wedge, one or more layers of a nylon stockinet is applied with as little peripheral tension as possible. A PVA sleeve is pulled over the stockinet, smooth side in, and the atmospheric pressure is reduced by 1-3 inches of mercury, or just enough to pull the Spenco into the recesses of the plaster positive.

The Lynadure is introduced through the small end of the PVA sleeve. The

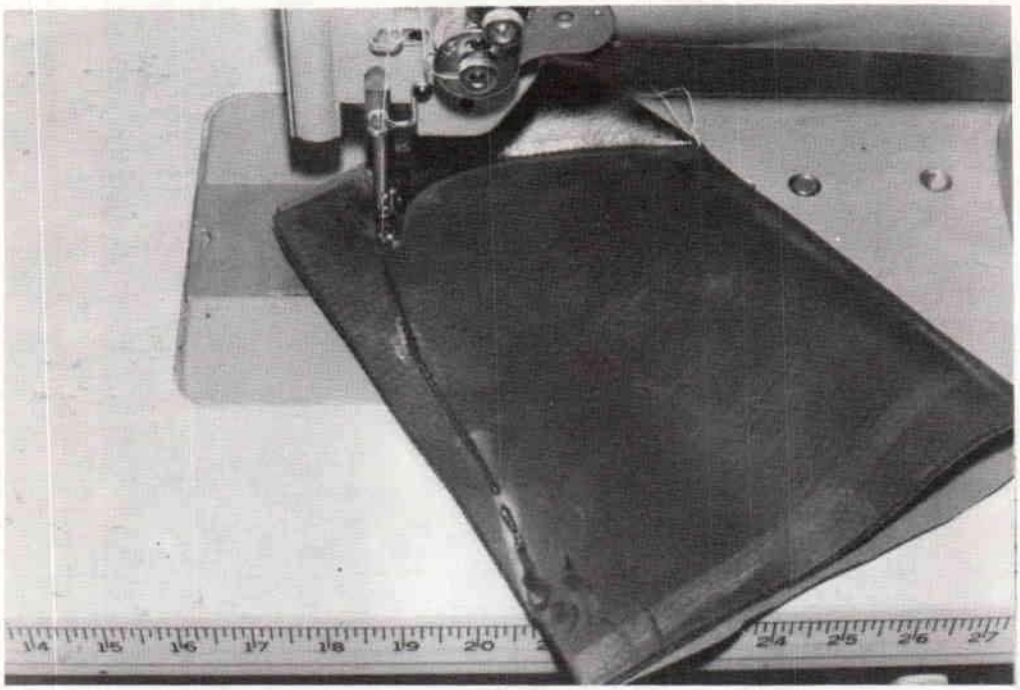

Fig. 3. A four-stitch-per-inch seam is used to sew along the posterior margin.

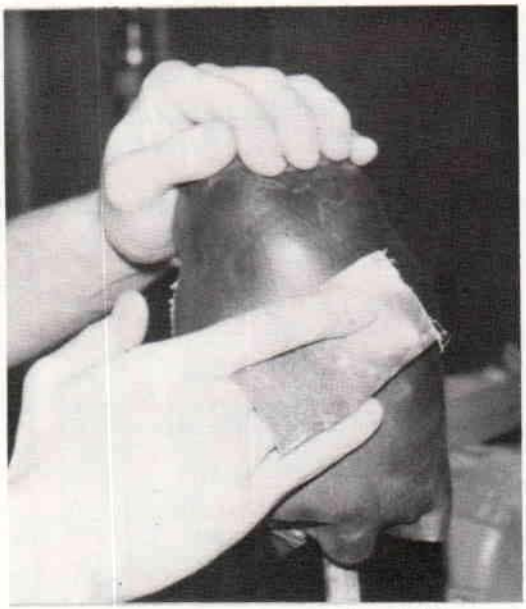

Fig. 4. The outer surface is sanded until it becomes rough and sticky.

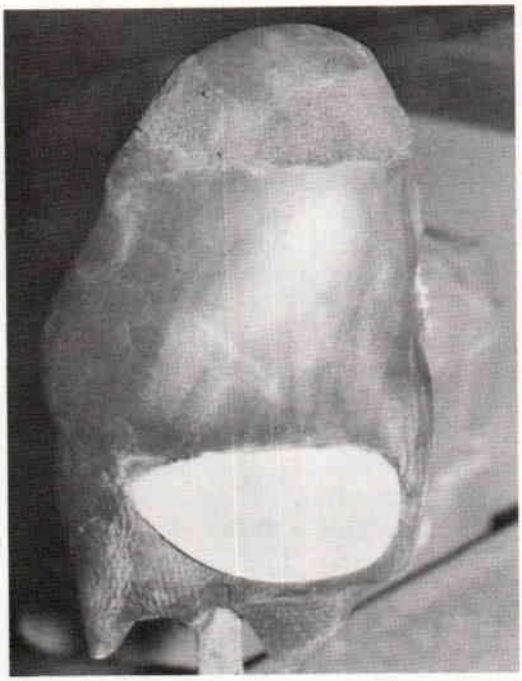

Fig. 5. A supracondylar insert consisting of several layers of Kemblo glued together may be used.

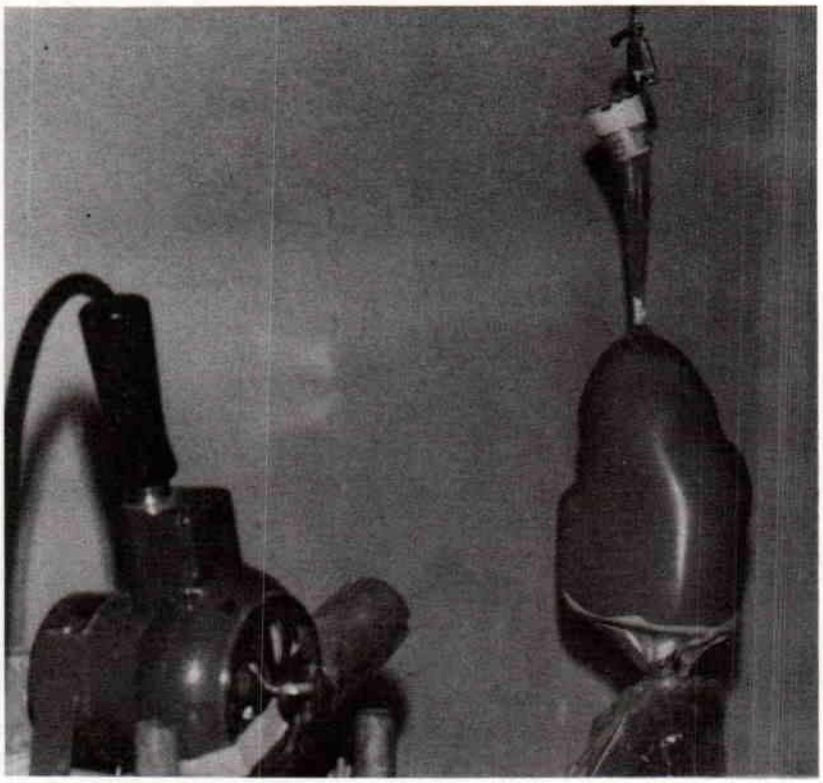

Fig. 6. Demoulding time can be reduced by use of a heat gun.

mixing ratio of Lynadure is 10 parts resin to 3 parts promoter. Pot life (working time) at room temperature is about 7-10 minutes. Demolding time can be accelerated to about 30 minutes with heat (180 deg. to 200 deg. F. (Fig. 6). It is best to laminate the plastic socket directly over the Lynadure while it is still in the curing stage. To make more efficient use of time and materials, the heat generated from the polyester curing cycle provides a near perfect temperature for the curing of the Lynadure. The shelf-life of Lynadure is 12-16 weeks after the container is opened.

I have used these inserts routinely in my own practice for about 12 months with very good results. Patients must apply the liner to the limb, and then insert both liner and limb into the socket. The only problem so far is the tendency for the Lynadure to delaminate from the Spenco, a problem that can be avoided if the Spenco is sanded and primed adequately before laminating with Lynadure.

Footnotes

[1]Medical Care Services, Inc., 1259 Monument Boulevard, Concord, California 94520

References

(1) Radcliffe, C.W., and James W. Foort, *The patellar-tendon-bearing below-knee prosthesis,* Biomechanics Laboratory, University of California, 1961, pp. 85-91.