

Elastic-Liner Type of Syme Prosthesis: Basic Procedure and Variations

Maurice A. LeBlanc¹

In the past few years, a number of prosthetists have been fabricating elastic-liner types of Syme prostheses, and their procedures have been described in the litera-

thereby allowing greater strength (with no openings) and a smoother cosmetic finish (with no straps) while maintaining total contact and suspension (fig. 2). However, it

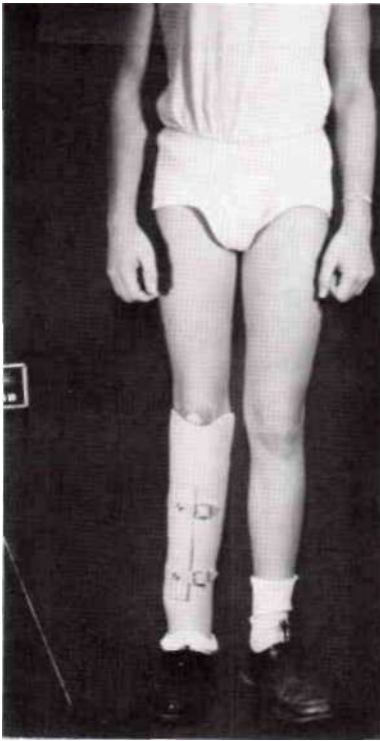


Fig. 1. Conventional Syme prosthesis.

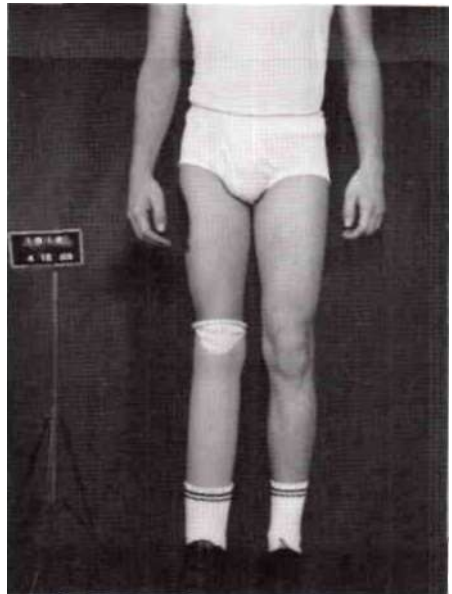


Fig. 2. Elastic-liner Syme prosthesis.

ture (1-5). This article presents the most commonly used procedure and some of the variations to it.

The elastic-liner type of Syme prosthesis has the advantage of eliminating the door on the conventional prosthesis (fig. 1),

cannot be used if the bulbous end of the stump is too large for satisfactory cosmesis of the cylindrical portion or for making the liner (not possible when the distal end is larger than the proximal brim).

BASIC PROCEDURE

1. Felt patches are placed on the stump for relief of bony prominences and/or sensitive areas.

2. A plaster cast is taken of the stump with partial weight-bearing and with blocks making up the length discrepancy.

¹ Staff Engineer, Committee on Prosthetics Research and Development, National Research Council—National Academy of Sciences.

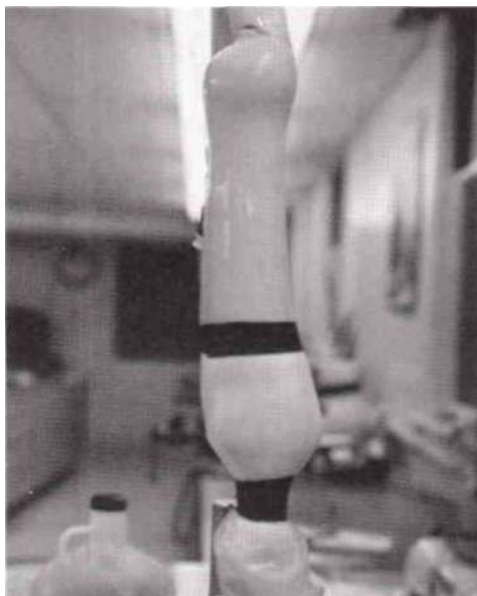


Fig. 3

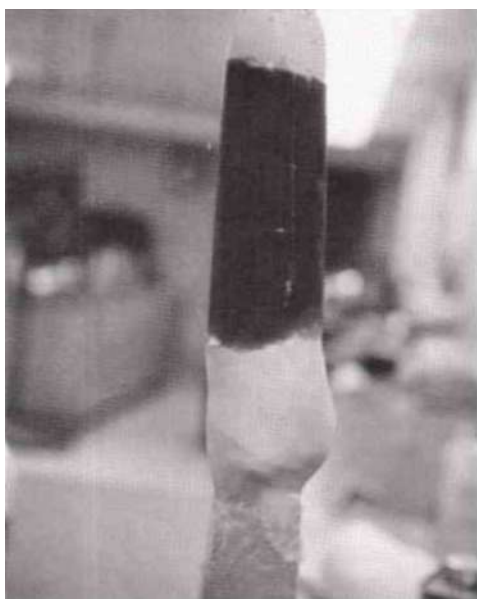


Fig. 4

3. The largest diameter of the bulbous end of the stump is measured, and the proximal level of the stump model is marked where its largest diameter equals that of the bulbous end.

4. Using nylon stockinette, the inner socket is vacuum-laminated with Silastic

(TM) elastomer #384 from the level marked in step 3 to the end of the stump (fig. 3).

5. The remainder of the inner socket (the proximal brim down to the level of the elastomer) is laminated with Laminac (TM) #4110 polyester resin.

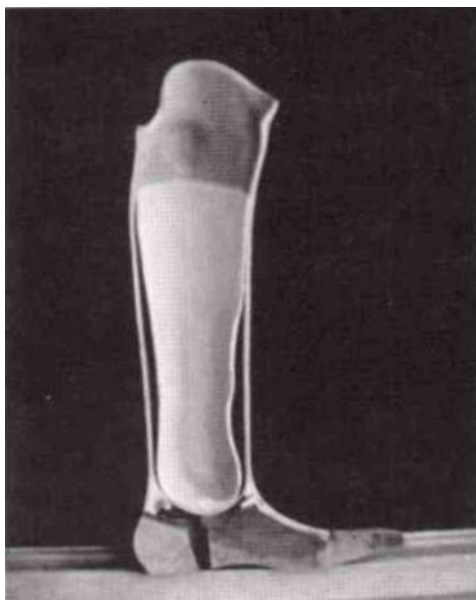


Fig. 5



Fig. 6

6. A wax build-up is made over the center portion of the inner socket between the bulbous end and the level marked in step 3 (fig. 4). The build-up is cylindrical in shape to allow entry of the stump into the socket.

7. The outer shell of the socket is laminated with Laminac #4110. Figure 5 shows a cutaway view of the inner socket and outer shell of the prosthesis. Note that the end of the liner must be attached to the outer shell so it will not pull out with the stump.

8. Using reference lines established on the plaster cast, the socket is statically aligned following the attachment of a SACH foot which has been cut and shaped to receive the bulbous end of the socket. (There is normally about a three-inch height discrepancy with the Syme's amputation.)

9. The socket is then dynamically aligned to the amputee's gait. Depending on the



Fig. 7

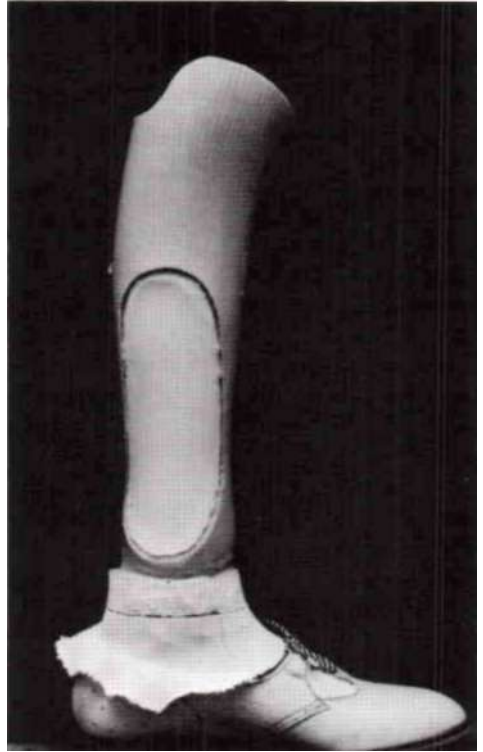


Fig. 8

method of attachment of the SACH foot to the socket, adjustment is usually provided by means of an alignment disc or by repositioning the socket with quick-setting epoxy resin.

10. The prosthesis is completed by laminating the socket and keel of the SACH foot and reattaching the sole (fig. 6). Fiberglass reinforcement is usually used in the lamination.

VARIATIONS

a. Alginate can also be used to make the negative impression of the stump. It gives better detail, and its elasticity allows easy stump removal. However, it is expensive, and one cannot see to position the heel pad while it is setting.

b. Modification can be accomplished on the plaster model instead of using the felt patches. Either way is satisfactory, but

using the patches saves time and is equally effective if they are properly placed.

c. A combination of 80% of Silastic elastomer #384 and 20% of #386 (foam) for the liner can be used to increase its expandability. More than 20% of #386 foams too much and reduces durability (2).

d. One variation on the size of the liner is to laminate the liner down to the largest diameter of the bulbous end rather than including the entire end. It is then not necessary to attach the end of the liner to the outer shell (fig. 7).

e. Another method of sizing the liner is to make an elastic window in the inner socket instead of making a whole inner bladder (fig. 8). This allows entry by rotating the stump as it goes into the socket, and makes possible a very cosmetic prosthesis.

f. Instead of making a wax build-up, it is possible to use Silastic elastomer #386

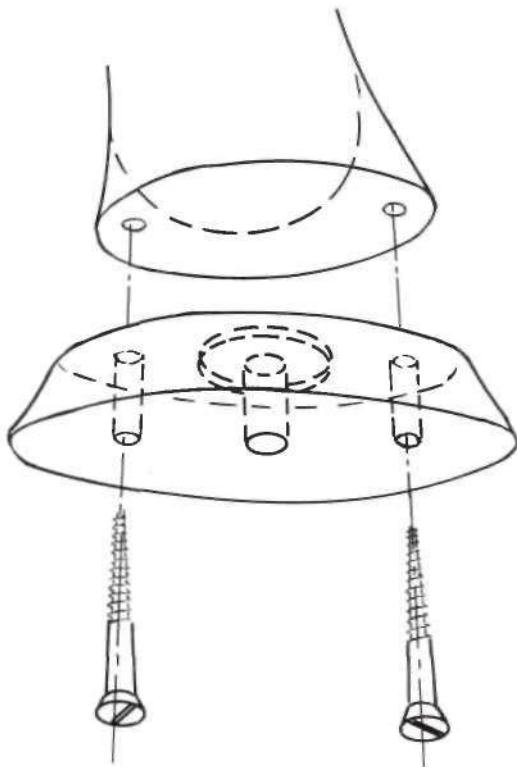


Fig. 9

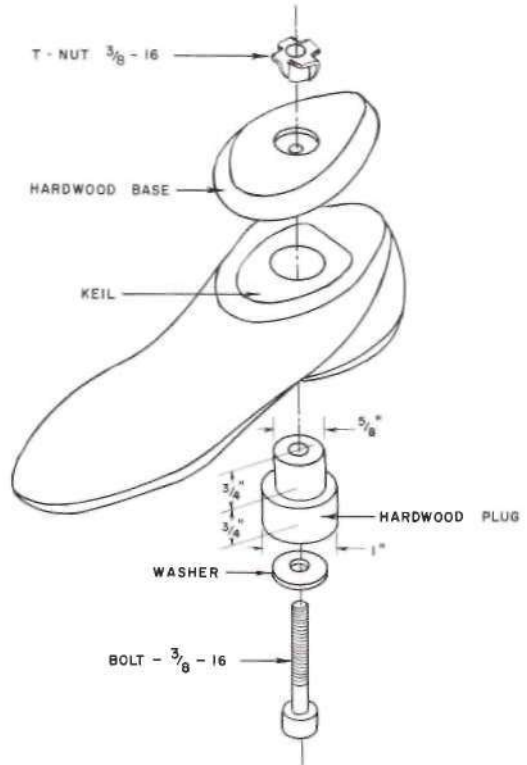


Fig. 10

foam for the space between the liner and outer shell and to leave it in the prosthesis. It is lightweight and can be compressed to allow entry of the stump. (This procedure is being used by William Sinclair, C.P.O., at Jackson Memorial Hospital in Miami, Florida.)

g. Another way to modify the SACH foot and attach it to the socket is shown in figures 9 and 10.

A wooden block is fitted and fastened to the distal end of the socket, and the bottom is sanded so it establishes the flexion and adduction angles of the socket. The wooden block forms a socket base for attachment of the SACH foot with the hardwood base and plug which reinforce the keel.

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REFERENCES

1. Eckhardt, Arthur L., and Harold Enneberg, The use of a Silastic liner in the Syme's prosthesis, *Inter-Clinic Inform. Bull.*, 9:6:1-4, March 1970.
2. Marx, Herbert W., An innovation in Symes prosthetics, *Orth. and Pros.*, 23:3:131-138, September 1969.
3. Mazet, Robert, Jr., Syme's amputation, a follow-up study of fifty-one adults and thirty-two children, *J. Bone Joint Surg.*, 50-A:8:1549-1563, December 1968.
4. Meyer, Leslie C, Harry L. Bailey, and Dewey Friddle, Jr., An improved prosthesis for fitting the ankle-disarticulation amputee, *Inter-Clinic Inform. Bull.*, 9:6:11-15, March 1970.
5. Sarmiento, Augusto, Raymond E. Gilmer, Jr., and Alan Finnieston, A new surgical-prosthetic approach to the Syme's amputation, a preliminary report, *Artif. Limbs*, 10:1:52-55, Spring 1966.