

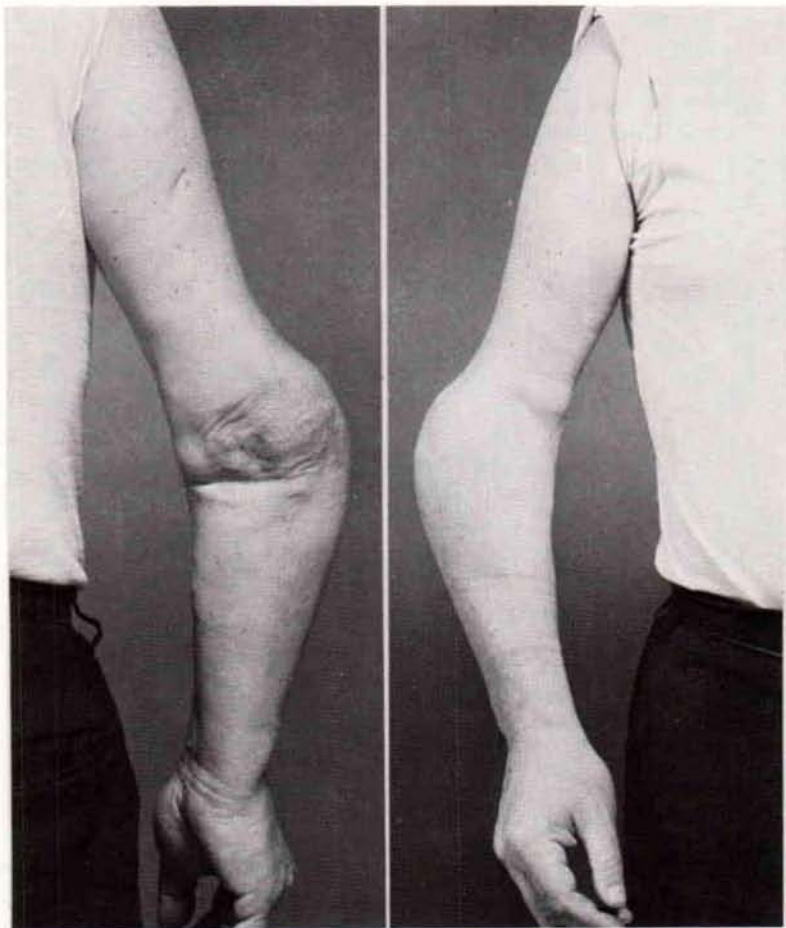
THE USE OF POLYPROPYLENE IN AN UPPER-LIMB ORTHOSIS

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During the past several years, sheet polypropylene has proven to be a durable plastic, useful in orthotics. Polypropylene is strong, light in weight, and relatively easy to mold. It has been used very successfully in the fabrication of ankle, foot, and spinal orthoses. Described here is a

procedure, based on research done at the Veterans Administration Prosthetics Center, New York City, using polypropylene in the fabrication of an upper-limb orthosis for control and protection of a painful elbow.

The patient (Fig. 1) has considerable lateral



Figs. 1. Anterior and posterior views of the deformed limb.

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and anterior tilt in the plane of the humero-ulnar articulation. There is a large rectangular piece of detached bone in the cubital space. Present, also, is osteosclerosis of the dorsal fragment of the olecranon. Pain and ultrasensitivity at the elbow joint limits his ability to extend his arm fully.

The objective was to provide an orthosis with hinges at the elbow, and a cap to protect the olecranon and posterior portion of the elbow, which at the same time would serve as a stop to limit extension of the forearm. The completed orthosis is shown in Figure 2. The protective cap is part of the humeral segment of the arm.

FABRICATION TECHNIQUES

A plaster cast made with the arm fully extended proved to be the best method for use with vacuum-forming techniques.

The cast is modified with reliefs to provide for the formation of the olecranon cover and to allow for pressure sensitive areas. One sleeve of cotton

stockinet is pulled over the cast to provide the air space desirable in the vacuum-forming procedure (1). Two pieces of polypropylene, $\frac{1}{4}$ -in. thick, are fitted to the frame of the vacuum-forming machine.

The vacuum-forming procedure is carried out in two stages. The first piece of polypropylene is placed in the oven at a temperature of 375°F for approximately 10 to 15 minutes. The cast is placed on the stand with the dorsal aspect facing upward for the best results. The heated polypropylene is pulled over the cast and the vacuum applied. Excessive material is cut away to provide the forearm cuff, and the cast and cuff are placed in position for the second forming procedure.

The second sheet of polypropylene is heated and vacuum formed over the cast and forearm cuff. The upper-arm cuff is trimmed so enough material is left to cover the epicondyles and to a level 1 in. distal to the olecranon.

The elbow joint axis is located, and copper

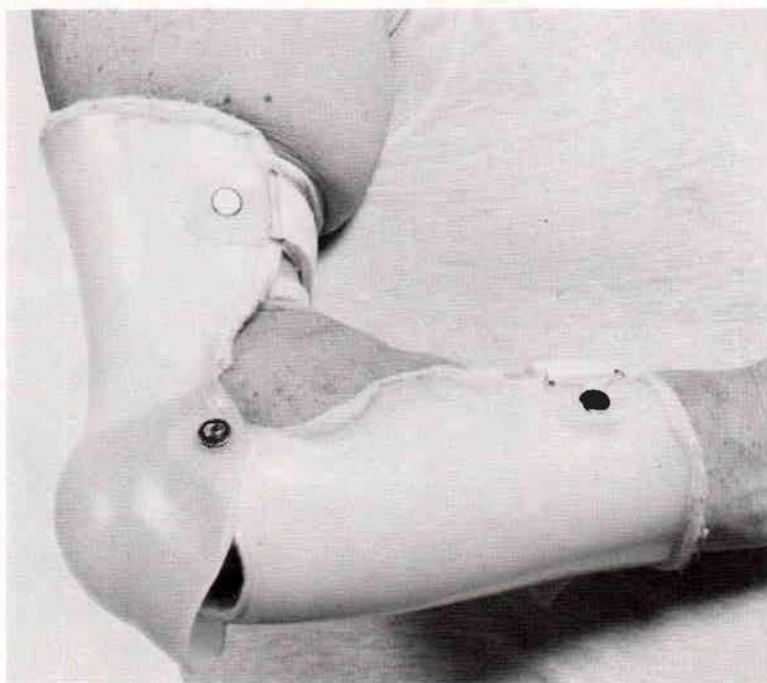


Fig. 2. Lateral view of polypropylene elbow orthosis depicting the protective cover in flexed position.

rivets and burrs are used to join the two parts. The orthosis is held to the arm and forearm by two Velcro straps with plastic loops and tongues.

The polypropylene elbow orthosis can be fabricated easily in 2 to 4 hours. It is cosmetic, light in weight, durable, and easy to keep clean.

The completed orthosis is shown in Figures 2, 3 and 4. The liner in this orthosis is moleskin, but it is not considered to be necessary.

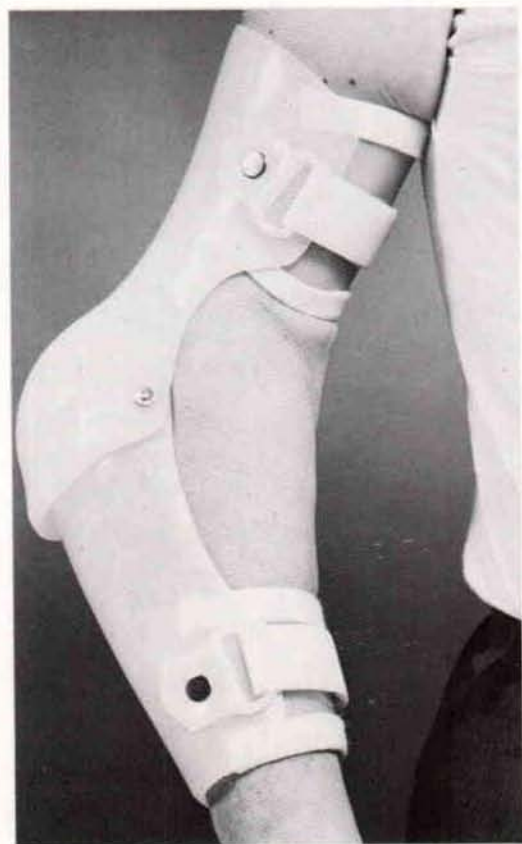
ACKNOWLEDGMENTS

I wish to give my sincerest thanks and appreciation for the time and effort contributed by Dr. Gustav Rubin of the Veterans Administration Prosthetics Center towards the development of

the Polypropylene Elbow Orthosis during my employment at the Veterans Administration Prosthetics Center.

LITERATURE CITED

1. Wilson, A. Bennett, Jr., Vacuum forming of plastics in prosthetics and orthotics. *Orth. and Pros.* 28:1:12-20, March 1974



Figs. 3. Anterior view of elbow orthosis. Note the hyperextension stop.

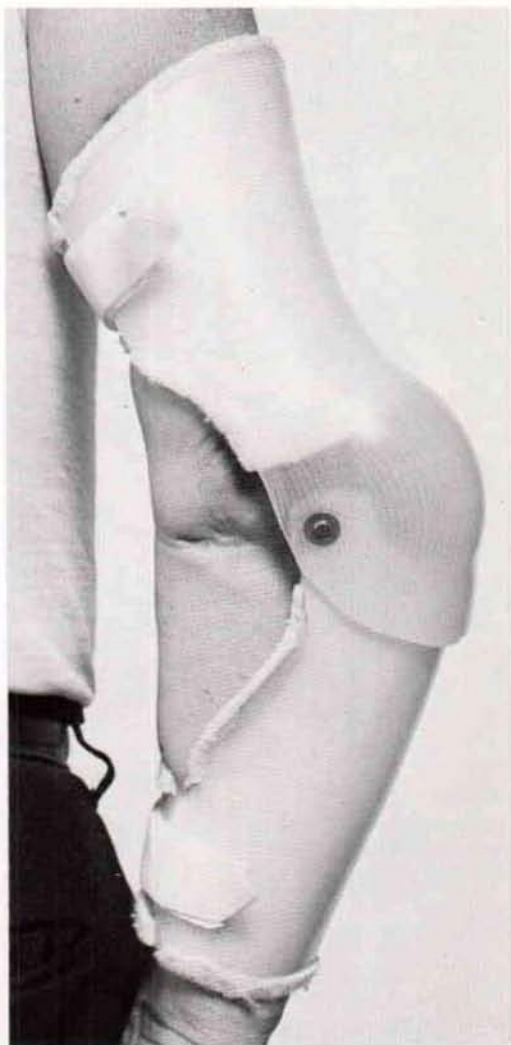


Fig. 4. Posterior view of the elbow orthosis. The liner used in this instance is moleskin, but is not considered to be necessary.