Polyethelene Girdle for the Milwaukee Brace

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Since the inception of the "Milwaukee Brace" orthotists have been searching for a material to substitute for the leather originally recommended for fabrication of the girdle.

Leather can be molded readily, it can breathe, and is quite compatible with the outer body tissues. However, leather has its drawbacks. Good grades are much in demand, and not always readily available. An otherwise good hide may have small imperfections which make it unusable. Leather must be mulled and molded while wet. The drying time is long, and molded leather must be lined with horsehide or some equivalent. The procedures are time consuming, and therefore expensive.

Some plastics with promising characteristics were presented a few years ago for replacement of leather. Unfortunately, these materials had drawbacks that were not noticed immediately. Experiments with these plastics in our facility showed them to be acceptable but not ideal.

A material that we have found to be most satisfactory is low-density Polyethelene. Polyethelene has a smooth finish, and it has presented no problems of chafing or reddening the skin owing to abrasion, especially in the waist area. It does not need to be lined. It has the "snap" and flexibility similar to leather so that it can be bent, yet does not lose its ability to control. More than 30 braces using Polyethelene have been fitted during the past year.

Polyethelene is commercially available in 4′ x 8′ sheets, 3/16″ thick, at a cost of less than $20.00 per sheet. When properly laid out at least ten pieces 12″ x 36″ can be cut from one sheet and there will still remain material for making pads, etc. (Fig. 1).

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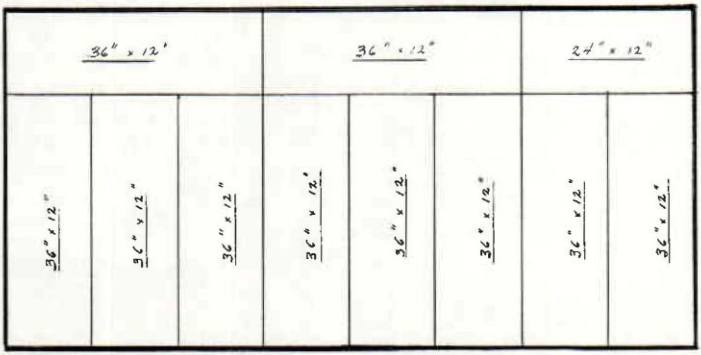

Figure 1

Layout for 4 ft. by 8 ft. sheet of Polyethylene sheet to obtain maximum number of girdles for the Milwaukee Brace.

TOOLS AND MATERIALS NEEDED

1. Forced air oven capable of 230° F.
2. Cloth covered wood frame.
3. Commercial Talc (Merck).
4. Heavy elastic strap.
5. China marker.
6. 2-3 pr. insulated gloves.
7. Hammer and nails.
8. Knife.
9. Heat gun.
10. Felt cone or muslin wheel.

The cast is smoothed and vertical-fabrication lines are marked anteriorly and posteriorly. Trim lines can be marked on the cast also at this time (Fig. 2). A piece of the plastic is cut to the desired height and length according to the measurements of the cast. A vertical centerline is marked on the plastic with a china marker or similar marking pencil. The plastic is placed in an oven pre-heated to 230° F, for eight minutes (Fig. 3). Use a well-powdered heavy cloth stretched over a wood frame for a non-adhering surface. After the plastic has been heated properly it is carefully removed from the oven and transferred to the cast, making certain that the center line on the plastic is aligned with the anterior vertical fabrication line on the cast. An elastic strap, 2″ wide and 36″ long, is stretched around the waist while the rest of the plastic is held manually next to the cast. Nails are used along the posterior edges to hold the plastic to the cast (Fig. 4).

N.B. Avoid overheating. If the material is allowed to heat for a longer period of time or at a higher heat than indicated, it will distort e.g., reduce in length and width but

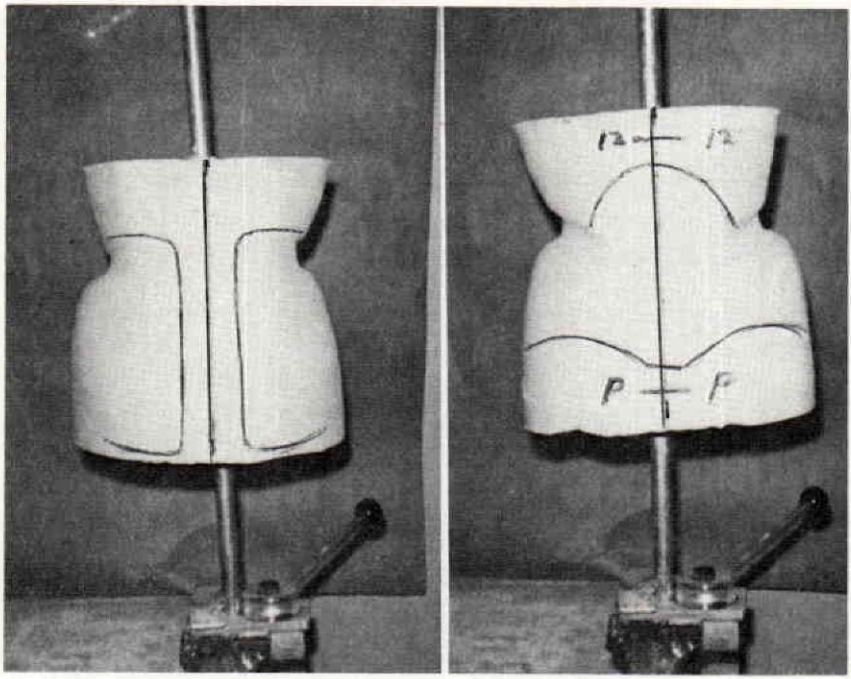

Figure 2
Trim lines marked on cast for the Milwaukee Brace.

become thicker, softer than desirable, tacky, and the surface will become uneven or bubbly. While the material is still quite warm, the excesses posteriorly can easily be trimmed with a knife.

Three people are needed for a very short period for the actual molding procedure. One person is needed on each side of the cast in order to position the hot plastic while a third person stretches the elastic strap into the waist area. This same person can then hand the elongated ends of the strap to the people on each side while he nails the plastic to the cast. The elastic strap is then removed and the excess plastic material is cut away.

After it has cooled and "set," the plastic may be cut along the trim lines marked on the cast (Fig. 5) with a heat gun and sharp knife. Because Polyethelene is translucent when heated the lines are visible at this time. The edges are smoothed initially on a felt cone and, finally, on a muslin wheel at 3450 RPM. The material will not "burn" or melt at this speed.

The attachment of anterior and posterior uprights to the Polyethelene girdle is done with jiffy, or speed rivets (Fig. 6). The use of copper rivets for attachment is not recommended, because the plastic can be cut slightly by the head of a copper rivet, thus inducing splitting of the plastic.

It has not been necessary to use

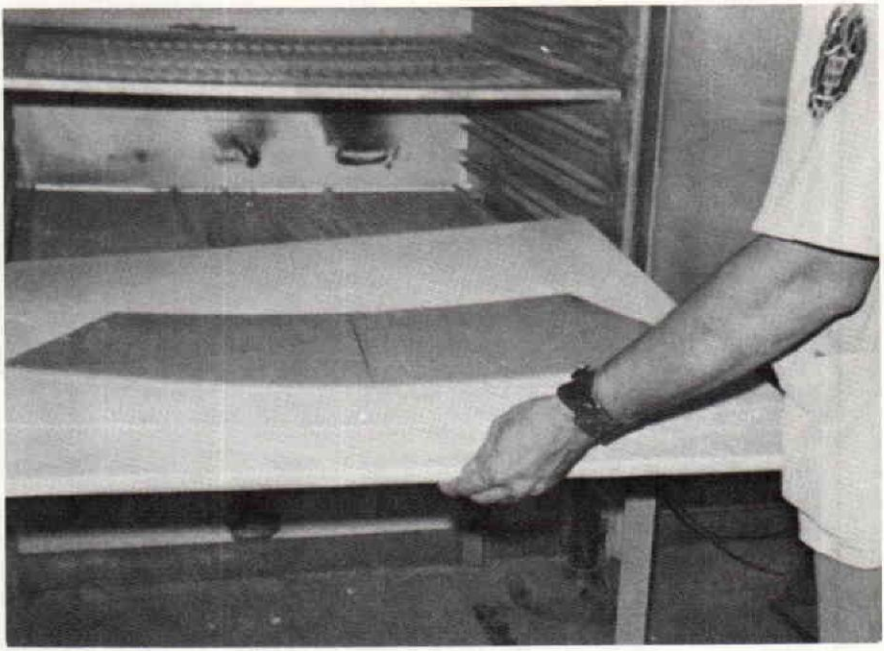

Figure 3
Polyethylene sheet being put into oven on a cloth-covered wood frame.

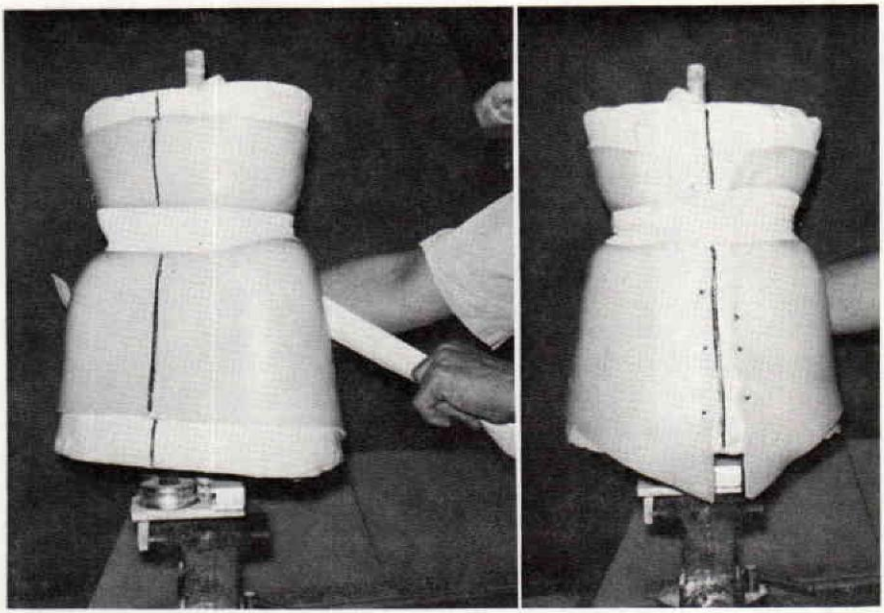

Figure 4
Use of elastic strap for molding the Polyethylene sheet, left, and anterior view showing the use of nails to hold the sheet in proper position over the mold.

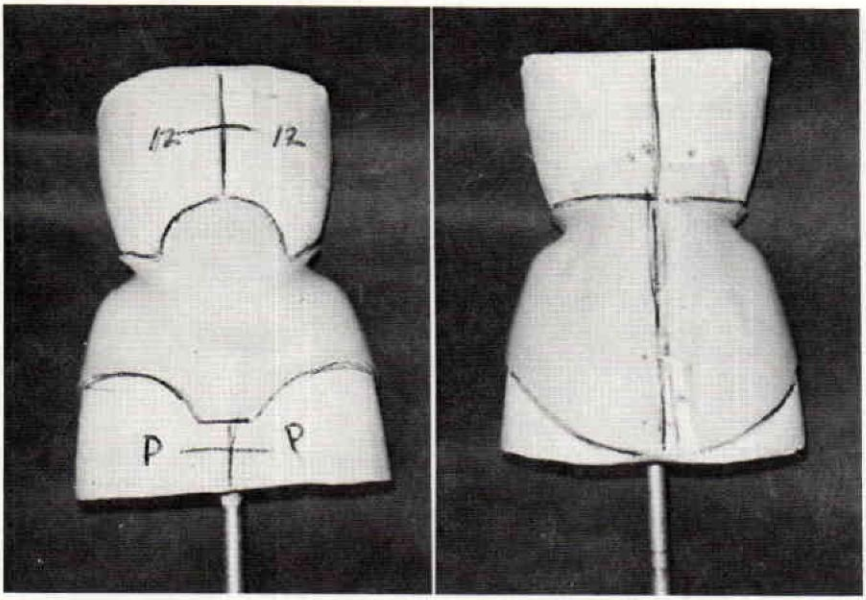

Figure 5
The Polyethylene girdle after being trimmed on the cast.

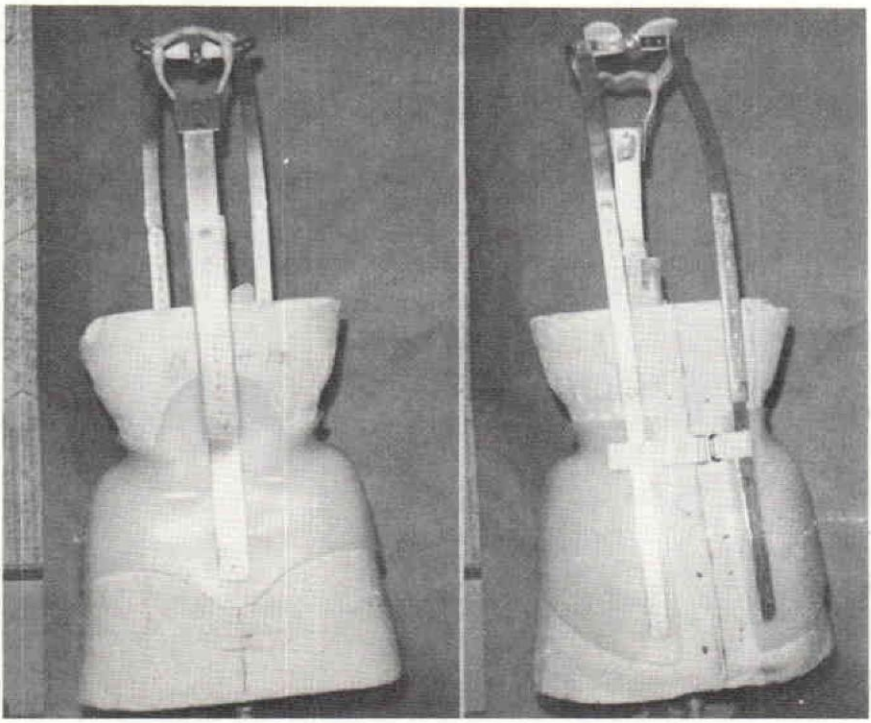

Figure 6
The Anterior and Posterior Uprights in Place.

a pelvic hinge on any of the Milwaukee braces made with Polyethelene. There have been no fractures or failures due to repeated flexure.

Polyethelene is washable and is impervious to most cleaning solutions. Heating with a heat gun permits slight adjustments. Polyethelene of this same thickness can also be used for making the correctional pads for scoliosis and kyphosis. The pads are lined with Plastazote and a Dacron strap is used for attachment. Plastazote is washable also.

Low-density Polyethelene has answered many of our problems concerned with the girdle of the Milwaukee brace. It is inexpensive, relatively easy to form, easy to keep clean, relatively easy to adjust, and is flexible but firm.

Polyethelene is not considered to be the last word in materials for the girdle of the Milwaukee brace but at this time appears to be the best for this purpose.