New Techniques In The Modification Of The Milwaukee Brace

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The use of plastics is by now an old story to prosthetists, but orthotists have been somewhat slower to make use of them in braces. This article is intended to call the attention of orthotists to the possibilities of a plastic lamination for the Milwaukee Brace as a jacket foundation for the brace.

Plastic, being a nonporous material, is far superior to leather jackets in the sense that there is no deterioration as often experienced in the old method. There is no breakdown vertically as was the case in leather. Cosmetically, it is cleaner and can be made to fit much better than leather and the exterior metal frame.

The Orthotist can cut his work time in half by using the plastic lamination.

Basically the negative cast is taken in the usual manner, having the patient in a vertical position. By the use of overhead traction the spine is partially straightened, making sure the anterior superior spine and the crest of the Ilium are marked with indelible. The cast should cover one-half of the Gluteals, and extend upward over one-half of the mandible and occiput. The indentation over the crest should be deeply pronounced. After the positive cast is made and dried the indention over the crest of the Ilium should be more pronounced by skiving in deeper with a cast knife or drawing knife. All build-ups for nonpressure points should be done with plaster instead of the traditional felt as the resin will soak in the felt during lamination.

The anterior superior spines and the crest of the Ilium should be built up with plaster so that no pressure is acquired from the jacket when the traction of the chin and occiput plates are applied. The indentation just over the crest keeps the jacket from slipping over the pelvis when traction is applied. It should be so placed on the cast as not to give any pressure on the lower thorax on the curved side. The side of the cast opposite the apex of the curve should be built up with plaster to match the afflicted side to give a more uniform exterior appearance. This also gives more room for the pressure pad to correct the Scoliosis when applied with vertical traction. The cast is now ready for about three coats of Parting Lacquer which should be allowed to dry thoroughly (about one day).

Next the patterns for the metal strips are made and the metal is cut and bent anterior to posterior from the bottom of the jacket up and over the crest of the Ilium. In these strips, one-fourth inch holes are drilled and staggered about one-half inch apart over the crest of the Ilium only. These one-fourth inch holes allow resin to run through into the indentation over the crest during lamination. After the metal is bent and drilled, it is then removed from the cast. A circumference measurement is taken around the thorax, pelvis and over the crest of the cast. From these three measurements a paper pattern is made and the first layer of Dacron felt, one-fourth inch

thick, is made, folded in half and sewed in a seam. By cutting the Dacron from a pattern the necessary tightness is acquired between cast and Dacron. The Dacron is then stretched over the cast, the seam being in back where the jacket is opened, and stapled around the axilla line to the cast. After the first layer of Dacron is applied to the cast, cut six strips of Dacron about one-and-a-half inches wide and long enough to cover from anterior superior spine to posterior superior spine. Lay these Dacron strips, three to each side, into the indentations over the crest of the Ilium. The metal strips that have been cut and pre-bent are now ready for pre-application to the cast. Next place the metal strips back in place over the Dacron strips, making sure the one-fourth inch holes are drilled, and apply the second layer of Dacron felt, using the foregoing process. The metal work is thus between the interior and exterior surfaces of the lamination.

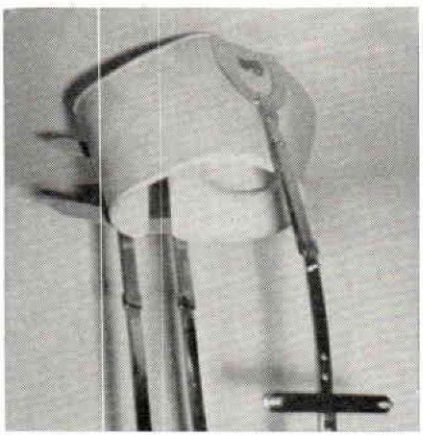

Figure 1—Showing the plastic lamination. Notice the indentation over the crest inside.

Figure 2—The plastic jacket and exterior metal frame showing adjustability of the Orthosis.

After two Dacrons are applied, pull on three nylon stockinettes sewed square across and tie off on the pipe inserted into the cast. Make a Poly Vinyl Alcohol bag long enough to extend at least twelve inches beyond each end of the cast. The cast is put in the vise, in an inverted position and is ready for lamination. Mix enough resin to thoroughly saturate depending on the size of the cast. A mixture of 70 per cent 4134 to 30 per cent 4110 will give sufficient flexibility. Add to this the catalyst and color depending on whether Negroid or Caucasian. After soaking in wet towel and applying the bag tied off over the head of the cast, the promoter is added to the resin, allowing about 40 minutes setting time.

The resin is poured in from the bottom of the inverted cast and worked down into the layers of material making sure to saturate thoroughly over the crests. After complete saturation of the material is acquired tie the bag off at the bottom and hook up the current vacuum machine used in Prosthetic laminations on Hemipelvectomies, hip and shoulder disarticulations, etc. The vacuum will suck the bag into the material and the Dacron strips over the crest will be pulled in pronouncing the indentation on the cast to a maximum degree. As the vacuum pulls out air the excess looseness of the bag can be pulled posteriorly in a vertical seam which will be cut out in the posterior

opening of the jacket. The vacuum continues to run until the lamination is firmly set, then released and the lamination is allowed to cool. After cooling, the Orthotist can immediately remove the jacket from the Orthosis by means of a stryker cast cutter. After the jacket is removed and cut to the desired shape, it is then reapplied to the cast and the metal work may begin.

The jacket, in finishing, may be covered with thin horsehide inside and turned over the edges or left as is. The metal strips laminated inside the jacket serve as anchor points for the attachment of the exterior metal uprights. The vertical uprights are of stainless steel, made adjustable by welding a T on the bar and bending over the overlapping bar. The long bar, anteriorly, after being shaped is welded to the horizontal bar under the mandible. From here it passes downward through the bent T on the lower bar and a number 18 hole is drilled in the end. This one hole corresponds with a series of holes number 29 drilled and tapped in the short bar for adjustments vertically. As the child grows, more pressure is applied through the mandible and occiput plates. The posterior bars are made in the same order. Each bar is set in a piece of rectangular tubing corresponding to the bar size used.

The two posterior pieces of tubing are riveted with stainless steel rivets through the plastic and metal strips laminated inside. The anterior tubing is silver soldered to a horseshoe shaped stainless steel bar and then riveted on, making sure the ends of the bar are directly over the inserted metal strips. The neck piece is made of three individual pieces of metal. A stainless steel bar is placed directly under the mandible in a horizontal position. This bar should be long enough to give ample room on each side of the neck. Cut two other bars with sufficient length to give adjustment and lay up vertically. By using heat put a twist in the ends of each vertical bar until the short end crosses the body of the long end. After twisting the bars, we have two vertical bars with a three-fourth inch horizontal twist on one end of each bar. Over-lap the horizontal twists of the vertical bars on the ends of the horizontal bar under the mandible, drill through both and rivet, making a hinge. These two vertical bars are now slotted. The occiput bar is made in the same manner with a hinge on one side only and the other side solid.

Figure 3—The head piece assembly with posterior and anterior hinges.

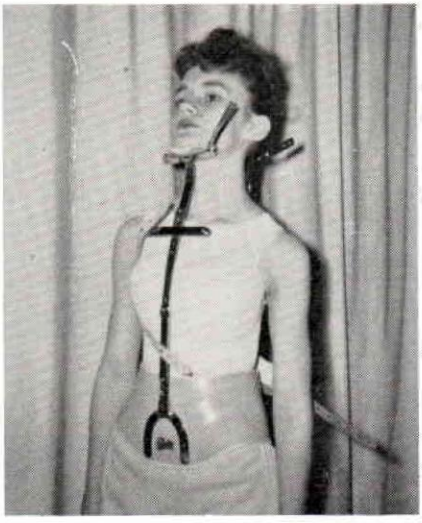

Figure 4—The complete lateral opening of the head assembly on its axis.

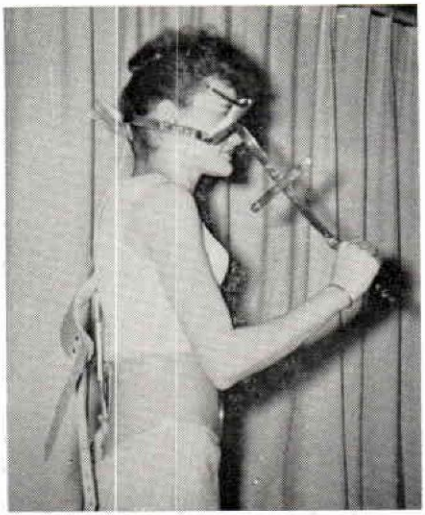

Figure 5—Displacing of the anterior bar showing metal frame swinging out.

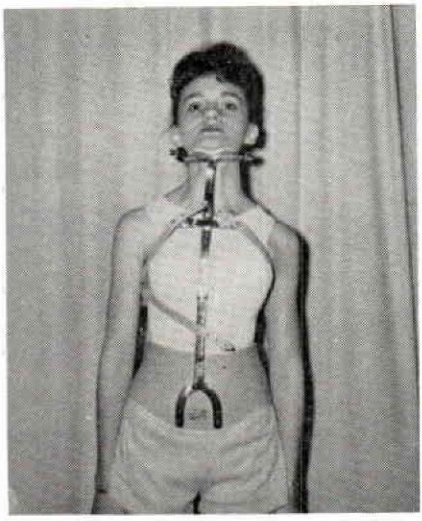

Figure 6—Anterior view. The T bar anteriorly keeping the straps of the pads off the busts.

The ends of the occipital bar extend anteriorly down each side of the neck with the anterior bars extending posteriorly. These bars are overlapped and are cut leaving room for future adjustments of the head piece. Two screws are tapped and screwed in from the inside of the lateral vertical bars of the posterior head piece. The body of these screws passes through the slotted ends of the anterior vertical bars and are secured with wingnuts. The head piece is now assembled in a three hinge affair. The solid side of the head piece is left fastened while the double hinged vertical bars on the other side are undone and both vertical bars swing out on their axis leaving a complete opening of the head piece laterally.

The chin and occiput plates are cupped to fit, padded with foam rubber, covered with horsehide and sewn with a baseball stitch by hand. After the brace is applied, the patient may easily disassemble it for removal. The patient removes the wingnuts on the double hinged side allowing the vertical bars to swing out on their axis leaving the complete side of the neck piece open. The head and neck pass laterally through this opening as the anterior bar is pulled upward out of its tubing. Once the anterior bar is displaced from its tubing it swings on its hinges to the opposite side, taking with it the chin piece. The patient may then reach over his head as in removing a sweater and pull upward on the posterior uprights displacing them from the tubing. The complete metal frame is removed intact by the use of the solid side of the neck piece. The posterior straps are then undone and the jacket removed. The brace is reapplied reversing each step.

A moveable T bar was found essential on the anterior upright in keeping the straps of the pressure pad off of the busts. The straps of the pressure pad are held in place by truss studs, so placed on the metal frame that the pressure pad may be placed at the apex of the curve, furnishing the pad with a maximum degree of correction. A sling type counter pressure pad is used on the opposite side under the axilla. It should fit loosely and serve as a crutch and a means of keeping the patient centered in the brace.

By using this method, the Orthotist saves himself valuable time which may be utilized for other things. He has saved time used in bending and

cupping the metal strips in over the crests and moulding the leather and waiting for it to dry. The finished laminated jacket is nicer exteriorly and interiorly, has a better, closer fit and retains a longer flexibility than leather without cracking. The plastic jacket may also be relieved inside with a sand cone if necessary. Approximately three hours are required to use this method.

Working in close unison with the Doctor and Therapist, several of these types of braces have been clinically checked out and successfully used at the Jr. League Home for Crippled Children at Nashville, Tennessee.

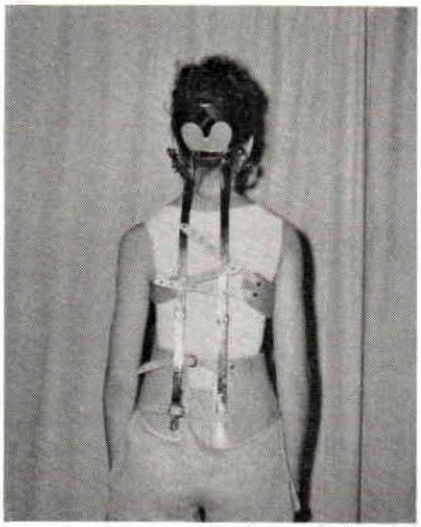

Figure 7—Posterior view. The pressure pad at the apex of the curve on a right Scoliosis.

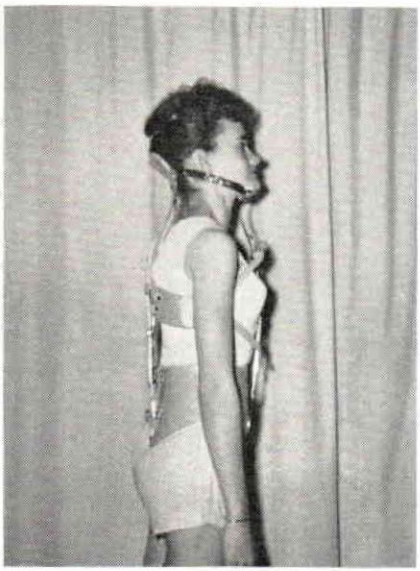

Figure 8—Lateral view. The complete Orthosis applied to the Patient.

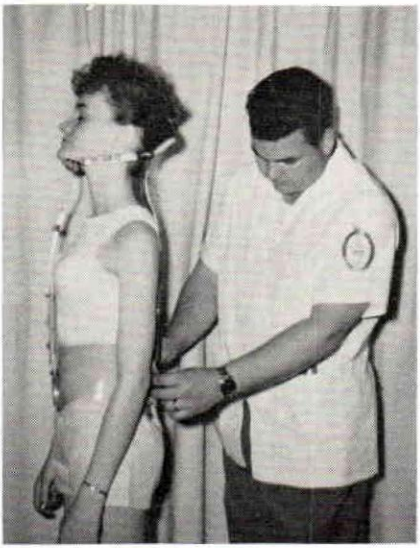

Figure 9—Initial fitting and application of the Orthosis.

Figure 10—Clinical Checkout.

May 7, 1963

Maximal utilization of the Milwaukee type brace for the correction of spinal curve problems has been hampered in the past by several problems. One such initial problem has been that of acquiring an adequate fit of the pelvic girdle experienced with the moulded leather process. Since such a precise fit has been found to be a vital part of the function of the device, it has been felt that the use of the plastic laminate jacket affords a method of faithful reproduction of the cast contours.

A second problem, and probably the most important consideration, has been one of assuring sufficient patient comfort and facility to endure the necessary wearing of the brace. The use of the hinged girdle and neck piece, as described above, has been an important contribution to this aspect. This allows ease of entry and exit from the brace for brief periods of rest and for personal care, that seem to please the patients and their families, and thereby contribute to more intensive co-operation on their part.

Thus far, the use of this modified type of Milwaukee brace has been deemed as effective, if not more so, than the previous types in the correction of the deformed spine.

Philip B. Williams, M.D.

VRA OFFICIALS RECEIVE HONOR AWARDS

Secretary Anthony J. Celebrezze presented honor awards this spring to outstanding employees of the Department of Health, Education, and Welfare at the Annual Awards Ceremony. The employees were recognized for their contributions to health, education, and welfare and for their achievements in the service of the Department.

James F. Garrett, Ph.D., Assistant Commissioner, Research and Training, Vocational Rehabilitation Administration, Washington, D. C., received the Distinguished Service Award, the highest honor conferred by the Secretary. Dr. Garrett was one of nine so honored.

Three other Vocational Rehabilitation Administration members received the Superior Service Award. They are:

Russell J. N. Dean, Chairman, Policy Planning and Legislation Staff, Washington, D. C.

William M. Eshelman, Assistant Chief, Division of State Program Development, Washington, D. C.

Corbett Reedy, Regional Representative, Charlottesville, Virginia