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Orthotic Management of High Thoracic – Low Cervical Fractures[1]

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In stabilizing high thoracic - low cervical fractures, a halo orthosis is safe and effective. It provides maximum stabilization of the fracture site. The University of Washington, Division of Prosthetics-Orthotics, has developed an orthosis which, while it does not provide the rigid immobilization of the halo, does provide adequate stabilization for a fracture which has formed callus, approximately 4-6 weeks postoperative. Clinical experience has shown several worthwhile advantages of this orthosis over the halo, which warrants its use at this stage of the treatment program. The orthosis is a bivalved, laminated body jacket to which a S.O.M.I.[5] superstructure is attached (Fig. 1).

The advantages of this orthosis are: 1) it can be easily and safely donned and doffed, which allows easier hygienic care and allows periodic checks of soft tissue condition; 2) it is light in weight; and 3) the patient is less encumbered than in a halo.

FABRICATION

The patient is casted with a circumferential wrap from symphysis pubis to sternal notch. A fracture table (Fig. 2) is recommended to achieve flexion or extension of the spine which varies with the type of fracture.

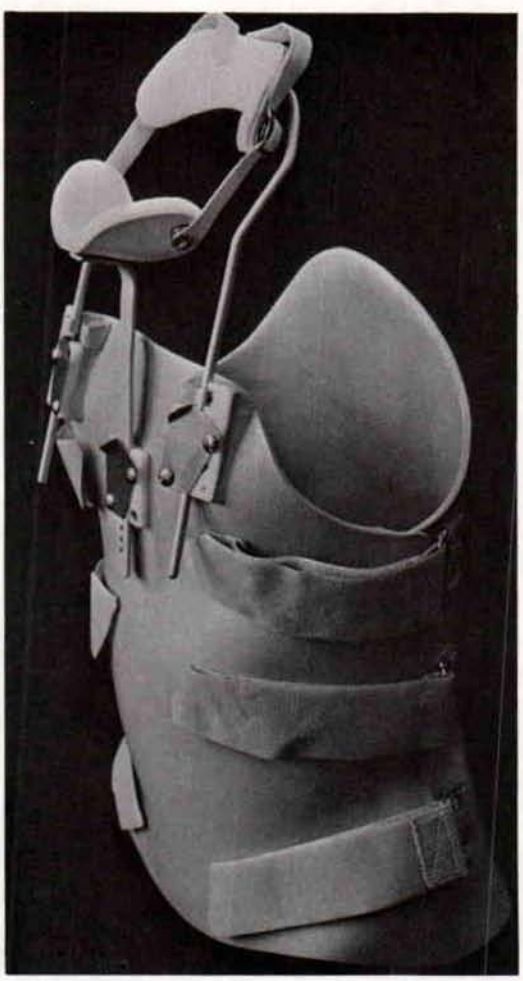

Fig. 1. Anterior-lateral view of the plastic laminated body jacket with S.O.M.I. superstructure.

On the positive mold several modifications are made. Suspension of the orthosis is achieved by removing plaster just proximal to the iliac crests and below the 12th ribs. Slight relief must be made for the spinous processes by building up the plaster positive over the entire length of the spine. In the same manner, relief must be made over the iliac crests and over any protrusions of internal fixation appliances which might be present.

To provide a soft liner, Plastazote is heated and molded to the posterior section of the positive mold, extending anteriorly to the sagittal midline to provide an overlap with the anterior shell.

An inner PVA bag is pulled over the entire mold, followed by five layers of nylon stockinet and an outer PVA bag. Type 4110 resin is used in the laminating process.

The posterior section is trimmed out, and all corners and edges are rounded and smoothed leaving trimlines 1-1/2 in. anterior to the midline.

The posterior section is re-applied to the positive mold. Heated Plastazote is applied to the anterior aspect of the mold, overlapping the posterior section.

The posterior section is laid up and laminated.

The anterior section is trimmed out to just below the sternal notch superiorly and 1-1/2 in. above the symphysis pubis inferiorly. The lateral trim lines allow for a 2 in. overlap on the posterior shell.

The body jacket is trimmed in the axillary area to allow for full range of

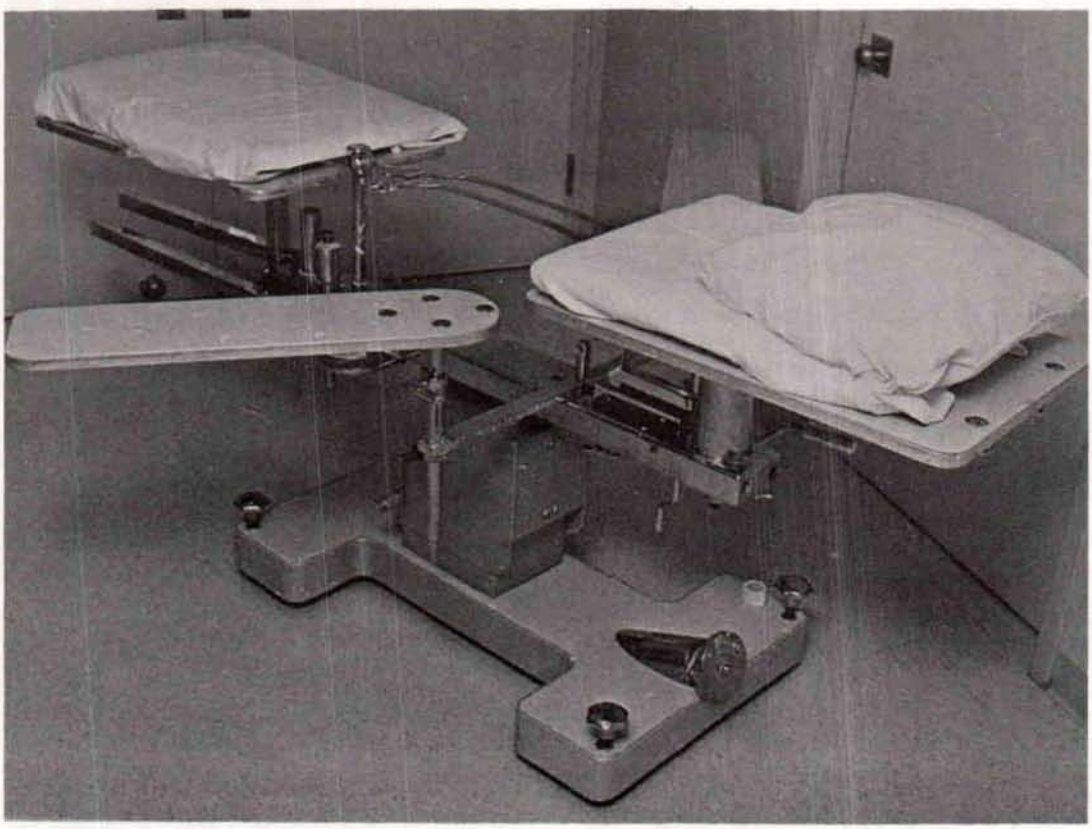

Fig. 2. Fracture table used to attain desired amount of flexion or extension of the spine.

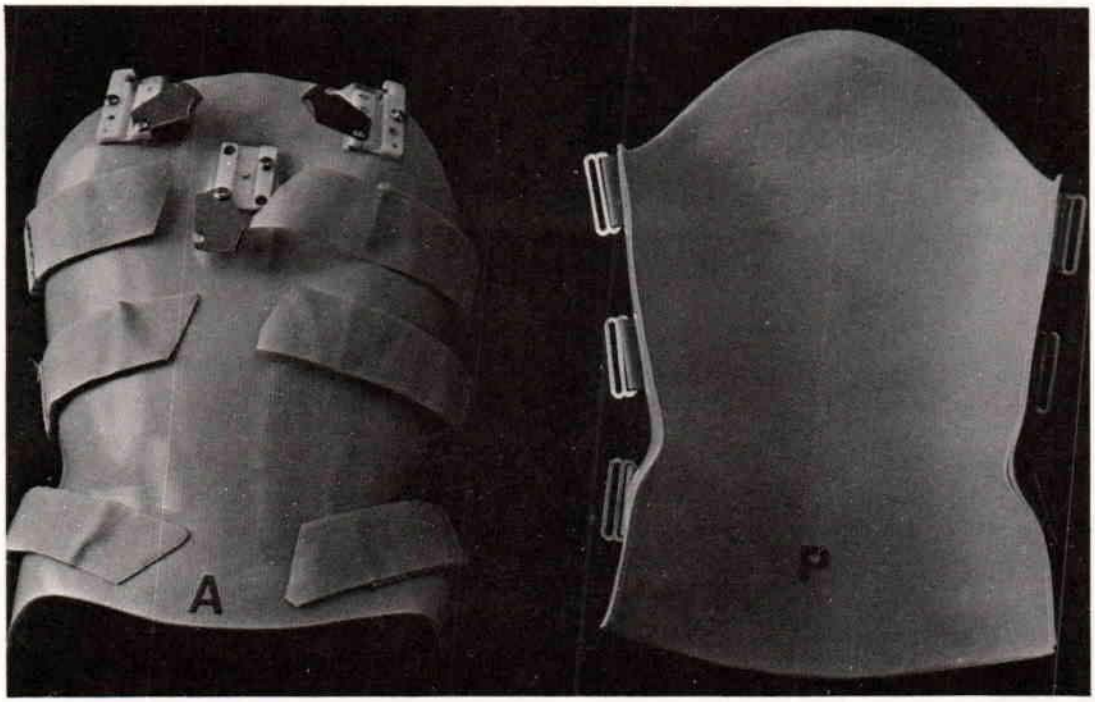

Fig. 3. Anterior and posterior shells. Note the Velcro closures, plastic channels for superstructure attachment, and the indentation over the iliac crests for suspension.

shoulder motion; over the hips to allow for enough hip flexion to sit comfortably; and superior to the buttocks so that the orthosis is not pushed up in sitting.

Lastly, six 2-in. Velcro straps, three on each side, are attached for maximum adjustability (Fig. 3). The S.O.M.I. superstructure is now attached to the superior border of the anterior shell, and adjusted to fit the patient, and holes are drilled in the shell to apply plastic channels (Fig. 4).

The S.O.M.I. type superstructure was chosen for this orthosis because the superstructure can be applied without changing the position of the patient's head since both mandibular and occipital pads are attached anteriorly; the former by a chin bar, and the latter by the curved neck support bar. In addition, to allow for easier eating, shaving, etc., the S.O.M.I. has an optional "head restraint band" which is connected to the occipital pad and wraps around the forehead. This band prevents motion of the head when the mandibular pad is removed.

FITTING

The posterior section is positioned while the patient is prone. The patient is turned to the supine position, and the anterior section is applied so that the suspension grooves are superior to the iliac crest and inferior to the 12th rib. The S.O.M.I. superstructure is inserted into the plastic channels to stabilize the head in the desired position. In this manner, the orthosis can be applied without any motion of the patient's spine (Fig. 5).

RESULTS

During the development of the orthosis 16 patients were fitted successfully. Clinically, there was no delay in healing,

Fig. 4. The S.O.M.I. superstructure and the plastic channels.

Fig. 5. Patient fitted with orthosis.

and no progression of deformity was apparent on X-ray. The orthosis is less cumbersome, and patients are up and active sooner. They can be bathed daily and possible pressure problems can be detected and corrected before decubiti have a chance to develop.

SUMMARY

The addition of a S.O.M.I. superstructure to a bivalved, laminated body jacket has proven highly effective in the stabilization of high thoracic-low cervical fractures. In most instances, the orthosis can be used safely at approximately 4-6 weeks postoperatively.

The advantages of this orthosis are:

1) It can be easily and safely donned and doffed, allowing for easier hygienic care and for periodic checks for soft tissue condition.

2) It is light in weight and less encumbering than a halo.

The construction of the orthosis is described in detail, as is the method of applying the orthosis to the patient without moving the patient's spine.

Clincal results have shown this orthosis to be an asset in the treatment of high thoracic-low cervical fractures.

Footnotes

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[5]United States Manufacturing Co., 623 South Central Avenue, P.O. Box 110, Glendale, California 92109. S.O.M.I. Orthosis model #B101 less chest plate and shoulder bars.