

A NEW NON-INVASIVE HALO ORTHOSIS FOR IMMOBILIZATION OF THE CERVICAL SPINE¹

C. L. Wilson, M.D., F.R.C.S. (C)²

A. G. Hadjipavlou, M.D., F.R.C.S. (C)³

G. Berretta, C.O. (C)⁴

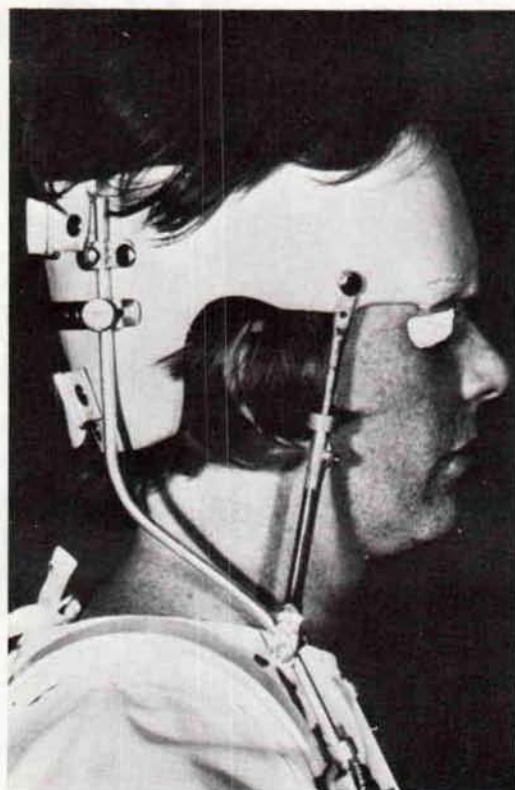


Fig. 1. The head component is moulded on the patient's head and attached to the sternal component by two posterior bars and two anterior uprights. Note that the chin is free and the orthosis does not interfere with opening of the mouth.

Because of the failure of the previous orthoses, except for the "halo" device, to immobilize the cervical spine and the disadvantage caused by the continued wearing of the mandibular immobilizing component, a new non-invasive halo orthosis has been designed.

Biomechanically, this orthosis is a total-motion control device. However, the chin is free, and thus undesirable movement from the temporomandibular joint is not imparted through the head to the cervical spine during the act of chewing and talking (Fig. 1). A special feature of this orthosis is that there are no undesirable forces applied over the temporomandibular articulation. Cineradiographic studies have shown that the spine remains almost immobile. The cervical spine is also partially unloaded from the weight of the head.

It is our opinion that this orthosis is almost the treatment of choice whenever rigid immobilization of the cervical spine is indicated. We have used this orthosis for conservative treatment of fracture of the cervical spine as an immobilizer following cervical spine surgery. We treated 20 cases (1), who had extremely unstable cervical spines with excellent results regarding healing and stability.

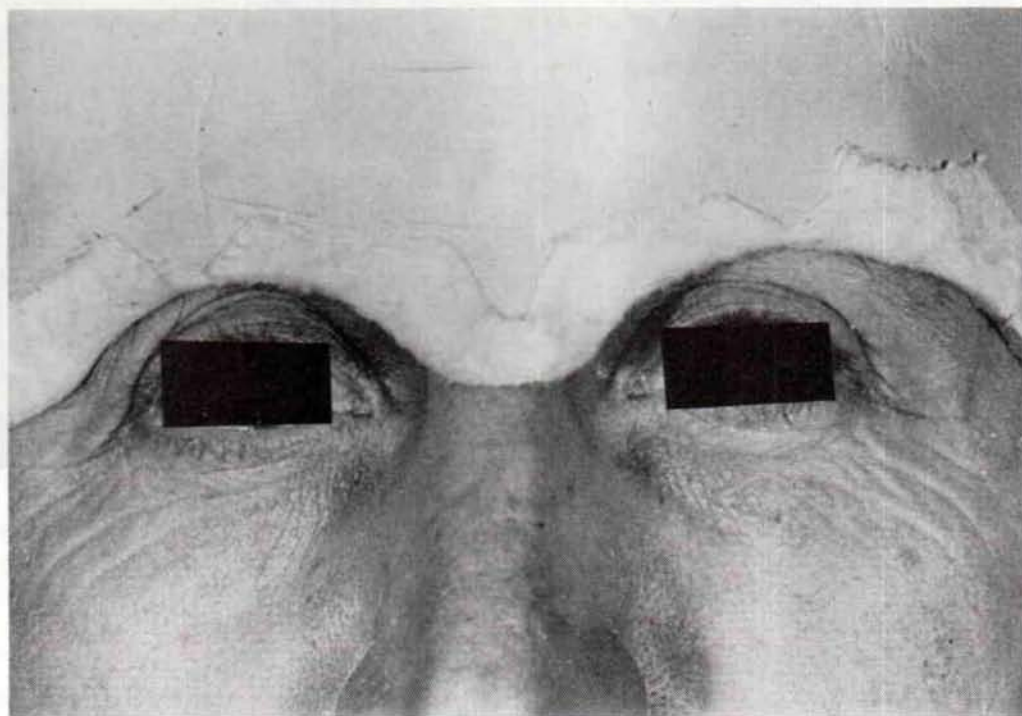


Fig. 2. the proper contour of the head component of the non-invasive halo orthosis.

Design and Fabrication

Construction materials include San-splint, steels (pre-moulded), Velcro straps, aluminum rods, iron rods, shoulder straps, foam, and felt. San-splint is a thermoplastic material that becomes pliable when heated in water at 120 deg. F., and thus can be moulded directly over the patient's head (Fig. 2).

A pre-moulded thoracic appliance with shoulder extensions, forming the thoracic component, is then applied to the patient's chest. When the head mould and thoracic mould are in the proper place, the orthosis is aligned with posterior bars which are fitted just in front of the occiput and curve anteriorly to be connected to the thoracic piece (Fig. 1).

An additional pair of uprights that are adjustable for height are attached to the tem-

ples and to sternal outriggers. The chest piece is held over the base of the neck by shoulder rests which are strapped to the lower end of the chest piece by axillary straps. The shoulder rests are placed close to the neck so that motion at the shoulder does not impart movement to the head component of the orthosis.

Finally, a Velcro strap to close the head piece is used on the back of the head (Fig. 3). The orthosis can be adjusted to position the head as required. If pressure areas are found directly over the bony prominences, the shape of the head mould should be readjusted. Because it is made from a thermoplastic material the contour can be changed by heating it and remoulding (Fig. 4).

In order to prevent the head from shifting and take the pressure from the head piece

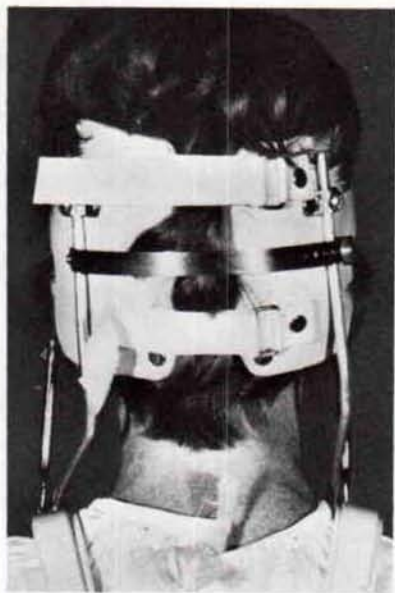


Fig. 3. The head piece is closed posteriorly by a Velcro strap. Tension can be adjusted by the patient.

when the patient is in a recumbent position, a chin plate can be fitted at the chest component.

This mandibular immobilizer is needed mostly at night (Fig. 5) and is seldom, if ever, necessary during the daytime. The chin plate can be removed easily for eating, shaving, etc. and also can be attached to the sternal component before the halo in order to prevent motion while immobilizing an unstable spine or fitting the orthosis to a patient under traction.

Summary

A new non-invasive halo orthosis was presented. It is a versatile total-motion control device that has been used for fractures of the cervical spine and as an immobilizer following cervical spine surgery.

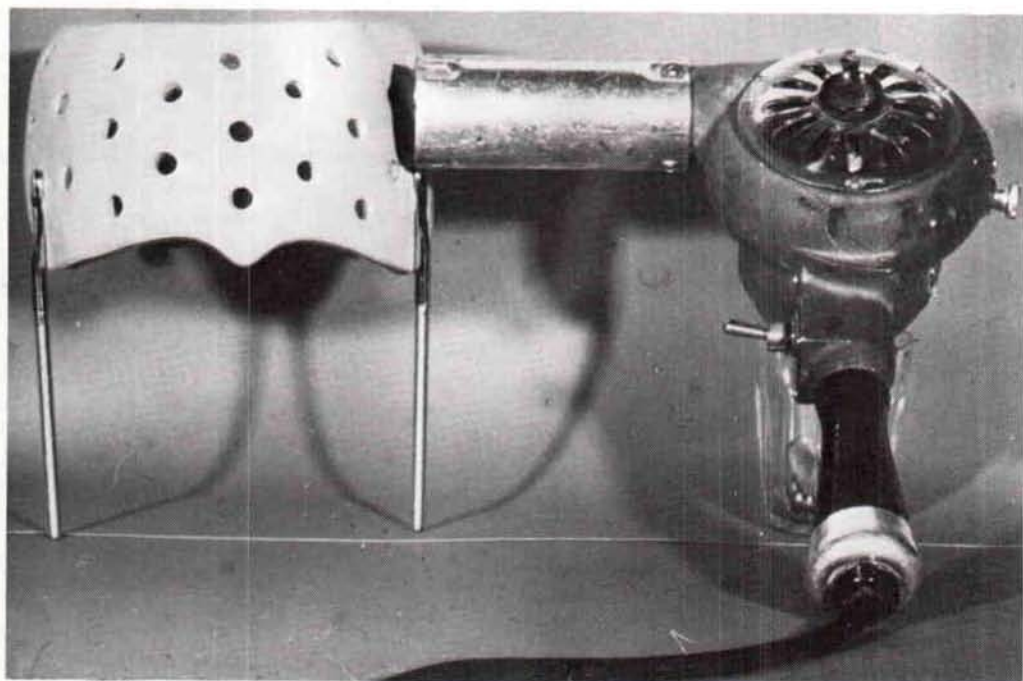


Fig. 4. The head component of the prosthesis is a thermoplastic material and thus can be easily remoulded by heating with a heat gun.



Fig. 5. Anterior view of the Wilson Orthosis properly made and fitted. Note that the chin piece can be removed easily and fitted by the patient. The orthosis is needed mostly at night.

Sommaire

Dû aux échecs des orthèses précédentes et de leurs inefficacités d'immobiliser correctement la colonne cervicale (excepté le halo device) ainsi que l'énorme désavantage de la pièce mentonnaire, une nouvelle orthèse a été inventée avec succès.

Cette attache, du point de vue mécanique, est un dispositif de contrôle total des mouvements. Ceci est un type d'immobilisation halo "non-invasive." La pièce mentonnaire, ne se porte que la nuit.

Dans cet appareil, le menton est libre et par conséquent aucun mouvement n'est transmis (quand le patient parle, mange etc. . .) à travers l'articulation temporo-mandibulaire pour atteindre le crane et la colonne cervicale.

Cette attache serait presque le traitement de choix pour une indication d'immobilisation rigide de la colonne cervicale.

Footnotes

¹This work was carried out from the Department of Orthopaedics, Reddy Memorial Hospital, Montreal, Quebec and the Laboratory of J. E. Hanger of Montreal.

²Orthopaedic Surgeon in Chief, Reddy Memorial Hospital.

³Attending Orthopaedic Surgeon, Santa Cabrini Hospital.

⁴Certified Orthotist (C) President, J. E. Hanger of Montreal. Address reprint requests, J. E. Hanger, Ltd., 4259 St. Catherine Street West, Westmount (Montreal), Quebec H3Z 1P7