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Cervical Orthoses

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Orthoses are fit for the control of motion about a joint or joints. By extension, cervical orthoses are fit to control motion of the cervical spine. Such orthoses are provided to patients for a wide variety of conditions ranging from the merely inconvenient on one end of the spectrum to the life threatening at the other end. In response to this need, a plethora of devices have been described; a review of the literature and of manufacturers' catalogs will reveal a positive galaxy of orthoses, all described as being of great efficacy and many differing from others in matters of only minor detail. What seems to be lacking is any systematic and quantitative assessment of the various orthoses' merits and a rational scheme for their use. While it may be overstating the case, it seems that most individuals in various parts of the country rely on two rules of three: selecting from the panoply available three orthoses graded as minimally, moderately, and maximally immobilizing; and fit in terms of small, medium, and large. Which orthoses are selected is shaped by local preference, training, and experience among other factors.

In contrast to other areas of orthotics, the topic of cervical orthotics can be described as a stepchild or plain shoe. Since the end of World War II, other areas of orthotics have been radically reshaped (lower limb orthotics and spinal orthotics for scoliosis and kyphosis) by the application of new knowledge, new technology, and new philosophies of treatment. Upper limb orthotics occupies the middle ground: it's not that the effort has not been made, just that the results have been less than totally successful.

It would, of course, be fallacious to suggest that no effort at all has been made to elucidate in some rational fashion the prescription of cervical orthoses. James D. Harris, D.O., in his review of cervical orthoses in *Orthotics Etcetera, 2nd Ed.* (1) cites a variety of references which used such means of measuring cervical motion as goniometry, cineradiography, and still radiography to assess the immobilizing affects of various orthoses. He further used these references and descriptions of effectiveness in his comparisons of a variety of orthoses. Rollin M. Johnson and his coworkers (2, 3) used their original studies for a similar purpose. The impression remains, however, that while useful work has been done, the effects of it have been relatively small scale, and much remains to be done. This point of view is endorsed by the results of a workshop panel convened in 1977 (4). It would seem that there exists a genuine need for research to be conducted comparing the efficacy of various orthoses with an eye towards developing a rational basis for prescription and for the results to be widely disseminated.

The contrary point of view can, of course, be argued. Those instances that are truly life threatening are relatively few, usually promptly recognized, and are best managed aggressively with immobilization, confinement to bed and even surgery. For the rest, cervical orthoses are generally prescribed for episodic and short term relief of pain. Even if prescribed with an orthosis that does not perfectly match the need, patients limit their activities in response to pain and if necessary a new orthosis can be prescribed. Under the circumstances a basic measure of common sense illuminated by experience will serve to assess the competing claims of similar orthoses and match a particular orthosis with a particular situation.

It would also be fallacious to argue that no improvements in technology have been made. While such developments as the Philadelphia Collar and the S.O.M.I. can be cited, the foremost example is the Halo. Originally a specialized device applied in specialized centers for relatively few indications, it has, in the guise of the Halo-vest, come to be widely used in instances where maximal immobilization and possibly distraction are needed. While intimidating in appearance and implications, the evidence is that the technique is readily mastered, and that the device is well tolerated by patients. However, the possibility of such complications as pin-site infections, penetration of the skull, and loosening do exist. As a result of

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these reasons and the generally felt need for something less drastic, if equally effective, calls have been made for a non-invasive halo (4).

In response, Wilson, Hadjipavlou, and Berretta (5) described "A New Non-Invasive Halo Orthosis . . ." in 1978. Fundamentally, this is a S.O.M.I. orthosis modified by the substitution of a low temperature thermoplastic skull-cap for the occipital piece. The authors cited experience treating 20 cases of unstable fractures and cineradiographic studies to support their contention that "this orthosis is almost the treatment of choice whenever rigid immobilization of the cervical spine is indicated."

In a similar vein, Rubin, Dixon, and Bernkopf (6) described in 1978 another modification of the S.O.M.I. In this device the mandibular piece was removed and two pads pressing in under the zygomatic arches where substituted. In addition, a "cranial vertex pad" rigidly fixed to the occipital pad and flexibly connected to the zygomatic pads was added. The authors showed radiographic and photographic evidence of near rigid immobilization of the cervical spine of one subject. However, they cautioned that the device was intended for relatively brief use, specifically for the removal of trauma patients to a hospital by trained paramedics, and they further speculated as to the unknown effects of long-term pressure on the zygomatic arches.

Interestingly enough, both Harris (1) and Rubin, et al (6) refer to a device described by Boldrey in 1945. It is described as a rigid cap encompassing the posterior and lateral aspects of the skull with a forehead strap and sub-zygomatic pads. It was connected by a posterior steel upright to padded thoracic and lumbar bands with over the shoulder extensions and straps.

None of these variations are commercially available. One further point needs to be considered: Harris (1) cites evidence of Hartman, et. al. that the Guilford Orthosis is 90-95% effective in restricting motion. Therefore, does the need for a non-invasive halo really exist?

In any event, it is apparent that the subject of cervical orthotics is one that has received scant attention. What is not so apparent is whether or not such attention is vitally needed.

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