



Clinical Prosthetics & Orthotics



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Spring (Issued Quarterly)

Cervical Orthoses

Charles H. Pritham, CPO*

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.

References

1. Harris, James D., "Cervical Orthoses," *Orthotics Etcetera 2nd Ed.*, edited by James B. Redford, M.D., Williams and Wilkins, Baltimore, MD, 1980, pp. 100-122.
2. Johnson, R.M.; Hart, D.L.; Simmons, E.F.; Ramsby, G.R.; and Southwick, W.O., "Cervical Orthoses, A Study Comparing Their Effectiveness in Restricting Cervical Motion in Normal Subjects," *JBJS*, Vol. 59-A, No. 3, April 1977, pp. 332-339.
3. Johnson, R.M.; Owen, J.R.; Hart, D.L.; and Callahan, R.A., "Cervical Orthoses: a Guide to their Selection and Use," *Clinical Orthopaedics and Related Research*, No. 154, Jan.-Feb. 1981, pp. 34-35.
4. Edmonson, A.S.; et al., "Report—Panel on Spinal Orthotics" *Orthotics and Prosthetics*, Vol. 31, No. 4, pp. 67-71, Dec. 1977.
5. Wilson, C.L.; Hadjipavlou, A.G.; and Berretta, G., "A New Non-Invasive Halo Orthosis for Immobilization of the Cervical Spine," *Orthotics and Prosthetics*, Vol. 32, No. 1, March 1978, pp. 16-19.
6. Rubin, G.; Dixon, M.; and Bernknopf, J., "An Occipito-Zygomatic Cervical Orthosis Designed for Emergency Use—A Preliminary Report," *Bulletin of Prosthetics Research*, BPR 10-29, Spring 1978, pp. 50-64.

Clinical Prosthetics and Orthotics

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Questionnaire

The Clinical Prosthetics and Orthotics—C.P.O. editorial board believes that two-way communication will aid the growth of the profession. The AAOP provides a forum, within this publication, through which practitioners can let their voices be heard on significant issues. Please take a few minutes to complete the questionnaire on cervical orthoses and return to: Charles H. Pritham, CPO, Editor, Clinical Prosthetics and Orthotics, c/o Durr-Fillauer Medical, Inc., Orthopedic Division, 2710 Annicola Highway, Chattanooga, TN 37406.

1. Do you feel there exists a need for further research in cervical orthotics?

Yes _____ No _____

2. Do you feel such research would affect your practice?

Yes _____ No _____

3. Do you feel there exists a need for a non-invasive halo?

Yes _____ No _____

4. Do you as an orthotist currently participate in the application of Halo-Vests?

Yes _____ No _____

5. List, in order of frequency, the three most commonly used cervical orthoses in your practice.

1. _____

2. _____

3. _____

Comments (please use separate sheet if necessary):

Meetings and Events

Please notify the National Headquarters immediately concerning additional meeting dates. It is important to submit meeting notices as early as possible. In the case of Regional Meetings, it is imperative to check with the National Headquarters prior to confirming date to avoid conflicts in scheduling.

1983, May 5-7, AOPA Region IV Annual Meeting, Downtown Holiday Inn, Jackson, Mississippi.

1983, May 12-14, AOPA Regions II and III Combined Meeting, Colonial Williamsburg, Williamsburg, Virginia.

1983, May 19-22, AOPA Region V Annual Meeting, Stouffers Dublin Hotel, Columbus, Ohio.

1983, May 25-28, AOPA Regions VII, VIII, X and XI Combined Meeting, Four Seasons, San Antonio, Texas.

1983, June 3-5, AOPA Region IX, COPA, and the California Chapters of the AAOP Combined Annual Meeting, Harrah's, South Lake Tahoe, Nevada.

1983, June 7-10, UCLA Advanced Upper Extremity Prosthetics Seminar, Los Angeles, California.

1983, June 12-16, 6th Annual Conference on Rehabilitation Engineering, Town and Country Hotel, San Diego, California.

1983, June 14-18, Annual Conference of the American Physical Therapy Association, Convention, Center, Kansas City, Missouri. Contact: Meeting Services, APTA, 1156 15th St., N.W., Washington, DC 20005, 202-466-2070.

1983, June 16-19, AOPA Region VI and AAOP Midwest Chapter Combined Annual Meeting, Olympia Resort and Spa, Oconomowoc, Wisconsin.

1983, June 19-23, American Medical Association's Annual Meeting of the House of Delegates, Chicago Marriott Hotel, Chicago, Illinois.

1983, July 17-22, ABC Practical/Video/Oral Exam in conjunction with Northwestern University, Radisson Hotel, Chicago, Illinois. Contact: ABC National Headquarters, 717 Pendleton St., Alexandria, Virginia 22314.

1983, July 31-August 4, National Spinal Cord Injury Association Annual Convention, Americana Congress Hotel, Chicago, Illinois. Contact: Illinois Chapter, National Spinal Cord Injury Association, P.O. Box 468, Palos Park, Illinois 60464, 312-974-1103.

1983, August 14-18, Boston Scoliosis Brace Course, sponsored by the Dept. of Orthopedic Surgery, The Children's Hospital, Boston, Massachusetts. Contact: Paula Roth, Dept. of Orthopedic Surgery, The Children's Hospital, Boston, Massachusetts 02115.

1983, September 5-9, The IV World Congress of the International Society for Prosthetics and Orthotics, Imperial College of Science and Technology, London, England.

1983, September 16-17, Forum '83—A National Symposium on Custom Fitted Seating Systems, Sponsored by AAOP and the Newington Children's Hospital. Contact: The Newington Children's Hospital, Orthotics and Prosthetics Dept., 181 East Cedar St., Newington, Connecticut 06111.

1983, September 21-23, Annual Advanced Course on Lower Extremity Prosthetics, Nassau County Medical Center, East Meadow, New York. Contact: Dept. of Physical Medicine and Rehabilitation, Nassau County Medical Center, 2201 Hempstead Turnpike, East Meadow, New York 11554, 516-542-0123.

1983, October 25-30, AOPA National Assembly, Hyatt Regency, Phoenix, Arizona. Contact: AOPA National Headquarters, 703-836-7116.

1984, January 25-29, AAOP Annual Meeting and Seminar, Dutch Resort Hotel, Lake Buena Vista, Orlando, Florida. Contact: AAOP National Headquarters, 703-836-7118.

1984, April 12-15, AOPA Region IV Annual Meeting, Waverly Hotel at the Galleria, Atlanta, Georgia.

1984, April 19-22, AOPA Regions V and VI Combined Annual Meeting, Amway Grand Plaza Hotel, Grand Rapids, Michigan.

1984, May 3-4, AOPA Regions II and III Combined Annual Meeting, Concord Hotel, Kiamesha Lake, New York.

1984, June 1-3, AOPA Region IX Meeting, Harrah's, South Lake Tahoe, Nevada.

LETTERS TO THE EDITOR

Your responses to the letters are welcomed.

Dear Editor,

Few people will disagree with the observation that poor communication is the cause of many unnecessary misunderstandings that lead to inconveniences, arguments, accidents, and all sorts of other unpleasanties. Because nearly all of our communication is affected by the use of words, it is important that we select and use the most appropriate words available to convey information, thoughts, and ideas.

Because the English language contains more words than any other language, it is the most versatile and the most useful, which is the primary reason that it has replaced French as the diplomatic language. Thus, English provides the user the opportunity to describe events, conditions, things, and people and to otherwise express himself to various degrees and shades of meaning not possible in any other language. Yet there seems to be no synonym or useful alternate expression for "amputation stump."

In spite of this, the term "residual limb" is being used by some in print to avoid use of a word that they consider to be an "ugly" word, which causes embarrassment to the amputee.

I do not disagree with the concept of searching for or devising a better word or expression, but I believe strongly that it should be better in every way. The word "residual" when used as an adjective means "remaining," and therefore each time I read or hear "residual limb," my immediate interpretation is the remaining, or intact, arm or leg of a unilateral amputee. To be correct, one would have to use "the residual part of the leg (arm)."

Not only is the term "residual limb" misleading to most readers who have a good command of the English language, but it must be quite confusing to foreign readers and listeners. The use of coined or poorly conceived terms in scientific and technical texts where precision is important can be extremely troublesome, especially to newcomers to the field when they can't find the intended definition in the dictionary.

There is certainly no objection to using any substitute the clinician wants to devise in talking to a sensitive patient. In oral communication between two people or a small group "a rose by any other name would smell as sweet," but in written texts, the meaning of each word must be quite specific; and therefore, I believe it not to be in the best interest of all concerned to continue use of the term "residual limb" in the scientific and technical literature.

Use of "stump" in limb prosthetics simply follows the tree analogy used to describe the major segments of the human body—trunk and limbs—and therefore it is quite logical to use it. It cannot be considered to be a "pretty" word, but neither are "amputation" and "amputee," which seem to be quite acceptable.

I hope that "residual limb" is being adopted mostly by those who like to use faddish words such as "impact" or "target" as verbs and the non-existent

"prioritize," and that in time its use will be discontinued.

Perhaps *Clinical Prosthetics and Orthotics*—C.P.O. would like to serve as a forum to find out how others feel about the matter.

Sincerely,
A. Bennett Wilson, Jr.

Mr. Wilson raises very pertinent questions in his letter. In many instances (and certainly in many professions other than ours) people seem to adopt new terminology not to improve accuracy of communication, but rather to create an aura of technological sophistication and superiority. Yet the situation remains: many people object to the use of words such as "stump." It might be mentioned in passing that many patients object to being called patients, contending that they are not sick when they just need a new prosthesis.

What do you think? How do you cope with such situations? Your responses to Mr. Wilson's letter are invited.

The Editor

Dear Editor,

I would like to suggest an upgrading of terminology to the Academy and the industry in general regarding specific components in upper extremity prostheses.

My concern is with the use of the term "terminal device" as referring to the product—be it hook, hand or whatever that is attached to the end of the prosthesis. In the several years I've been associated with the prosthetics industry and from the viewpoint of both an amputee and a therapist, I feel this particular terminology is unduly callous and cold. Its effect upon new patients can be harsh in that it connotes an object which has no relationship to the human anatomy. It may in fact be a cause for psychological revulsion by the patient because he or she cannot identify with the language or its meaning.

Because patient acceptance and functional use of prosthetic devices is paramount to the profession, I suggest that "terminal device" be deleted from our language and replaced with the more appropriate term, "anatomical replacement." An "anatomical replacement," unlike the term terminal device, has an identifiable origin to the patient, is a more logical description of the product, and has less robotic, more humanistic inferences. Anatomical replacement can refer to a split hook, APRL device, GRIP Prehensile Hand, mechanical hand, cosmetic hand, or myoelectrically controlled hands. To describe something to a patient as a terminal device and something as a hand creates an unnecessary bias, one I feel is not only inaccurate but can potentially alienate the amputee from prosthetic products in general.

I encourage response to this suggestion and hope that those individuals in positions to enact such terminology change take this suggestion to heart and act on it accordingly.

Yours truly,
Bob Radocy
Therapeutic Recreation Systems
Boulder, CO

Mr. Radocy addresses an interesting question. The term "terminal device" was adopted partially to provide a generic term including both hook and hand and partially to avoid the unpleasant connotations associated with the word "hook." His suggested replacement "anatomical replacement" is hardly a valid substitute. The term means the same as the word prosthesis and is hardly specific. An anatomical replacement could just as easily be an ear or an eye as a hand. What do you think? Do you object to the term "terminal device?" Do your patients? What alternate term do you suggest?

A Message from the Editor

In the past year, several suggestions have been received that the questionnaire be printed on a separate piece of paper and inserted loosely into C.P.O. This is to avoid the necessity of cutting out a page of the newsletter and thus losing content on both sides of the page. While the point is a valid one and we view it sympathetically, the fact is that circumstances dictate against our adopting such a policy.

Currently C.P.O. is mailed unwrapped and without an envelope. It is a stipulation of the Postal Service that when this is done, there be no loose inserts. In order to enclose loose inserts it would be necessary to put the individual copies of C.P.O. in envelopes or wrappers. Quite frankly, the cost is prohibitive. As an alternative we would suggest that those wishing to respond to a questionnaire and yet retain their copy of C.P.O. undestroyed have the relevant page reproduced on a copying machine. Such machines are widely available today and the expense is nominal.

We hope that this will not discourage anyone from responding. Over the years C.P.O. and its predecessors have raised a number of relevant issues and generated some very interesting data in return. Responding to a questionnaire is one way, however small, of participating in the affairs of the profession, and it is always interesting to find out how your fellow professionals stand on issues of significance.

10th Annual Meeting of American Academy of Orthotists and Prosthetists

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Please identify author(s) and their professional title (CP, CO, MD, etc.) underlining the speaker.

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Questionnaire

Extra-Ambulatory Protheses

The following analysis and comments were drawn from responses to a recent questionnaire on extra-ambulatory protheses. The article, "Extra-Ambulatory Activities and Amputee," by Drew A. Hittenberger, CP, appeared in the Autumn, 1982 issue of *C.P.O.* (Vol. 6, No. 4).

As of January 25, 1983, five responses had been received to the questionnaire on extra-ambulatory protheses. This is a very low response and of course no valid conclusions can be drawn from it.

In response to question number one, "How many extra-ambulatory protheses have you made?" four responses said six-15 and one said 16-25.

On question number two, "What percent of your patients are involved in some form of physical exercise?" the average response was nine percent with a high of 20%, a low of five percent and one who said he had never thought to ask.

When asked, "What percent of your patients ask you about extra-ambulatory prosthetics?" the average response was 11% with a low of two percent and a high of 25%.

The respondees were asked to list, in order of occurrence, extra-ambulatory activities in which their patients participate. There were four mentions of swimming, although one was not the first activity listed; there was also one mention of scuba diving. Snow skiing was mentioned three times and water skiing once. Running and racquetball (a running sport) were both mentioned once, as were hunting, fishing, weight-lifting, and horseback riding.

The respondees were asked what percentage of patients used their prosthesis for more than just daily activities and the average response was seven percent, with a high of ten percent, a low of five percent, and one who didn't know.

As to how many of their patients had one prosthesis for daily activities and one for extra-ambulatory activities, the respondees on the average said four percent, with a low of one percent, to a high of ten percent.

All the respondents said that they informed their patients of handicapped sports organizations. One said he had a directory posted, and another said that there were no such organizations in his area.

Three of the respondents said that they were not satisfied with the level of prosthetics and its role in extra-ambulatory activities. One said yes, and the fifth said yes, but with reservations.

Reasons given for amputees not being more involved were:

- lack of interest
- not involved before amputation
- non-positive social conditioning
- fear of injury
- ignorance
- embarrassment
- rejection
- poor post-operative management

All five said that they would like to attend a seminar on the topic. Several additional comments were received and are listed below. In addition, Carl A. Caspers, CPO, of Minneapolis, Minnesota took the time to write a long, thoughtful letter in response. Parts of it are quoted below.

Additional comments:

1. "Yes—we need better research on different designs of protheses for different functional activities."

2. "Technical reports detailing alignment and fabrication for these specialized devices [are needed]. I have had to research, design, and devise techniques to create extra-ambulatory protheses. Also pre-printed bulletins with photographs for the patients would offer greater understanding and perhaps desire for these devices."

Mr. Caspers writes, in part:

"This letter is in response to Drew Hittenberger's article on extra-ambulatory activities and the amputee in the Autumn issue of *Clinical Prosthetics & Orthotics—CPO*. I was very pleased to see this article covering this subject as this has been a sadly neglected area for a long time.

"Mr. Hittenberger brings up some very good questions regarding the rehabilitation team's capability of maximizing the patient's activity level and more importantly the resultant poor postoperative care and management of the amputee. The vast [majority] are suffering from diabetes or other vascular complications. Obviously, the level of activity and the requirements for these people are going to be considerably less strenuous than those of a younger amputee. I think the problem goes back one step further and does not start with the post-operative care but in the operative management of the amputee. To date, the physician's main concern has been with the medical needs of the patient at that time and very little thought is given to the patient's functional needs after amputation. Such things as myodesis procedures, tibia-fibula stabilization, and lengths of lever arms are all crucial in the long-range function of an amputee. . . .

"In the area of limitation, I think Mr. Hittenberger covered this very well. There is an economic limitation that needs to be covered here also. The rehabilitation team's knowledge of extra-ambulatory activities and its awareness of the many extra-ambulatory prosthetic devices is somewhat limited. This thereby creates an economic factor that many amputees are unable to deal with. As has been well documented in the field of prosthetics, there is a need for extra-ambulatory devices and these should

be considered in the total rehabilitation, physically, psychologically, and economically.

"In the areas of prosthetic design, I think there are a number of things to provide [the patient] the capability of participating competitively or recreationally in extra-ambulatory activities. A sound pain-free residual limb is essential for good function in these areas. A good understanding of bio-mechanics as applied to the amputee is essential for the prosthetist to provide a well designed prosthetic device . . .

"In this day and age we have available to us a very sophisticated armamentarium of component parts and space-age type materials that lend themselves extremely well to prosthetic device fabrication, particularly in the specialized limbs geared toward specific physical activities.

"In recent times there has been much use of things such as rotational absorbers, Greissinger feet, and multi-axis type ankle joint foot complexes. All of these types of items offer capability to the amputee but should not be applied in a general fashion. There are many activities where a rotator or multi-axis type foot complex is extremely detrimental to the functionality of an amputee. Any sport which requires rapid directional changes would be a good example where these items should not be used. A person making quick and rapid adjustments in dynamic balance

requires immediate response from the floor through floor reaction with his foot. This cannot be accomplished adequately with such items.

"In conclusion, I feel that extra-ambulatory activities of the amputee and the resultant prosthetic devices that may be required for his successful participation in these activities is a relatively untouched area. A great deal of input is needed, both from the amputees in this country and the individual prosthetic practitioner, along with the physician and rehabilitation team members. I, myself, have been an amputee for 23 years and have been involved in numerous competitive and recreational activities and sports. I have found there are many areas in which I can participate in a non-handicapped world, and can be very competitive either on a one to one basis or as a team member. I have found this to be extremely fulfilling for myself and feel this is one of the ultimate goals that any amputee would strive to achieve."

• • •

As regards the question of torque absorbers and use of the more sophisticated ankle foot complexes, Mr. Caspers raises a very interesting question. Certainly many prosthetists hold decided views on the topic and it would be interesting to receive Letters to the Editor on the matter.

The Editor

AAOP Photo-Slide Contest

PRIZES

1st: \$100; 2nd: \$75; 3rd: \$50; 4th: \$25

All Contestants will receive Honorable Mention in the *Almanac*.

CRITERIA

1. Must be a series of 15 or more slides dealing with either orthotics or prosthetics.
2. Slides must illustrate one of the following: a) Patient management, b) Fabrication techniques, c) Components as directly applicable to patients, OR d) Successful rehabilitation using orthoses or prostheses.
3. Professional-type quality, 35mm only, possessing: a) Sharp focus; b) Accurate exposure; c) Simple, non-distraction background (preferably a solid color extending from above the patient to the floor); d) Readable graphs and charts, as needed; e) Clean clothing on all subjects—use shorts, leotards, drapes or gowns.
4. Slides must be numbered and labeled. If script is required, it must accompany series.
5. All slides will be copywritten and become property of the Academy, for use in the AAOP slide library as a resource for the profession.
6. All patients depicted in slides must have signed releases.
7. Contest limited to Academicians, certified practitioners, and persons in ABC-certified firms and/or AOPA member firms.

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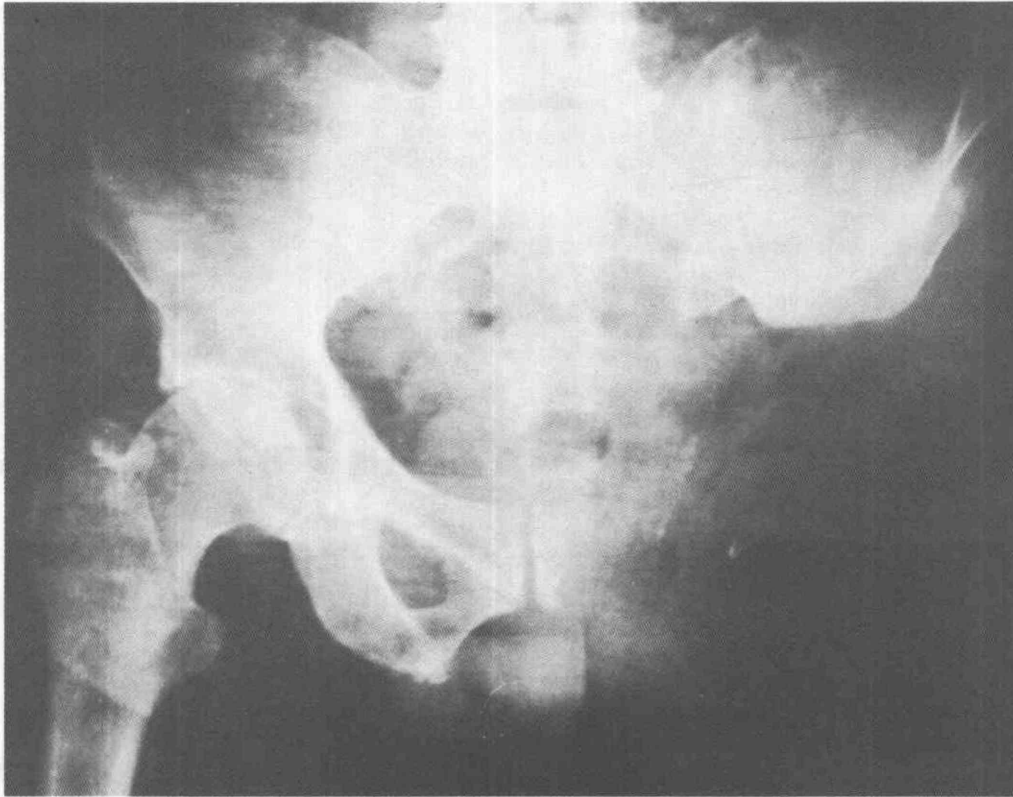
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DEADLINE

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Bivalved Spinal Orthoses for the Structurally Unstable Spine

H.R. Lehneis, Ph.D., CPO*, Roger Chin, CPO*, Donald Fornuff, CP*

With the advent of plastics, particularly thermoplastics, and plastics technology, plastic molded spinal orthoses are increasingly used in the orthotics management of the structurally unstable spine for nearly all levels of involvement. Depending on the risk factor involved, they may be used in lieu of surgery, i.e. when the patient is not a candidate to undergo surgery for various physiological reasons, or they may be used in the post-surgical management of the structurally unstable spine. Because of the ability of modern plastics to be intimately contoured to the body, they provide for far safer orthotics management, particularly of the cervical spinal region, than conventional orthoses. Often they are a preferred substitute over casts since these bivalved orthoses can be readily removed, either fully or partially, for hygienic reasons and the orthosis can be kept clean much more easily than a cast.

Orthotics Designs

Two types of bivalved spinal orthoses are described below:

- a. Cervico-thoracic orthosis (CTO) with forehead band.
- b. Thoraco-lumbo-sacral orthosis (TLSO).

With slight modifications, various combinations of the above can be designed. The area of injury or surgery usually determines the height and design of the orthosis. The contours of the orthosis aid in maintaining the proper position on the patient. Overlapping edges avoid pinching and allow for some weight gain or loss.

The bivalved opening allows for fast removal in case of cardiac or respiratory problems, situations in which access has to be almost immediate. It is also a comfort to the patient, while lying in bed, that either half of the orthosis can easily be removed for short periods of time to give some relief from pressure and for ventilation.

CTO with forehead band (fig. 1)

The cervical region is the most flexible of the spine. Rotation, flexion/extension, and lateral bending are difficult to control using just a cervical orthosis. Stabilization of the thoracic spine is necessary in order to provide the base, or foundation, for control of the cervical spine and head.

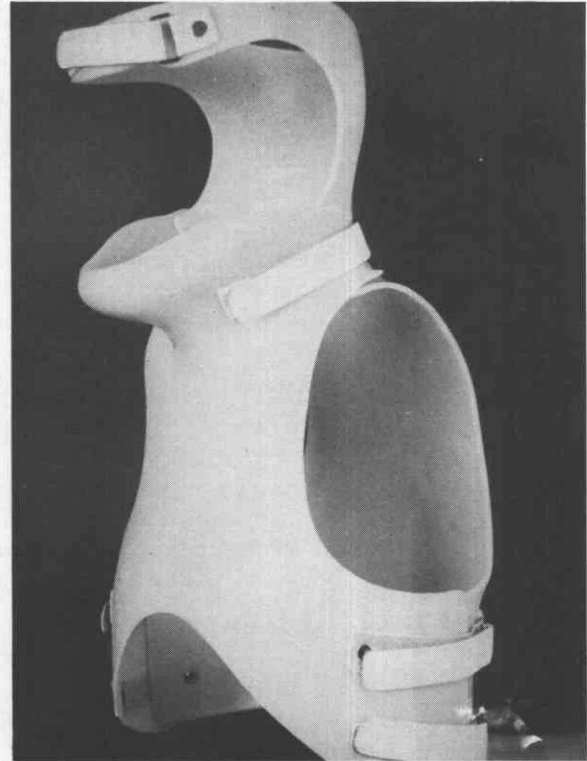


Fig. 1

It is extremely important to appreciate that without proper head control the cervical spine cannot be properly stabilized. Thus, the orthosis must extend posteriorly to cover the occipital area (fig. 2), and anteriorly around the forehead, as well as the mandibular area (fig. 3). Inferiorly, it should be noted that the orthosis covers the entire rib cage, including the floating ribs (fig. 4).

Thoraco-Lumbo-Sacral Orthosis (fig. 5)

Orthotics design for structural instability of the thoracic and lumbar spine requires the formation of a sound base inferiorly. In general, this is identical to the trimline used in the Milwaukee brace, or other orthoses for scoliosis. The superior trimlines depend on the level of involvement, but extend from at least the level of the xyphoid process to the inferior border

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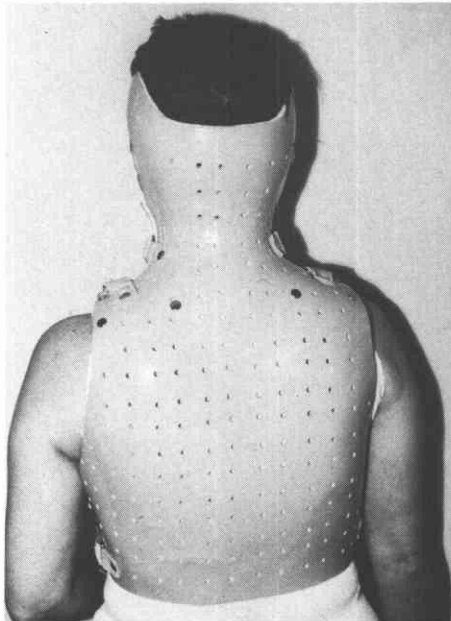


Fig. 2

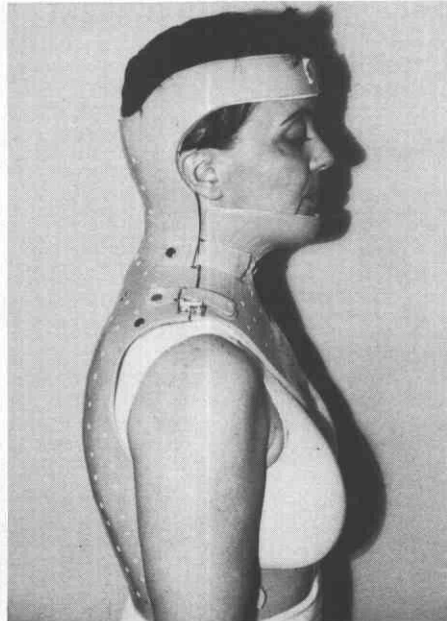


Fig. 3



Fig. 4

of the clavicle (fig. 6). The lateral Velcro® closures are of the cross-diagonal type described earlier by Ekus¹ to minimize relative vertical displacement between the bivalved sections.

Indications

The orthoses described are indicated either in lieu of surgery if the patient is not a surgical candidate for any physiologic reason, or post-surgically to maintain the desired position of the spine, instead of a plaster cast.



Fig. 5

Medical indications are:

1. Fracture and fracture-dislocations, including the odontoid process.
2. Ligamentous rupture or laxity with resultant instability of the spine.
3. Neoplastic disorders with concomitant degeneration of the vertebrae.

Physical indications are:

1. Lightweight.
2. Hygiene, i.e. ability to clean the orthosis.
3. Removability of either portion of the orthosis for patient hygiene and ventilation.

Casting Technique

The casting method requires a Stryker frame. It is essential for accurate casting, and is the safest method for the patient. Body movement is limited to transfer in the supine position from bed to frame and back to bed, if the patient is not already in a Stryker frame and

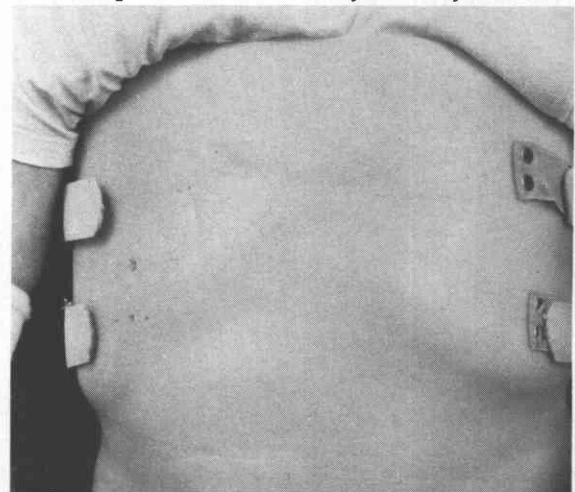


Fig. 6

¹Ekus L., CO, Cross-Diagonal Closure of Pelvic and Spinal Appliances. *Newsletter—Prosthetics and Orthotics Clinic*, Vol. 5, No. 1, 2/1981—Winter/Spring Issue

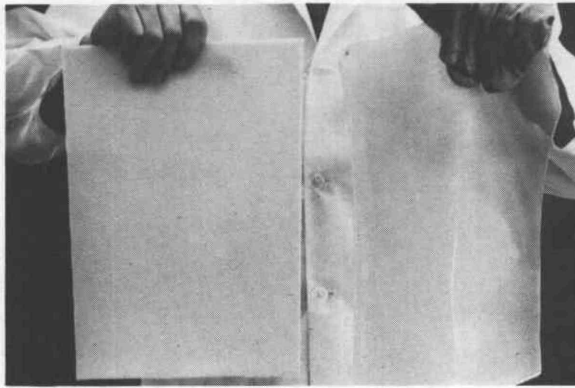


Fig. 7

in skeletal traction. The patient can be turned from a supine to a prone position by turning the frame, which has been locked to prevent body movement. This method has proven to be the fastest, simplest, and cleanest.

With the patient on the Stryker frame in the supine position, bony prominences and areas of relief are marked with an indelible pencil. The patient's anterior half is covered with a separative jelly (K-Y[®], petrolatum), except the hair, which is covered with stockinette for casting for the CTO. Approximately 8-10 layers of plaster splints are applied in alternating vertical and horizontal layers to give the anterior shell added strength. With the patient in the supine position, abdominal pressure (which supports the spinal column internally) is built in at the time of casting.

When the anterior half has hardened sufficiently to support the body without distortion, the patient is turned to the prone position. Again, bony prominences and areas of relief are marked with an indelible pencil on the posterior side which is then covered with a separative jelly. Approximately 4-6 layers of plaster splints are applied in alternating horizontal and vertical layers. The posterior half does not have to be as strong as the anterior half, as the patient will not be lying in it as in the anterior half. All casts are bi-valved with approximately 5 cm. overlap of the posterior half on the anterior half. A separative jelly is spread over the anterior areas to be covered by the posterior overlap. When the posterior half has hardened sufficiently to be removed, the sections will part easily because of the separative jelly under the overlap. They are then put back together with the overlap providing the key for proper position of the anterior and posterior halves.

The cast is then filled and modified. All bony prominences or areas of relief are built up approximately 2 to 3 cm. while in the soft tissue areas, e.g., abdomen, plaster is removed.

Fabrication

While any thermoplastic sheet material may be used for molding the orthosis, at this institution Subortholen[®] is preferred. It is a high strength polyethylene which is not only thermoplastic, but can be cold-formed as well. When heated, it can be drape-molded quite easily, and in a cold state, can be hammered similar to light alloy sheet material (e.g., hammered thin to form a hinge or channeled for

rigidity or relief). Subortholen[®] is available in thicknesses of 1 to 6 mm.

Sheets are cut to the size needed and placed in an oven heated to 150-160 degrees centigrade (350°F). The material is ready for molding when the sheet has lost its pink color and is almost translucent (fig. 7, right). When molding Subortholen[®], a half hour oven dry cast or driest possible cast is recommended. The cast should be covered with stockinette to prevent moisture contact to the Subortholen[®] which, if not done, may cause rapid cooling, bubbling, and an uneven finish on the surface.

The posterior half is molded first to extend approximately 5 cm. beyond the lateral midlines. When cooled, the posterior half is removed and cut to the desired trim lines and placed back on the cast. The anterior half is then molded to overlap the posterior half by approximately 5 cm. After the anterior half is cut to the desired trim lines, the orthosis is ready for fitting.

Special Fitting Considerations

Cervico-Thoracic Orthosis with Forehead Band :

1. Inferior trim line of forehead band should be approximately 1 cm. above the eyebrows.
2. Circumferential pressure adjustability of head band is accomplished by means of a Velcro[®] strap.
3. Mandibular pressure can be controlled by tightness of forehead band.
4. Inferior trim lines need not extend below rib cage, as not to restrict lateral and posterior/anterior motion.
5. Posterior/superior trim line should extend 3-4 cm. above the apex of the occiput.

Thoraco-Lumbo-Sacral Orthosis:

1. The orthosis must be keyed in the soft tissue area between the rib cage and iliac crests to prevent vertical displacement of the orthosis.
2. The anterior inferior aspect must be trimmed to avoid sitting problems and pressure on the pubis. The posterior inferior trimline should allow sitting without the orthosis being pushed up from contact with the chair.
3. Depending on the level of involvement, the anterior superior trimline should extend from a point somewhere between the xyphoid process to a level that follows the course of the inferior border of the clavicles.

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