

A Multi-Adjustable Cervical Orthosis for Use in the Treatment of Torticollis (A Case Study)

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INTRODUCTION

In the treatment of torticollis, the use and design of cervical orthoses is varied depending on the severity of the deformity, surgical intervention, if any, and continued follow-up care relative to the initial success towards its resolution. Orthoses may be simple collars or poster-type braces. In certain instances, intricate custom devices may be most appropriate, such as described by Townsend.¹ For the most part, these orthoses act to control the deformity but are often limited in their adjustability, comfort, and ease of use, especially in those instances when the physician has sole contact with the device. It was the need to incorporate these design requirements into a functional unit that prompted the suggestion of a new orthosis. The orthosis described in this paper provides an alternate means to orthotic treatment of torticollis and related conditions.

CASE HISTORY

The patient for whom the cervical orthosis was designed was, at the time of the treatment, a 19 year-old female with a diagnosis of congenital torticollis, significant

enough to produce feelings of self-consciousness when in public. Upon examination and evaluation, it was decided that a surgical release of the tight sternocleidomastoid muscle on the left side of her neck would be the treatment of choice. Post-surgical care was to include an orthosis to maintain the new position and to prevent recurrence of contracture. The orthosis was to be worn for 24 hours a day for the first three weeks, with weaning of the orthosis over the next three months.

In past instances, a SOMI² type orthosis has been prescribed for use, but not always without problems. Patient tolerance and ultimate rejection is a problem, as well as skin breakdown. In addition, the fitting of this type of brace varies from practitioner to practitioner. If the patient is seen in the doctor's office, adjusting the orthosis would prove difficult without the orthotist present (it would be necessary for the patient to return to the orthotic practitioner's office). Therefore, a custom total contact support that would provide better patient acceptance and eliminate skin irritation, along with a design that would allow the physicians to make position adjustments in the office, was indicated.

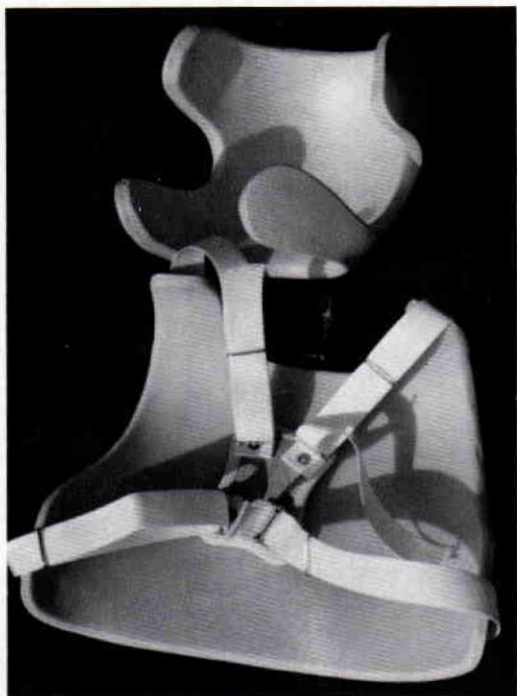


Figure 1. A multi-adjustable cervical orthosis (M.A.C.O.), anterior view.

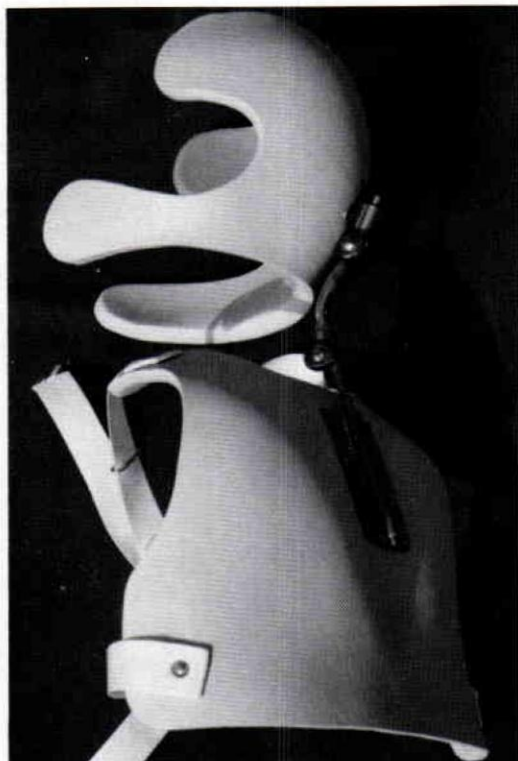


Figure 2. A lateral view of the orthosis.

FABRICATION AND FITTING

The patient was seen in the office one week before surgery was scheduled in order to take a plaster negative impression from which the orthosis would be fabricated. The patient was seated on an examination table and stockinette was placed on her in a two-step procedure. Two separate pieces of stockinette were pulled over her head and down onto her torso, extending down to her waist; slits were cut for the arms to extend through. Two smaller pieces, each sewn at one end, were pulled over her head, extending down to her sternal area, with slits placed up the sides so the smaller pieces would provide a smooth transition to the larger torso pieces. Holes were cut for the eyes and nose. Using an indelible pencil, both ears were outlined on the stockinette. The patient was placed in as close to a neutral position as possible, though with the design of this orthosis,

correction during the casting stage is not necessary.

Strips of four-inch wide plaster bandage were cut, and, starting with the torso, were applied in anterior and posterior sections, extending to the crests. Additional strips were applied to the neck and head, covering everything but the face. The edges of the sections were coated with Vaseline[®] for ease when separating from each other. The strips and stockinette were removed and put together, ready to be poured to form the positive model. The positive model was carefully smoothed, and build-ups were placed in the areas of the scapulae.

For materials, one-eighth inch kydex plastic was used because of its strength and ease with which it can be adjusted with the application of heat. For comfort, 1/4 inch plastazote was added for an interface. There is only a posterior plastic section to the brace on the torso with trimlines as shown (Figures 1 and 2). One-inch dacron straps are riveted to the corners of the post-

erior torso piece. Anteriorly, four one-inch slide buckles are attached to a leather sternal piece, trimmed to prevent impingement on the breasts. This leather piece will act as the attachment point of the dacron straps. This design will keep the orthosis lightweight and less bulky (Figure 3). The headpiece is trimmed to provide as much contact with the head as possible without pressing on the ears. The extensions anteriorly provide contact above the mandible, acting to maintain and control the motion of the head within the plastic (Figure 4).

The key aspect of the orthosis is the use and positioning of the ball joints incorporated into the system. These are two single joints that are riveted and welded together to form one unit (Figure 5). The motion of the two joints together act to more closely approximate normal cervical motion. The inclusion of Allen set screws enable the unit to be locked in any position, in any plane. In order to further enhance the rotational capacity and extendibility of the joints, additional modifications were made. Stainless steel plates are riveted onto the torso and head piece. Onto these plates are welded steel sleeves, into which the ends of the joints slide. The sleeves are drilled and tapped, with Allen set screws added. The finished unit now has motion in all planes, with adjustability at four separate points and the capacity to lengthen or shorten the height of the head piece (Figure 6). The finished orthosis was fit on the patient one week following surgery, with instructions to wear the orthosis 24 hours a day, removing it only for bathing. This was done for three weeks, after which the patient would gradually be weaned from the orthosis.

FOLLOW-UP

The patient was seen for a one-week follow-up. She had been following instructions as to its use and accepted it as part of her treatment. She related that she had only minor problems that were alleviated by minor postural changes. This included sleep time. There were no signs of skin irritation from the plastic or padding and



Figure 3. View showing the orthosis on the patient (anterior view).



Figure 4. A lateral view of the patient wearing the orthosis.

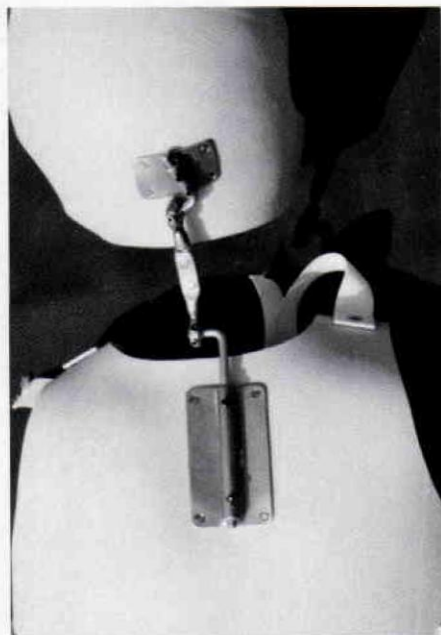


Figure 5. A posterior view of the orthosis. Note the ball joints and length adjustment rods.

the patient stated the orthosis was comfortable. She had no problem putting the orthosis on and had maintained good position inside the orthosis. A subsequent follow-up two weeks after this visit found the patient still maintaining good position and tolerating the orthosis well. The two month follow-up was equally successful.

CONCLUSION

The problems of cervical control, patient tolerance, and ease of adjustability in a cervical orthosis have been addressed in this study. The cervical orthosis described above was found to offer excellent control of the head in all planes, especially for rotational positioning. Adjustments were done simply and quickly, with good holding power from the Allen set screws. Patient acceptability in this case was good, and comfort was maximized with total contact support and use of padding material.

One major advantage of this orthosis, due to the adjustability of the joint, allowed presurgical casting and fitting while deformity still existed, eliminating a



Figure 6. Posterior view of the patient in the orthosis, showing adjustments.

painful casting procedure and delays in orthotic delivery. Correction of the deformity need not be done in the casting stage, thus making presurgical fitting possible, when necessary. The application of this orthosis may prove beneficial in other instances when such cervical control is desired under similar circumstances. We are further evaluating its use in other cervical anomalies.

REFERENCES

1. Townsend, Barry, B.S., C.P.O., "Static Rotational Control Cervical Orthosis for the Treatment of Congenital Muscular and Associated Plagiocephaly and Hemihypoplasia," *Orthotics and Prosthetics*, Vol. 36, No. 1, Spring, 1982.
2. SOMI orthosis is manufactured by United States Manufacturing Company in Pasadena, California.

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