

Torticollis: Differential Diagnosis, Assessment and Treatment, Surgical Management and Bracing

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The Use of Splinting in Conservative and Post-Operative Treatment of Congenital Muscular Torticollis

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SUMMARY. Standard conservative treatment for infants with congenital muscular torticollis does not consistently resolve lateral head tilt. This paper describes two custom-made neck collars used for this purpose. Indications for use and fabrication, as well as precautions, are discussed. Collars are readily accepted as part of the treatment program and are effective in improving the infant's ability to hold his or her head in midline. In addition, a procedure for splinting following surgery to lengthen the sternocleidomastoid muscle is described. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: getinfo@haworth.com]

Standard conservative treatment^{1,2} of infants with congenital muscular torticollis (CMT) consisting of stretching, positioning,

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and strengthening has been practiced widely throughout North America for the past twenty years. Published results of treatment have been inconsistent in use of assessments and descriptors, making outcomes difficult to analyze. In our clinical experience we have found that full neck range of motion (ROM) was generally achieved within a few months of beginning treatment for infants under one year of age. Some infants, however, continued to show a persistent head tilt toward the side of the torticollis. This led us to develop two types of collar, the Tubular Orthosis for Torticollis (TOT) and a foam collar, to be used as adjuncts in the management of this group of children.

DESCRIPTION

The Tubular Orthosis for Torticollis or TOT³ is assembled from premade plastic parts; the foam collar is adapted from a small adult-sized cervical collar. Both devices employ a lateral obstruction to limit head tilt toward the side of the torticollis but permit freedom of movement in other directions. We believe that the TOT is somewhat more dynamic than the foam collar; it produces mild discomfort on lateral head tilt, thereby stimulating active lifting of the head away from the noxious input and toward vertical alignment.

INDICATIONS

Collar use is added to the conservative treatment of infants with CMT if they are 4 months of age or older and show a consistent head tilt of 5 degrees or more. The infant must have adequate ROM and lateral head righting reactions (head control and strength) to lift his or her head away from the side of the collar.

FABRICATION AND FIT

Tubular Orthosis for Torticollis*

A length of PVC tubing twice the circumference of the neck plus 4-6 inches is cut and joined into a circle using an end connector

*TOT collar available in Canada from Symmetric Designs Ltd, Ganges, BC, (604) 537-2177, and in the U.S. from North Coast Medical, San Jose, CA, 1-800-821-9319.

(Figure 1). Two struts to provide a lateral stimulus on the affected side are selected, allowing .5 inch for T-junctions at the top and bottom: strut A spans from posterior to the crest of the trapezius to the occiput and strut B from anterior to the crest of the trapezius to the tip of the mastoid process. A T-junction is fitted over the PVC tubing approximately 1 inch from the end connector and inserted into strut A. A second T-junction is similarly positioned on the other side of the end connector and inserted into the other end of strut A. Strut B is joined to the PVC tubing about 1 inch from strut A at one end, and about 3 inches away at the other end, using two more T-junctions (Figure 2). The ends of the collar are fastened together with a C-clip. Occasionally, the end connector can cause skin irritation and pressure when placed centrally. An alternative in this case is to place the end connector along the base of the neck and join the PVC tubing by tying it at the side of the neck with twill tape (Figure 3).

The collar is placed on the infant and any necessary adjustments are made to length and position of struts and length of PVC tubing. For correct fit, the infant should be holding his or her head in midline, slightly away from the struts, and there should be room for 1 or 2 adult-sized fingers to fit between the C-clip and the back of the neck, or between the PVC tubing and the anterior neck.

To increase comfort and decrease the likelihood of pinching the skin, moleskin can be wrapped around the two layers of PVC tubing in the area under the chin. The struts and T-junctions can also be covered with moleskin although this makes it more difficult to

FIGURE 1. TOT Parts: A, End Connector; B, T-Junction; C, C-Clip; D, Strut

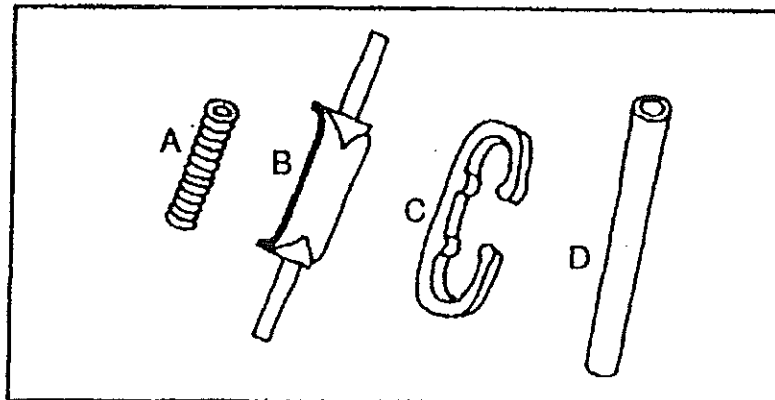


FIGURE 2. Completed Collar

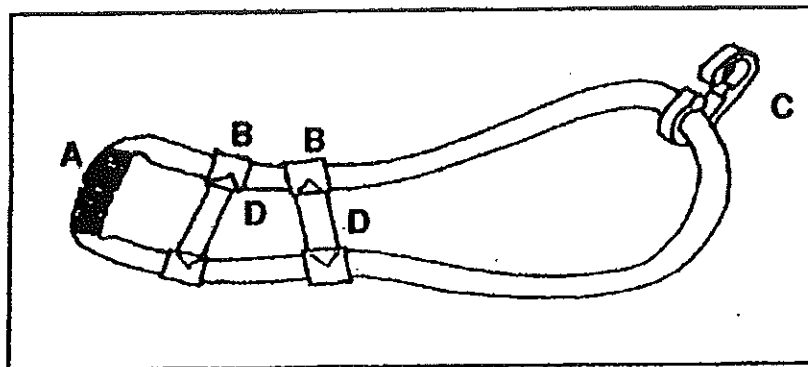
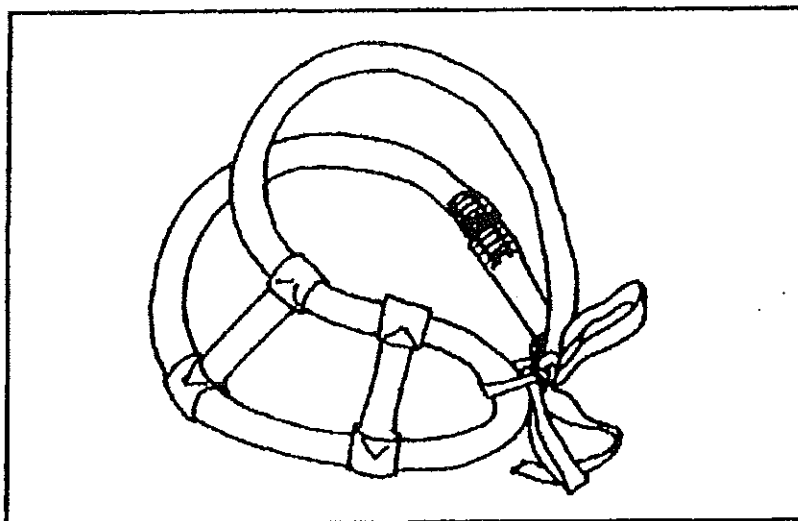


FIGURE 3. Alternative Method of Fastening TOT



adjust the fit of the collar. Alternatively, the collar can be placed inside a sleeve of stockinette.

Foam Collar

Choose an adult-sized small, firm foam cervical collar with adequate length to fit around the infant's neck. Remove the stockinette and velcro to expose the foam. Cut the foam to be narrow under the chin and on the uninvolved side. A concave section may be cut out

under the ear on the involved side to avoid pressure to the ear lobe. The collar will attach at the middle of the back of the neck. The collar on the involved side should support the head as close to midline as possible. Decreasing the height and thinning the foam on the uninvolved side and under the chin will allow the child to laterally flex toward that side. The collar should be as vertical as possible. There should be room for 1 or 2 adult-sized fingers to fit between the neck and collar. A good place to check this is in the front of the neck during swallowing. The collar is covered with cotton fabric and velcro closures are sewn on (Figure 4).

APPLICATION AND USE

Application of the collar is generally easiest with the young infant in prone. The center of the TOT is placed under the chin, the struts positioned spanning the shoulder on the affected side, with the top of the anterior strut on the mastoid process (just behind the earlobe). The C-clip is then fastened (Figure 5). The foam collar is positioned similarly, with the highest aspect under the ear on the affected side (Figure 6). As both infant and caregiver become more accustomed to the process, the collar can be put on with the infant sitting or standing.

Because the TOT is easily adjusted, it can initially be made to fit

FIGURE 4. Foam Collar

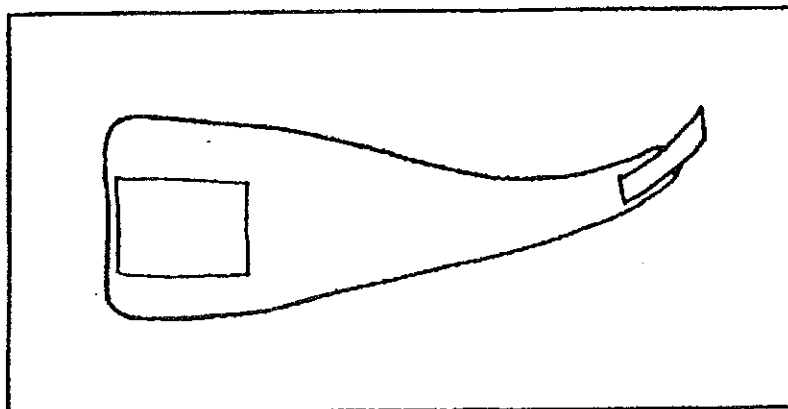


FIGURE 5. Child Wearing TOT

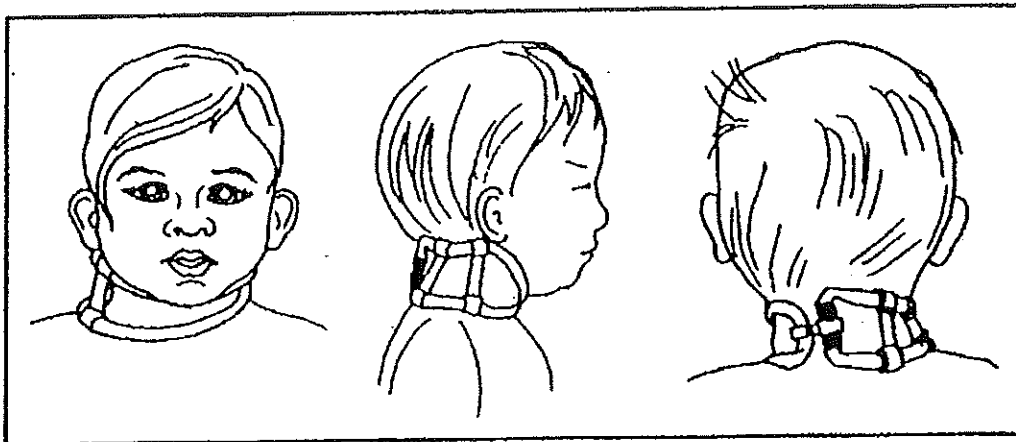
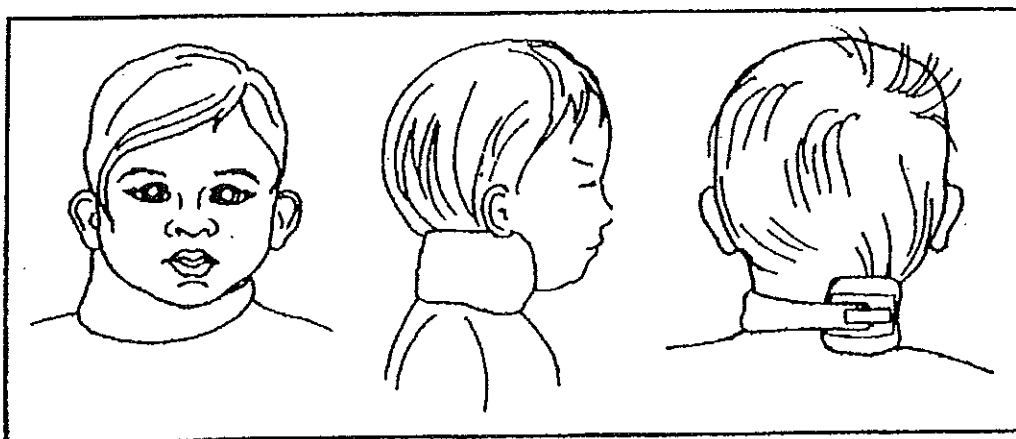


FIGURE 6. Child Wearing Foam Collar



looser than is optimal in order to facilitate the build-up of wearing tolerance and the learning of application by caregivers. The goal is full-time wear during the waking hours and most infants achieve this within the first week (toddlers may require a bit longer). TOT fit is then adjusted by changing the length of struts or tubing to stimulate active correction of head position to achieve midline orientation. Further adjustments are made as required for growth. The collar is removed for stretches. Active strengthening exercises may be done while wearing the collar. We find that collar wear is

generally required for a minimum of 2 to 3 months and may be needed for 8 months or more in some instances.

The infant's head position without the collar is reassessed at each clinic visit. When head tilt is less than 5 degrees consistently, collar use is gradually decreased. The collar is removed for 1 to 2 hours at a time of day when the infant is most rested and likely to maintain a good head position (often on rising in the morning or following naps). Head position is monitored by the parent at these times. If a midline position is maintained consistently, time without wearing the collar is gradually extended. The collar is reapplied if head tilt recurs. This may be seen near nap times, at the end of the day, or following exercise sessions when the muscles are fatigued. Head tilt may also increase with teething or when the child is ill.

PRECAUTIONS

Collar use is intended to stimulate muscle activation for correction of head position to midline orientation. If the infant is unable to achieve this position, he may use the collar as a passive support or may adjust his body position to avoid correction. The therapist must watch for depression of the shoulder on the affected side, trunk curvature, or lateral shifting of the cervical spine. All infants should have visual screening to eliminate the possibility of visual torticollis before applying a collar.

Some children are reluctant to turn their head toward the affected side while wearing the collar because it does provide some resistance to this movement. Extra emphasis should be placed on gaining neck rotation toward the affected side both in the clinic and at home.

Caution must be taken when applying the collar to avoid pinching or folding the skin under the tubing or edge of the foam. Infants often show considerable redness under the TOT tubing and struts after a period of wear. Parents must be instructed in checking the skin periodically after removal of the collar. Redness should fade within a half-hour.

During hot weather some children may develop a heat rash while wearing a collar. Use of talcum powder or corn starch helps to keep

the skin dry. The TOT can be enclosed in a sleeve of stockinette or other soft fabric to improve comfort.

OUTCOME

Our clinical observation of infants with CMT demonstrated that, although conservative treatment of CMT improved muscle length and strength, some infants and children did not adopt an upright head position. We believe that the addition to the treatment program of the use of a custom-made collar which stimulates active use of the contralateral sternocleidomastoid (SCM) muscle throughout the day results in improved strength of that muscle and a more consistently upright position of the head. Infants who also have plagiocephaly may have improved symmetry if collar use is initiated early.

A small pilot study on the use of the TOT was conducted at British Columbia's Children's Hospital (BCCH) in 1984-85.³ The group of infants fitted with a TOT had an average head position of 89.5 degrees (90 degrees = vertical) at the end of treatment; the control group had an average head position of 84.8 degrees.

The use of a collar as an adjunct to conservative treatment of CMT has been readily accepted by parents, children, and infants, and we have noted no deleterious effects. Its use with infants with CMT over 4 months of age who consistently have a head tilt of more than 5 degrees has become a routine part of our management program for these infants.

POST-SURGICAL SPLINTING FOR CMT

At BCCH, orthopaedic surgeons see several new patients each year with untreated or unresolved CMT. Following surgical lengthening or release of the SCM, the surgeons prefer to have the child's head maintained in a position that prevents re-shortening of the muscle during healing. To achieve the desired positioning, occupational therapists enter the operating room immediately following the surgical procedure to fabricate a low temperature thermoplastic "collar" while the child remains under anaesthetic. Over the years this collar has taken numerous forms; the present version is a hybrid

of a design developed at BCCH with one from Sick Children's Hospital in Toronto, Ontario, Canada.

The child's head is positioned such that the previously shortened muscle is placed on stretch—that is, tilted laterally away from the released muscle and rotated toward it. Jobst custom-splint thermoplastic material (Remington Medical, 1124 Lonsdale Avenue, #406, North Vancouver, B.C., Canada V7M 2H1, phone 1-800-267-5822) is used with contour foam placed for comfort over the jawline, the shoulder on the side opposite the surgery, and any bony prominences, such as the clavicles. Contour foam is also placed over the ear on the surgical side. The premeasured and pre-cut thermoplastic material is molded over the surgical side of the face and skull, the entire neck and both shoulders (Figure 7).

A rolled reinforcement bar of thermoplastic is added to the surgical side to strengthen the splint. The foam is replaced in the jaw and shoulder areas and covered with moleskin. The impression from the foam over the ear is perforated to facilitate hearing. Straps are added to hold the splint down onto the chest and shoulders and to keep it firmly in contact with the skull. The splint is worn 23 hours a day (off for skin care, stretching and exercises) for the first 1 to 2 post-surgical months and at night for several more months. We believe that use of this splint has been effective in maintaining length of the SCM muscle following surgery.

FIGURE 7. Child Wearing Post-Surgical Splint



CONCLUSION

Two custom-fabricated collars for use as adjuncts to conservative treatment of CMT and an orthosis for post-surgical maintenance of lengthening of the SCM muscle were described. Orthotic aids are believed to be useful for improving vertical alignment of the head on the trunk in management of congenital muscular torticollis.

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