Collar Sling for Bilateral Shoulder Subluxation

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A collar with arm cuffs for reduction of bilateral shoulder subluxation was developed for a 61-year-old businessman who had good hand function, but in whom polymyositis with atrophy of the proximal muscles bilaterally had resulted in severe shoulder subluxation and pain (Figure 1). Other slings designed to reduce shoulder subluxation were unacceptable for our patient for the following reasons:

1. They were designed for use with unilateral subluxation.
2. They inhibited use of the hand.
3. Worn over clothing, they were cosmetically unsatisfactory.
4. They were uncomfortable when worn for long periods of time.

This bilateral sling consists of a rounded collar with front opening and two arm cuffs with Velcro closures. Because of skin folds from muscle atrophy, the patient also used a 50.4-cm (20-inch) piece of Ace bandage wrapped around his arm under each cuff for a more comfortable fit. Straps located on the front and back of the collar extend to loops with "D" rings on the cuffs. Figures 2 and 3 show the placement and fastening of the straps.

The sling was cosmetically acceptable to the patient; he has worn it daily for 12 to 14 hours without discomfort. After three months of wear, the following improvements were reported by the patient and observed by the therapist:

1. Marked decrease (1.5 cm) in shoulder subluxation bilaterally during wear (see Figures 4 and 5). Even without the collar on, subluxation of the left, or more involved, shoulder was reduced by 1 cm from what it was before fitting with the sling.
2. Significant decrease in pain.
3. Elimination of tingling in the right hand that had been present for approximately one year.

Materials
Lightweight, pliable leather, approximately 25 x 50 cm (10 x 20 inches); 2.5-cm (1-inch) webbing; 2.5-cm (1-inch) "D" rings; 10.2-cm (4-inch) Ace wrap, 50-cm (20-inch) long, optional. (A double thickness of closely woven cotton or cotton/polyester fabric may be used in place of the leather.)

Assembly
Step 1. Fit a paper pattern of the collar (Figure 6) on the patient, as shown in Figures 2 and 3. A semicircular notch may be made at the center top back to relieve any pressure on the C7 spinous process.

Step 2. Transfer the fitted paper pattern to the leather; cut out and place on the patient. If it does not lie smoothly across the back and shoulders, take a dart in the back. Sew a webbing strip, with Velcro closure to the front, to lie just below the sternal notch. (If substituting fabric for the leather, allow for seams. Stitch two pieces together, leaving opening to turn. Turn and top stitch.)
Step 3. To make arm cuffs, measure the circumference of the mid-upper arm. Add 5 cm (2 inches) for overlap of the cuff closure. Cut four pieces of canvas 13.8-cm (5.5-inches) wide by the length measured above, according to the pattern shown in Figure 4 (the slight curve creates a funnel shape). Sew two pieces together along both long sides and one end, allowing a 1.4-cm (%-inch) seam. Turn and sew the remaining open end. Repeat for the other cuff. Sew on Velcro closures as shown in Figures 2 and 3. Arm cuff support straps are made by sewing a loop of webbing with “D” ring onto the upper edge of the cuff, and placed as shown in Figures 2 and 3.

Step 4. To make collar support straps, cut four lengths of webbing approximately 18-cm (7-inches) long. Velcro pile is sewn at one end of each webbing strap and Velcro hook at the other. The anterior straps are sewn onto the collar so that they cross the deltoid-pectoral notch, as shown in Figure 2. The posterior straps are placed as shown in Figure 3. Care should be taken to place these straps far enough laterally so the humerus is lifted into the acromion fossa rather than being adducted.

Application
The application of the sling requires the assistance of another person. The sequence of application is as follows:

1. Place the collar section and secure in front.
2. Apply the cuffs to the mid-upper arms.
3. Insert the shoulder straps into the “D”-rings of the cuffs, alternating adjustments right and left, front and back. Apply sufficient traction to reduce subluxation. This requires a good deal of pull, and without adequate upward force, no benefit is achieved.

Careful fitting of the cuffs (circumference and width) is essential for proper function and comfort. The width given is for a person of average height and build, and should be adjusted as necessary. The cuff should be wide enough to provide adequate purchase on the skin to prevent undue riding up. If the cuff impinges on the axilla when traction is applied, it should be reapplied tighter and/or more distally.

Although this patient experienced no vascular or neurological symptoms from wearing the sling, the therapist must watch for edema or change in color of the hands. Also, the patient should be instructed to report any tingling or numbness. Subtle and adjustments in fit and application should be made to correct any vascular or neurological problems.

This sling is inappropriate for unilateral involvement since it restricts full shoulder range of motion bilaterally. A similar sling, using the arm cuff and a figure-8 harness around the uninvolved axilla, has been more successful with hemiplegic patients.

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