Dynalllic Elbow Splint Following Tendon Transfer to Restore Triceps Function

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This paper describes a splint designed as part of the postoperative management of a quadriplegic patient following a tendon transfer procedure to restore elbow extension. A detailed description of the surgical procedure may be found in the literature (1).

A splint was needed that would allow full active elbow extension, while simultaneously limiting elbow flexion. On the fifth postoperative week the splint was applied, and the amount of elbow flexion allowed was gradually increased by 10° per week until 90° of elbow flexion was attained.

Materials
Polyform and T-stick foam padding (2), approximately 1 sq ft of each; sheet metal, approximately 1.5-mm thick; cotton webbing, 2.5-cm width; 4 plastic “D”-rings; Velcro hook and pile, 2.5-cm wide; Speedy Rivets; two 3/16-inch bolts with nuts; moleskin.

Procedure
Two half shells were cut from the polyform. One shell was formed over the lateral side of the forearm, extending from approximately 5 cm distal to the elbow joint to 3 cm proximal to the wrist joint. The other proximal shell was formed over the anterior aspect of the upper arm approximately 2.5 cm proximal to the elbow joint and 5 cm distal to the shoulder joint capsule. To assure unrestricted shoulder abduction, it was necessary to cut out the proximal and medial aspect of the shell. Straps were made from cotton webbing and Velcro, and riveted to the opposite side (Figure 1). The “D”-ring strap component should lie on the body of the splint to prevent pinching.

To make the hinge, the sheet metal was cut to form four rectangular supports, 7 x 1.5 cm. All edges were carefully filed. Three holes were punched through each piece. Each was then bent slightly to conform to the curvature of the shells: Two (one medial, one lateral) to fit approximately 2 cm proximal to the distal edge of the upper arm shell, and two to fit on the forearm shell approximately 2 cm distal to the elbow joint. All four were bent slightly outward to prevent the hinge from contacting the skin. A hinge was assembled on each side of the elbow by using a nut and bolt.
Once in place, the bottom of the bolt was hammered down to prevent slippage during flexion and extension. A few drops of household oil reduced friction.

To make the flexion stop, a piece of sheet metal was cut into a T shape, approximately 16-cm long and 3-cm wide at the top. The top bar was shaped to conform to the proximal edge of the forearm shell. Three holes were punched, and the piece was riveted in place with the long arm pointing proximally. To prevent sliding, a small piece of moleskin was placed where the stop contacted the upper shell. The angle of this T support determines the amount of flexion achieved.

The degree of elbow flexion was increased gradually in weekly increments of 10° to 15° by simply bending the support. This was in accordance with the schedule established with the hand surgeon.

With this hinge, active elbow extension was used to exercise the transferred tendon, while simultaneously protecting it. The splint enabled the therapist to accomplish these goals: exercise and protection. Therapists' concerns, of course, extend beyond splint construction; throughout the patient’s hospital course the patient received therapy in range of motion, skin care, muscle strengthening, training to improve activities in daily living, as well as emotional preparation to facilitate use of the tendon transfer.

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REFERENCES
2. Polyform and T-stick soft adhesive padding may be purchased from Ali Med, 138 Prince Street, Boston, MA 02113