

SPRING CLIP TUBULAR ORTHESIS FOR THE QUADRIPLEGIC HAND

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An adaptive hand orthosis may have to be used to provide or improve the function in a quadriplegic patient. Such an orthosis must mechanically supplement prehension by some type of holding device. It also must be simple to apply. Most quadriplegic patients experience great difficulty in managing straps and buckles which secure their hand splints in place. Yet as a general rule such orthosis must be removed to permit the patient, if he is able, to wheel himself independently. Then the orthosis must be re-applied to allow him functional activities. This whole process requires considerable dexterity and usually means some outside help from an attendant.

This difficulty has been eliminated by placing on the forearm extension hinged metal clips. These clips are activated by leaf springs incorporated into the hinges, which are so arranged that they will hold them either fully opened or securely closed. The opening is usually placed on the ulnar side, but it can be on the radial side. The clips project slightly on one end. This projection is used to open the clip by pushing under it or by hooking it over an edge of a table, a lapboard or an arm rest of the wheel chair. The clip is closed by depressing it through slight pressure, as by weight of the other forearm, which trips the leaf spring in the hinge. This simple mechanism permits the patient to become quite independent in a number of hand activities. Usually this spring clip splint is provided with a tubular holding device. A tubular holding device will allow the quadriplegic patient, who has very limited dexterity, an easier method of utilization and exchange of various utensils.

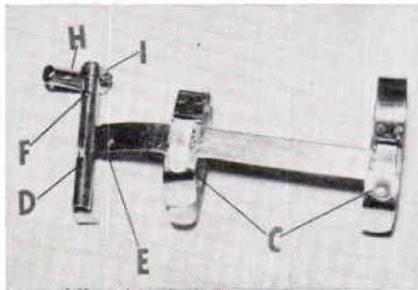
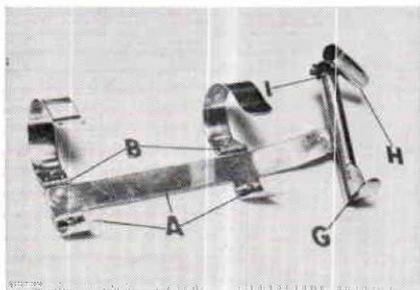
The tubular holder consists of a hollow metal cylinder which is usually attached to the above forearm splint. The tube is placed across the palm of the hand so that it will project slightly between the thumb and index finger in the web space. A bracket is placed on the ulnar side to prevent the hand from slipping off the holder. Self-care articles and utensils are modified by attaching to them handles or extensions of metal rods of a size that fit the hollow cylinder of the holder. The free end of each rod is tapered and rounded so that it can be slipped easily into the tube. The rod is held securely in place by a ball spring tension lever which, pushing through a hole in the cylinder, becomes engaged in a small depression on the rod. This creates sufficient friction to prevent the rod from rotating or slipping out. The tension of the spring is so adjusted that it will permit easy removal of the utensil by exerting slight traction such as can be supplied by the weight of the other hand or forearm.

A second shorter tube, called pencil holder, is placed at an optimal angle to the first tube, between the thumb and index finger. This permits

the holding of such objects as pencils, typing sticks, etc. It also provides stability on the radial side.

The specifications for the spring clip tubular splint are:

- A. F-Bar .064" x $\frac{3}{4}$ " x $9\frac{5}{8}$ " stabilizer section, with one projection at forearm .064" x $\frac{3}{4}$ " x $2\frac{1}{4}$ " and one projection at wrist .064" x $\frac{3}{4}$ " x $2\frac{1}{4}$ " location 5" from forearm.
- B. 2— $\frac{3}{4}$ " Butt hinges, attached opposite projection on F-Bar, with .064" x $\frac{3}{4}$ " x $6\frac{1}{2}$ " strip attached.
- C. .040" x $\frac{1}{2}$ " x $1\frac{3}{8}$ " Stainless steel spring attached.
- D. One piece Stainless steel tubing $\frac{1}{2}$ " O.D. x $\frac{3}{8}$ " I.D. x 5" long.
- E. Attach to F-Bar with bracket silver soldered on tubing.
- F. $\frac{3}{16}$ " ball attached to .059" spring. Hole for ball $\frac{7}{8}$ " from thumb side of tube.
- G. Bracket silver soldered to tube on little finger side.
- H. Pencil holder, $\frac{3}{16}$ " ball attachment to .059" spring, hole location $\frac{3}{8}$ " from end of 2" tube. Tube $\frac{3}{8}$ " I.D. x $\frac{1}{2}$ " O.D.
- I. Stainless steel clip to attach to pencil holder to palmar section.



It is obvious that the tubular holder is superior to other types of adaptive orthosis because it is easier for the quadriplegic patient who has poor maneuvering dexterity to insert the tapered rod into a round tube than trying to perform this action utilizing flat holding devices.

Because the patient can apply and remove this simple adaptive orthosis he becomes more independent in a number of functional activities of daily living.

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