January 2007 Splint
Dorsal Wrist Extension Fulcrum Splint

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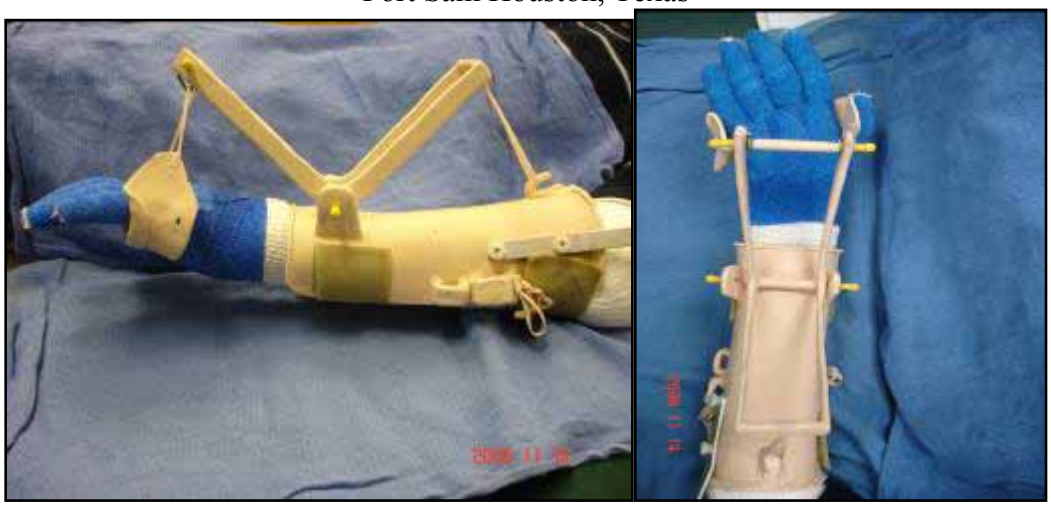

Description of splint: A dynamic wrist extension splint implementing a fulcrum device to create continuous balanced stress to soft tissue, removing compressive forces on articular surfaces typical in other dynamic splint designs.

Materials used/needed:

* Hydrocollator	* Heat gun	* Towel
* Polyform® splint material	* Splint wire	* Needle nose pliers
* Rotary hole punch	* K-Wire caps	* Rubber bands

Fabrication instructions: 1) Cut Polyform® splinting material into 3 – 6" x 1" pieces.
2) Heat each piece and press into towel to remove lamination.
3) Roll each piece to form a dowel approximately 8" long with a 3/8" diameter.
4) Manually flatten all three pieces to approximately 3/8" width and 3/16" thickness.
5) Heat and bend two of the pieces at mid-point to create a 90 degree angle.
6) Cut the third piece into 3 - 2 ½" lengths.
7) Cut 2- 4" lengths of splinting wire.
8) Reheat 2 of the flattened 2 ½" Polyform® pieces.
9) Re-roll each piece of Polyform® around one of the 2 wires leaving approximately ¾" of wire exposed on each side.
10) With heat gun, spot heat one end of a 2 ½" roll and the outside apex of one angled piece and attach heated ends. Let cool after attaching.
11) Repeat same process using free end of the same 2 ½" roll with the second angled piece.
12) Assure parallel alignment and symmetry of the two angled pieces by placing on a flat surface to form a tent. Spot heat angles as necessary to adjust alignment. Let cool.

13) Using the **wireless** 2 ½" piece, spot heat and attach flush to one of the 'open' ends of the tent to stabilize.
14) Form 2 'S' shaped hooks from 1 ½" pieces of splinting wire using pliers.
15) Slide one hook onto exposed wire at each end of remaining 2 ½" dowel.
16) Use standard rotary hole punch (size 3 or 4) to place holes in side of remaining open ends of angled pieces approximately ¼" from the end, centered on the material. The holes need to be large enough to allow the splinting wire to pass through.
17) Spread open-ended angled pieces to pass wire (inside out) through each hole. Cover the end of the exposed wire with K-Wire Caps. Hooks should be to the inside of the angled struts.
18) Fabricate a dorsal based forearm support on the affected forearm, assuring 2/3rds of the forearm length is covered with the forearm support ending just proximal to the wrist articulation.
19) Form a palmar bar (as shown in photograph) around the hand using splint material clearing the distal palmar crease and thenar eminence assuring that proper arch integrity and freedom of the digits is achieved.
20) Punch a hole in each end of the palmar bar on the ulnar and radial side to achieve a 90 degree angle of pull.
21) Using Polyform® scrap material, create 2 fulcrum mounts approximately 1" wide and ¾" high and punch holes as seen in photograph.
22) Place mounts on exposed wire of fulcrum axis and cover the ends with K-Wire caps.
23) To determine location of fulcrum, place forearm support on patient (as indicated in step 18) and use Velcro hook and loop to strap in place.
24) Place a mark on forearm support just proximal to ulnar styloid with wrist in neutral position to indicate fulcrum placement.
25) Center fulcrum over mark and attach fulcrum mounts to forearm support by spot heating mounts and forearm support. Note: fulcrum should be placed as close to the wrist articulation as possible.
26) Insert rubber bands through holes in palmar bar and connect to fulcrum hooks.
27) Loop remaining rubber band(s) to proximal fulcrum cross bar and pull on rubber band(s) to position proximal and distal fulcrum ends at equal height from forearm.
28) Fabricate Polyform® hook from 1" long material. Roll and flatten material as in Steps 3 & 4 and bend to form hook as shown.
29) Spot heat and center hook on proximal forearm support. Loop rubber bands to hook.
30) To increase wrist extension, heavier or more rubber bands are added to the proximal hook.

Advantages: Ease of application and removal. Allows for a constant, low load and progressive stress to burn scars. Allows for functional use of wrist and hand while in use.
Minimal adjustments are required. Complies with principles of dynamic splinting to limit compressive force at the articulation of the wrist.

Disadvantages: Advanced splint construction skill required. Fabrication time is approximately 1 hour.

Indications: Forearm, wrist and hand burns which require excision and grafting.
Forearm, wrist and hand burns which are at risk for burn scar contracture. Upper extremities which have developed radial nerve palsy.

Precautions/Contraindications: Requires education of staff, non-medical attendants and patients to assure proper placement and use of the splint. Resistance should be checked at regular intervals to assure adequate resistance and comfortable fit.

Supporting references: None.

Clinical Reasoning: The splint idea actually did come about from an intervention with a patient. I had created a typical hinged wrist extension splint for him and he c/o wrist pain in the joint w/ use, adjustments didn't help...so I used the concept of force application at two points w/ a distant apex hoping to reach functional ROM before the force applied was directly affecting the joint allowing us to decrease proprioceptive pain.
It worked great. Not only did he use it pain free; within 24 hours he had gained 30 degrees of wrist (P) ROM.
Other patients we've used it on have had similar results, increased wrist ROM, increased functional use of the wrist/hand involved and decreased splint discomfort.

If you have any questions about the design of the splint or comments about the fabrication, please email Charles at: Charles.Quick1@us.army.mil