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Complex made Simple...clinically relevant education by Judy C. Colditz, OT/L, CHT, FAOTA

March 2016

ClinicalPearls

No. 39

NEOPRENE: SOMETIMES THE UNIQUE SOLUTION

On occasion therapists are faced with clinical challenges to which there is no readily available solution. Neoprene is an orthotic material which sometimes can provide a custom solution to a unique problem.

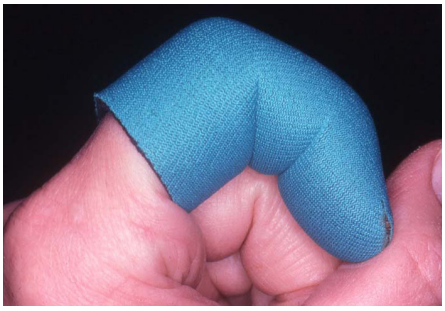
Perhaps the patient has a bulbous arthritic finger joint but wants to maintain some motion. A snug fitting neoprene sleeve can provide an external "ligament," diminishing pain during use. A sleeve can cover the entire finger to provide insulation against cold exposure, allowing the patient to return to work in a cold environment.

Neoprene is also an effective padding material, being especially effective at absorbing sheer force. The slightly stretchy and soft characteristics make it an ideal material for pressure distribution in some strapping applications.

In our busy clinics it is inefficient to construct a neoprene orthosis when there are many readily available commercial neoprene solutions. Constructing an orthosis of neoprene is best reserved for the one-of-a-kind problems for which you have nothing else to offer the patient.

This clinical pearl offers tips for working with neoprene and construction instructions for three specific orthoses: 1) A finger sleeve for insulation or for use as an external ligament, 2) a finger protector for a contracted finger with scleroderma, and 3) a soft orthosis to maintain thumb abduction in an insensate hand with median palsy.

These are only a few of the many ideas for the use of neoprene for unique clinical circumstances.



1) A neoprene insulating finger sleeve



2) An easily removable neoprene protector for a contracted PIP joint resulting from scleroderma



3) A neoprene thumb support for median palsy

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Disclaimer: HandLab Clinical Pearls are intended to be an informal sharing of practical clinical ideas; not formal evidence-based conclusions of fact.

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NEOPRENE: SOMETIMES THE UNIQUE SOLUTION (continued)

TIPS FOR WORKING WITH NEOPRENE

USES FOR NEOPRENE:

1. External Ligament: Elastic; allows motion while providing support
   - Must be tight enough to provide support to joint but not constrict blood flow
2. Insulation; no water or air passes through
   - Must be snug to block airflow but not constrict
3. Strapping; no sharp edges
   - Distributes pressure over bony prominences
4. Padding; absorbs sheer force
   - Small piece of adhesive hook can hold neoprene in place (if fabric cover is made of loop)
   - Can be removable and washable

WORKING WITH NEOPRENE (Synthetic Rubber)

1. Choose material thickness
   - Thickness measures neoprene (black core) only
   - 3mm-(1/8 in.) for most wrist/hand orthoses
   - 1.5-2mm-(1/16 in.) for finger sleeves
   - Type of fabric laminated to neoprene alters thickness
2. Determine stretch
   - Amount of stretch varies based on fabric laminated to neoprene
   - Directional stretch may vary greatly
3. Create pattern
   - Make rough paper pattern (depending on direct of stretch)
   - Cut pattern larger than needed (you can always make smaller!)
   - Glue seams, evaluate fit; adjust fit as needed by re-doing seams
   - Make fit snug; neoprene stretches with use

TECHNICAL TIPS: Seaming Neoprene

1. Gluing Seams (must use neoprene glue)
   - Apply thin layer of glue to both sides (black edge only)
   - Allow to dry until tacky
   - Put edges together
   - Avoid stress until glue cures 24 hrs.
2. Sewing Seams
   - Use largest needle possible

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NEOPRENE: SOMETIMES THE UNIQUE SOLUTION (continued)

- Use longest stitch possible
- Place paper above and below neoprene for successful sewing
- Use stretch stitch (zig-zag)

3. Using heat activated seam tape
   - Place tape over seam, cover with paper and apply heat from iron
   - Hold iron in place until glue melts (this is longer than you think!)
   - Tape best as reinforcement to glued seam; attach to one or both sides of seam.
   - Must cure 24 hrs. before stress

CREATING CLOSURES ON NEOPRENE

1. Attaching neoprene to neoprene
   - Use neoprene with UBL (unbroken loop: fuzzy material to which hook can be attached) on one side and a hook fastener on the other side. NOTE: the hook may appear to attach to some fabric covered neoprene but unless it is UBL, it will not have useful durability
   - Sew hook and/or loop fastener to neoprene in desired location/s
   - Apply heat-activated hook and/or loop to neoprene
2. Attaching neoprene to thermoplastic materials
   - Apply a small amount of adhesive hook closure to the inside of the thermoplastic and apply neoprene with UBL as strap
   - Attach neoprene to non-coated (sticky) thermoplastic that has been heated (dry heat is best)
   - Attach neoprene with rivets, making a large "washer" so the rivet does not pull out of the hole in stretchy neoprene

U.S. SOURCES FOR NEOPRENE

- Seattle Fabrics; **www.seattlefabrics.com**
- Benik Corporation; **www.benik.com**
- Warm Belly Wetsuits (possibly for scraps of thin neoprene); **www.warmbelly.com**
- North Coast Medical; **www.ncmedical.com**
- Patterson Medical; **www.pattersonmedical.com**
- Your local dive shop

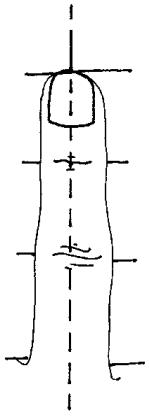
REFERENCES

Colditz JC: Splinting with Neoprene, Morgan Hill, CA, 1999, North Coast Medical, Inc

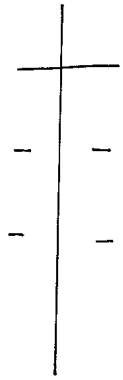
NEOPRENE FINGER SLEEVE (Insulation or support)

Design & Instructions by Judy C. Colditz, OT/L, CHT, FAOTA

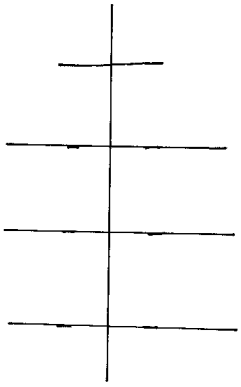
NOTE: These instructions are for use with 1.5-2mm (1/16 inch) thick neoprene with nylon knit fabric on both sides. If thicker material is used, width must be added to the pattern to accommodate the thicker material. For joint support of PIP, do not include fingertip



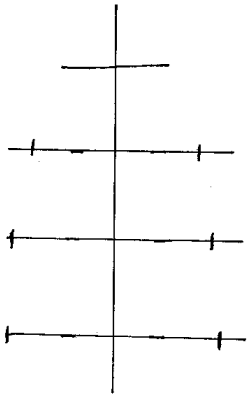
STEP 1: Draw a straight line & place finger centered over line. Mark: 1) end of finger 2) DIP joint 3) PIP joint and 4) base.



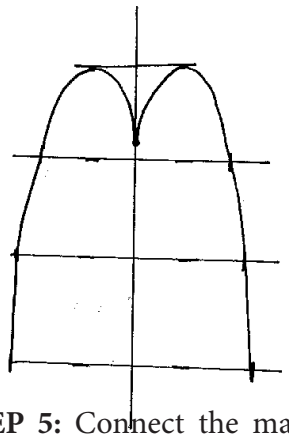
STEP 2: When the finger is removed the drawing should look like this.



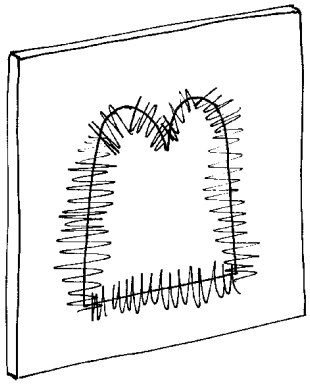
STEP 3: Connect the marks with straight horizontal lines.



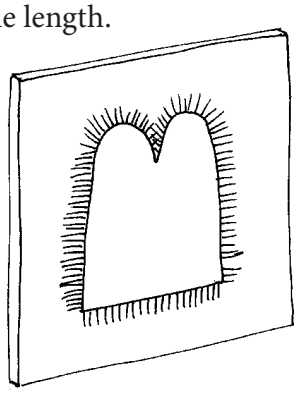
STEP 4: Measure circumference of DIP, PIP, & base. Center circumference measurement on center line and mark the length.



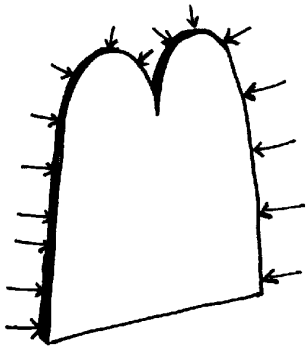
STEP 5: Connect the marked lines, curving both sides of the top as shown. Do not make tips too pointed. Cut out the pattern.



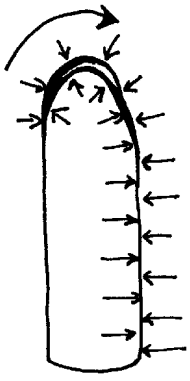
STEP 6: Place pattern on neoprene and mark edges with chalk. Maximum stretch across allows easiest flexion.



STEP 7: Cut outline created by chalk mark. Cut edges squarely.



STEP 8: Apply glue on edges, starting in center. Dry until tacky.



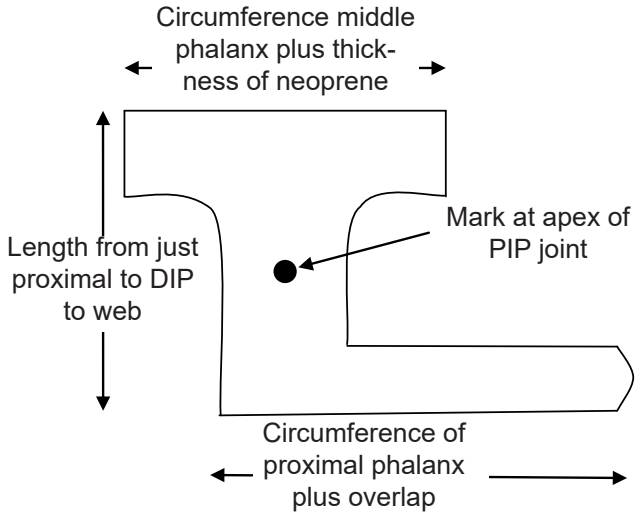
STEP 9: Start at center abutting the edges; cure 24 hours.

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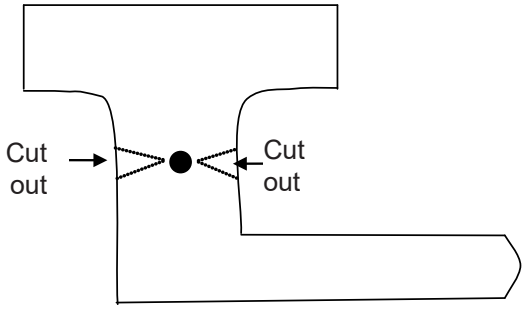
FINGER PROTECTOR FOR CONTRACTED SCLERODERMA PIP JOINT

Design & Instructions by Judy C. Colditz, OT/L, CHT, FAOTA

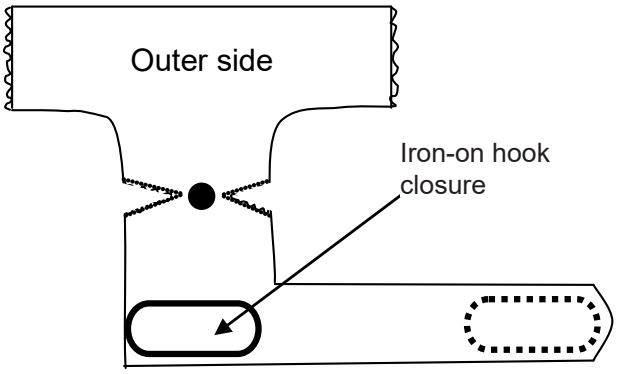
NOTE: These instructions are for use with 3 mm (1/8 inch) thick neoprene with nylon knit fabric on both sides. This must be loose fitting; direction of stretch is not relevant.



STEP 1: Draw a pattern by taking measurements on the contracted finger. It is VERY IMPORTANT that this fits loosely so as not to constrict the already compromised blood flow; be generous; you can always make it smaller.



STEP 2: Cut out small triangles on each side of the PIP joint mark. The tips of the triangles almost meet in the middle.



STEP 3: Apply iron-on hook closure to the underside of the finger protector and iron-on loop closure to the outer side of the finger protector.

STEP 4: Apply neoprene glue to the inside edges of the triangles and the edges of the closed loops. Edges to be glued marked are with: ∿∿∿

STEP 5: Fit protector to patient, checking that the fit is LOOSE. If there is too much material over the PIP joint, cut larger triangles and re-glue.

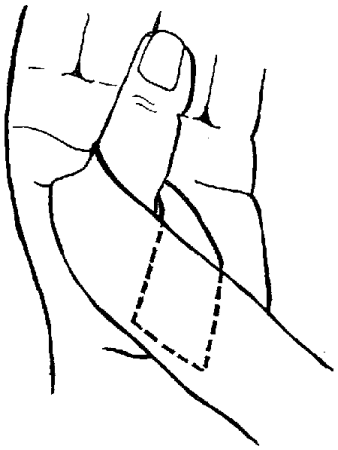
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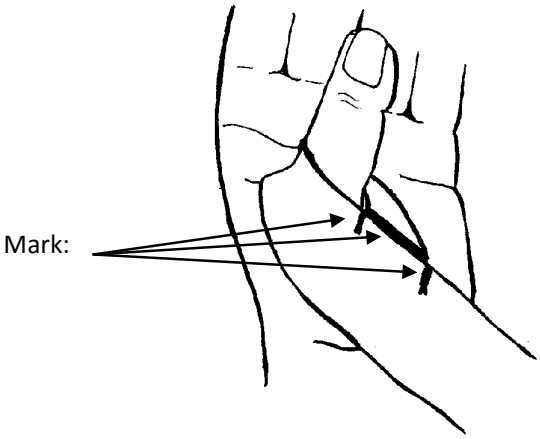
NEOPRENE THUMB ABDUCTION ORTHOSIS

Design & Instructions by Judy C. Colditz, OT/L, CHT, FAOTA

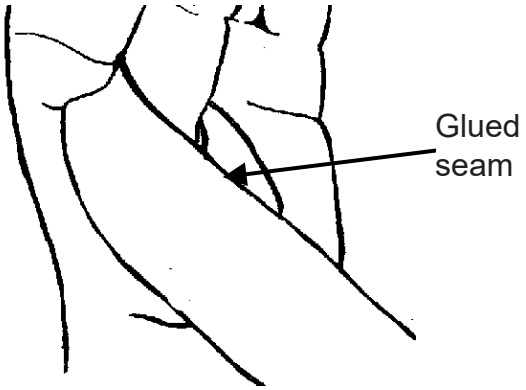
Use 3mm-(1/8 in.) thickness.

STEP 1: Cut an 18-inch length of 2-inch wide Neoloop or neoprene with loop fabric on one side. Wrap around the thumb, overlapping as shown. Loop side should face outward.

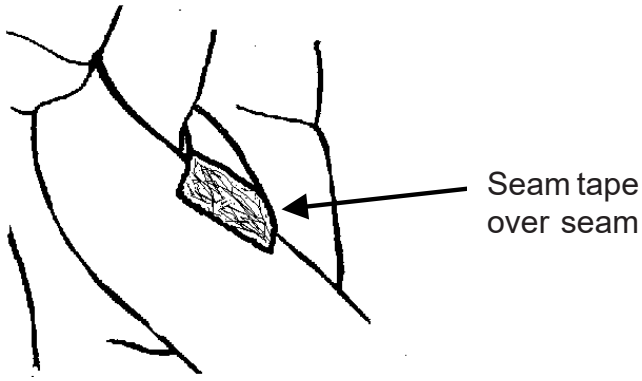




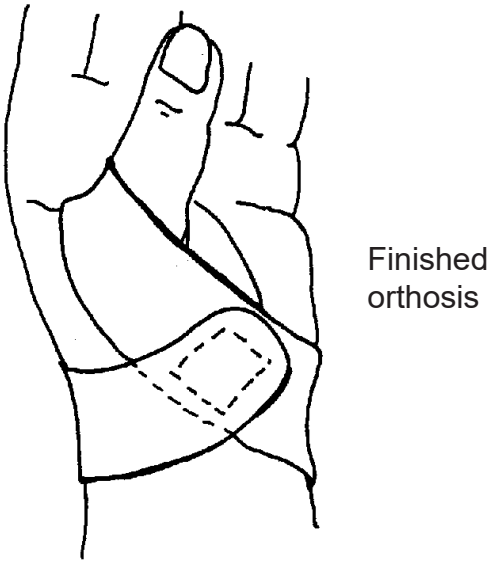
STEP 2: Mark the underneath strap where it is crossed over by the top strap. Also mark the top strap where the edges of the underlying strap meet it. Cut off the underlying strap at the angle marked.



STEP 3: Apply a thin layer of neoprene glue on the end of the strap you have just cut and on the edge of the strap between the marks. When the glue is tacky, place the two edges together to make the seam.



STEP 4: To reinforce the seam, (optional) place a strip of seam tape with the glue side down over the seam. Apply heat from an iron directly to the seam tape until the glue melts. HINT: Use a piece of paper between the iron and tape and hold the iron. Do not move it back and forth. On this orthosis you will be more successful applying the seam tape to the inside of the seam (non-loop side). Trim ends of tape if needed.



STEP 5: Apply heat sensitive hook closure on the inside of the overlapping strap where it overlaps the strap at the base of the thumb. Allow to set before pulling open and close.

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