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Practice Forum

The Rectangle: A hand-based pattern for a dorsal short thumb opponens orthosis with metacarpophalangeal support



Tina R. Veraldi OTR/L, CHT, BS

Retired from SSM Physical Therapy, Saint Louis, MO, USA

This author presents another pattern for a CMC orthosis that can be fabricated in a short period of time because of the straight cuts required to follow the pattern. This device can provide patients another choice of orthotic device to enhance compliance with wearing the device. — KRISTIN VALDES, OTD, OT, CHT, Journal of Hand Therapy, Practice Forum Editor.

There are many different designs for custom thermoplastic hand-based opponens orthoses that provide effective support to the carpometacarpal (CMC) joint,^{1–5} and this pattern is presented for its short fabrication time and ease of achieving the proper fit (Figs. 1–4). As a simple rectangle, the pattern has a minimalistic design^{6,7} using straight cuts, where folding and wrapping the material create the form that immobilizes the joints. Some opponens patterns (Fig. 5) that provide MCP support involve complex curved borders and may take more time to determine the optimal placement and fitting.^{8–11}

Two other orthoses have been found in the literature with some features in common with “The Rectangle.” Poole and Pellegrini¹² present a photo of a completed “short opponens” in an article from 2000, that appears close to “The Rectangle”, however, the pattern is not provided. In early 2017, a similar pattern (Fig. 4) was

described as “a whale of a design,” but the orientation of thermoplastic on the hand differs in at least 3 ways: the palm is covered because the plastic is molded circumferentially, the thin thermoplastic strip is placed at the dorsal hand, and the orthosis also supports the second metacarpal.¹³ “The Rectangle” exposes the palm, the thin portion of the orthosis supports the thumb, and the second metacarpal is free (Figs. 3 and 4). A comparison of these orthoses provides an example of how therapists should assess the needs of the individual and simultaneously assess the qualities of the many valid orthotic designs to provide the most appropriate joint support, optimal function, and patient satisfaction.

Purpose and orthotic geometry

This orthosis can be a part of treatment for many problems involving pain,^{4,5,13,14} joint tightness, and laxity^{14,15} and movement

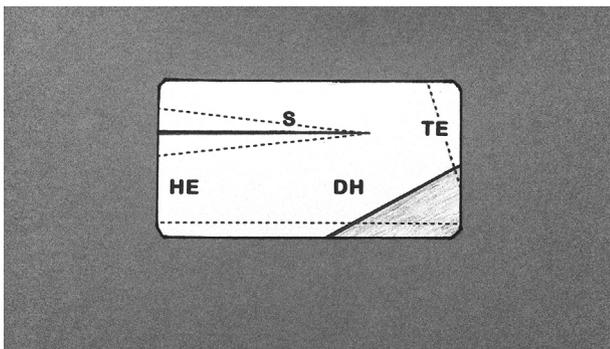


Fig. 1. Rectangular pattern for thermoplastic. Solid lines and dotted lines indicate where to cut and fold, respectively. Shaded area is to be trimmed off. Placement during molding is indicated with anatomical references: DH = dorsal hand; HE = hypothenar eminence; S = thumb strip; TE = thenar eminence.



Fig. 2. Palmar view of the rectangle short opponens, with MCP at 30°, before the palmar Velcro strap is applied. MCP = metacarpophalangeal.



Fig. 3. Radial view of the rectangle short opponens, with MCP at 0°. This MCP position promotes flexor pollicis longus gliding.¹⁸ MCP = metacarpophalangeal.

system syndromes.¹⁶ It can be an aid for patients who are learning dynamic stability approaches¹⁷ and joint protection.^{4,5,15} It can also be considered appropriate for rheumatoid diseases,³ tendinopathies,¹⁸ sprains,^{3,14} and fractures.⁵ The applications for CMC osteoarthritis and associated stiffness are presented here. The wearing schedule is determined by the therapist on an individual basis; it can range between day/night use, full/part time use, and alternation with a forearm-based orthosis.^{3,5,14}

To position the thumb metacarpophalangeal (MCP) joint with osteoarthritis, consider the rationale of the options. 30 degrees flexion (Fig. 2) can alleviate painful loading at the CMC joint.^{12,14,17} The mid-range position can facilitate orthotic use during tasks.^{14,15} The thermoplastic at the thenar eminence and dorsal base is folded for firm support that prevents the first metacarpal from displacement.¹⁴

Materials

- 1/8-inch thermoplastic material; consider a product with minimal memory for precise fitting.
- One inch width loop and adhesive hook Velcro straps.
- Padding for dorsal hand area.

Fabrication (see Figs. 1-4)

1. Measure rectangle pattern: Longitudinally on the long finger from just distal to MCP joint to mid carpal level. Transversely start in center of palm, around to dorsal thumb, go along the

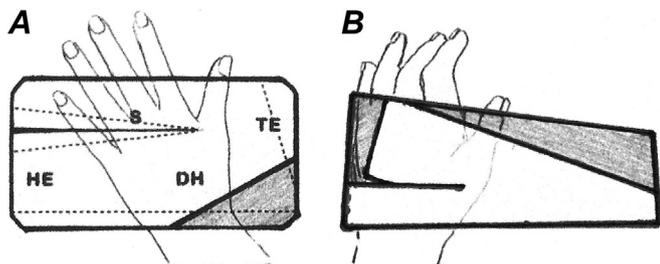


Fig. 4. Two orthotic patterns with the left hand indicated for the approximate placement of the thermoplastic during fabrication. Shaded areas are to be trimmed off. (A) “The Rectangle” and (B) “whale of a design” as interpreted from Figures 2A and 3A in the *Journal of Hand Therapy* submission.¹³

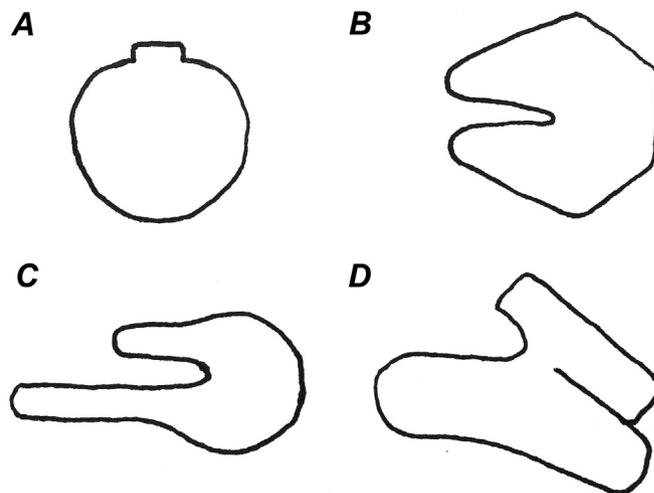


Fig. 5. Examples of other patterns for left hand-based opponens orthoses with MCP support. MCP = metacarpophalangeal. (A) Boscheinen-Morrin and Conolly;⁸ (B) Hogan and Uditsky;⁹ (C) Wilton and Dival;¹⁰ and (D) Tenney and Lisak.¹¹

1. Cut: on solid lines. Thumb strip (S) requires only 1 straight cut, starting at the ulnar side, about 2.5-3.5 cm proximal from the distal edge, and ending at a point that preserves 6-7 cm intact at the radial side.
2. Cut: on solid lines. Thumb strip (S) requires only 1 straight cut, starting at the ulnar side, about 2.5-3.5 cm proximal from the distal edge, and ending at a point that preserves 6-7 cm intact at the radial side.
3. Fold: on dotted lines before placement on hand. Folding the thermoplastic away from the volar thumb interphalangeal joint will be done during molding of the thumb strap.
4. Mold base: place folded material onto thenar eminence. Maintain orientation in palm, then wrap plastic onto the dorsal hand and hypothenar eminence.
5. Mold thumb support and position the CMC and MCP: use specific range, or for functional positioning, have the patient lightly touch thumb and finger tips. Wrap the strip (S), over the first web space, and around P1 of the thumb. Adjust folded edges to allow full motion of the wrist and thumb interphalangeal joint.
6. Velcro strapping: (1) across volar aspect of palm and (2) at thumb (if not bonded).
7. Check for secure and comfortable fit: observe patient wearing orthosis during pinch and grasp. Consider padding for the dorsal hand area of orthosis.

Clinical implications and conclusion

A key benefit of this approach is optimizing fabrication time. Time spent on cutting and fitting the orthosis can require approximately 10 minutes with this method. Inherent in this pattern, the thumb strip has sufficient length to wrap around P1 to provide proper support of the bone's shaft and to prevent a painful pressure area. The secure and comfortable fit, along with the exposed palm, may lead to patient compliance and satisfaction.

Acknowledgments

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Quiz: # 628

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1. One advantage of the device is that it

- a. has great esthetic appeal
- b. requires no velcro
- c. requires only straight cuts
- d. that it is applied with coban

2. Having the MCP at 0° facilitates gliding of the

- a. FPL
- b. FPB
- c. opponens pollicis
- d. EPL and EPB

3. The device

- a. has a dynamic component
- b. does not cross the MCP joint

c. crosses the IP joint

d. allows the IP joint free

4. Another advantage of the device is that

- a. the MCP joint can be free
- b. the thenar eminence is uncovered for increased tactile stimulation
- c. fabrication time is optimized
- d. its cost is covered by all insurance plans

5. The creator recommends the device exclusively for daytime wear

- a. true
- b. false

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