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CONTINUED

Thumbs Up for Function: Orthotic Intervention for the Thumb CMC Joint- Osteoarthritis

Jeanine Beasley, EdD, OTR, CHT, FAOTA

3

CONTINUED

As a result of this course, participants will be able to:

1) Identify three orthotic designs that have been reported in the literature to reduce pain at the CMC joint.
2) Describe two outcome measures that have reported improved function when clients wore a CMC orthosis.
3) Report the orthotic design that provides the most joint stability in contrast to the design that allowed the most hand function.

4

The Importance of the Thumb CMC

- The thumb is the most important digit of the hand
- The CMC is most important joint of the thumb
- The CMC magnifies the complexity of human prehension (Neumann & Bielefeld, 2003)

5

CMC OA Incidence Varies

Clinical Findings

- 13% 41-50 years
- 57% 61-70
- 69% 80+

(Sodha et al., 2005)

Radiological Findings

- 20% over 40 years
- 42% in males and 57% in females over 75 years

(Van Saase, et al. 1989)

Radiological findings do not necessarily correlate with clinical findings (Dahaghin, et al. 2005)

6

70-88% of therapists working with this diagnosis recommend an orthosis

O'Brein VH, Mc Galha JL. Current practice Patterns in conservative thumb CMC joint *Arthritis. Journal of Hand Therapy, 27 (*1): 14-22/

7

Why do we use an orthosis?

Decrease Pain (Bani et al., 2013a, 2013b; Becker et al., 2013; Berggren et al., 2001; Boustedt et al., 2009; Egan and Brousseau, 2007; Gomes Carreira et al., 2010; Hermann et al., 2014; Kjeken et al. 2011; Rannou et al. 2009;Valdes and Marik, 2010; Wajon and Ada, 2005; Weiss et al., 2004;Weiss et al. 2000, Bongi et al. 1991; Melvin & Carlson-Rioux, 1989; Swigart 1999)

Increase Function (Bani et al., 2013a, 2013b, 2014; Becker et al., 2013; Boustedt et al. 2009; Hermann et al. 2014; Rannou et al. 2009, Sillem et al. 2011, Wajon & Ada, 2005; Gomes Carreira et al. 2010)

Decrease inflammation (Zhang et al., 2007; Swigart et al. 1999)

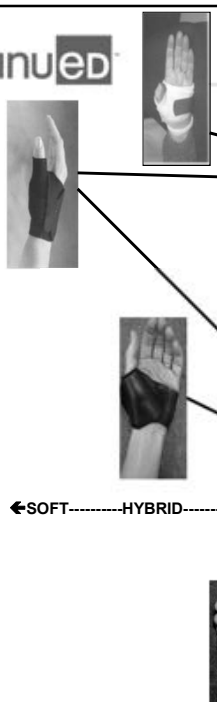
Pinch Strength (Rannou et al. 2009; Wajon & Ada, 2009)

Stability (Hamann et al., 2014, Barron et al. 2013)

Individuals with CMC OA have 2-3 times the functional limitations in dressing, eating, and carrying a 10# load. (Dillon et al. 2007)

8

Decrease Pain- 6 Systematic Reviews



Aebischer et al., 2016 (SR)
Bani et al., 2012, 2014
Becker et al., 2013
Berggren et al., 2001
Bongi et al., 1991
Boustedt et al., 2009
Egan & Brousseau, 2007 (SR)
Gomes Carreira et al., 2010
Hermann et al., 2014
Kjeken et al., 2011 (SR)
McKee & Rivard, 2005 (SR)
Melvin & Carlson-Rioux, 1989
Sillem et al., 2011
Swigart, 1999
Rannou et al., 2009
Valdes & Marik, 2010 (SR)
Wajon & Ada, 2005 (both improved)
Weiss et al., 2004, 2000
Ye et al. 2011 (SR)

9

When should an orthosis be worn?

- No standard instructions in many of the studies. (Henrique TQ de Ameda et al., 2016)
- During heavy or painful activities and at night (Berggren et al., 2001; Bongi et al., 1991; Buurke et al., 1999; Melvin & Carlson-Rioux, 1989; Swigart et al., 1999; Weiss et al., 2000).

10

Increased Function

DASH

Bani et al., 2012 (improved over time)
Becker et al., 2013
Boustedt et al., 2009
Gomes Carreira et al., 2010

AUSCAN

Hermann et al., 2014
Sillem et al., 2011 (Hybrid Orthosis)

Cochin Hand Function Scale

Rannou et al., 2009 (12 months night wear)

Sollerman Test

Wajon & Ada, 2005

11

Decreased Inflammation

Swigart et al., 1999

"Overall, splinting was found to be a well-tolerated and effective conservative treatment to diminish, but not completely eliminate, the symptoms of carpometacarpal joint arthritis and inflammation."

Zhang et al., 2007 (SR)

"The focus of splinting the thumb CMC is to decrease inflammation by providing rest and immobilization."

12

Increased Pinch Strength

Rannou et al. 2009
Wajon & Ada, 2009
Bani et al., 2014
Grenier et al. 2016



2.47# 3.25## 2.64 #

Other studies do not show an increase

13

STABILITY

Rhizo Forte V/2013 BSN

Rhizo Hit SPOR

Push® MetaGrip®
Largest Functionality

Rhizomed MEDI
High Stabilization (↓AROM – Low functionality)

Hamann N. et al., 2014: CMC and MCP joint motion restriction is at the expense of hand functionality.

- Motion analysis with orthoses in place for AROM
- Sollerman Test for functionality

14

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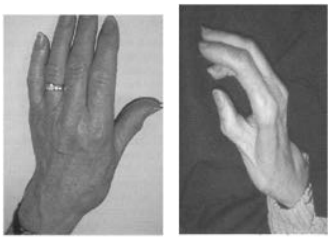
To include the MP or not to include the MP that is the question…

- Both decreased pain
- PUSH® MetaGrip® with the MP free allowed more function



Professional clinical judgment is required

Vegt, A. E., Grond, R., Grüschke, J. S., Boomsma, M. F., Emmelot, C. H., Dijkstra, P. U., & Sluis, C. K. (2017). The effect of two different orthoses on pain, hand function, patient satisfaction and preference in patients with thumb carpometacarpal osteoarthritis. *Bone Joint J,* 99-B(2), 237-244. Accessed March 09, 2017. https://doi.org/10.1302/0301-620X.99B2.37684.

15

CONTINUED

Cantero-Tellez, R., Hugo Villfane, J., Valdez, K., Berjano, P. (2018) Effect of immobilization of metacarpophalangeal joint in thumb carpometacarpal Osteoarthritis on pain and function. A quasi-experimental trial, *31,* 68-73.

Clinically significant reduction in pain and improved DASH scores

16

STABILITY

- Weiss et al., 2000, 2004
- Reported decreased CMC joint subluxation using radiographic assessment and observed joint position.
- Both hard and soft orthoses decreased pain and subluxation
- Better alignment with custom orthosis.

17

Reducing the Need for Surgery

- Berggren et al. (2001). A seven year prospective study.
  - Joint Protection, adaptive equipment, soft orthoses (leather or textile)
  - After 7 months 23 out of 33 (70%) did not want an operation. During the next 7 additional years only 2 more had surgery.

18

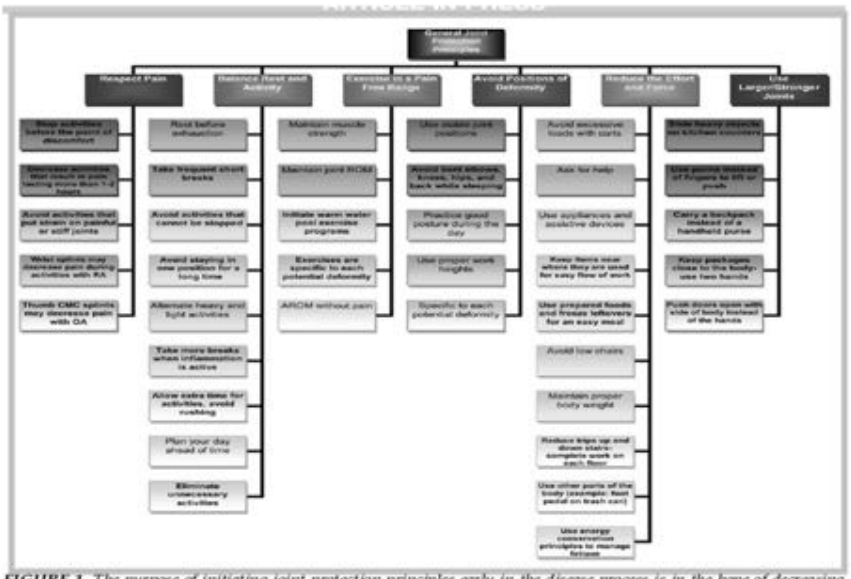


FIGURE 1. The purpose of initiating joint protection principles early in the disease process is in the hope of decreasing joint stress and damage. The principles themselves were first developed by Cordery (1965).[40] This is an overview and thematic categorization of general joint protection principles for rheumatoid arthritis (RA) and osteoarthritis (OA).[40–42,46,48] Several studies support the effectiveness of joint protection programs in decreasing pain and increasing activity of daily living (ADL) function.[40,43,47–49]. Adapted from Cordery,[40] Melvin (1989), Meenan et al. (1992), and Hammond et al. (2001).

19

CONTINUED

What about joint protection and OA?

Osborne, et. al (2007) Does self-management lead to sustainable health benefits in people with arthritis? A 2 year transition study of 452 Australians. The Journal of Rheumatology, 34(5), 1112-1117

Study found that such programs decreased pain, fatigue, and health distress.

The European League Against Rheumatism (EULAR) in their systematic review stated education concerning joint protection with an exercise regimen is recommended for all patients with hand OA evidence level of IV.

20

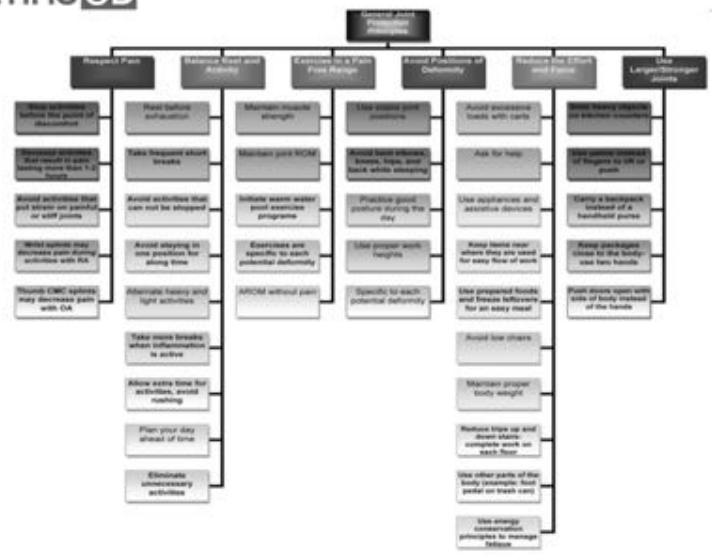


FIGURE 1. The purpose of initiating joint protection principles early in the disease process is in the hope of decreasing joint stress and damage. The principles themselves were first developed by Cordery (1965).[4] This is an overview and thematic categorization of general joint protection principles for rheumatoid arthritis (RA) and osteoarthritis (OA).[4] [7,35,45] Several studies support the effectiveness of joint protection programs in decreasing pain and increasing activity of daily living (ADL) function.[36,40,43,45–48]

21

Respect Pain

Swigart et al. (1999) Splinting in the treatment of arthritis of the first carpometacarpal joint. The Journal of Hand Surgery, 24A (1), 86-91. (splints decreased pain and inflammation)

- Stop activities before the point of discomfort
- Decrease activities that result in pain lasting more than 1-2 hours
- Avoid activities that put strain on painful or stiff joints
- Wrist splints may decrease pain during activities with RA
- Thumb CMC splints may decrease pain with OA

22

Balance Rest And Activity

There is a moderate evidence to support joint protection education and adaptive equipment for increased hand function and pain reduction in patients with OA. (Valdes K, Marik T. 2010)

23

Exercise in a Pain Free Range

Manual therapy and Therapeutic Exercise strongest Evidence. (Bertozzi et al., 2015)

Combining joint protection and pain-free hand home exercises were found to be an effective means to increase hand function (Boustedt C. 2009, Stamm TA, et al. 2002)

Low-impact general conditioning increased the aerobic capacity and decreased depression and anxiety in patients with arthritis. (Minor MA, et al. 1989)

24

Avoid Positions of Deformity

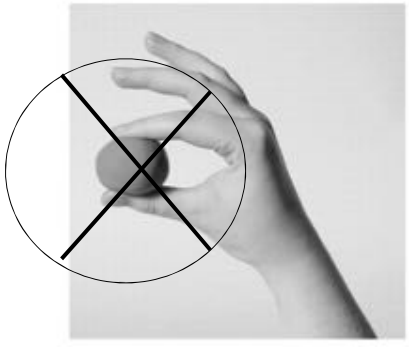
The European League Against Rheumatism in their systematic review state that education concerning joint protection with an exercise regimen is recommended for all patients with hand OA.(Zhang W, et al. 2006)

Lateral pinch can cause subluxation of the thumb CMC joint (Zancolli 1987, Brunelli & Brunelli, 1991). Protect the thumb ray with a “C” Shaped tripod pinch.

- Use stable joint positions
- Avoid bent elbows, knees, hips, and back while sleeping
- Practice good posture during the day
- Use proper work heights
- Specific to each potential deformity

25

1 kg of pressure at the tip is 12 kg at the CNC joint (Cooney & Chao, 1974)



Joint protection for OA should also take into account the specific deformity or potential deformity which may include instability of the CMC joint and the deformities of the involved interphalangeal joints. Because excessive pinching during ADLs impart large forces to the thumb CMC joint, educating patients in decreasing pressure to the thumb CMC joint is important.

26

CONTINUED

Reduce the Effort and Force

- Avoid excessive loads with carts
- Ask for help
- Use appliances and assistive devices
- Keep items near where they are used for easy flow of work
- Use prepared foods and freeze leftovers for an easy meal
- Avoid low chairs
- Maintain proper body weight
- Reduce trips up and down stairs- complete work on each floor
- Use other parts of the body (example: foot pedal on trash can)
- Use energy conservation principles to manage fatigue

Adaptive equipment used in one study included enlarged writing grips, “Dycem,” an angled knife, a book holder, and other equipment based on individual daily activities. (Stamm TA, et al. 2002)

27

CONTINUED

Use Larger/Stronger Joints

- Slide heavy objects on kitchen counters
- Use palms instead of fingers to lift or push
- Carry a backpack instead of a handheld purse
- Keep packages close to the body- use two hands
- Push doors open with side of body instead of the hands

There is a moderate evidence to support joint protection education and adaptive equipment for increased hand function and pain reduction in patients with OA. (Valdes K, Marik T. 2010)

28

Joint Protection

- Several studies support the effectiveness of joint protection programs in decreasing pain and increasing ADL.
  (Brosseau L, et al, 2003, Hurkmans E, et al. 2003, Beardmore TD, 2008, Ettinger WH, et al. 1997, Valdes K, Marik T. A 2010, Dziedzic et al., 2011, Stamm et al., 2002)
- We are poised as therapists to demonstrate our Distinct Value in this area

29

Orthotic Preferences

- Weiss el al. (2000): Found both long and short splints decreased pain and 73% preferred a short splint.
- Valdes & Marik (2010): Patients preferred exclusion of the wrist and a flexible orthosis
- de Almeida et al. (2016): widespread clinical variation in practices and preferences

30

Combinations

- Boustedt et al., 2009: Pain and stiffness decreased with orthotics, exercise, and joint protection vs. joint protection alone.
- Aebicher et al., 2016: Single interventions not effective and should be combined with orthotics.

31

Conclusion

- CMC Orthoses can decrease pain, increase function, decrease inflammation, increase pinch strength, improve thumb stability, and may reduce the need for surgery.
- The orthotic selection should be individualized for each client.
- Research backs up what you do!

32

As a result of this course, participants will be able to:

1) Identify three orthotic designs that have been reported in the literature to reduce pain at the CMC joint.
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33

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36

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Thank you!

Email:beasleyj@gvsu.edu

37