Successful Orthotic Intervention for Osteoarthritis of the Thumb CMC Joint

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Outline
- Background, rationale, objective
- Mary’s story
- Methods
- Results
- Limitations
- Conclude Mary’s story
- Conclusions
- Questions and discussion

Background and Rationale:
Osteoarthritis (OA) of thumb CMC joint

- Thumb CMC OA is a prevalent form of arthritis (Haara et al., 2005)
- Many risk factors identified (Fontana et al., 2007)
- Characterized by pain and limited engagement in meaningful occupations (Cook & Lalonde, 2008; McKee & Rivard, 2004)
- Treatment of CMC OA depends on severity and impairment (Jaggi & Morris, 2007)

Background and Rationale:
Orthotic intervention (OI) for CMC OA

- Application of orthosis:
  - Conservative, non-invasive treatment
    (Polatsch & Pakisma, 2006; Berggren et al., 2001; Colditz, 2000; Weiss, LaStayo, Mills, & Bramlet, 2000; Swigart, Eaton, Glickel, & Johnson, 1999)
  - First-line treatment, particularly when less severe (Beatus & Beatus, 2008)
- The most appropriate orthotic designs remain debatable

Background and Rationale:
Bio-occupational Approach to OI (McKee & Rivard, in press)

<table>
<thead>
<tr>
<th>Guiding Principles of OI</th>
<th>Thumb CMC OA literature</th>
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<tbody>
<tr>
<td>Promote Client-centeredness</td>
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<td>Optimize Usability</td>
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<td>Optimize Comeness</td>
<td>Occupational considerations</td>
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<tr>
<td>Optimize Comfort</td>
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<td>Use Less Is More Approach</td>
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<td>Identify &amp; Address Biological Goals</td>
<td>Biological considerations</td>
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<td>Minimize Biological Harm</td>
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<td>Incorporate Sound Mechanical Principles</td>
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<td>Provide Comprehensive Education</td>
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<td>Monitor and Modify</td>
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<td>Evaluate Outcomes</td>
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Mary’s Story

- Person
  - 57 year old with CMC OA
  - Thumb pain
- Occupations
  - Self care: Laundry, cooking, driving, dressing
  - Productivity: Medical receptionist
  - Leisure: kayaking, hiking, skiing
- Environment
  - Lives in Sudbury
  - Supportive husband and family
“My self image had changed from being a vibrant active woman to observing myself as a decrepit, weak woman unsure of my hand capabilities.”

Objective of presentation

- Describe novel orthotic design features that enhance usability, reduce pain and promote occupational engagement for participants with thumb CMC OA.

Methods

Research design: Descriptive/Exploratory
- Secondary analysis of client files receiving OI from Pat McKee
- Follow-up survey

Participants
- Inclusion criteria:
  - Pain in thumb CMC joint affecting daily function
  - Interested in receiving orthotic intervention
  - Had received hand-based, custom-made neoprene/thermoplastic orthosis from Pat McKee through self-referral

Methods

Orthotic intervention
- Custom-made hand-based orthoses made from
  - 1.6 mm Black Aquaplast T
  - 1.6 or 3.2 mm Breathoprene (type of neoprene)
  - Materials from Sammons Preston

Outcomes measures
- Patient-Rated Wrist/Hand Evaluation – pain, difficulty with functional activities (MacDermid & Tottenham, 2004)
- Grip & pinch strength
- Follow-up survey
  - Online
  - 12 questions - 10-point Likert scale and comment boxes

Results: Sample

- Participants

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
</tr>
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<tbody>
<tr>
<td>N</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>Mean age</td>
<td>59.6</td>
<td>57.5</td>
</tr>
<tr>
<td>Age range</td>
<td>45-83</td>
<td>55-60</td>
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<tr>
<td>Follow-up</td>
<td>From 1 month to 5 years</td>
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- Follow-up survey
  - 83.3% response rate
**Results: Pre-intervention**

- **Pain**
  - “Pain rather than disability is my biggest problem” (JB)
- **Grip and pinch weakness**
- **Occupational performance issues**
  - Self-care: getting dressed, opening jars, opening doors
  - Productivity: RN, jeweler
  - Leisure: gardening, yoga
- **Strategies**
  - Medically-based: NSAIDs, cortisone injections, surgery
  - Other: assistive devices, task avoidance

**Results: Intervention Evolution**

- Less is more!
- Can comfort through web space be enhanced?

(McKee & Eason-Klatt, 2006)

**Results: Intervention Evolution**

- Yes – replace thermoplastic with neoprene
- What about the sweaty padding?
- Replace with neoprene

Half-lined neoprene

**Results: Intervention Evolution**

- Fully-lined with neoprene improves comfort
- Less is more - Reduce amount of thermoplastic

**Results: Guiding Principles**

- **Biological goals**
  - Stabilize CMC joint to relieve pain and enhance strength
  - Enabled by thin, flexible thermoplastic and ability to cinch orthosis firmly around unstable CMC
- **Cosmesis** – black – doesn’t show soiling; stream-lined
- **Convenience** – one strap, easy to cinch firmly
- **Less is more** – include only affected joint(s)
- **Comfort** – from neoprene
  - “Feels secure and comfortable” (JB)

**Results: Guiding Principles cont’d**

- **Client-centred** – offer options
- **Monitoring and Modification** – ongoing communication
- **Evaluated outcomes**
  - Patient Rated Wrist/Hand Evaluation
  - Grip & pinch strength
**Results: Post-intervention**

- **Reduced pain**
  - “Comfortable and helped reduce pain” (JL)
  - “No pain and feels stronger” (HW)
- **Increased engagement in occupations**
  - “Has enabled me to continue my career as a concert pianist” (CW)
  - “Everyday tasks are doable” (PV)
- **Challenges wearing orthoses**
  - Need to take off when toileting or in wet environments

**Results: Follow-up survey**

- **Reduction in pain** on 10-point Likert scale

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<tr>
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<th>Baseline</th>
<th>Follow up</th>
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<tr>
<td>Pain at worst</td>
<td>60% reported 8-10/10</td>
<td>26.7% reported 8-10/10</td>
</tr>
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</table>

0 = no pain, 10 = extreme pain

- **Pain medication** - Of those previously using 80% reported using less or none
- **Strength** – 53.3% reported increased strength; none weaker
- **Overall satisfaction** – 66.7% rated 9/10 or 10/10
- **Surgery** - 3 participants had Sx despite OI

**MARY’S STORY CONTINUED...**

First Day

10 Weeks

Two styles of orthoses provided.
Pattern

• Orient the neoprene to stretch in the direction that needs the most contouring and stretch of thermoplastic – usually transversely (circumferentially)

<table>
<thead>
<tr>
<th>LATERAL PINCH</th>
<th>GROSS GRASP</th>
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<tbody>
<tr>
<td>First Day</td>
<td>10 Weeks</td>
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<tr>
<td>No Orthosis</td>
<td>2.25</td>
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<tr>
<td>Thumb MCP</td>
<td>3.5</td>
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<tr>
<td>Thumb MCP CMC</td>
<td>3.5</td>
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Limitations

• Study participants were self-referred
• Not all had x-rays - OA not staged
• Individualized care - each participant was seen at different follow-up points

Summary and Conclusions

• Clients very satisfied with custom-made, thermoplastic-neoprene, hand-based orthoses
  – Comfortable, convenient and useable
  – Reduced pain and improved engagement in occupations
• Client-centred approach – choices offered
• Guiding principles are helpful to consider during OI
• Monitoring and evaluation are important
  1. Grip & pinch strength with and without pain
  2. Self-report pain scale
  3. Occupationally-based outcome measure – e.g. Patient-specific Functional Scale

Thank you!

Last words...

“If my house were to burn down […], I’d want to save my dog, my cat and my thumb splint. Really!”

(MB)

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References


References


