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**Rheumatoid Arthritis and Splinting**

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Rheumatoid Arthritis and Splinting

Disciplines
Occupational Therapy | Rehabilitation and Therapy

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Clinical Scenario:

Currently, an estimated 1% of the population is affected by rheumatoid arthritis (Radomski & Trombly, 2008). Women are shown to be affected 2 to 3 times more often than men, between the ages of 40 to 50. The onset of the disease may be at any age, but usually between the ages of 35 and 50. Onset has been reported as early as childhood or as late as in the elderly. As part of a comprehensive management of RA, splints and/or orthoses are recommended to treat symptoms of the disease to help improve performance in daily activities on top of other interventions. Approximately 75% of RA patients develop inflammation of the wrist joints, reducing grip strength and dexterity (Oldfield & Felson, 2008), and most of the literature discusses using immobilization as a treatment. A typical client is 45 years old, female and has developed RA from either genetic or environmental factors. Intervention for RA will vary depending on the client and the progression of the disease. Occupational therapists will treat RA patients to increase their participation in their daily activities such as, ADL’s, IADL’s, work, leisure and social participation. One of the most important methods to decrease limitations during the acute phase of joint inflammation is to maintain ROM exercise on a daily basis. Immobilization with splinting may cause the typical client to decrease ROM if they are wearing a splint for longer periods of time without adherence to rest breaks and ROM exercises & stretches.
Twenty-four patients with RA and finger flexion contracture participated in a matched-pair experimental study to investigate the effect of corrective splinting on RA fingers. After a six-week baseline measurement of hand function, which included grip strength and ROM, the patients were randomly placed into two groups, where each used a different splint program. Hand function was reassessed after six weeks and they concluded that a splinting program is effective in correcting flexion contracture of the joint and improving grip strength and hand function. However, further studies are needed with larger participation to support the positive effect of splinting, including a more biomechanical analysis (Li-Tsang, Hung & Mak, 2002).

In a systematic review, Egan et al discusses the current evidence for treating RA and assessed the effectiveness of splints/orthoses in relieving common symptoms of RA (Egan et al, 2001). Occupational therapists are interested in evidence based studies that are currently discussing if the uses of splints are effective in decreasing RA symptoms because there is currently a limit of research on this topic.

**Focused Clinical Question:** What evidence is currently available that discusses the effects of Splints/Orthoses (published between 2000 – 2008) in decreasing pain, swelling and/or deformity in rheumatoid arthritis patients to increase overall functional participation in ADL’s independently?

**Summary of Search and Key Findings:**

**Search:**
- Searched for systematic reviews, meta-analysis (Cochrane library), and randomized controlled trials (5 different databases). Qualitative studies were also searched.
- Key terms included: RA, splinting, orthoses, immobilization, and adult.
- Located 5 articles (one systematic review, three randomized control trials and one qualitative study) that addressed the effectiveness of splinting RA patients.
- Summary of Level I and V: Of the three level I studies that examined the effectiveness of splinting to decrease RA symptoms, one examined splints and orthosis for treating RA (Egan et al, 2008); one examined the use of static splints in performance of daily activities (Pagnotta, Korner-Kitsensky, Mazer, Baron & Wood-Dauphinee, 2005); and one examined custom-made vs. commercially available splints (Haskett, Backman, Porter, Goyert & Palejko, 2004).
- Summary Qualitative Contributions: The descriptive study was included; however, no other qualitative studies were included. The one study examined the determinants of the use of wrist working splints in RA (Veehof, Taal, Willems & Laar, 2008).

Best Evidence:
• The one level V study examined silver ring splints to improve dexterity (Zijlstra, Heijnsdijk-Rouwenhorst & Rasker, 2004).
• One systematic review was found and appraised. The article reviewed the current literature on splints and orthoses for treating RA since 1998.
• The review assessed current literature on the effectiveness of orthoses in relieving pain, decreasing swelling, and preventing deformity.
• Intervention included rigid, semi-rigid, or soft orthotics designed to provide support and/or pain relief at any joint in the hand and wrist.
• Limitations of the study included the difficult nature of making conclusions based on the identified studies.

Key Findings:
• Results were expressed as mean difference with 95% confidence intervals. The only significant differences were in lower grip strength of the non-dominant hand, with both the palmar custom molded (95% CI = -54.04 to -4.16) and elastic ready-made splints (95% CI = -62.01 to -4.01).

Clinical Bottom Line: There is not enough statistically significant evidence that shows a strong effect of splint use to decrease symptoms in RA clients alone. Evidence was shown that wearing wrist splints during work statistically decreases grip strength and does not affect pain, morning stiffness, pinch grip, or quality of life after up to normal wear of 6 months. No evidence was found that resting wrist and hand splints change pain, grip strength, assessment scores or number of swollen joints. However, many studies concluded that clients preferred use to non-use of splints. In conclusion, there isn’t enough evidence to make a statement to occupational therapists about the overall effectiveness of splints to decrease pain or increase overall functional independence in RA clients. Splinting can be effective if worn during parts of a client’s day in conjunction of exercise and rest.

Limitation of this CAT: This critically appraised paper has been prepared by an MOT2 student whom is not an expert researcher. The CAT has not been externally peer-reviewed or was an exhausted search.
**Search Strategy:**

**Terms used to guide Search Strategy**

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient/Client</td>
<td>Adult rheumatoid arthritis clients</td>
</tr>
<tr>
<td>Intervention</td>
<td>Splint/Orthosis immobilization</td>
</tr>
<tr>
<td>Comparison</td>
<td>Non-Splint use, soft vs. hard splint, pre-fabricated vs. custom made splints</td>
</tr>
<tr>
<td>Outcome(s)</td>
<td>Increased AROM, dexterity and grip strength, decreased pain and inflammation</td>
</tr>
</tbody>
</table>

**Databases and Sites Searched**

<table>
<thead>
<tr>
<th>Database/Site</th>
<th>Search Terms</th>
<th>Limits Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>OT Search</td>
<td>1. RA and splinting</td>
<td>English Text only, Studies between 1995 – 2008</td>
</tr>
<tr>
<td>Medline (OVID)</td>
<td>1. Rheumatoid arthritis AND splinting</td>
<td>English Text only, Studies between 1995 – 2008, Avoided Level IV or V, when possible</td>
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<tr>
<td></td>
<td>2. Splinting (splinting, hand, adult)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Acute phase RA (arthritis, aged, rheumatoid fx)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Splinting, adult, contracture w/RA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. #3 and RA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. RA of the hand</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Prospective analysis AND splinting</td>
<td></td>
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<tr>
<td></td>
<td>8. RCT AND RA -RA/Splint</td>
<td></td>
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<tr>
<td>Cinahl</td>
<td>1. Hand</td>
<td>English Text only, Studies between 1995 – 2008, Avoided Level IV or V, when possible</td>
</tr>
<tr>
<td></td>
<td>2. Wrist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Hand Injury</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Intervention AND Splinting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Splinting and Hand</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Arthritis AND Aging</td>
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</tr>
<tr>
<td></td>
<td>7. Arthritis AND Aging</td>
<td></td>
</tr>
<tr>
<td>Database</td>
<td>Search Terms</td>
<td>Inclusion Criteria</td>
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<tr>
<td>------------</td>
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<tr>
<td>Cochrane</td>
<td>1. Splinting AND RA</td>
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<td></td>
<td></td>
<td>• Studies between 1995 – 2008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Only systematic reviews</td>
</tr>
<tr>
<td>AARP</td>
<td>1. RA AND Splinting</td>
<td>• English Text only</td>
</tr>
<tr>
<td></td>
<td>2. RA</td>
<td>• Studies between 1995 – 2008</td>
</tr>
<tr>
<td></td>
<td>3. Splinting effects</td>
<td></td>
</tr>
<tr>
<td>Sport Discus</td>
<td>1. RA of the hand</td>
<td>• English Text only</td>
</tr>
<tr>
<td></td>
<td>2. RA of the hand AND Splinting</td>
<td>• Studies between 1995 – 2008</td>
</tr>
<tr>
<td></td>
<td>3. RAAND AND immobilization</td>
<td>• Avoided Level IV or V, when possible</td>
</tr>
</tbody>
</table>

Many articles were saturated between the different databases giving a well-round search.

**Inclusion Criteria:**

- Published between 1995 and 2008
- Meta-analysis or systematic review
- Levels I-III evidence, however, level V was included as well as a qualitative study
- Participants were rheumatoid arthritis clients/patients
- Participants were at least 18 years of age (adults)
- Study was written in English
- Full-text studies
- Any article that discussed the effects of Splinting and RA patients

**Exclusion Criteria:**

- Other arthritis diagnosis besides RA
- Non-thermoplastic splints
- Participants under 18 years of age
- Any full-text articles not available in English
Results of Search:

Table 1: Summary of Study Designs of Articles Retrieved

<table>
<thead>
<tr>
<th>Level of Evidence</th>
<th>Study Design/Methodology of Articles Retrieved</th>
<th>Number Located</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Systematic reviews, meta-analysis and randomized control trials</td>
<td>3</td>
<td>CINAHL, Medline &amp; Cochrane</td>
</tr>
<tr>
<td>II</td>
<td>Two group, non-randomized control trial</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>III</td>
<td>One group, non-randomized control trial</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>IV</td>
<td>Single-subject design, descriptive studies</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>V</td>
<td>Case reports and expert opinions</td>
<td>1</td>
<td>CINAHL</td>
</tr>
<tr>
<td>N/A</td>
<td>Qualitative studies</td>
<td>1</td>
<td>CINAHL</td>
</tr>
</tbody>
</table>

Best Evidence:

The following articles was identified as the ‘best’ evidence and selected for critical appraisal. Reasons for selecting this paper were:

- Highest level of evidence as a systematic review that addresses the clinical question.
- Discusses the intervention (splinting), outcome (Increased AROM, dexterity and grip strength, decreased pain and inflammation) and patient (Adult rheumatoid arthritis clients).

Summary of Evidence:

Table 2: Description and appraisal of: Splints and orthosis for treating rheumatoid arthritis by Egan et al, 2001.

Aim of the study:
To assess the effectiveness of splint/orthoses use in patients with rheumatoid arthritis to relieve pain, decrease swelling, and/or prevent deformity, and to determine the impact of splints/orthoses on strength, mobility, and function.

Intervention investigated:
- Working wrist splints, resting hand and wrist splints, special shoes and insoles
- Use during work and daily activities
Outcome measures (primary and secondary):
Two reviewers independently selected the studies to be used for the systematic review of the topic and extracted the data. A validated scale was used to assess the methodological quality of the RCT’s and CCT’s. Studies were considered for inclusion if OMERACT outcomes were measured (number of tender joints per participant, number of swollen joints per participant, pain, physician’s & participant’s global assessment, functional status, acute phase reactants, and radiological evidence of damage). Inclusion also included if: duration of morning stiffness, muscle strength, endurance, ROM, postural status, gait status, walking speed, walking distance, cadence, etc… were included. Compliance was not considered an outcome measure.

Results:
Reported that there is evidence that wearing wrist splints during work statistically significantly decreases grip strength and does not affect pain, morning stiffness, pinch grip or QOL after up to 6 months of regular wear. They found no evidence that resting wrist and hand splints change pain, grip strength, or number of swollen joints. However, patients who wore splints for 2 months reported that they preferred use to non-use, and padded resting splints to unpadded ones. One study on special shoes reported evidence on significant benefits of wearing extra-depth shoes for semi-rigid insoles provided better pain relief that extra-depth shoes alone when worn over 12 weeks.

Original authors’ conclusion:
There is insufficient evidence to make firm conclusions about the effectiveness of working splints in decreasing pain or increasing function for people with RA. Potential adverse effects, such as decreased ROM, do not seem to be an issue, but some of the splints decrease grip strength and dexterity. Preliminary evidence suggests that resting hand and wrist splints do not seem to affect ROM or pain, however, those patients preferred wearing the splint than not wearing.

Critical Appraisal
Validity:
Methodology: two and the three reviewers determined the studies that would be retrieved. They independently extracted the data from each study using a pre-developed form. The data was then check by a third and fourth reviewer.
Rigour: The methodological quality of the RCT’s and CCT’s were assessed using a validated scale.
Selection: Twelve papers were identified that reported on 10 eligible studies with a total of 449 participants. Quality of studies focused on the presence and quality of randomization, double-blinding, and description of withdrawals and drop-outs.
Bias: None of the studies were allowed for pooling of results to compare, limiting the results in the end. It was noted in the review that providing placebos and blinding patients is very difficult, if not impossible to do in orthotic/splinting studies, which could affect the results also.
Results:
The results were unfavorable for the intervention of splinting in RA patients to relieve pain, decrease swelling, and/or prevent deformity. No evidence was found that resting wrist and hand
Implications for practice/applicability:

The effectiveness of wrist and hand splints in individuals with rheumatoid arthritis is very complex to study. The recommended use varies between each individual patient and with the fluctuating course of the disease. Given the limitations of the study designs, it is hard to fully conclude the effectiveness of splinting to increase AROM, grip strength and dexterity and decrease pain and inflammation. The review can be applied to how to recommend splints to future RA patients by taking into consideration the results of each study. The potential that splinting can provide pain relief for different periods during an RA patient’s diagnosis, along with the cost effectiveness, tends to support current practice with today’s occupational therapists. However, the therapist must take into consideration each individual client’s prognosis and combine the intervention of splinting with a routine of exercise/activity and resting where the patient is not wearing the splint.

Article critically appraised:


References

Level 1 Evidence


Level 2 Evidence
N/A

Level 3 Evidence
N/A

Level 4 Evidence
N/A

Level 5 Evidence