# The Effects of Splinting on Functional Independence for Adults with Dupuytren's Contracture: A Systematic Review

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**Abstract:** Dupuytren's contracture is a congenital, fibroproliferative disorder of palmar fascia that causes flexion contractures of one or more digits (Kitridis et al, 2018). Dupuytren's contracture ultimately requires surgery to repair and restore function at the hand and digits. A systematic review was conducted to investigate the question, does splinting promote increased functional hand independence in middle-aged adults with Dupuytren's contracture? Five articles were selected with specific criteria: studies published between 2014 to 2024, peer-reviewed, and had a focus on splinting as a post-surgical intervention. The results concluded that splinting is an effective intervention for maintaining the range of motion (ROM) gained through surgery and decreasing the recurrence rate of Dupuytren's contracture.

**Importance:** Splinting is a common protocol following surgery for those with Dupuytren's contracture to help maintain positive outcomes**.**

**Objective:** To identify, evaluate, and synthesize the current literature concerning Dupuytren's contracture to determine the efficacy of splinting.

**Data Sources:** A literature search occurred between May 2024 and May 2024. Follow-up searches were conducted in June 2024. Databases included PubMed, EBSCO, Cochrane Library, and CINAHL using Hawai'i Pacific University's online library databases. Search terms included "adults or middle-aged or mid-life or older adults", AND "Dupuytren's Contracture or Disease", "Celtic hand" AND "Splinting or splint or functional splint or orthotic or orthotics or brace or braces or bracing", as well as combinations of these terms, "function or independence of functional outcomes or range of motion or AROM or PROM or autonomy or recurrence."

**Study Selection and Data Collection:** This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Published peer-reviewed studies were included in the systematic review. Data from presentations, non-peer reviewed literature, and dissertations were excluded.

**Findings:** Five studies were included and all five were Level I studies according to the American Occupational Therapy Association's Levels of Evidence.

**Conclusion and Relevance:** Night splinting is effective and improves ROM post-surgery and decreases Dupuytren's contracture recurrence for individuals with Dupuytren's contracture.

**What This Systematic Review Adds:** There are limited high-quality studies that evaluate night splinting for Dupuytren's contracture. This systematic review provides a starting point for evaluating the efficacy of night splinting in OT practice. More research is needed to investigate the effectiveness of night splinting for Dupuytren's contracture.

**Key words:** Dupuytren's Contracture, independence, splinting.

## Introduction

Dupuytren's contracture (DC) or disease is a congenital, fibroproliferative disorder of palmar fascia that causes flexion contractures of one or more digits (Kitridis et al., 2018). It is often inherited in an autosomal fashion but is most commonly seen with multifactorial etiology. The mechanism is still unknown but may be linked to smoking, alcoholism, diabetes, nutritional deficiencies, or epileptic medications. There is no clear link between occupation and activities being risk factors. Because of the recurrence rate and progressive nature of this condition, there are some precautions to follow: avoid gripping things too tightly or holding a static position for a long period, repetitive trauma, stop drug and alcohol use, be aware of changes in hand function or tightening of palm or fingers.

Some of the signs and symptoms include the following: difficulty laying hand flat on a surface with palm down, one or more small nodules in the volar side of the hand, nodules causing thickening or shortening of the fascia, causing thick bands of tissue under skin, pits or grooves in the skin compressed by contracture, fingers are pulled forward toward the palm. This condition affects Caucasian men due to familial factors, more men than women in a 2:1 ratio and the prevalence grows with age (Kitridis et al., 2018).

In more recent times, some collagen injections have proven successful in preventing the progression of the disease. Ultimately, surgery and hand rehabilitation are the optimal resolution, however, require weeks of splinting and hand therapy post-procedure. In this systematic review, the efficacy of splinting post-fasciotomy will be explored across five articles.

## Method

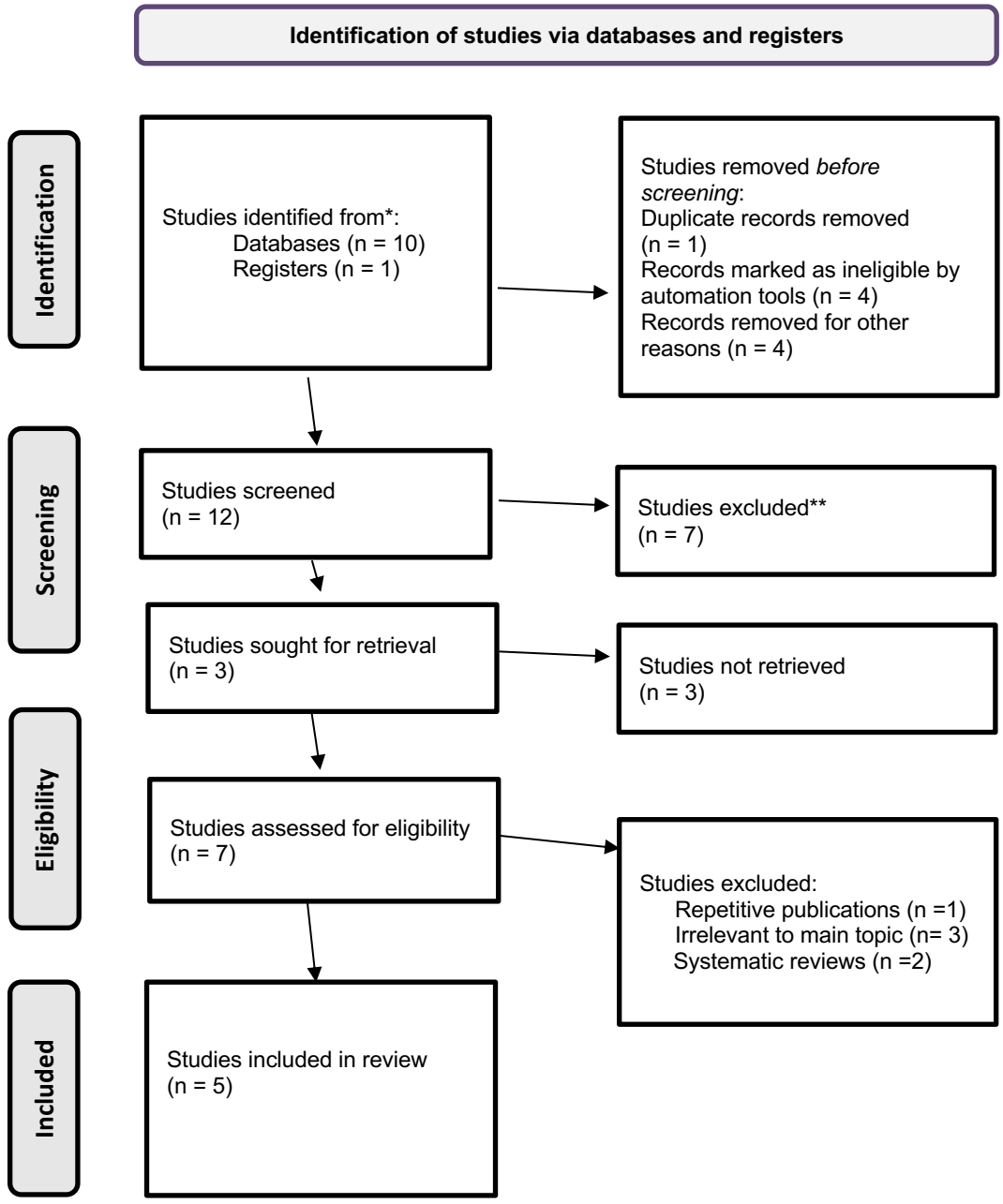
The systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and incorporated recommended processes for conducting a systematic review. The guiding research question for this systematic review was: Does splinting promote increased functional hand independence in middle-aged adults with Dupuytren's contracture?

A broad search of the literature occurred between 5/17/24 and 5/24/24. An additional search was conducted on 5/30/24 to ensure all relevant research was included. The inclusion criteria for studies in this systematic review were as follows: peer-reviewed, published in English, and dated between 2014-2024. Exclusion criteria, in addition to those studies that did not meet the inclusion criteria, included articles that were systematic reviews, scoping reviews, dissertations, and presentations. A search for relevant literature was completed using the electronic databases through Hawai'i Pacific University's online library database including PubMed, EBSCO, Cochrane, and CINAHL. Search terms included Dupuytren's Contracture OR

Celtic hand, as well as combinations of these terms: splinting, orthotics, bracing, independence, function, grip strength. Appendix A provides an extensive list of all search terms used for this systematic review. The initial search included 33 articles related to the research topic **(Fig. 1**). Four independent reviewers completed the screening and selection of the studies, assessed the quality of the studies, and extracted the data.

**Figure 1**

*PRISMA Flow Diagram*



## Results

Five studies met the inclusion criteria. These articles were assessed according to their risk of bias, level of evidence, and quality. This systematic review included five studies that contained relevant information regarding whether splinting promotes increased functional outcomes with range of motion, mobility, and grip strength in individuals with Dupuytren's contracture. The information from these articles were divided into three themes: Night Splinting, MCP and/or PIP Extension with Splint Use, and Night Splinting and Passive Exercises. An evidence table is provided in Appendix B. The Cochrane risk-of-bias guidelines were used to assess each article and are provided in Appendix C.

### Night Splinting

Five of five studies on Dupuytren's contracture discussed the efficacy of night splinting as an intervention post treatment. All five of these studies were Level I. All studies provided evidence that night splinting is not effective and does not enhance the improvement of Dupuytren's contracture.

Bowers et al. (2021) explored the use of night splinting after the use of collagen *Clostridium histolyticum* (CHH) injectables. Twenty-six patients completed the study with 12 in the orthosis group and 14 in the no orthosis control group. The orthosis group was fitted post manipulation with a custom hand-based orthosis that would hold the treated finger in maximal extension. This group was instructed to wear the orthosis at night for 3 months. Assessment was performed on all patients at 7-10 days, 30 days, and 90 days post manipulation. The primary outcome that was measured was improvement in total active extension (TAE). Most of the participants (90%) had contractures at the MCP joint and by the end of the study, the participants demonstrated slight improvement with the use of a splint, injection and home exercise program.

Giesberts et al. (2019) examined the use of dorsal extensor night splints to measure how the contraction forces change over time. The study examined the tissue adaptation rate for Dupuytren's contracture treatment with postoperative splints. Eleven participants, ages 59-75 years old with the metacarpophalangeal or proximal interphalangeal and received partial fasciectomy were included in the study. Primary outcomes looked at the force applied to the fingers by the splint and how it impacted functional independence. The participants received more force across a span of time and demonstrated a decrease in pressure at the 3 hours threshold, which indicated the effectiveness of a splint post-fasciectomy. The study demonstrated an increased range of motion at the metacarpophalangeal joint.

Kitridis et al. (2018) evaluated the benefits of night splinting along with hand exercises to prevent the recurrence of Dupuytren's contracture. Thirty patients participated in this study

and qualified if they were diagnosed with Dupuytren's contracture grade II-IV. The group was instructed to utilize night splinting for 24-weeks with a combination of home hand exercises for eight weeks. The primary outcome that was measured was recurrence and grip strength. Of the 30 participants, only 2 redeveloped Dupuytren's contracture post-procedure because they did not utilize the night splints, however those that were compliant with the night splint demonstrated improved Quick DASH score, but low grip at the 24-week mark.

Jerosch-Herold et al. (2011) studied the effectiveness of splinting post-surgery for Dupuytren's contracture. In this study, there were 154 participants from five regional hospitals who received hand surgery. Both groups were issued post-operative hand therapy exercises, however the experimental group was issued a splint. The outcomes identified from the study were self-reported functions using the DASH questionnaire, range of motion, and patient satisfaction. The results showed no significant difference when a splint was utilized based on the measurements from the QuickDASH assessment and active range of motion.

Tam et al. (2016) examined two groups that received needle aponeurotomy to release the contracted palmar fascia followed by custom hand splints, nightly wear schedule and a home exercise program (HEP). There were 53 participants in the study, with digit four or five being affected. The hand splint group received custom night extension splints post-operatively. The control group was excluded from the night splints, however received a HEP. Measurements were taken pre- and post- operatively of the metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints. When both groups were compared, the levels of change did not vary significantly. The results demonstrated that both groups exhibited an increase in active range of motion implying that splinting does not increase the ROM in individuals with Dupuytren's Contracture.

All five studies included in the systematic review investigated the effectiveness of night splinting as a post-operative intervention following various surgical treatments (Bowers et al., 2021; Giesberts et al., 2019; Jerosch-Herold et al., 2011; Kitridis et al., 2018; Tam et al., 2016). Each study utilized custom hand splints for the patients made for them by certified hand therapists, and the patients were instructed to only use them at night.

Several studies on treatments for Dupuytren contracture exhibited notable limitations. Jerosch-Herold et al. (2011) conducted a non-blinded study where both practitioners and subjects knew the treatment details, potentially biasing reporting and assessment. Their reliance on post-treatment evaluations limited a comprehensive understanding of long-term effectiveness, compounded by a shorter orthosis duration of three months instead of the FDA-recommended four-month period and significant noncompliance among subjects, complicating outcome interpretation (Jerosch-Herold et al., 2011). Giesberts et al. (2019) encountered issues with force sensor placement on foam layers rather than directly on skin, leading to inconsistent

measurement values and incomplete data due to sensor adjustment or removal by subjects. Furthermore, their focus on the most affected digit without using medical imaging to assess overall hand functionality, skewed their outcomes (Giesberts et al., 2019). Tam et al. (2016) faced limitations in data consistency due to incomplete active range of motion data collected by various practitioners rather than the performing physician. These limitations highlight the necessity for enhanced study design and adherence to standardized protocols in future research efforts.

**MCP and/or PIP Extension Splinting**

Four of the five studies on post-procedural methods for Dupuytren's disease discussed the outcomes of MCP and/or PIP extension with splint use. Four of the five studies were Level I studies (see Appendix B). All studies provided evidence that splinting is effective and potentially beneficial, especially with increasing or maintaining extension at the MCP and/or PIP joints.

Bowers et al. (2021) explored night splinting after the use of collagen Clostridium histolyticum (CHH) injectables. Twenty-six patients completed the study with 12 in the orthosis group and 14 in the no orthosis control group. The orthosis group was fitted post manipulation with a custom hand-based orthosis that would hold the treated finger in maximal extension. This group was instructed to wear the orthosis at night for 3 months. Assessment was performed on all patients at 7-10 days, 30 days, and 90 days post manipulation. The primary outcome that was measured was improvement in total active extension (TAE). Most of the participants (90%) had contractures at the MCP joint and by the end of the study, the participants demonstrated slight improvement with the use of a splint, injection and HEP.

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Jerosch-Herold et al. (2011) studied the effectiveness of splinting post-surgery for Dupuytren's contracture. In this study, there were 154 participants from five regional hospitals who received hand surgery. Both groups were issued post-operative hand therapy exercises, however the experimental group was issued a splint. The outcomes identified from the study were self-reported functions using the DASH questionnaire, range of motion, and patient satisfaction. The results showed no significant difference when a splint based was utilized on the measurements from the QuickDASH assessment and active range of motion.

Tam et al. (2016) examined two groups that received needle aponeurotomy to release the contracted palmar fascia followed by custom hand splints, nightly wear schedule and a home exercise program (HEP). There were 53 participants in the study, with digit four or five being affected. The hand splint group received custom night extension splints post-operatively. The control group was excluded from the night splints, however received a HEP. Measurements were taken pre- and post- operatively of the metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints. When both groups were compared, the levels of change did not vary significantly. The results did not demonstrate a significance with or without a night splint. However, those who received a night splint had a 32 degree increase at the PIP joint.

The four articles focused on custom hand splints for post-operative treatment of Dupuytren's contracture. While the splints in these studies were all made to provide extension to the MCP and/or PIP joint, there was some variability when it came to the type of splint provided. The different types of splints used in the study were static extension splints (Bowers et al., 2021), dorsal hand splint (Giesberts et al., 2019), thermoplastic extension splint (Jerosch-Herold et al., 2021), and hand-based extension splint (Tam et al., 2016).

Jerosch-Herold et al. (2011) had similar limitations such as short duration of night orthosis and poor patient compliance. Giesberts et al. (2019) reported the same limitations with inadequate force sensor placement on the skin that significantly affected measurements of the force and temperature of the finger. Understanding the importance of proper placement of equipment and patient compliance is crucial for consistent results. The study by Tam et al. (2016) had incomplete AROM data provided by different practitioners, as opposed to data provided by the actual physician who performed the surgeries.

**Night Splinting and Passive Exercises**

Three of the five studies on Dupuytren's contracture discussed the efficacy of the additional intervention of passive stretching. Three of these studies were Level I studies. All studies provided evidence that passive stretching is effective and potentially beneficial.

Bowers et al. (2021) explored the use of night splinting after the use of collagen *Clostridium histolyticum* (CHH) injectables. Twenty-six patients completed the study with 12 patients in the orthosis group and 14 patients in the no orthosis control group. The orthosis group was fitted post manipulation with a custom hand-based orthosis that would hold the treated finger in maximal extension. This group was instructed to wear the orthosis at night for 3 months. Assessment was performed on all patients at 7-10 days, 30 days, and 90 days post manipulation. The primary outcome that was measured was improvement in total active extension (TAE). Most of the participants (90%) had contractures at the MCP joint and by the

end of the study, the participants demonstrated slight improvement with the use of a splint, injection and HEP.

Kitridis et al. (2018) discussed the benefits of night splinting along with hand exercises to prevent the recurrence of Dupuytren's contracture. Thirty patients participated in this study and qualified if they were diagnosed with Dupuytren's contracture grade II-IV. The group was instructed to utilize night splinting for 24-weeks with a combination of home hand exercises for eight weeks. The primary outcome that was measured was recurrence and grip strength. Of the 30 participants, only two redeveloped Dupuytren's contracture post-procedure because they did not utilize the night splints. However those that were compliant with the night splint demonstrated improved quick DASH score, but low grip at the 24-week mark.

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Uniformly, the three studies all implemented passive exercises in addition to the hand splinting for post-operative intervention. Bowers et al. (2021) had the participants do active and passive stretching exercises. Kitridis et al. (2018) had the participants do passive exercises five times daily for fifteen minutes. Tam et al (2016) incorporated passive range of motion exercises in the home exercise program. While there was variability in the duration and type of exercises, each of these studies utilized passive exercises in addition to splinting to determine its efficacy on hand function.

Limitations of these studies included small sample sizes, the methodology of reported results, and duration of intervention. All studies had small sample sizes with the largest study having only 50 participants (Tam et al., 2016). One study was limited to most participants being male with only one female (Bowers et al., 2021). Another study used the same surgical team for the operative portion of the condition (Kitridis et al., 2018). In addition, the method of reported results varied significantly. In all three studies, the duration of the exercises was different. Bowers et al. (2021) focused on reassessing the exercises after each visit. Kitridis et al. (2018) had an exercise prescription for only eight weeks. Tam et al. (2016) noted the frequency at which the exercises were to be done but not the duration. A limitation of this modality, evident

in the three randomized control trials is the inability to blind the intervention to the treatment groups, physicians, and primary investigators (Bowers et al., 2021; Kitridis et al., 2018; Tam et al., 2016).

## Discussion

Night splinting is a common intervention post-procedure for Dupuytren's disease. Despite its prevalent use, there is no strong evidence to support that night-splinting in addition to hand therapy in of itself is beneficial compared to one who just had hand therapy and a home exercise program. The results may have been affected by recall bias or compliance with the wearing schedule. In Kitridis et al. (2018), participants were instructed to remove splints during the daytime for the next 24 weeks, or a span of 6 months, post-operation. However, in Jerosch-Herold et al. (2011), participants were instructed to wear splints for the next 3 weeks until another fabrication was made, and scar tissue was more established. Each fabrication was to be worn and followed up in the next 6-12 months. Despite these thorough instructions, wearing a splint post-surgery did not seem to demonstrate any significance.

Among the articles, many discussed that most baseline groups had MCP contractures, PIP contractures, or both. Most studies showed greater improvement in the proximal, MCP joint compared to the PIP joint or both MCP/PIP joints contracture. Additionally, there are not enough studies on the PIP joint improvement from splinting nor was that a particular area of interest from these studies (Tam et al., 2016).

Within the studies, other non-surgical methods and procedures besides splinting benefited those with Dupuytren's disease. The secondary, favorable outcome that arose from the studies included a passive range of motion as an intervention. In the study by Tam et al. (2016), splints were not issued to the ones who received passive range of motion stretches. In the study by Kitridis et al. (2018), participants were instructed on passive tendon gliding for at least 15 minutes per day in addition to night splinting. Additionally, participants were also receiving scar and edema management, if indicated (Kitridis et al., 2018).

The studies varied with the time of follow-up post-procedure for Dupuytren's disease. In Jerosch-Herold et al. (2011), the follow-up ranged from 90 days to 12 months. In Kitridis et al. (2018), participants were followed up at 24 weeks with little significance of the use of splinting found. Based on these studies, a timeline should be identified for best practice in the future.

## Limitations of the Research Study

Throughout this review, several limitations were identified. Due to the accelerated nature of the Hawaii Pacific University program and Scholarly Practice II class, there was not sufficient time to make an extensive list of articles that would meet the inclusion criteria. Along

with that, there was not an extensive amount of time to be able to get interlibrary loan requests approved to certain articles that could've been beneficial to consider for inclusion in the systematic review. There were also some limited search strategies that occurred, these included: limited access to some databases, sample sizes, and publication dates. Most of the articles that fit the inclusion criteria had small sample sizes. This limited the variability and diversity with populations. Many studies related to the topic were conducted prior to the 10-year period identified for currency within the inclusion criteria.

## Implications for Occupational Therapy Practice

The results of this systematic review have shown applicable intervention strategies to use in practice. Splinting as a post-operative intervention can be beneficial for occupational therapy practitioners to incorporate into treatment to help maintain range of motion. Creating custom splints can also be used by practitioners. Utilizing the results found in the study will help occupational therapy practitioners use these key takeaways in practice:

- Splinting has the potential to be beneficial for individuals who have Dupuytren's contracture.
- Given that the systematic review yielded results that splinting does not increase range of motion, it was still concluded that it does assist in maintaining range of motion.
- There is emerging evidence to support the use of splinting as a tool for post-operative intervention to decrease the chances of recurrence.
- Occupational therapists can provide custom splinting to increase comfort and address the needs of a patient with Dupuytren's contracture.
- Splinting with occupation-based interventions can promote independence with ADLs and IADLs.
- More research could be done to create a splinting protocol for post-operative patients as many of the studies utilized different timelines.

## Conclusion

Credible research suggests that splinting for Dupuytren's contracture may be an appropriate therapeutic tool. The intervention was reviewed to understand how it can impact range of motion and recurrence of Dupuytren's contracture. The results demonstrated that splinting is not effective in increasing range of motion but had success in maintaining the range of motion recovered from surgery. Splinting helps to prevent recurrence of Dupuytren's contractures. Further research is necessary to define the most effective splinting protocols and timelines within clinical practice to yield the most effective results. It would be beneficial to research the mechanism of Dupuytren's Contracture to see how splinting can best be utilized.

## References


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**Appendix A**

*Search Terms*

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| adults or middle-aged or mid-life or older adults<br><br>AND<br><br>dupuytren's contracture or celtic hand<br><br>AND<br><br>splinting or splint or functional splint or orthotic or orthotics or brace or braces or bracing<br><br>AND<br><br>function or independence or functional outcomes or range of motion or AROM or PROM or autonomy or recurrence |

**Appendix B**

*Evidence Table*

| Systematic Reviews of Splinting for Dupuytren's Contracture | | | | | |
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| Author/Year | Level of Evidence<br>Study Design<br>Risk of Bias | Participants<br>Inclusion Criteria<br>Study Setting | Intervention and Control Groups | Outcome Measures | Results |
| Bowers, et al. (2021)<br><br>10.1016/j.jhsg.2021.05.001 | Level 1B<br><br>RCT<br><br>*Risk of Bias*<br>Moderate | *Participants*<br>(n = 29; 28 men and 1 woman)<br>They were then randomized in a 1:1 ratio for each severity group to orthosis or no orthosis groups using a computer-generated random number table<br><br>*Inclusion Criteria*<br>Adult Pts with DC and a palpable cord treated with CCH<br><br>*Study Setting*<br>Single Institution in the United States | - All Pts received 1 dose of 0.58 mg CHH injected into cord causing contracture<br>- All Pts instructed about active tendon gliding ROM, AROM/PROM and edema control<br><br>*Intervention 1:*<br>Orthosis<br>Received custom made thermoplastic orthosis from hand therapist. Orthosis molded on the palmar surface of the hand holding the treated finger in max extension. Instructed to wear | - Assessed approximately 7-10 days, 30 days, and 90 days after manipulation<br>- ROM measure with goniometer (MCP, PIP DIP)<br>- Self-administered MHQ, VAS, and satisfaction survey at each subsequent visit<br>- Orthosis compliance survey | *Significant Findings*<br>The primary affected joint was the MCP joint. Both groups demonstrated significant improvement in TAE at the 90-day follow-up compared to baseline. No significant improvement with Pts using orthosis. |

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| | | | the orthosis during sleep for 3 months<br><br>*Intervention 2:*<br>No Orthosis<br>Placed into soft dressing and instructed to remove it the next day. | | |
| Giesberts, et al. (2019)<br><br>10.1016/j.jht.2018.09.014 | Level 1B<br><br>RCT<br><br>*Risk of Bias*<br>Moderate | *Participants*<br>(n = 11)<br><br>*Inclusion Criteria*<br>Pt treated with open fasciectomy. Only fingers with extension deficit contractures were treated with dorsal hand splint.<br><br>*Intervention Setting*<br>Handencentrum Enshede | *Intervention:*<br>- Baseline information was collected; affected digit, affected joint, preoperative ROM, Tx history.<br>- Postoperative AROM and force of the splint were measured in weeks after surgery.<br>- 3-5 days after surgery, custom-made dorsal hand splints were fitted to Pt.<br>- Splints were only used at night and returned weekly to be assessed. | - Finger AROM differences between pre-op, post-op, and follow-up were tested using Mann-Whitney U-tests. | *Significant Findings*<br>- Extension deficit caused by the effects of DC was successfully treated in all subjects.<br>- Ext. improved post-op, but flexion AROM worsened (most likely due to swelling and sensitivity).<br>- The follow-up AROM measurements showed that ext AROM was maintained and flexion AROM was regained. |

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| Jerosch-Herold, et al. (2011)<br><br>10.1186/1471-2474-12-136 | Level 1B<br><br>RCT<br><br>*Risk of Bias*<br>Moderate | *Participants*<br>(n = 154)<br><br>*Inclusion Criteria*<br>Dupuytren's contracture affecting one or more digits who received fasciectomy or dermofasciectomy<br><br>*Intervention Setting*<br>5 National Health Services Hospital Trusts | *Intervention 1:*<br>Splinting (n=77)<br>Received custom made thermoplastic splint. Pt wore the splint at night only and was given a splint diary to keep track.<br><br>*Intervention 2:*<br>No splint group (n=77)<br>Received normal hand therapy.<br>AROM of MCPJ and PIPJ were measured with a goniometer and recorded. | - Self-reported UE function using the 30-item DASH questionnaire.<br>- AROM of the MCPJ, PIPJ, and distal interphalangeal joint (DIPJ)<br>- ROM assessed with Rolyan finger goniometer and following standardized protocol.<br><br>- Primary and secondary outcomes were assessed prior to surgery and at 3, 6, and 12 postop. | *Significant Findings*<br>There were no significant differences at 12 months between the two groups in DASH score, degrees of total active flexion, degrees of total active extension. Both groups were satisfied with the outcome at 12 months. No significant differences were found at 3/6 mo. |
| Kitridis et al. (2018)<br><br>10.1007/s00590-018-2340-6 | Level 3B<br><br>Control Study<br><br>*Risk of Bias*<br>Moderate | *Participants*<br>(n=30)<br><br>*Inclusion Criteria*<br>Adult Pts undergoing DC surgery. Flexion contracture of at | - Postoperative hand was immobilized in short arm thermoplastic splint (to maintain full extension)<br>- Pts were instructed to | *Recurrence*<br>- Assess flexion contracture of at least 30 degrees of more in the MCP<br><br>Functionality<br>QuickDASH | *Significant Findings*<br>Two Pts discontinued, all other patients had complied with the post op protocol. QuickDASH improved from |

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| | | least 30 degrees in the MCP or any contracture at PIP or DIP joints.<br><br>*Intervention Setting*<br>Orthopedic Department of a tertiary University Hospital | remove splint at daytime and do exercises 5x/day for at least 15 min.<br>- Extension splint used at nighttime for six months after surgery<br>- Pt assessed at the end of night splinting and final follow up (at least 2 years) | Grip Strength<br>Jamar Handgrip Dynamometer | 61.5 to 8.6. No significant difference in grip strength |
| Tam, et al. (2016)<br><br>10.4172/plastic-surgery.1000951 | Level 1B<br><br>RCT<br><br>*Risk of Bias*<br>Moderate | *Participants*<br>(n = 53; control group n=44, treatment group n = 9)<br><br>*Inclusion Criteria*<br>Patients who underwent needle aponeurotomy for DC .<br><br>*Intervention Setting*<br>Trillium Health Partners, | *Intervention 1:*<br>- Pts referred to the Hand Program at THP for custom extension splinting.<br>- Fabricated using a thermoplastic material custom molded to Pt hand.<br>- Only wore the splint at night<br>- HEP of AROM and PROM 10 repetitions per hour during the day<br><br>*Control Group:* | - Data from the participants were entered into the research database by the investigators of the study.<br>- Ensured accuracy by cross-referencing w/ surgeons chart and THP's meditech dictations for reports.<br>- AROM measured at pre- and postoperative states. | *Significant Findings*<br>- There was minimal change in AROM for the treatment group<br>- Not a strong need for extension splinting following needle aponeurotomy. Implies postoperative splinting may not be a necessary component of treatment. |

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| | | outpatient Hand Program | - Postoperative followup w/ surgeon.<br>- HEP of AROM and PROM exercise | - Access time for Pts to be admitted to HTP was determined from the date of referral to date of initial assessment in therapy.<br>- Length of stay determined from initial assessment to date of discharge. | |
| *Note*. [Define any acronyms used] DC = Dupuytren's Contracture, RCT = Randomized Control Trial, CCH = Clostridium Histolyticum, AROM = Active Range of Motion, PROM = Passive Range of Motion, DASH = Disabilities of the Arm, Shoulder, and Hand, TAF = Total active flexion, TAE = Total active extension | | | | | |

**Appendix C**

*Risk-of-Bias Table*

| Risk-of-Bias Table: Randomized Controlled Trial (RCT) and Non-RCT | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Selection Bias (Risk of bias arising from randomization process) | | | Performance Bias (effect of assignment to intervention) | | Detection Bias | | Attrition Bias | Reporting Bias | Overall risk-of-bias (low, moderate, high |
| Citation | Random Sequence Generation | Allocation Concealment (until participants enrolled and assigned) | Baseline difference between intervention groups (suggest problem with randomization?) | Blinding of Participants During the Trial | Blinding of Study Personnel During the Trial | Blinding of Outcome Assessment: Self-reported outcomes | Blinding of Outcome Assessment: Objective Outcomes (assessors aware of intervention received?) | Incomplete Outcome Data (data for all or nearly all participants | Selective Reporting (results being reported selected on the basis of the results?) | |
| Bowers, et al. (2021) | + | + | + | + | - | + | + | - | + | low |
| Jerosch-Herold et al. (2011) | + | + | - | + | - | + | - | + | - | moderate |
| Tam, et al. (2016) | + | + | + | - | - | + | + | + | - | moderate |

*Note*. Categories for risk of bias are as follows: Low risk of bias (+), unclear risk of bias (?), high risk of bias (–). Scoring for overall risk of bias assessment is as follows: 0–3 minuses, low risk of bias (L); 4–6 minuses, moderate risk of bias (M); 7–9 minuses, high risk of bias (H).

Citation. Table format adapted from Higgins, J. P. T., Sterne, J. A. C., Savović, J., Page, M. J., Hróbjartsson, A., Boutron, I., . . . Eldridge, S. (2016). A revised tool for assessing risk of bias in randomized trials. Cochrane Database of Systematic Reviews 2016, Issue 10 (Suppl. 1), 29–31. https://doi.org//10.1002/14651858.CD201601

| Risk of Bias for Before-After (Pre-Post) Studies with No Control Group | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Citation | Study question or objective clear | Eligibility or selection criteria clearly described | Participants representative of real-world patients | All eligible participants enrolled | Sample size appropriate for confidence in findings | Intervention clearly described and delivered consistently | Outcome measures pre-specified, defined, valid/reliable, and assessed consistently | Assessors blinded to participant exposure to intervention | Loss to follow-up after baseline 20% or less | Statistical methods examine changes in outcome measures from before to after intervention | Outcome measures were collected multiple times before and after intervention | Overall risk of bias assessment (low, moderate, high risk) |
| Giesberts, et al. (2019) | Y | Y | Y | NR | N | Y | N | N | Y | Y | Y | low |
| Kitridis et al. (2018) | Y | Y | Y | NR | N | Y | Y | N | Y | Y | N | low |
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*Note*. Y = yes; N = no; NR = not reported. Scoring for overall risk of bias assessment is as follows: 0–3 N, Low risk of bias (L); 4–8 N, Moderate risk of bias (M); 9–11 N, High risk of bias (H).

Citation. Table format adapted from National Heart Lung and Blood Institute. (2014). Quality assessment tool for before–after (pre–post) studies with no control group. Retrieved from https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools