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Rodrigues JN, Becker GW, Ball C, Zhang W, Giele H, Hobby J, Pratt AL, Davis T

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[Intervention Review]

Surgery for Dupuytren's contracture of the fingers

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ABSTRACT

Background

Dupuytren's disease is a benign fibroproliferative disorder that causes the fingers to be drawn into the palm via formation of new tissue under the glabrous skin of the hand. This disorder causes functional limitations, but it can be treated through a variety of surgical techniques. As a chronic condition, it tends to recur.

Objectives

To assess the benefits and harms of different surgical procedures for treatment of Dupuytren's contracture of the index, middle, ring and little fingers.

Search methods

We initially searched the following databases on 17 September 2012, then re-searched them on 10 March 2014 and on 20 May 2015: the Cochrane Central Register of Controlled Trials (CENTRAL), *The Cochrane Library*, the British Nursing Index and Archive (BNI), the Cumulative Index to Nursing and Allied Health Literature (CINAHL), EMBASE, the Latin American Caribbean Health Sciences Literature (LILACS), Ovid MEDLINE, Ovid MEDLINE-In-Process and Other Non-Indexed Citations, ProQuest (ABI/INFORM Global and Dissertations & Theses), the Institute for Scientific Information (ISI) Web of Science and clinicaltrials.gov. We reviewed the reference lists of short-listed articles to identify additional suitable studies.

Selection criteria

We included randomised clinical trials and controlled clinical trials in which groups received surgical intervention for Dupuytren's disease of the index, middle, ring or little finger versus control, or versus another intervention (surgical or otherwise). We excluded the thumb, as cords form on the radial aspect of the thumb and thus are not readily accessible in terms of angular deformity. Furthermore, thumb disease is rare.

Data collection and analysis

A minimum of two review authors independently reviewed search results to select studies for inclusion by using pre-specified criteria, assessed risk of bias of included studies and extracted data from included studies.

We grouped outcomes into the following categories: (1) hand function, (2) other patient-reported outcomes (e.g. satisfaction, pain), (3) early objective outcomes (e.g. correction of angular deformity), (4) late objective outcomes (e.g. recurrence) and (5) adverse effects.

Main results

We included 14 articles describing 13 studies, comprising 11 single-centre studies and two multi-centre studies. These studies involved 944 hands of 940 participants; of these, 93 participants were reported twice in separate articles describing early and late outcomes of one trial. Three papers reported the outcomes of two trials comparing different procedures. One trial compared needle fasciotomy versus fasciectomy (125 hands, 121 participants), and the other compared interposition firebreak skin grafting versus z-plasty closure of fasciectomy (79 participants). The other 11 studies reported trials of technical refinements of procedures or rehabilitation adjuncts. Of these, three investigated effects of postoperative splinting on surgical outcomes.

Ten studies (11 articles) were randomised controlled trials (RCTs) of varying methodological quality; one was a controlled clinical trial. Trial design was unclear in two studies awaiting classification. All trials had high or unclear risk of at least one type of bias. High risks of performance and detection bias were particularly common. We downgraded the quality of evidence (Grades of Recommendation, Assessment, Development and Evaluation - GRADE) of outcomes to low because of concerns about risk of bias and imprecision.

Outcomes measured varied between studies. Five articles assessed recurrence; two defined this as reappearance of palpable disease and two as deterioration in angular deformity; one did not explicitly define recurrence.

Hand function on the Disabilities of the Arm, Shoulder and Hand (DASH) Scale (scores between 0 and 100, with higher scores indicating greater impairment) was 5 points lower after needle fasciotomy than after fasciectomy at five weeks. Patient satisfaction was better after fasciotomy at six weeks, but the magnitude of effect was not specified. Fasciectomy improved contractures more effectively in severe disease: Mean percentage reduction in total passive extension deficit at six weeks for Tubiana grades I and II was 11% lower after needle fasciotomy than after fasciectomy, whereas for grades III and IV disease, it was 29% and 32% lower.

Paraesthesia (defined as subjective tingling sensation without objective evidence of altered sensation) was more common than needle fasciotomy at one week after fasciectomy (228/1000 vs 67/1000), but reporting of complications was variable.

By five years, satisfaction (on a scale from 0 to 10, with higher scores showing greater satisfaction) was 2.1/10 points higher in the fasciectomy group than in the fasciotomy group, and recurrence was greater after fasciotomy (849/1000 vs 209/1000). Firebreak skin grafting did not improve outcomes more than fasciectomy alone, although this procedure took longer to perform.

One trial investigated four weeks of day and night splinting followed by two months of night splinting after surgery. The other two trials investigated three months of night splinting after surgery, but participants in 'no splint' groups with early deterioration at one week were issued a splint for use. All three studies demonstrated no benefit from splinting. The two trials investigating postoperative night splinting were suitable for meta-analysis, which demonstrated no benefit from splinting: Mean DASH score in the splint groups was 1.15 points lower (95% confidence interval (CI) -2.32 to 4.62) than in the no splint groups. Mean total active extension in the splint groups was 2.21 degrees greater (95% CI -3.59 to 8.01 degrees) than in the no splint groups. Mean total active flexion in the splint groups was 8.42 degrees less (95% CI 1.78 to 15.07 degrees) than in the no splint groups.

Authors' conclusions

Currently, insufficient evidence is available to show the relative superiority of different surgical procedures (needle fasciotomy vs fasciectomy, or interposition firebreak skin grafting vs z-plasty closure of fasciectomy). Low-quality evidence suggests that postoperative splinting may not improve outcomes and may impair outcomes by reducing active flexion. Further trials on this topic are urgently required.

PLAIN LANGUAGE SUMMARY

Surgery for Dupuytren's disease of the fingers

Review question

We conducted a review of the effects of surgery for people with Dupuytren’s disease of the fingers and found 13 studies with 940 participants; 93 participants were reported twice in separate articles describing early and late outcomes of one trial.

Background

Dupuytren's disease is common. Patients develop scar-like tissue under the palmar skin of the hand that draws their fingers into the palm and can affect function.

This condition can be surgically treated by cutting out the disease, then stitching the skin back into place (fasciectomy) or replacing it with a graft of skin taken from elsewhere on the body (dermofasciectomy). Alternative approaches involve breaking the cord of disease to straighten the finger. This can be done by moving a needle back and forth through the cord until it snaps, as when rubbing a rope repeatedly over a rock (needle fasciotomy), or by injecting into it an enzyme that digests a piece of the cord (collagenase). This weakens one spot, allowing the surgeon to snap the cord and straighten the finger. As the condition is related in part to genetics, it tends to come back, even

after successful treatment. As the latter two treatments leave the broken ends of the cord behind, recurrence may be quicker after these procedures than after traditional excisional surgery. However, recovery might also be quicker. The most effective treatment is unclear.

Study characteristics

After searching for all relevant studies up to May 2015, we found 13 studies (14 articles) that met our inclusion criteria. However, only three compared different operation types. The others compared aspects of one operation type. One study presented early and late outcomes.

Key results

What happens to people with Dupuytren's disease up to five weeks after needle fasciotomy compared with fasciectomy?

• Hand function may be slightly better after needle fasciotomy than after fasciectomy (low-quality evidence).

• People who have had needle fasciotomy may be more satisfied than those who have had fasciectomy (low-quality evidence).

• Fasciectomy probably straightens fingers better than needle fasciotomy in people with advanced disease, but probably no difference is apparent in people with milder disease (low-quality evidence).

• A feeling of tingling in the fingers is probably more common after fasciectomy than after needle fasciotomy during the first week after treatment (low-quality evidence).

What happens to people with Dupuytren's disease five years after needle fasciotomy compared with fasciectomy?

• Satisfaction may be better after fasciectomy than after needle fasciotomy (low-quality evidence).

• Recurrence may be more common after needle fasciotomy than after fasciectomy (low-quality evidence).

What happens to people with Dupuytren's disease up to 36 months after z-plasty closure of a limited fasciectomy compared with use of small 'firebreak' skin grafts (a form of dermofasciectomy)?

• Little or no difference in outcomes is likely between patients who had z-plasty and those who had small skin grafts, although skin graft procedures take longer to perform (low-quality evidence).

What happens to people with Dupuytren's disease who wear a splint at night after surgery?

• Wearing a splint at night after surgery probably does not help to straighten fingers nor to improve hand function, and it may slightly worsen the patient's ability to make a full fist (low-quality evidence).

Side effects in people with Dupuytren's disease after surgery and in those who wear a splint at night after surgery

Reporting of complications was variable. We often do not have precise information about side effects and complications, particularly rare but serious side effects. Side effects may include altered feeling in the fingers or reduced ability to make a full fist. Rare complications may include injury to the tendons that pull the fingers into the palm.

SUMMARY OF FINDINGS

Summary of findings for the main comparison. Summary of findings table 1: comparison of operation types: early results of needle fasciotomy vs limited fasciectomy for Dupuytren's disease

Comparison of operation types: early results of needle fasciotomy vs limited fasciectomy for Dupuytren's disease

Patient or population: 125 hands in 121 participants with Dupuytren's disease of the fingers for early outcomes (van Rijssen 2006)

Settings: single-centre Dutch study

Intervention: needle fasciotomy

Comparison: limited fasciectomy

Outcomes[a]	Illustrative comparative risks* (95% CI)		Number of participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk[b]	Corresponding risk			
	Limited fasciectomy	Needle fasciotomy			
DASH hand function score at 5 weeks Major outcome group 1 (hand function) (scores between 0 and 100, where 0 represents no impairment in hand function and 100 represents maximum impairment in hand function)	Mean DASH hand function score in the fasciectomy group was 16	DASH hand function score in the fasciotomy group was 5 lower than in the fasciectomy group	97 (1 study)	⊕⊕⊖⊖ **Low** [c]	P value = 0.017 as quoted in van Rijssen 2006 24/121 participants in the study did not adequately complete the DASH PROM tools Insufficient detail in article to allow calculation of 95% CI (standard deviations not provided) Unclear whether this is the most appropriate time point for study of 'early' outcome
Patient satisfaction at 6 weeks Major outcome group 2 (other PROM) (scores from "0 (no/very negative) to 10 (yes/very positive)")	See comment	See comment	121 (1 study)	⊕⊕⊖⊖ **Low** [d]	Data not described in van Rijssen 2006. Only level of significance provided P value = 0.002 as quoted in van Rijssen 2006

Early angular outcome at 6 weeks for Tubiana grade I disease (total passive extension deficit (TPED) of the MCPJ, PIPJ and DIPJ for preoperative contractures with a TPED of 0 to 45 degrees) **Early angular outcome at 6 weeks for Tubiana grade II disease** (total passive extension deficit (TPED) of the MCPJ, PIPJ and DIPJ for preoperative contractures with a TPED of 45 to 90 degrees) **Early angular outcome at 6 weeks for Tubiana grade III disease** (total passive extension deficit (TPED) of the MCPJ, PIPJ and DIPJ for preoperative contractures with a TPED of 90 to 135 degrees) **Early angular outcome at 6 weeks for Tubiana grade IV disease** (total passive extension deficit (TPED) of the MCPJ, PIPJ and DIPJ for preoperative contractures with a TPED > 135 degrees) Major outcome group 3 (early objective measurement)	For Tubiana grade I disease, mean percentage reduction in TPED in the fasciectomy group was 82% For Tubiana grade II disease, mean percentage reduction in TPED in the fasciectomy group was 78% For Tubiana grade III disease, mean percentage reduction in TPED in the fasciectomy group was 75% For Tubiana grade IV disease, mean percentage reduction in TPED in the fasciectomy group was 79%	For Tubiana grade I disease, mean percentage reduction in TPED in the fasciotomy group was 11% lower than in the fasciectomy group For Tubiana grade II disease, mean percentage reduction in TPED in the fasciotomy group was 11% lower than in the fasciectomy group For Tubiana grade III disease, mean percentage reduction in TPED in the fasciotomy group was 29% lower than in the fasciectomy group For Tubiana grade IV disease, mean percentage reduction in TPED in the fasciotomy group was 32% lower than in the fasciectomy group	For grade I disease, 57 (1 study) For grade II disease, 70 (1 study) For grade III disease, 27 (1 study) For grade IV disease, 10 (1 study)	⊕⊕⊖⊖ **Low** [e]	For grade I disease, P value = 0.329 in van Rijssen 2006 For grade II disease, P value = 0.071 in van Rijssen 2006 For grade III disease, P value = 0.000 in van Rijssen 2006 For grade IV disease, P value = 0.004 in van Rijssen 2006
Major outcome group 4 (recurrence)	See comment	See comment	See comment	See comment	Not studied in van Rijssen 2006
Paraesthesia at 1 week Major outcome group 5 (adverse effects) Defined as "tingling sensations at any part of the treated digit without objective disturbance of sensation at the tip of the digit" per hand	228 per 1000	67 per 1000	117 (1 study)	⊕⊕⊖⊖ **Low**[f]	P value = 0.013 in van Rijssen 2006 Relative effect not calculated as only study available

*The basis for the **assumed risk** (e.g. median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval; **DASH:** Disabilties of the Arm, Shoulder and Hand Scale; **DIPJ:** Distal interphalangeal joint; **MCPJ:** Metacarpophalangeal joint; **PIPJ:** Proximal interphalangeal joint; **PROM:** Patient-reported outcome measures; **RR:** Risk ratio; **TPED:** Total passive extension deficit.

GRADE Working Group grades of evidence.
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[a]Recurrence was not studied in van Rijssen 2006, as this article considered early outcomes only. Recurrence is a late effect, and recurrence in this trial is considered in the next 'Summary of findings' table.
[b]All assumed risks are based on mean values for limited fasciectomy as reported in van Rijssen 2006.
[c]Evidence downgraded from high to low for DASH at 5 weeks because of significant attrition. van Rijssen 2006 had significant risk of performance and detection biases, and imprecision.
[d]Evidence downgraded from high to low for patient satisfaction at 6 weeks, as scale used was not validated. van Rijssen 2006 had significant risk of performance and detection biases, and imprecision.
[e]Evidence downgraded from high to low for early angular outcomes in grade I disease at 6 weeks, as van Rijssen 2006 had significant risk of performance and detection biases, and imprecision.
[f]Paraesthesia at 6 weeks downgraded from high to low, as scale was not validated. van Rijssen 2006 had significant risk of performance and detection biases, and imprecision.

Summary of findings 2. Summary of findings table 2: comparison of operation types: late results of needle fasciotomy vs limited fasciectomy for Dupuytren's disease

Comparison of operation types: late results of needle fasciotomy vs limited fasciectomy for Dupuytren's disease

Patient or population: 93 participants (van Rijssen 2012a)

Settings: single-centre Dutch study

Intervention: needle fasciotomy

Comparison: limited fasciectomy

Outcomes	Illustrative comparative risks* (95% CI)		Number of participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk			
	Limited fasciectomy	Needle fasciotomy			
DASH hand function score at 5 years Major outcome group 1 (hand function)	See comment	See comment	See comment	See comment	Not studied in van Rijssen 2012a

(scores between 0 and 100, where 0 represents no impairment in hand function and 100 represents maximum impairment in hand function)					
Patient satisfaction at 5 years Major outcome group 2 (other PROM) (scores between "1 (not at all), 10 (excellent)")	Mean satisfaction score in fasciectomy group was 8.3	Mean satisfaction score in fasciotomy group was 2.1 lower than in fasciectomy group	93 (1 study)	⊕⊕⊖⊖ **Low** [a]	P value < 0.001 as quoted in van Rijssen 2012a Likelihood of selecting treatment again significantly higher after fasciectomy (P value = 0.008) Insufficient detail in article to allow calculation of 95% CI (standard deviations not provided)
Major outcome group 3 (early angular outcome)[b]	See comment	See comment	See comment	See comment	This major outcome group is not relevant to a late outcome comparison
Recurrence at 5 years Major outcome group 4 (recurrence) Defined as reoperation or progressive angular deformity of 20 degrees in a successfully treated joint	209 per 1000	849 per 1000	93 (1 study)	⊕⊕⊖⊖ **Low** [c]	Progressive angular deformity defined in van Rijssen 2006 as an increase in TPED ≥ 30 degrees. In van Rijssen 2012a, different definitions used (increase of 20 degrees in a successfully treated joint) in other studies of Dupuytren's disease, such as Hurst 2009, acknowledged and applied P value < 0.001 in van Rijssen 2012a Relative effect not calculated, as only study available Recurrence rate influenced by the definition of recurrence used, and by length of follow-up period
Major outcome group 5 (adverse effects)[d]	see comment	see comment	see comment	see comment	Not discussed in van Rijssen 2012a; analysed in van Rijssen 2006

*The basis for the **assumed risk** (e.g. median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval; **DASH:** Disabilities of the Arm, Shoulder and Hand Scale; **PROM:** Patient-reported outcome measure; **RR:** Risk ratio; **TPED:** Total passive extension deficit.

GRADE Working Group grades of evidence.
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.

Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[a]Quality of evidence for patient satisfaction at 5 years downgraded from high to low because of significant risks of bias in van Rijssen 2012a, and as the result of imprecision.
[b]Early angular outcomes and adverse effects not considered in this table, as these are relevant to early outcome assessment, and so are included in the previous 'Summary of findings' table.
[c]Quality of evidence for recurrence at 5 years downgraded from high to low because of significant risks of bias in van Rijssen 2012a, and as the result of imprecision.
[d]Early angular outcomes and adverse effects not considered in this table, as these are relevant to early outcome assessment, and so are included in the previous 'Summary of findings' table.

Summary of findings 3. Summary of findings table 3: comparison of operation types: firebreak skin grafting vs z-plasty closure of fasciectomy for Dupuytren's disease

Comparison of operation types: firebreak skin grafting vs z-plasty closure of fasciectomy for Dupuytren's disease

Patient or population: 79 participants (Ullah 2009)

Settings: single-centre UK study

Intervention: firebreak skin grafting to close incision

Comparison: z-plasty closure of incision

Outcomes	Illustrative comparative risks* (95% CI)		Number of participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk			
	z-plasty	Firebreak skin grafting			
PEM hand function score at 3 years Major outcome group 1 (hand function) (scores between 0 and 77, where 0 represents no impairment in hand function and 77 represents maximum impairment in hand function)	See comment	See comment	79 (1 study)	⊕⊕⊝⊝ **Low** [a]	Data represented graphically only; differences between groups described as not statistically significant; no P value provided
Major outcome group 2 (patient satisfaction and other PROM)	See comment	See comment	See comment	See comment	Not studied in Ullah 2009
Correction of MCPJ and PIPJ deformities at	All MCPJs fully corrected	All MCPJs also fully corrected	79	⊕⊕⊝⊝ **Low** [b]	

2 weeks Major outcome group 3 (early angular outcomes)	Mean PIPJ correction 6 degrees in the z-plasty group	Mean PIPJ correction no different (also 6 degrees) in the skin graft group from the z-plasty group	(1 study)		
Progressive contracture by 3 years Major outcome group 4 (recurrence)	109 per 1000	136 per 1000	79 (1 study)	⊕⊕⊝⊝ **Low** [c]	P value = 0.17 in Ullah 2009 Rates assessed per finger (90 fingers treated among 79 participants)
Hypoaesthesia Major outcome group 5 (adverse effects)	Radial digital nerve territory: 217 per 1000 Ulnar digital nerve territory: 217 per 1000	Radial digital nerve territory: 341 per 1000 Ulnar digital nerve territory: 455 per 1000	79 (1 study)	⊕⊕⊝⊝ **Low** [d]	P value = 0.2 for radial digital nerve territory in Ullah 2009 P value = 0.03 for ulnar digital nerve territory in Ullah 2009

*The basis for the **assumed risk** (e.g. median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval; **MCPJ:** Metacarpophalangeal joint; **PEM:** Patient Evaluation Measure; **PIPJ:** Proximal interphalangeal joint; **PROM:** Patient-reported outcome measure; **RR:** Risk ratio.

GRADE Working Group grades of evidence.
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[a]Quality of evidence for PEM hand function score at 3 years downgraded from high to low, as neither data nor P value was provided to support statement, and as the result of imprecision.
[b,c,d]Quality of evidence downgraded from high to low because of risks of bias and imprecision.

Summary of findings 4. Summary of findings table 4: refining rehabilitation: three months of postoperative night splinting with hand therapy vs hand therapy alone for rehabilitation following surgery for Dupuytren's disease

Refining rehabilitation: three months of postoperative night splinting with hand therapy vs hand therapy alone for rehabilitation following surgery for Dupuytren's disease
Patient or population: 210 participants with Dupuytren's disease of the fingers in 2 studies (225 digits reported across all studies) (Collis 2013; Jerosch-Herold 2011)
Settings: multi-centre UK RCT and single-centre New Zealand RCT
Intervention: three months of night splinting in extension in addition to hand therapy ("splint")

Comparison: hand therapy alone ("no splint")

Outcomes	Illustrative comparative risks* (95% CI)		Number of participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk			
	No splint	Splint			
DASH hand function score at 3 months Major outcome group 1 (hand function) (scores between 0 and 100, where 0 represents no impairment in hand function and 100 represents maximum impairment in hand function)	Mean DASH ranged across 'no splint' groups from 10.8 to 11	Mean DASH in 'splint' groups was 1.15 lower (95% CI -2.32 to 4.62) than in 'no splint' groups	205 participants (2 studies)	⊕⊕⊖⊖ **Low** [a]	Unclear whether this is the most appropriate time point for study of 'early' outcome
Major outcome group 2 (patient satisfaction)	See comment	See comment	See comment	See comment	Not assessed in these studies
Total active extension at 3 months Major outcome group 3 (early objective measurement) Total active extension (TAE) of MCPJ, PIPJ and DIPJ; higher value indicates loss of extension and a worse outcome	Mean TAE ranged across 'no splint' groups from 24 degrees to 33 degrees	Mean TAE in 'splint' groups was 2.21 degrees higher (95% CI -3.59 to 8.01) than in 'no splint' groups	225 digits (2 studies)	⊕⊕⊖⊖ **Low** [b]	Unclear whether this is the most appropriate time point for study of 'early' outcome
Major outcome group 4 (recurrence)	See comment	See comment	See comment	See comment	Not assessed in these studies
Total active flexion at three months Major outcome group 5 (adverse effects) Total active flexion (TAF) of MCPJ, PIPJ and DIPJ; lower value indicates loss of flexion and a worse outcome	Mean TAF ranged across 'no splint' groups from 217.6 degrees to 245 degrees	Mean TAF in 'splint' groups was 8.42 degrees lower (95% CI 1.78 to 15.07) than in 'no splint' groups	225 digits (2 studies)	⊕⊕⊖⊖ **Low** [c]	Conflicting findings from subgroups Unclear whether this is the most appropriate time point for study of 'early' outcome

*The basis for the **assumed risk** (e.g. median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval; **DASH:** Disabilities of the Arm, Shoulder and Hand Scale; **DIPJ:** Distal interphalangeal joint; **MCPJ:** Metacarpophalangeal joint; **PIPJ:** Proximal interphalangeal joint; **RCT:** Randomised controlled trial; **TAE:** Total active extension; **TAF:** Total active flexion.

GRADE Working Group grades of evidence.
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.

Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[a,b,c]Quality of evidence was downgraded from high to low because of risks of bias and imprecision.

BACKGROUND

Description of the condition

Dupuytren's disease may affect the hand and the sole of the foot. In the hand, it is characterised by slow but progressive fibroproliferative changes associated with the palmar aponeurosis, which lies beneath the skin of the palm, and its extensions into the fingers (Hurst 2000). Although it most commonly involves the ring and little fingers, this disorder can affect any digit. In early stages, nodules of Dupuytren's tissue are formed in association with palmar aponeurosis. These may coalesce to form cords of Dupuytren's tissue that run to the fingers. The cords may shorten and prevent full extension of the fingers, thus stopping patients from placing their hands flat on a surface. Patients may report difficulty in putting on gloves, washing their face or performing other dextrous tasks. If left untreated, this restriction of finger extension usually progresses, although the rate of progression is unpredictable. Changes are irreversible without treatment (Luck 1959). Loss of motion, particularly functional extension, results in activity limitations and motivates the patient to explore surgical options (Pratt 2009).

The prevalence of Dupuytren's disease varies with geographic location and patient sex and age. It is unusual among individuals younger than 50 years and is more common in men, although this sex difference may diminish with increasing age. Its prevalence is highest in men of Northern European origin, and in British men and women over the age of 75 years may be as high as 18% and 9%, respectively (Early 1962).

The aetiology of Dupuytren's disease is not fully understood. Higher prevalence amongst family members has been accepted for a long time (Yost 1955), and the disorder is associated with diabetes mellitus and smoking (Burge 1997). However, its proposed association with epilepsy is unclear (Geoghegan 2004), and its reported association with socio-economic factors and manual work remains controversial (Early 1962; Herzog 1951).

Although typical patients experience slow progression of disease and respond well to intervention, some experience aggressive disease progression, often from an early age, and earlier recurrence - a condition referred to as 'Dupuytren's diathesis' (Hueston 1963). Benefits of treatment may vary according to the anatomical location of Dupuytren's disease within the hand. One study reported more improved hand function when investigators compared proximal interphalangeal joint (PIPJ) treatment versus metacarpophalangeal joint (MCPJ) correction (Draviaraj 2004). However, achieving correction at the PIPJ is more difficult: Whereas MCPJ contractures usually can be fully corrected with surgery, PIPJ contractures frequently are incompletely corrected. Consequently, heterogeneity is evident in terms of disease presentation within the digits, response to surgery and functional benefit derived from surgery.

No cure is known for Dupuytren's disease; cure would require removal of Dupuytren's tissue from the palm of the hand and the flexor surfaces of digits, as well as inhibition of subsequent disease formation. Instead, the primary goal of treatment is to excise, divide, break or dissolve cords of Dupuytren's tissue that are preventing full finger extension, with the intention of improving or correcting finger contracture (loss of extension). However, as some cells that produce Dupuytren's tissue are inevitably left throughout the hand and within the region of the treated cord, Dupuytren's contractures can form later at other sites in the hand (disease extension), or a 'recurrent contracture' may develop within the operative site. Treatment usually is offered before the affected finger has contracted so far that hand function is significantly impaired, because small contractures that have developed recently have a better chance of correction than long-standing severe contractures, which may have allowed secondary joint stiffness to develop in the underlying 'flexed' joints. A 30-degree MCPJ contracture is often cited as a threshold for offering surgery (BSSH 2010). Such a figure may be chosen, as less significant contractures might not be expected to cause functional impairment, and because some believe that surgery itself might stimulate disease progression (Bisson 2003), although this theory has not been proved scientifically.

Non-operative strategies include radiotherapy, physical therapy (typically involving splinting) and ultrasonography. The value of radiotherapy for established contractures is uncertain, and outcomes of splinting and ultrasonography are variable (Ball 2002; Stiles 1966). A novel treatment approach consists of injecting collagenase into Dupuytren's cords, causing finger contracture (Hurst 2009). Collagenase synthesised by *Clostridium histolyticum* degrades collagen within Dupuytren's cords, thus weakening them, so they can be broken by forced extension of the affected finger on the following day. The Food and Drug Administration (FDA) has approved this treatment for use in the United States (FDA 2010), and it is now licenced for use in the European Union, although its effectiveness has not been fully evaluated (Thomas 2010). This topic will be considered in a separate review.

Currently, the mainstay of treatment for Dupuytren's contracture is surgery, and many surgical options for Dupuytren's disease are available, beginning with Baron Dupuytren's description of surgical release of the contracture, performed without anaesthesia in 1831 (Elliot 1999). Common management strategies are presented here by extent of surgery, starting with the least invasive approach. Relative benefits and disadvantages are summarised.

Description of the intervention

Observation

Treatment is not mandatory, and after informed discussion of the natural history of the condition and different treatment options, a patient may elect observation of the hand. Patients with mild disease and no functional impairment may also be observed. A subgroup, labelled "non-Dupuytren's disease" by one team of authors, may not experience disease progression (Rayan 2005). Observation may be encountered as a comparator intervention rather than as an experimental intervention.

Needle fasciotomy (aponeurotomy)

This involves blind division of the contracture with a hypodermic needle (usually 25-gauge). This concept dates back to the time of Dupuytren himself, and it has experienced a resurgence in popularity since the 1990s (Badois 1993). Benefits of this procedure include that it can be performed in clinic on an outpatient basis, and so it may be cost-effective, and it may have a good rapid recovery rate. Disadvantages include that needle fasciotomy may have a significant recurrence rate of 75% or more at five years (van Rijssen 2006a; van Rijssen 2012a), and the procedure carries risks of tendon and digital nerve and artery damage. Although most surgeons

agree that this procedure has a role in managing Dupuytren's disease causing contracture of the MCPJ, it is less popular for the treatment of Dupuytren's cords that are causing contracture of the PIPJ, because of associated risk of damage to the digital nerves and flexor tendons in the finger and inability to reliably release contractures of the PIPJ. A six-week follow-up study suggested that it might be a reasonable alternative to limited fasciectomy in the short-term management of selected cases such as those involving elderly patients, with acceptance of significantly higher recurrence after needle fasciotomy compared with fasciectomy and the tendency for quicker recurrence. This was seen in five-year follow-up data from the same study (van Rijssen 2012a).

Very limited fasciectomy (segmental aponeurectomy)

Small incisions are made over the portions of the Dupuytren's cord that are causing the contracture, and segments are excised so that the finger straightens (Moermans 1991). No attempt is made to remove all of the cord causing the contracture. Benefits of this procedure are that it is relatively less invasive and involves a quick (two-week or three-week) recovery period. However, it is performed in an operating theatre and is thought to be associated with a high rate of recurrence of Dupuytren's contracture - up to 38% (Moermans 1996) - which may occur because significant deposits of Dupuytren's tissue persist in the hand and the finger. Although most surgeons agree that this procedure has a role in Dupuytren's disease in the palm of the hand that is causing contracture of the MCPJ, it is less popular for treatment of cords in the finger itself, which cause contracture of the PIPJ, because it introduces risk of damage to the digital nerves and the inability to reliably release contracture of the PIPJ.

Limited fasciectomy

Through this procedure, the surgeon aims to remove all of the Dupuytren's cord that is causing the finger contracture. Limited fasciectomy has been the most popular treatment for Dupuytren's disease in the recent past, but it carries a significant recurrence rate and involves a relatively long rehabilitation phase (four to six weeks). Furthermore, it carries a small, although significant, risk of complications such as diffuse finger stiffness, which may involve not only the operated finger but the other fingers of the hand as well. Recurrence following limited fasciectomy may exceed 20% at five years (van Rijssen 2012a), possibly because disease-forming cells retained in the subcutaneous fat and skin may form 'recurrent' contractures.

Dermofasciectomy

This is a more extensive procedure in which all of the Dupuytren's cord causing the contracture is excised. In addition, all subcutaneous fat and skin on the palmar aspect of the proximal and middle pulp spaces of the finger (overlying the cord) are excised, leaving only the flexor tendon sheath and the two neurovascular bundles. The resultant skin defect is covered with a full-thickness skin graft, which usually is harvested from the medial border of the forearm or upper arm, the front of the elbow or the ulnar aspect of the hand. Proponents of this procedure claim that through excision of skin and subcutaneous fat that may be involved in Dupuytren's disease, the rate of recurrence of a Dupuytren's contracture is reduced (Armstrong 2000). Many surgeons selectively use this procedure in young patients and in those with the 'diathesis', in whom risk of recurrence in later life is high. Specific disadvantages of dermofasciectomy include a longer rehabilitation phase and the need to harvest a skin graft. Complications include loss of the skin graft and, as for limited fasciectomy, the possibility of finger stiffness and complex regional pain syndrome.

How the intervention might work

Surgery, consisting of excision or division of Dupuytren's cord, should allow immediate full extension of affected joints, as long as the underlying joint has not developed a fixed flexion deformity for other reasons (e.g. collateral ligament contraction, checkrein ligament shortening, arthritis).

Why it is important to do this review

Comparative analysis of the outcomes of different surgical treatment options for Dupuytren's disease is needed to investigate whether more invasive procedures, such as dermofasciectomy, have lower 'recurrent contracture' rates, and whether any such benefit is outweighed by a higher rate of adverse events (complications) or an unacceptably longer or more difficult rehabilitation period. Although comparison of different operative techniques is important, it must be recognised that surgery is only part of a complex intervention needed for the treatment of Dupuytren's contracture. The outcome of treatment may not be determined only by which type of surgery is performed, but also by the postoperative rehabilitation regimen provided (splintage and hand therapy) and other treatment factors such as patient selection and site of contracture (MCPJ alone, PIPJ alone or both joints together). Also the outcome of Dupuytren's surgery is usually defined by the 'recurrent contracture rate' (in contrast to 'disease extension' to other digits, the rate of which is not affected by surgery). Only a few studies have assessed outcomes by using patient-centred outcome tools, or have investigated the severity and length of postoperative recovery from surgery.

OBJECTIVES

To assess the benefits and harms of different surgical procedures for treatment of Dupuytren's contracture of the index, middle, ring and little fingers.

METHODS

Criteria for considering studies for this review

Types of studies

We included randomised controlled trials (RCTs) and controlled clinical trials (CCTs), irrespective of language or sample size.

Types of participants

Adult men and women from all ethnic origins, with or without risk factors for Dupuytren's disease, who had undergone a surgical procedure for primary (not recurrent) Dupuytren's contracture of one or more of the index, middle, ring and little fingers.

Types of interventions

Any surgical intervention, including percutaneous needle fasciotomy (aponeurotomy), very limited fasciectomy, limited fasciectomy and dermofasciectomy. Comparators included alternative surgical procedures, placebo/sham surgery and other active non-surgical treatments (collagenase injection, hand therapy, physiotherapy, radiotherapy). We did not anticipate studies undertaken to compare active treatment versus

observation alone. If we identified such studies, we planned to discuss them.

Types of outcome measures

The validity and reliability of any outcome measures commonly used in Dupuytren's disease have not been well studied. We have listed below outcomes expected to be reported by study investigators. We selected hand function as the top primary outcome, as this represents an important patient-centred measure. In contrast, angular measurements are objective, surgeon-centred measurements.

Major outcomes

- Level of hand function restored, as assessed by the Disabilities of the Arm, Shoulder and Hand (DASH) Scale (Hudak 1996), the Patient Evaluation Measure (PEM) (Macey 1995), grip strength measures or the Jebsen-Taylor Hand Function Test (Jebsen 1969). We were uncertain about which standardised outcome instruments we would encounter, but we found that all were reported.
- Patient satisfaction and other patient-rated outcomes (such as pain or health-related quality of life (HRQoL)). We will report all measures encountered.
- Early angle outcomes and other objective outcomes. These may involve (1) improvement in contracture immediately after surgery - differences between finger angle measurements immediately after surgery and preoperative finger angle measurements, (2) residual contracture immediately after surgery - as assessed by angle measurement (goniometry) or (3) early results (as above) at time of discharge from care. Active or passive angles may be reported. Angles may be presented per joint, or per ray.
- Recurrence of Dupuytren's disease/contracture in the operated field. As recurrence is time-dependent, length of follow-up is not standardised and a universally agreed upon definition of recurrence is not available, we have described recurrence rates and length of follow-up for each study in narrative format. We planned to perform time-to-event analyses when we found appropriate data. However, we did not expect that these data would be available. We would have performed meta-analyses only for studies with similar definitions of recurrence and providing recurrence data at similar follow-up times after surgery ('similar definitions of recurrence' would include those with recurrence involving a 20-degree to 30-degree increase in angle compared with early discharge data or preoperative data). Minimum length of follow-up for eligibility in this analysis was 18 months. This was decided on the basis of two considerations: Shorter follow-up gives insufficient time for recurrence; and no consensus has been reached to define minimum length of follow-up, which varies widely in published studies, ranging from three weeks to 13 years (Becker 2010).
- Adverse effects. Those anticipated included loss of finger flexion, loss of finger sensation due to digital nerve injury, vascular compromise, delayed healing and infection. As the extent of reported adverse events was unknown, we collected and reviewed total adverse effects data. Review authors agreed to focus on five key adverse events, should these prove to be extensive.

Minor outcomes

- Economic costs of intervention. When provided, we would assess these costs as total documented costs of the procedure and rehabilitation. When time to recurrence was documented, we would calculate cost per year of recurrence-free survival. However, we anticipated that these data would not be commonly available.

Search methods for identification of studies

We performed all searches on 17 September 2012. We re-ran searches on 10 March 2014, and again on 20 May 2015, and we updated the results.

Electronic searches

We searched the following electronic databases to find reports of relevant RCTs and CCTs:

- The Cochrane Central Register of Controlled Trials (CENTRAL) (2012, Issue 8).
- British Nursing Index and Archive (BNI) - 1985 to September 2012.
- Cumulative Index to Nursing and Allied Health Literature (CINAHL) - 1981 to September 2012.
- EMBASE - 1980 to September 2012.
- Latin American Caribbean Health Sciences Literature (LILACS) - 1982 to September 2012.
- Ovid MEDLINE - 1948 to September 2012.
- Ovid MEDLINE-In-Process and Other Non-Indexed Citations - 1948 to September 2012.
- ProQuest (ABI/INFORM Global and Dissertations & Theses) - all entries to September 2012.
- Institute for Scientific Information (ISI) Web of Science.
- clinicaltrials.gov.

We provided the full search strategy for CENTRAL in Appendix 1.

We combined the Ovid MEDLINE search with the Cochrane Highly Sensitive Search Strategy for Identifying Randomised Trials in MEDLINE: Sensitivity- and Precision-Maximizing Version (2008 revision) (Lefebvre 2011): Ovid format (see Appendix 2 for the full strategy). We combined the EMBASE (Appendix 3) and CINAHL (Appendix 4) searches with trial filters developed by the Scottish Intercollegiate Guidelines Network (SIGN) (SIGN 2011), and we applied no restrictions on the basis of language nor date of publication.

We used variations of the Ovid MEDLINE search strategy to search the other databases listed above (Appendix 5; Appendix 6; Appendix 7; Appendix 8).

Searching other resources

We reviewed the reference lists of short-listed articles to identify additional suitable studies, and we searched Web of Science to identify studies that cited the items in the short list. We applied no language restrictions, and we translated potentially eligible foreign language studies.

Data collection and analysis

Selection of studies

From the title, abstract or descriptor, two review authors (JR, GB) independently screened all abstracts to identify potential studies for review, using a checklist of the criteria for inclusion (see Criteria for considering studies for this review and Appendix 9). The two review authors compared their lists of potential studies and produced an agreed upon short list. We obtained copies of the full articles of papers on the agreed upon short list.

Two review authors (JR, GB) independently reviewed the full text of abstracts of the 'agreed short list' papers and identified those suitable for inclusion, using the selection checklist (Criteria for considering studies for this review). We resolved disagreements by discussion and by referral to a third review author (TD). We did not mask titles of journals nor names of study authors and supporting institutions.

Data extraction and management

Two review authors (JR, CB) independently extracted data regarding source, study design, intervention, population and outcomes using a piloted form. We resolved disagreements by consensus after additional review by a third review author (TD).

Assessment of risk of bias in included studies

Two review authors (CB, JR) independently used the tool for assessing risk of bias developed by The Cochrane Collaboration (Higgins 2011). We assessed all seven domains (sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective outcome reporting and other issues) of this tool by allowing classification of domains into 'high risk of bias', 'low risk of bias' or 'unclear risk of bias' (see Appendix 10). We judged by outcome when most of the seven domains were deemed to provide high risk or low risk. We resolved disagreements by discussion and by referral to a third review author (TD). As we had anticipated that few studies might employ blinding, we assessed use of blocked randomisation in unblinded studies as a source of 'other' bias. In blocked randomisation, investigators use sequences of allocation assignment to balance enrolment between trial arms. In an unblinded study, this could contribute to risk of bias similar to that seen with poor allocation concealment. We assessed the quality of evidence by using Grades of Recommendation, Assessment, Development and Evaluation (GRADE) criteria, while taking into account risks of bias.

Measures of treatment effect

If appropriate, we had planned to use standardised mean differences (SMDs) to combine different outcome measures from different trials (Hedges 1982).

In studies that reported dichotomous data, we planned to calculate risk ratios (RRs) with 95% confidence intervals (CIs). For rare events (< 10%), we planned to calculate Peto odds ratios with 95% CIs. We planned to combine results for meta-analysis using fixed-effect or random-effects models, depending on heterogeneity (see Data synthesis).

Unit of analysis issues

Review authors expected that most studies would use the hand as the unit of randomisation. Assessing outcomes such as hand function would not be possible if individual fingers from the same hand were used as the unit of randomisation. We recorded the unit of randomisation (participant, hand, finger or unclear) for each included study.

We did not expect to identify any cross-over studies, given that the interventions described here are single-stage definitive treatments. We expected to find no cluster-randomised studies.

Dealing with missing data

We anticipated two types of missing data: unreported and withdrawn. If data were not reported in included trials, we contacted study authors to request assistance. We planned to attempt no imputation.

Assessment of heterogeneity

If appropriate, we planned to test statistical heterogeneity by visually inspecting graphs and by performing Chi^2 and I^2 statistical tests. We considered a Chi^2 test result with P value < 0.10 to be significant. We classified an I^2 test result greater than 50% as showing substantial heterogeneity.

Assessment of reporting biases

To reduce the risk of reporting bias, we searched multiple sources, including ProQuest (ABI/INFORM Global and Dissertations & Theses), to identify all published and unpublished results.

We drew funnel plots to assess risk of publication bias.

We searched ISI Web of Science to identify relevant results that had not been published. If we identified such work, we planned to contact study authors to ask for a copy of the data.

Data synthesis

We compared data from selected studies by using the statistical software of The Cochrane Collaboration, Review Manager (Review Manager 2011). If studies were sufficiently similar, we planned to undertake a meta-analysis. If we needed to perform meta-analyses, we planned to use the random-effects model.

When the same outcome measures were assessed with different scales, we would use SMDs.

However, we anticipated that data from different studies would be difficult to compare, and that a meta-analysis might be inappropriate. This would be the case particularly for the main outcome of 'recurrence' because of:

- differences in length of follow-up (recurrence rate increases with length of follow-up); and
- differences in the definition of 'recurrence'.

We would use a fixed-effect model to combine data if outcomes were homogeneous. If results were heterogeneous, we would undertake subgroup analysis to identify the reasons for heterogeneity. We would apply the random-effects model if we could find no reason for heterogeneity.

If the nature of the included studies did not allow for statistical analysis, we would use narrative (qualitative) summaries to present study results.

Subgroup analysis and investigation of heterogeneity

If we found significant heterogeneity, we would not pool the data and we would present a summary of methodological quality and study results. We would consider reasons for heterogeneity by performing subgroup analysis with regard to:

- length of time to follow-up;
- PIPJ and MCPJ outcomes separately, as it is well recognised that MCPJ contractures correct better than PIPJ contractures;
- severity of disease before operation (when provided, we expect that this will be given in the form of total passive extension deficit (i.e. sum of the passive extension deficit at the MCPJ and the PIPJ);
- number of joints involved; and
- postoperative treatment offered.

Sensitivity analysis

Outcome measures (e.g. the definition of recurrence) have been explained differently (Becker 2010). If appropriate, we would perform a sensitivity analysis to examine whether results vary according to different definitions used.

We would undertake sensitivity analysis in cases of missing data (e.g. intention-to-treat vs per-protocol analysis) to examine variations between approaches to analysis.

RESULTS

Description of studies

Results of the search

The search yielded 2464 references (see Figure 1). We removed 103 duplicates before screening abstracts.

Figure 1. Study flow diagram.

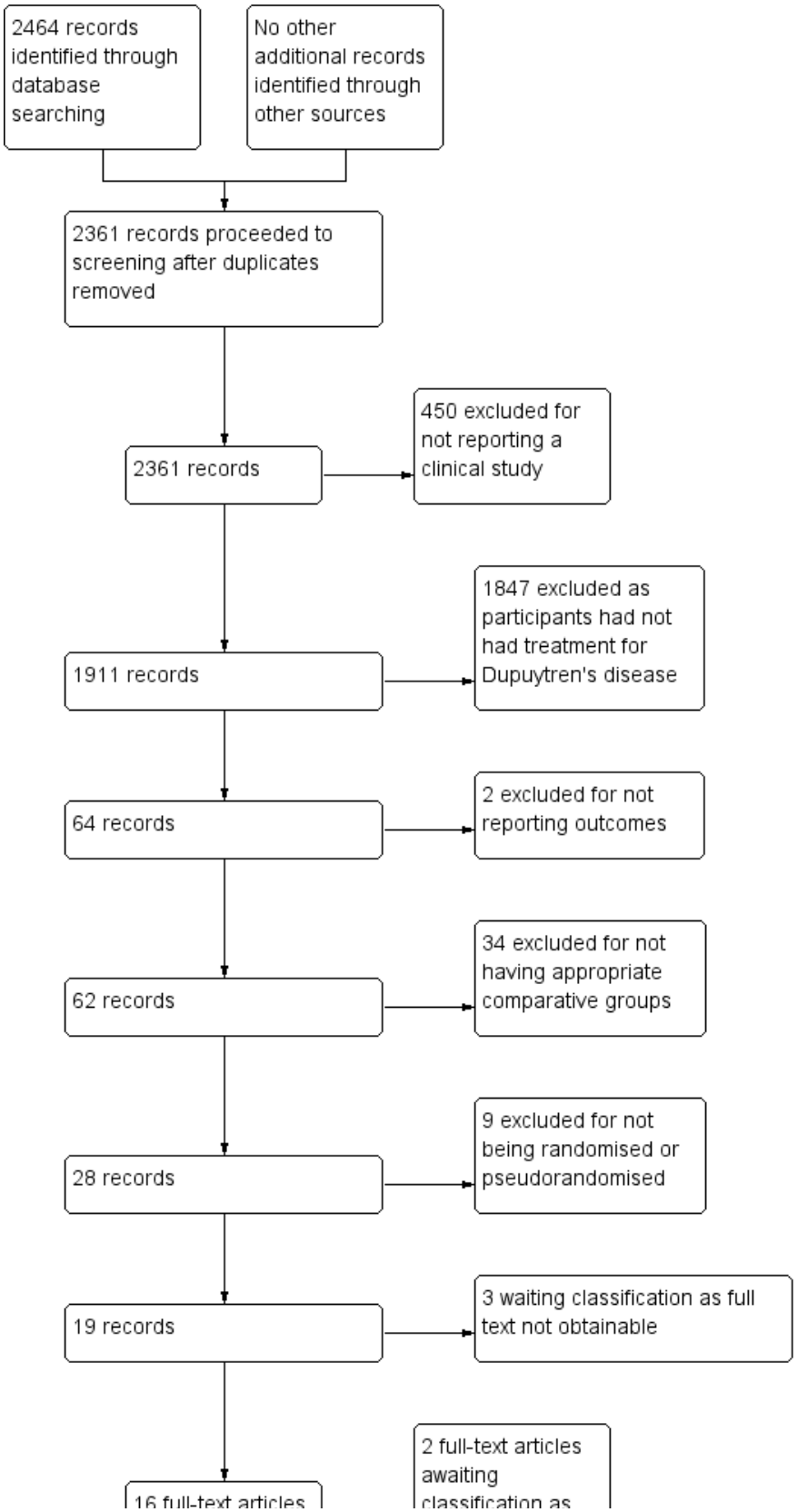
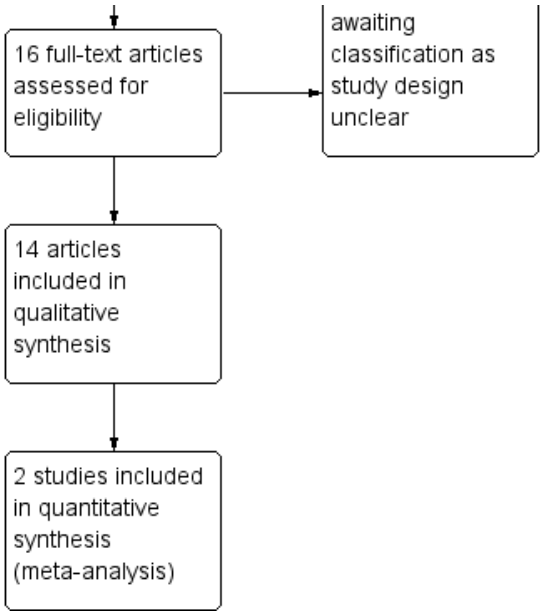


Figure 1. (Continued)



Of the remaining 2361 studies, we reviewed 16 full-text articles. We could not classify two because the full-text article did not adequately describe the study design, and it was not clear if studies were randomised or pseudorandomised (Hazarika 1979; Ward 1976). Both articles are over 35 years old, and we could not obtain clarification from study authors.

We included 14 full-text articles in the review (see Characteristics of included studies and Bhatia 2002; Bulstrode 2004; Chignon-Sicard 2012; Citron 2003; Citron 2005; Collis 2013; Degreef 2014; Howard 2009; Jerosch-Herold 2011; Kemler 2012; McMillan 2012; Ullah 2009; van Rijssen 2006; van Rijssen 2012a), and we excluded 2264 studies. These 14 articles described 13 studies, with one study described in both an early outcome paper (van Rijssen 2006) and a late outcome paper (van Rijssen 2012a).

Included studies

Eleven studies were single-centre studies; seven of these were based in the United Kingdom and one each in Canada, France, Belgium and New Zealand. Two articles were reports of one trial based in the Netherlands. We identified two multi-centre studies (Jerosch-Herold 2011; Kemler 2012). All five centres in Jerosch-Herold 2011 were located in the UK. Both centres in Kemler 2012 were located in the Netherlands. All studies were published in English. One study (Jerosch-Herold 2011) had an associated publication, which presented the trial protocol (Jerosch-Herold 2008).

The 14 studies included 940 participants; the 93 reported in van Rijssen 2012a were the same as those described in van Rijssen 2006. Thus 847 individual participants were recruited across all studies.

Interventions studied

We identified no articles in which investigators compared surgery versus observation.

Three articles described the outcomes of two trials that compared different surgical procedures (Ullah 2009; van Rijssen 2006; van Rijssen 2012a). One trial compared use of firebreak full-thickness skin grafts (a type of dermofasciectomy) versus z-plasty closure of a limited fasciectomy. Study authors refer to the original description of firebreak grafts in Hueston 1984. Here, firebreak grafts were described as small grafts strategically placed at flexion creases. In contrast, traditional dermofasciectomy may involve resurfacing of much larger areas of palmar skin (Seah 2012), which was achieved by conducting a limited fasciectomy, then excising palmar skin to accommodate the skin graft among those randomly assigned to this cohort. The other two articles reported early and late outcomes, respectively, for a single trial comparing needle fasciotomy versus limited fasciectomy.

Four of the other eleven articles compared surgical incision and wound management options (Bhatia 2002; Citron 2003; Citron 2005; Howard 2009). Bhatia 2002 and Howard 2009 compared staple closure against suture closure, and absorbable versus non-absorbable suture closures, respectively - both in limited fasciectomy. Citron 2003 and Citron 2005 studied types of incisions used for limited fasciectomy.

Three publications studied adjunctive treatments to surgery: One investigated bathing the operation site in 5-fluorouracil versus saline before closure (Bulstrode 2004), one compared use of steroid injections in conjunction with needle fasciotomy versus no adjunctive treatment (McMillan 2012) and the other compared tamoxifen versus placebo as neoadjuvant treatment in conjunction with fasciectomy (Degreef 2014).

The other four trials studied non-invasive adjuncts to surgery: Collis 2013, Jerosch-Herold 2011 and Kemler 2012 studied use of postoperative splints versus no splints, and Chignon-Sicard 2012 investigated use of a fibrin- and platelet-rich fibrin plug as a primary dressing versus a conventional low-adherence dressing for open palm surgery.

These different interventions can be used to classify studies into:

- those studying different treatment options;

- those refining a treatment option (e.g. limited fasciectomy incisions, closure types, invasive adjuncts, equipment usage); and
- those refining rehabilitation.

The first group comprises Ullah 2009, van Rijssen 2006 and van Rijssen 2012a, three other articles describe refining rehabilitation (Collis 2013; Jerosch-Herold 2011; Kemler 2012) and the remaining eight explore ways to refine intraoperative techniques.

Inclusion and exclusion criteria

Criteria were not always specified. Two articles did not provide inclusion and exclusion criteria (Bhatia 2002; Howard 2009). Of the other 12 studies, four specified age-related cutoffs for recruitment: younger than 70 years (Bulstrode 2004) and over 18 years of age (Chignon-Sicard 2012; Jerosch-Herold 2011; Kemler 2012). One study did not describe the ratio of participant genders (Howard 2009). None of the others explicitly excluded potential participants on the basis of gender, although one comprised only male participants (Bulstrode 2004).

Four studies excluded patients undergoing revision surgery (Citron 2003; Citron 2005; Degreef 2014; McMillan 2012). Of these, one study also excluded patients who had previously undergone other types of hand surgery (McMillan 2012).

Three studies specified site of disease within the hand. Citron 2003 included only patients with palmar disease affecting the MCPJ. In contrast, Ullah 2009 included only those with 30 or more degrees of contracture at the PIPJ. Jerosch-Herold 2011 excluded thumb and first webspace treatments. Citron 2005 recruited participants with Dupuytren's disease in one ray only.

Some studies used exclusion criteria related to co-morbidities that might influence outcome: Citron 2005, Ullah 2009, van Rijssen 2006 and van Rijssen 2012a excluded patients with bleeding tendencies. Diabetes mellitus was an exclusion criterion in Chignon-Sicard 2012 and McMillan 2012.

Some specific criteria were related to study design. For example, in Bulstrode 2004, participants had to receive treatment for two rays in one procedure, as one was randomly assigned to receive 5-fluorouracil, and the other to receive the control treatment of normal saline. In van Rijssen 2006 (and therefore van Rijssen 2012a), participants had to have well-defined cords of disease. This is a requirement for suitability for needle fasciotomy. Degreef 2014 excluded premenopausal women, patients taking anti-inflammatory drugs, those with a history of malignancy and patients with known allergy to tamoxifen.

Unit of analysis

The predicted unit of analysis was that randomisation would be performed by 'hand'. This could lead to enrolment of the same patient twice for surgery to each hand on separate occasions. van Rijssen 2006 and van Rijssen 2012a included four such cases. In contrast, in McMillan 2012, one participant with bilateral disease was entered only once in the trial. Similarly, in Citron 2005, six participants presented for randomisation twice for treatment of bilateral disease. They were enrolled only once in the trial. In the latter studies, the unit of randomisation was the 'participant'. Other studies reported specific individualised methods. Bulstrode 2004 used an internal control, with one digit on a hand randomly assigned to treatment, and another to control.

In terms of reporting recurrence, van Rijssen 2012a presented the number of hands and the number of participants who had developed deformity greater than 20 degrees in one joint. Other studies presented recurrence per participant (Citron 2003; Citron 2005; Degreef 2014). The only other study investigating recurrence was Ullah 2009, in which recurrence was described as the percentage of fingers that showed recurrence, rather than as the proportion of hands or participants.

Outcome measures

Outcomes measured varied between studies (Table 1). Specific outcomes were used for particular studies.

Length of follow-up varied between papers. Those investigating rehabilitation and early recovery varied from two-week follow-up (Bhatia 2002; Howard 2009) to six-week follow-up (van Rijssen 2006). Late outcome papers varied in length of follow-up from two years (Citron 2003; Citron 2005; Degreef 2014) to five years (van Rijssen 2012a).

Hand function

Several trials presented patient-reported outcomes. These included previously published patient-reported outcome measures (PROMs) such as DASH scale scores (Collis 2013; Degreef 2014; Jerosch-Herold 2011; van Rijssen 2006; van Rijssen 2012a) or the PEM (Ullah 2009). The design of studies such as Bulstrode 2004, with two digits on the same hand randomly assigned to different groups, would have prevented meaningful interpretation of patient-reported outcomes such as hand function.

Patient satisfaction and other patient-rated outcomes

Studies comparing procedure types (van Rijssen 2006; van Rijssen 2012a) reported patient satisfaction. However, although statistical significance was presented, investigators did not present full data. Furthermore, they did not describe or reference the development, validity and reliability of tools used to assess satisfaction. Collis 2013, Degreef 2014 and Jerosch-Herold 2011 also assessed satisfaction. Kemler 2012 assessed patient-perceived change. Some studies included self reported pain assessed by a visual analogue scale (VAS) (Bhatia 2002; Howard 2009; Kemler 2012). One study (Bhatia 2002) also reported patient-assessed wound appearance, although development, validity or reliability of the tool used was not described or referenced.

Early angles and other objective outcomes

Angular deformity was presented in different ways. Some investigators presented active finger angles (Bulstrode 2004; Collis 2013; Jerosch-Herold 2011; Kemler 2012; McMillan 2012), and others presented passive angles (van Rijssen 2006; van Rijssen 2012a). In some studies, it was not clear whether the angles presented were active or passive (Citron 2003; Citron 2005; Degreef 2014; Ullah 2009). Presentation of angular measurements varied between early and late outcomes of the same clinical trial (van Rijssen 2006; van Rijssen 2012a). Other objective outcomes measured included timings. Three studies presented analyses of time taken to perform key tasks involved in surgery or postoperative care (Bhatia 2002; Howard 2009; Ullah 2009).

Bulstrode 2004 and Chignon-Sicard 2012 presented time to healing. Collis 2013 and Ullah 2009 studied grip strength.

Recurrence

Studies that reported comparisons of operative technique considered recurrence in late outcome papers (Citron 2003; Citron 2005; Degreef 2014; Ullah 2009; van Rijssen 2012a) and extension deficit at early outcome points (Ullah 2009; van Rijssen 2006). The definition of recurrence varied from reappearance of palpable disease in the operated field (Citron 2003; Citron 2005) to recurrent angular deformity (Degreef 2014; Ullah 2009; van Rijssen 2012a).

Within trials comparing different procedures, recurrence was defined as an increase in joint angle of 20 or more degrees in van Rijssen 2012a and was not explicitly defined in Degreef 2014 or Ullah 2009. However, researchers discussed 'progressive recurrence of contracture', suggesting that angular deformity rather than reappearance of palpable disease accounted for this.

Adverse effects

Adverse effect reporting varied from not studying complications in a study of rehabilitation adjuncts (Jerosch-Herold 2011), to describing 'no intraoperative complications' (Bulstrode 2004) or 'no complications' (Citron 2003), to describing and attempting to quantify specific complications (Chignon-Sicard 2012). No standardisation was evident regarding which adverse effects were studied, even between similar studies.

Cost-effectiveness

No included studies presented formal cost-effectiveness analyses, although several articles did assess cost-effectiveness. However, these studies were not randomised and were not pseudorandomised, so we excluded them. Three studies presented analyses of time taken to perform aspects of surgery or postoperative care (Bhatia 2002; Howard 2009; Ullah 2009) that would be expected to have cost-effectiveness implications.

Summary

The primary objective of this review was to study trials comparing different treatment options. This group comprises only three papers describing two trials, and these two trials compared different interventions using different inclusion and exclusion criteria. Ullah 2009 compared small firebreak full-thickness skin grafting versus z-plasty closure of limited fasciectomy for contractures involving the PIPJ. In contrast, van Rijssen 2006 and van Rijssen 2012a described a trial comparing needle fasciotomy versus limited fasciectomy, with inclusion criteria including contractures that may not necessarily affect the PIPJ.

Among trials refining intraoperative techniques, all compared different interventions. Among trials refining rehabilitation adjuncts, two (Collis 2013; Jerosch-Herold 2011) investigated the same intervention using comparable measures and time points, allowing meta-analysis.

Excluded studies

In all, we excluded 450 studies on the basis of Q1 in Appendix 9 (i.e. they did not report the outcome of a clinical trial), and 1847 on the basis of Q2 in Appendix 9 (i.e. study participants had not undergone surgery for Dupuytren's disease of the fingers). We excluded two publications on the basis of Q3 in Appendix 9, as investigators reported a study protocol but no results (Jerosch-Herold 2008 reported the study protocol for Jerosch-Herold 2011). We excluded 34 studies on the basis of Q4 in Appendix 9 (i.e. two interventions were not compared, or no control group was included), and nine studies on the basis of Q5 in Appendix 9 (i.e. these studies were not randomised and were not pseudorandomised). We have described the studies in these three categories under Characteristics of excluded studies.

Three studies provided inadequate details in the abstract and references to allow a decision (Gazdzik 1997; Slullitel 1987; Yoshida 1998), and we could not obtain the original paper. We excluded them on this basis.

Risk of bias in included studies

We presented risk of bias for each study under Characteristics of included studies and summarised study results in Figure 2 and Figure 3.

Figure 2. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.

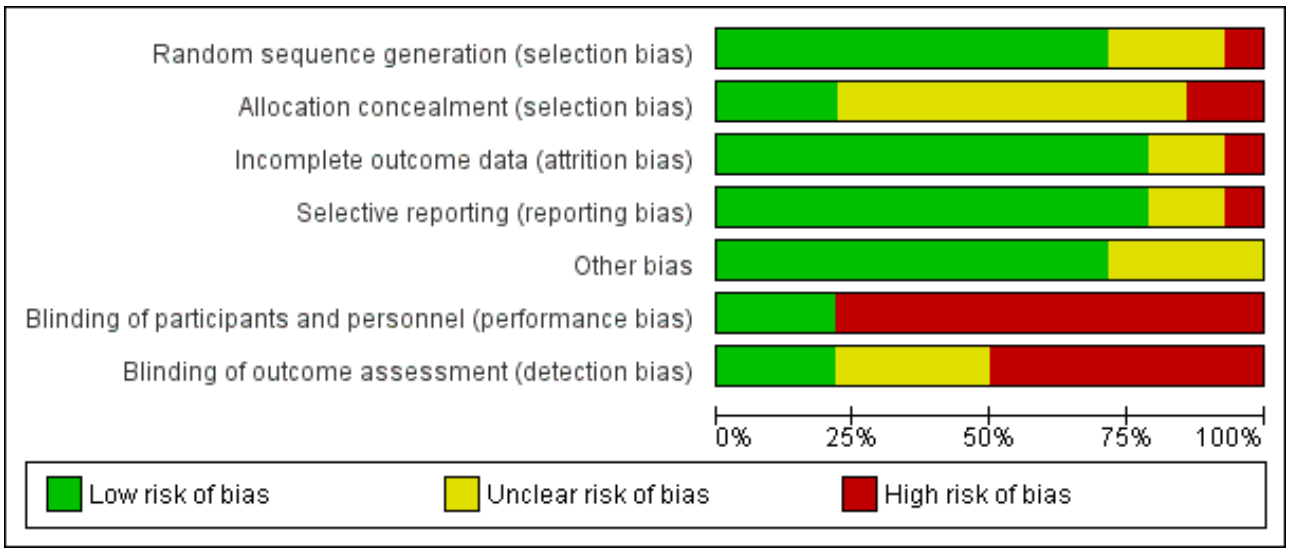
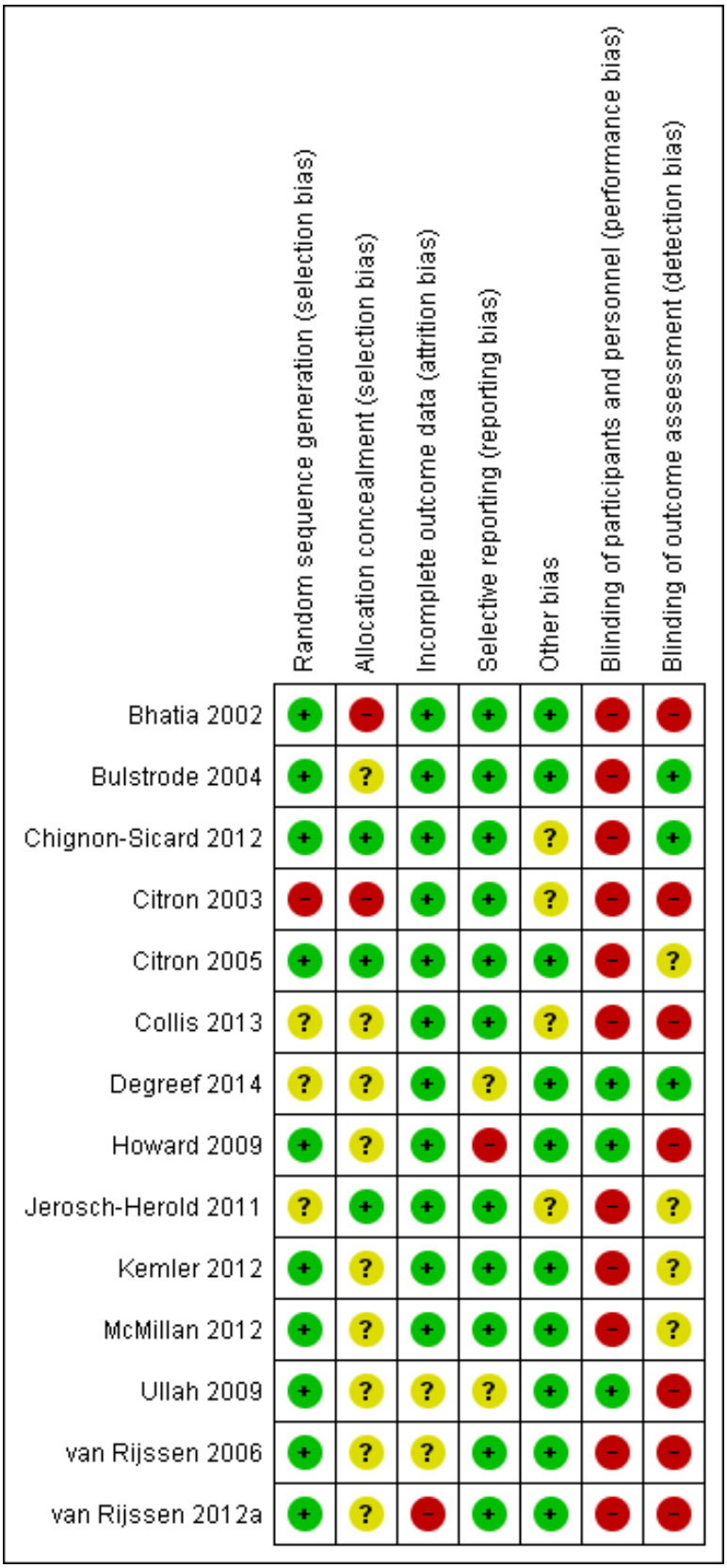


Figure 3. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.



Allocation

Three trials did not explain the randomisation process used, and one used alternation. The remaining nine studies used acceptable randomisation processes. Allocation concealment was poorly described, with only three studies adequately describing secure processes. Allocation concealment processes were robust in Chignon-Sicard 2012, Citron 2005 and Jerosch-Herold 2011 only. The former two of these studies listed here described sealed, sequentially numbered opaque envelopes, whereas Jerosch-Herold 2011 used telephone randomisation from another site but did not specify how the random sequence was generated. Four other articles used numbered sealed containers (envelopes or boxes) but did not describe whether they were opaque (Degreef 2014; Ullah 2009; van Rijssen 2006; van Rijssen 2012a). Other studies provided similar inadequate details on concealment.

Blinding

As the treatment involved is a surgical procedure, it is acknowledged that many trials are likely to be at high risk of performance bias, as the surgical team performing the procedure cannot always be blinded. In Degreef 2014, double-blinding was possible, as the intervention was a medical adjunct to surgery. However, trials of wound closure and adjuncts could defer randomisation until after the corrective element of the procedure had been completed. This was done only in Ullah 2009. Several other studies (Bhatia 2002; Bulstrode 2004; Chignon-Sicard 2012; Howard 2009; McMillan 2012) could have deferred randomisation in this way to reduce the impact of performance bias on other parts of the procedure, but they did not.

Few studies explicitly described blinding of assessment. Bulstrode 2004 employed double-blinding of the participant as well as the assessor. It is acknowledged that such blinding may be difficult to achieve in comparisons of procedures that leave distinctive and very different scar patterns on the hand (such as needle fasciotomy and fasciectomy). Chignon-Sicard 2012 also described blinding of outcome assessment.

Incomplete outcome data

Several studies did not formally describe attrition. van Rijssen 2012a, the study with the longest follow-up period, described significantly different levels of attrition between groups, which could have been influenced by treatment outcomes. Articles classified as having 'unclear' risk did not explicitly describe levels of attrition experienced.

Selective reporting

One study (Howard 2009) excluded outliers despite formal testing of the normality of data distribution and the decision to use non-parametric statistics. The primary conclusion of the study could become invalid with these outliers included in the analysis. Researchers described no protocol for their exclusion. One further study (Ullah 2009) listed the greatest number of secondary outcomes but did not describe them in detail and presented some only graphically.

Other potential sources of bias

As many studies were expected to be unblinded, we considered risks of blocked randomisation in such studies. This risk was unclear in four articles (Chignon-Sicard 2012; Citron 2003; Collis 2013; Jerosch-Herold 2011), which provided inadequate detail to allow exclusion of this risk of bias.

Effects of interventions

See: **Summary of findings for the main comparison** Summary of findings table 1: comparison of operation types: early results of needle fasciotomy vs limited fasciectomy for Dupuytren's disease; **Summary of findings 2** Summary of findings table 2: comparison of operation types: late results of needle fasciotomy vs limited fasciectomy for Dupuytren's disease; **Summary of findings 3** Summary of findings table 3: comparison of operation types: firebreak skin grafting vs z-plasty closure of fasciectomy for Dupuytren's disease; **Summary of findings 4** Summary of findings table 4: refining rehabilitation: three months of postoperative night splinting with hand therapy vs hand therapy alone for rehabilitation following surgery for Dupuytren's disease

Comparison of procedure types

Needle fasciotomy versus fasciectomy

One trial compared these procedures and reported early and late outcomes separately (van Rijssen 2006; van Rijssen 2012a). The early outcome article (van Rijssen 2006) reported 125 hands in 121 participants. The late outcome article (van Rijssen 2012a) included 93 participants from the original cohort. This comparison involved low-quality evidence related to study design limitations and imprecision.

Hand function

Low-quality evidence suggests that hand function, as determined by the DASH PROM, may be statistically significantly less after needle fasciotomy than after fasciectomy at all time points up to five weeks following surgery (P value = 0.017 at five weeks) (van Rijssen 2006). However, only 97 of 121 (80%) participants completed the PROM tool adequately to allow analysis. van Rijssen 2012a provided no evidence describing later functional outcomes.

Patient satisfaction and other patient-rated outcomes

Low-quality evidence indicates that patient satisfaction may be significantly greater for the needle fasciotomy group than for the fasciectomy group at six weeks (P value = 0.003 in van Rijssen 2006). Low-quality evidence also shows that by five years, patient satisfaction had reversed; satisfaction was significantly greater for fasciectomy (P value < 0.001 in van Rijssen 2012a), and overall satisfaction was less among patients with recurrence (P value < 0.001 in van Rijssen 2012a). However, the tools used may not have been robustly developed or validated, as has been discussed (Description of studies), and data presented were incomplete.

Early angles and other objective outcomes

Low-quality evidence suggests that correction of total passive extension deficit was not different between procedures for milder contractures (Tubiana stages I and II, which equates to total passive extension deficit across all joints less than 90 degrees) by six weeks, but limited fasciectomy achieved significantly better correction for more severe contractures (Tubiana stages III and IV, i.e. over 90 degrees of total passive extension deficit) (see Table 2).

Recurrence

Low-quality evidence indicates that recurrence may be significantly greater five years after needle fasciotomy (84.9% of hands after

fasciotomy vs 20.9% of hands after fasciectomy; P value < 0.001 in van Rijssen 2012a).

Adverse effects

Low-quality evidence suggests that complication rates were similar between procedures in terms of infection, haematoma, wound slough, skin fissure, sympathetic dystrophy, altered sensation, digital nerve injury, tendon injury and revision surgery. The incidence of paraesthesia was statistically significantly greater after limited fasciectomy than after fasciotomy one week after treatment (P value = 0.013).

Cost-effectiveness

No published data were found comparing the cost-effectiveness of needle fasciotomy and fasciectomy.

Summary

Evidence indicates that needle fasciotomy delivered better satisfaction and function than fasciectomy at early outcomes, although poor rates of completion of the PROM were an issue. Fasciectomy was more effective in correcting severe disease. Recurrence was greater at five years after needle fasciotomy, although functional outcomes had not been described. The cost-effectiveness of performing multiple needle fasciotomies rather than a single fasciectomy over a given period had not been studied. Study design limitations and imprecision reduced the quality of the evidence. At present, evidence in key areas is insufficient to show which treatment is superior overall.

Dermofasciectomy versus fasciectomy

One study compared firebreak skin grafting versus direct closure of fasciectomy (Ullah 2009) and provided low-quality evidence. Investigators included 79 participants and presented a large quantity of data only graphically.

Hand function

Hand function, as determined by the PEM PROM, was not different between fasciectomies and firebreak dermofasciectomies at 36 months. Investigators presented earlier time points only graphically.

Patient satisfaction and other patient-rated outcomes

We found no published data that compared these outcomes for fasciectomies and firebreak dermofasciectomies.

Early angles and other objective outcomes

Grip strength, angular deformity and motion at the PIPJ all correlated at 36 months. No differences between groups were evident throughout the study, although the data supporting this were presented graphically only.

Recurrence

We noted no differences between firebreak dermofasciectomies and fasciectomies in terms of recurrence, defined as progressive contracture, and time to recurrence.

Adverse effects

We found no differences between procedures in terms of antibiotic requirement, skin necrosis, wound dehiscence, radial hypoaesthesia or reflex sympathetic dystrophy. We noted a significantly greater incidence of ulnar hypoaesthesia after firebreak dermofasciectomy.

Cost-effectiveness

We identified no formal cost-effectiveness analysis data. However, we noted that firebreak dermofasciectomy took significantly longer to perform than fasciectomy involving z-plasty closure (79 vs 66 minutes; P value = 0.01).

Summary

Low-quality evidence indicates that firebreak dermofasciectomy and fasciectomy with z-plasty closure performed similarly. Given that firebreak dermofasciectomy took longer to perform, evidence does not support its routine use. However, we cannot extend this conclusion to other approaches to dermofasciectomy involving larger skin grafts. We obtained no data on comparison of other approaches versus dermofasciectomy and fasciectomy.

Technical refinements

Type of incision

Two articles studied incisions and included 30 and 100 participants, respectively. The first compared z-plasty closure versus direct closure of a transverse incision for fasciectomy (Citron 2003). The second compared a zig-zag (Bruner's) incision with direct closure versus a longitudinal incision with z-plasty closure for fasciectomy (Citron 2005). Researchers provided low-quality evidence related to study design limitations and imprecision.

Hand function

We found no data that described this.

Patient satisfaction and other patient-rated outcomes

We found no data that described this.

Early angles and other objective outcomes

We found no evidence of differences between a zig-zag incision and a z-plasty closure in terms of deformity or extension.

Recurrence

Low-quality evidence suggests that z-plasty closure of a palmar fasciectomy had significantly less recurrence (reappearance of palpable disease) than was seen with direct closure of a transverse incision (P value < 0.01 when trial recruitment was stopped at the interim analysis point in Citron 2003). Researchers reported no differences in recurrence defined this way between a zig-zag incision and a z-plasty closure.

Adverse effects

Investigators in Citron 2003 encountered no complications. In Citron 2005, researchers comparing a zig-zag incision versus a z-plasty reported no differences in total complications, algodystrophy and digital nerve injury.

Cost-effectiveness

We identified no formal cost-effectiveness analysis data.

Summary

Low-quality evidence supported z-plasty closure over direct closure of transverse incisions for MCPJ cords and showed no

differences between a zig-zag incision and a z-plasty closure for fasciectomy.

Wound closure

Two studies (Bhatia 2002; Howard 2009) investigated wound closure. Bhatia 2002 compared staple closure versus non-absorbable suture closure in 31 participants. Howard 2009 compared absorbable suture closure versus non-absorbable suture closure for fasciectomy in 62 participants. Both trials provided low-quality evidence related to study design limitations and imprecision.

Hand function

We found no data that described this.

Patient satisfaction and other patient-rated outcomes

Bhatia 2002 found no differences in patient-reported wound appearance at two weeks between those who received staples and those given non-absorbable sutures. Removal of staples was more painful than removal of non-absorbable sutures (P value = 0.008 in Bhatia 2002). Howard 2009 found no differences in visual analogue scale (VAS) pain scores between absorbable and non-absorbable suture groups at the first postoperative visit.

Early angles and other objective outcomes

Staple closure was quicker to perform than non-absorbable suture closure (P value < 0.001 in Bhatia 2002). Absorbable suture closure incurred less clinic time for management than non-absorbable suture closure, once outliers were excluded (P value = 0.003 in Howard 2009). However, exclusion of outliers from a non-parametric analysis may not have been appropriate and may invalidate this finding.

Recurrence

We found no data that described this.

Adverse effects

Neither study performed formal analyses of differences in complications between groups. However, complication rates were low for both groups in both studies.

Cost-effectiveness

We identified no formal cost-effectiveness analysis data. Analysis of timings as presented in Howard 2009 may not be robust, as has been explained.

Summary

Staple closure may be quicker to perform than suture closure and may achieve a comparable early wound appearance. However, removal of staples may be more painful.

In Howard 2009, absorbable sutures achieved early outcomes comparable with those of non-absorbable sutures and were reported to require less clinic time for postoperative management. However, the evidence was incomplete, and the quality of evidence was low. In particular, the main conclusion in Howard 2009 may not be valid, as the statistical analysis performed may have been inappropriate.

Intraoperative adjuncts

Two studies investigated intraoperative adjuncts to surgery. Each considered a different intervention. Bulstrode 2004 investigated bathing a fasciectomy wound in 5-fluorouracil compared with control, included 15 participants and provided low-quality evidence. McMillan 2012 compared a postoperative series of steroid injections as an adjunct to needle fasciotomy versus no injections in 47 participants and provided low-quality evidence related to study design limitations and imprecision.

One other study (Degreef 2014) considered a medical adjunct spanning the perioperative period. Researchers compared tamoxifen versus placebo administered preoperatively and postoperatively as an adjunct to fasciectomy, included 30 participants and provided low-quality evidence.

Hand function

Degreef 2014 reported no differences in hand function as assessed by the DASH Scale at one year for tamoxifen versus placebo as an adjunct to fasciectomy. We found no other data that described this.

Patient satisfaction and other patient-rated outcomes

Degreef 2014 reported that satisfaction was not significantly different between groups at three months. We found no other data that described this.

Early angles and other objective outcomes

Bulstrode 2004 found no differences between 5-fluorouracil treatment and control treatment in terms of healing time, total active motion and loss of extension. In McMillan 2012, a series of steroid injections resulted in significantly greater percentage improvement in total active extension deficit at all time points. In Degreef 2014, relative improvement in extension deficit, as quantified by the Tubiana index, was significantly better in the tamoxifen group than in the placebo group.

Recurrence

Bulstrode 2004 found no differences between 5-fluorouracil treatment and control treatment in terms of loss of extension nor total active motion at 18 months. McMillan 2012 reported significantly greater percentage improvement in total active extension deficit at six months (65% correction for steroid group vs 41% for control group; P value = 0.04) and in MCPJs and PIPJs considered separately at six months. In Degreef 2014, only one participant in the tamoxifen group experienced recurrence.

Adverse effects

Bulstrode 2004 and McMillan 2012 reported no complications. Degreef 2014 provided a narrative description of adverse events.

Cost-effectiveness

We found no data that described this.

Summary

We found no evidence of benefit nor harm resulting from addition of a 5-fluorouracil bath at completion of a fasciectomy, although function and long-term outcomes (beyond 18 months) were not studied. Evidence suggests that a series of steroid injections provided after needle fasciotomy may achieve and maintain better correction of contractures than needle fasciotomy alone, although

we found no long-term data, and available evidence was of low quality. Evidence indicates that a perioperative course of tamoxifen may improve early correction of deformity, but that any potential effect was lost by two-year follow-up.

Rehabilitation adjuncts

We identified four studies that investigated adjuncts that might aid rehabilitation. Collis 2013 and Jerosch-Herold 2011 compared three months of static postoperative splinting versus no postoperative splinting. Kemler 2012 also investigated postoperative splinting; the intervention arm underwent day and night splinting for a month, then night splinting for two months, and the study included 154 participants. Chignon-Sicard 2012 studied application of fibrin- and platelet-rich fibrin plug to open palmar wounds after fasciectomy to identify whether this improved healing. All studies provided low-quality evidence related to study design limitations and imprecision.

The primary aim of this review had been to study operative techniques. However, as rehabilitation adjuncts are components of hand therapy in Dupuytren's disease, these trials did meet the inclusion criteria specified in the protocol and have been included.

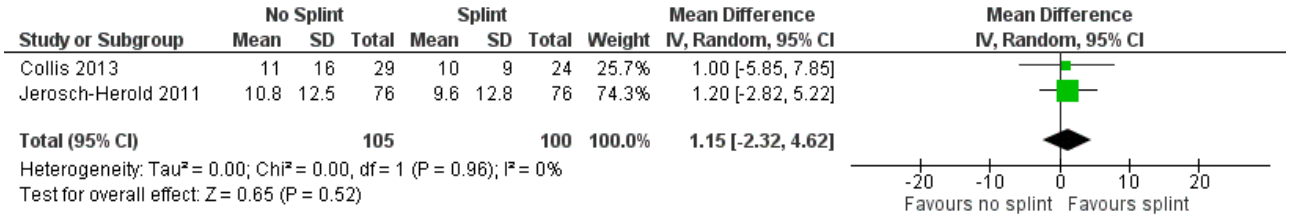
The published article for Collis 2013 did not provide all relevant data. We contacted study authors, who provided the necessary data for per-protocol analyses.

Hand function

Hand function, as assessed with the DASH PROM, was not affected by postoperative splinting at three months, six months and 12 months (Jerosch-Herold 2011). Collis 2013 also found no effect when analysing individual time points up to three months postoperatively. In the latter study, investigators combined time points because no differences were found with a mixed-effect model.

Meta-analysis of these two studies demonstrated no significant heterogeneity at baseline (Analysis 1.1), and an intention-to-treat analysis showed no differences in function between splint and no splint groups at three-month follow-up (Analysis 2.1; Figure 4). However, per-protocol groups were different from intention-to-treat groups, as participants in the 'no splint' group who experienced early re-contracture were then given a splint, and some participants in the splint group were not compliant with splinting (defined as self report of < 50% compliance). No differences between 'splint' and 'no splint' groups were apparent when data were analysed per protocol (Analysis 3.1).

Figure 4. Forest plot of comparison: 2 Effects of 3 months of postoperative night splinting (intention-to-treat), outcome: 2.1 DASH score at 3 months.



Patient satisfaction and other patient-rated outcomes

Patient satisfaction was not different among those receiving postoperative splinting and those not receiving splinting, as assessed by an 11-point verbal rating scale (Jerosch-Herold 2011). However, the validity and reliability of this scale were not described or cited. Patient-perceived changes were not significantly different between groups in Kemler 2012.

Early angles and other objective outcomes

As with hand function, no significant heterogeneity between studies was apparent at baseline (Analysis 1.2; Analysis 1.3). Total active flexion and total active extension were not different among those who received postoperative splinting at three, six or 12 months (Jerosch-Herold 2011). Collis 2013 found no differences in total active extension or flexion. Meta-analysis of three-month follow-up results from both studies revealed no differences in total active extension between splint and no splint groups (Analysis 2.2; Figure 5) but showed a significant difference in total active flexion, with splint group participants achieving 8.42 degrees less total active flexion than no splint group participants (Analysis 2.3; Figure 6). As discussed in the section on hand function above, intention-to-treat analyses were complicated by the fact that some in the 'no splint' group were given a splint if they experienced early re-contracture, and some in the 'splint' group were non-compliant. When meta-analyses were performed on the basis of per-protocol data, no differences were found between groups in terms of total active extension (Analysis 3.2), but the significant difference in total active flexion shown in Analysis 2.3 was more pronounced (Analysis 3.3).

Figure 5. Forest plot of comparison: 2 Effects of 3 months of postoperative night splinting (intention-to-treat), outcome: 2.2 Total active extension at 3 months [degrees].

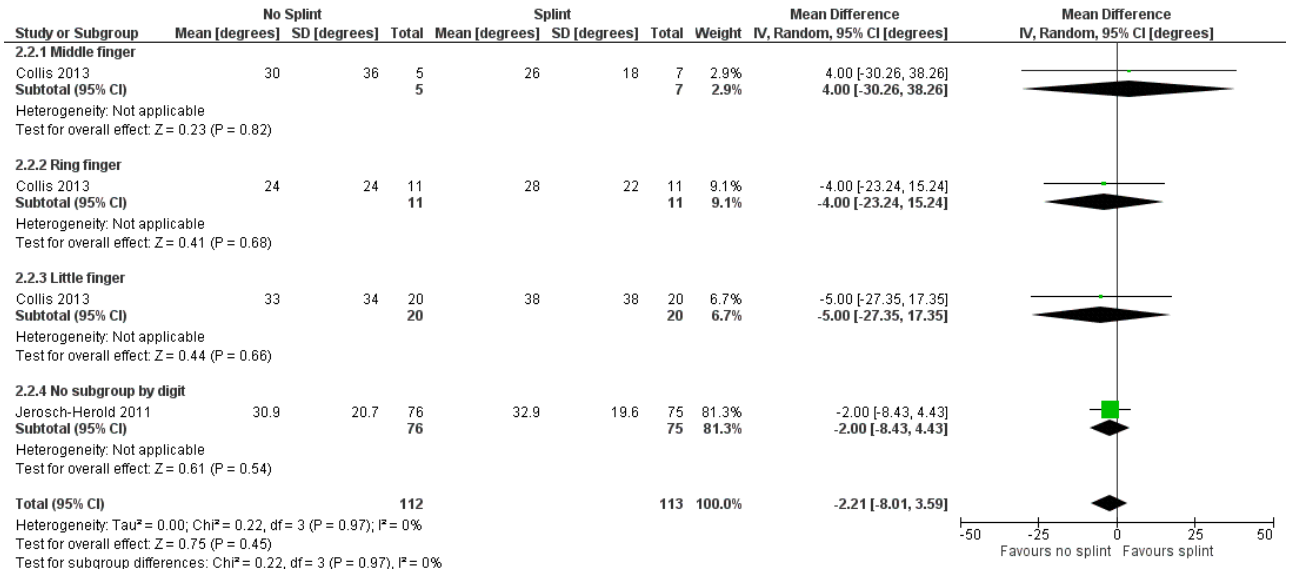
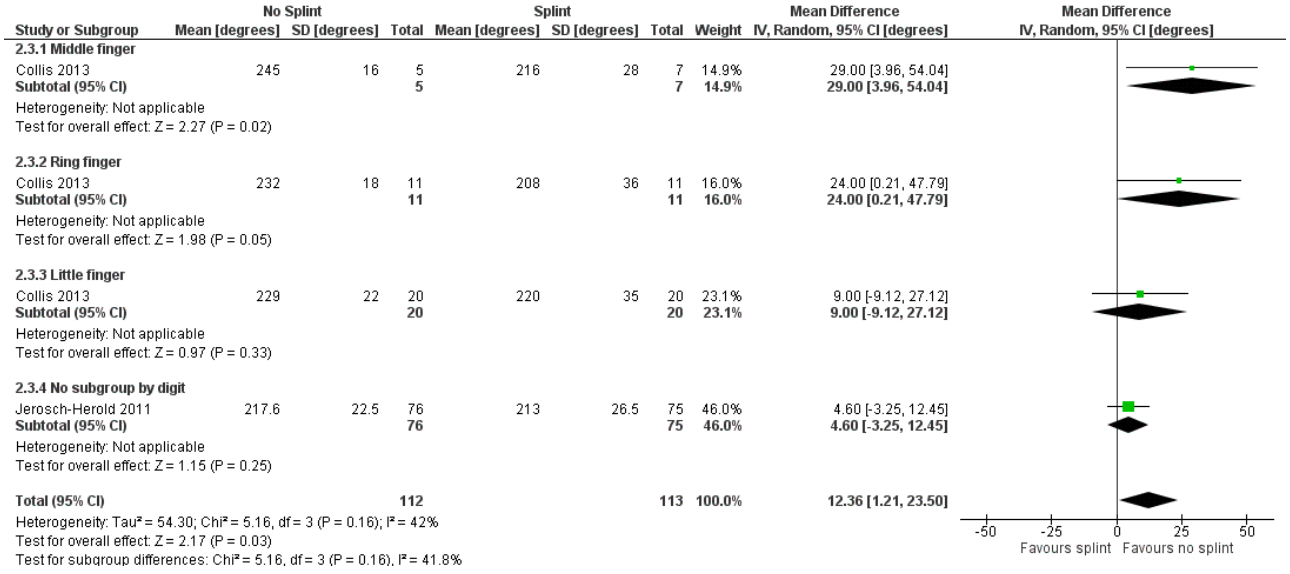


Figure 6. Forest plot of comparison: 2 Effects of 3 months of postoperative night splinting (intention-to-treat), outcome: 2.3 Total active flexion at 3 months [degrees].



Chignon-Sicard 2012 reported statistically significantly shorter healing delay from application of a fibrin- and platelet-rich fibrin plug to the open palmar wound versus control (median 24 days vs median 29 days) but no differences in secondary endpoints.

Recurrence

Chignon-Sicard 2012, Collis 2013, Jerosch-Herold 2011 and Kemler 2012 did not study recurrence.

Adverse effects

Chignon-Sicard 2012 studied bleeding and exudate and reported no significant differences between intervention and control groups. Investigators discussed other rare adverse events, including wound and chest infection.

Cost-effectiveness

No articles provided formal cost-effectiveness analysis data.

Summary

Evidence showing that postoperative splinting improves rehabilitation after fasciectomy or dermofasciectomy is lacking, but available evidence shows that three months of night splinting reduces total active flexion at three months.

DISCUSSION

Summary of main results

Outcomes measured

Review authors noted variation between studies in primary outcome measures assessed. Although some of this might be expected, for example, time taken for staple removal rather than recurrence as a long-term outcome, the extent of variation within groups of studies limits the usefulness of the data presented, as well as their interpretation. Such variation is seen across lower-quality studies as well. Providing no definition of recurrence, as was the case in Ullah 2009, is commonplace (Becker 2010) and limits interpretation of data.

Recurrence defined as the reappearance of palpable disease, as in Citron 2003 and Citron 2005, is acknowledged as generating qualitative data (Werker 2012). When detection bias is a risk, as in Citron 2003, the combination of an unblinded assessor and outcomes defined in a binary but subjective manner might be expected to be unsound. Additionally, this outcome is not a sensible option for studying fasciotomy, as palpable disease is never cleared from the treated field in the first place. Therefore, its use in Citron 2003 is not appropriate.

Even within studies that use angular deformity to define outcomes and recurrence, wide variation is evident in what exactly is measured and how it is described and presented (Ball 2013). Angles may be presented as the passive angles obtained by an assessor, as in van Rijssen 2006 and van Rijssen 2012a, or as active extension achieved unsupported by the participant, as in McMillan 2012. Such angles may differ, influencing study outcomes.

Although we could not perform meta-analysis to compare operation types because of the paucity of comparable trials, it is probable that even if additional data are generated in the future, meta-analysis would not be possible without standardisation of follow-up length and outcome measures used. As Dupuytren's disease is a slowly progressive condition (Luck 1959), recurrence is likely to increase with longer periods of follow-up. Furthermore, an understanding of the natural history of the condition (Luck 1959) suggests that recurrence defined as reappearance of palpable disease is likely to be encountered earlier than recurrence defined as deteriorating angular deformity. These inconsistencies contribute to the wide variation in recurrence rates reported in the existing literature - from 0% to 71% (Becker 2010). Other groups have noted the need for clarity and consistency (Werker 2012). This review reiterates this and calls for more detailed study of the validity and reliability of outcome measures to ensure that the most appropriate outcomes are assessed at consistent and meaningful time points. Furthermore, recurrence of palpable disease and recurrence of angular deformity may not be truly relevant endpoints. Assessment of hand function through patient-reported and patient-centred measures may be more appropriate. Some of the studies included in this review used patient-reported outcomes as a secondary endpoint.

Marked variation is evident in data reported by study authors as secondary outcomes. In part, this is a result of the study question selected, although outcomes handled as 'secondary' measures in studies were classified as appropriate primary outcome measures in this review, for example, patient-reported hand function. However, trials of procedure types and technical refinement varied in that some recorded numerous secondary measures (Ullah 2009) and others recorded virtually none other than complications (McMillan 2012). In Ullah 2009, not all outcomes were reported fully other than in graphs, raising an unclear possibility of reporting bias. Furthermore, even if the data had been fully reported, the value of capturing all outcomes is not clear. One secondary outcome measure of importance is assessment of health-related quality of life. Systems for analysing cost-effectiveness are informed by data describing this, and data are captured by PROMs such as the EuroQol 5 Domain scale (EuroQol-5D) (NICE 2008). Functional outcomes represent patient-centred outcomes and may be of pragmatic interest to commissioners of health care. Use of patient-reported data has been promoted nationally in the UK (Darzi 2008). This review cannot examine which of the range of PROMs available for use in Dupuytren's disease (Ball 2013) is most appropriate for use in future research. Recent reviews have called for further study of outcome measures (Ball 2013; Becker 2010; Werker 2012). To date, only a few studies have included patient-reported hand function. Data captured by the PEM in Ullah 2009 were not described in detail in the paper. The DASH scale used in Degreef 2014, van Rijssen 2006 and van Rijssen 2012a has been the most popular measure across all studies of Dupuytren's disease (Ball 2013). DASH data presented in van Rijssen 2006 did not support the same conclusions as were reached by measuring angles; needle fasciotomy fared better throughout early rehabilitation in terms of DASH scores, despite the fact that fasciectomy arguably provided better correction of angular deformity in general. Thus, the conclusions drawn in this paper are likely to vary considerably, depending on which outcome is considered to be of primary importance. van Rijssen 2012a did not include corresponding late outcome function data. Given the value of health-related quality of life data for accepted cost-effectiveness analyses (NICE 2008), and the wide variation in reporting of angles in the literature (Ball 2013), future pragmatic trials might consider patient-reported outcomes as the primary outcome measures, with joint angles demoted in importance. Furthermore, such a change might support the design of pragmatic studies. Ullah 2009 measured a variety of secondary outcomes. However, separating the primary outcome from complications may limit the clinical applicability of research findings. If an intervention achieves low rates of recurrence but does so with significant risk of complications such as chronic regional pain syndrome, cold intolerance and loss of grip strength or flexion, it may still fail to achieve meaningful clinical improvement for patients and cost-effectiveness for commissioning bodies. Reports of early and late outcomes of the trial comparing fasciectomy and needle fasciotomy (van Rijssen 2006; van Rijssen 2012a) considered patient satisfaction, as did a trial on the use of tamoxifen as an adjunct to surgery (Degreef 2014), although the validity and reliability of these assessments were not clear. As already discussed for angular measurements, further work is urgently required to establish the validity and reliability of patient-reported outcome measures.

Comparison of procedure types

We identified no studies in which surgery was compared with observation. Given that Dupuytren's disease typically is slowly progressive and is not life-threatening, such comparisons would be informative.

The trial reported in van Rijssen 2006 and van Rijssen 2012a suggests that needle fasciotomy may achieve angular correction

comparable with that of limited fasciectomy for milder Tubiana I and II contractures, but inferior correction for Tubiana III and IV contractures. However, this procedure leads to less functional impairment in the early postoperative phase (up to five weeks in van Rijssen 2006), earlier recovery and higher early patient satisfaction. By five years, it results in significantly higher recurrence and lower satisfaction than fasciectomy. The considerable difference in recurrence rates between fasciotomy and fasciectomy may be interpreted as demonstrating that fasciotomy is an inferior treatment. However, attrition bias may have affected late outcomes, and late functional outcomes were not recorded. As fasciotomy is less invasive, with quicker recovery (van Rijssen 2006), recurrence alone may not comprehensively describe late functional outcomes. Patient satisfaction is an important outcome for measurement, but perhaps it should be combined with, rather than used instead of, valid measures of hand function, as it might be influenced by factors besides the functional efficacy of treatment.

It might not be reasonable to expect needle fasciotomy, a demonstrably less invasive procedure that can be repeated for recurrent disease (van Rijssen 2012b), to achieve a durable effect comparable with that achieved by the more invasive fasciectomy. A more pragmatic study might consider early and late functional outcomes in groups randomly assigned to receive one fasciectomy or multiple needle fasciotomies over a period of years, with cost-effectiveness calculated on the basis of functional outcomes and treatment pathway expenses.

Comparison of fasciectomy with z-plasty closure versus firebreak skin grafting in Ullah 2009 revealed no differences between groups, other than prolonged operation time for skin grafting. This suggests that firebreak skin grafting may not prevent recurrence better than fasciectomy. However, dermofasciectomy comprises a spectrum, with small skin grafts used as firebreaks in Ullah 2009 at one end, and much more extensive skin grafts at the other end (Seah 2012). Thus, further comparison between limited fasciectomy and dermofasciectomy is needed.

Investigations of postoperative splinting

This was the only area in which meta-analysis was possible. Recruitment for Collis 2013 began before Jerosch-Herold 2011 was published. However, earlier publication of the trial protocol for Jerosch-Herold 2011 (Jerosch-Herold 2008) facilitated standardisation. Indeed, this was the only published trial protocol that we identified. Advanced publication of trial protocols is encouraged, as this may facilitate future standardisation of outcome assessment.

The functional outcome studied here was absolute DASH score at three months (rather than change in DASH score from preoperative to postoperative state), as preoperative DASH scores were not different between splint and no splint groups in either of the included studies (Collis 2013; Jerosch-Herold 2011). Furthermore, this final result represents patients' functional performance at that time. Individual splinting results from all three trials showed no beneficial or adverse effects over postoperative splinting, but meta-analysis of two of these studies showed statistically significant loss of flexion at three months caused by splinting. Whether the magnitude of the difference noted is of clinical significance, or whether it persists later in the rehabilitation period, is unclear. However, given the potentially expanded utilisation of resources needed to produce and maintain splints, we do not support their routine use.

Investigations of other questions

The primary objective of this review was to identify trials comparing different types of procedures. However, we have identified other trials within Dupuytren's disease surgery and have grouped them into trials investigating technical refinements of procedures, and trials investigating rehabilitation adjuncts. Although these studies might be considered tangential to the central aim of this review, we believe that appraising them is important to ensure that this review has been comprehensive, and that aspects of study methods and reporting have contributed to the conclusions presented here. In particular, analysing these studies informs implications for future research in this field. For example, Citron 2005 was the only included study that adequately described a randomisation process that used envelopes to provide adequate allocation concealment. As with studies comparing types of procedures, lack of comparable studies limited the performance of meta-analysis.

Bhatia 2002 demonstrated that staple closure of fasciectomies may be quicker than suture closer, while showing that it resulted in greater pain at staple removal. However, this finding may be limited by the risk of bias in this study regarding allocation concealment. Citron 2003 was stopped early because a higher rate of recurrence was noted after direct closure than after z-plasty closure. However, this difference had reached P value < 0.1 rather than the more conventional P value < 0.05; also, this study had been assigned high risk of bias related to use of alternation rather than randomisation, and as the result of performance and detection biases.

Overall completeness and applicability of evidence

This systematic review has identified very few high-quality studies of Dupuytren's disease surgery. Among the included trials, fewer still compared different procedures, and others studied refinements in practice. Despite the availability of many current treatment options for years or decades, the paucity of studies suggests that research in this field lacks direction.

Quality of the evidence

The quality of methods varied between studies. More modern studies were generally at less risk of bias. Our assessment of performance bias might be controversial. To minimise the potential for the surgeon to influence the quality of the procedure, we included blinding of the surgeon during the procedure. Achieving this blinding may be extremely challenging and may not be possible in some studies. However, clear efforts were made in Ullah 2009 to standardise the surgical procedure as far as possible, with randomisation performed intraoperatively rather than preoperatively, unlike other studies investigating an intervention of relevance to closing stages of the procedure. As a result of these efforts, excision of disease that might be considered the 'correction' portion of the surgery was not subject to lack of blinding, and only wound closure was unblinded. Taking such steps when possible may limit the effects of performance bias.

In addition to risks of bias related to study design limitations, we further downgraded the quality of evidence as the result of imprecision, with most comparisons based on one or two studies with small sample sizes and wide confidence intervals.

Potential biases in the review process

We explained deviations from the published protocol in the section titled Differences between protocol and review. We believe that these differences are minor and have not influenced review outcomes. Although we took explicit steps to review conference proceeding abstracts, we may have missed unpublished data. However, given the paucity of trial data identified across all sources, we believe it is unlikely that a significant volume of relevant data has not been published.

Agreements and disagreements with other studies or reviews

We are not aware of similar reviews on this topic. However, expert opinion supports the need for further research in this area to inform clinical practice.

AUTHORS' CONCLUSIONS

Implications for practice

This review has identified insufficient evidence to inform the roles of different procedures (needle fasciotomy, fasciectomy, interposition firebreak skin grafting or z-plasty closure of fasciectomy) in the surgical treatment of patients with Dupuytren's disease of the fingers, beyond discussion of the limited results of individual studies. Further research in this field is urgently required.

The meta-analysis performed here questions routine use of splinting following surgery for Dupuytren's disease, and this warrants further research. Splinting may impair outcomes by reducing active flexion, although this is not clear from the data presented here. Furthermore, given the unclear role of splinting in early re-contracture, splinting should be considered on an individual patient basis until further evidence becomes available.

Implications for research

A marked paucity of randomised controlled trials on Dupuytren's disease surgery has been noted. This is the case for comparisons of different treatment procedures, of which several are currently in use, including needle fasciotomy, fasciectomy and dermofasciectomy. The role of each of these treatments in relation to other treatments is not currently supported by high-quality evidence. Evidence related to collagenase will be considered in a separate review.

Given the need to justify the cost-effectiveness of treatments in modern healthcare systems, it might be advisable to target research towards comparisons of different procedures. At present, clinical practice in Dupuytren's disease is not informed by high-quality evidence. Logically, studies aimed at refining treatment might be better conducted only once the effectiveness and roles of different treatments have been established.

To date, design quality and reporting of trials in Dupuytren's disease surgery remain generally poor, with only a few examples showing good practice.

Future trials should ensure that risks of bias are minimised. As acknowledged, performance bias may prove difficult to minimise in some studies. That said, certain components of the studies included here have set precedents for processes by which risk of bias in random sequence generation, allocation concealment and outcome detection can be minimised. Future studies should endeavour to employ such robust processes, and to report them clearly.

Advanced publication of trial methods was encountered only once in this review, but it facilitated standardisation and meta-analysis. This practice is encouraged.

Before needed trials are undertaken, further study of outcome measures is needed to establish their validity and reliability for use in Dupuytren's disease. Once this has been done, consensus and consistency of outcome choices and time points of assessment are needed to ensure standardisation with other studies.

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CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Bhatia 2002

Methods	Single-centre UK study
	Randomised controlled trial
	Recruitment between June 2000 and March 2001

Bhatia 2002 *(Continued)*

Participants	31 participants 28:3 male/female ratio Mean age: 61 years Inclusion criteria: not specified Exclusion criteria: not specified
Interventions	Automated staple device closure vs Polybutester nonabsorbable suture closure

Outcomes	• Time taken for closure (rate per centimetre of wound) (recorded by independent observer)
	  • Staples quicker than sutures (P value < 0.001)
	• Visual analogue scale (VAS) pain on removal score (patient reported, at 1 week postop)
	  • Pain greater for staple removal than for suture removal (P value = 0.008)
	• Wound appearance grade at 1 week and at 2 weeks (recorded by unblinded surgeon)
	  • No differences between groups
	• Patient-reported wound appearance at 2 weeks (patient reported)
	  • No differences between groups
	• Complications reported? yes
	• Details: 1 superficial wound infection treated with antibiotics; "no other complications"

Notes	Length of follow-up: 2 weeks Low-quality evidence due to risk of bias regarding allocation concealment and imprecision No funding sources acknowledged; no conflicts of interest declared

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Random numbers table
Allocation concealment (selection bias)	High risk	Not discussed in paper; use of unsecured random numbers table assumed
Incomplete outcome data (attrition bias) All outcomes	Low risk	4 of 5 endpoints reported with complete data; 1 of 5 not reported (wound appearance category at 2 weeks)
Selective reporting (reporting bias)	Low risk	4 of 5 endpoints reported with complete data; 1 of 5 not reported (wound appearance category at 2 weeks)
Other bias	Low risk	No blocked randomisation in an unblinded study
Blinding of participants and personnel (performance bias) All outcomes	High risk	Blinding not possible
Blinding of outcome assessment (detection bias)	High risk	3 of 5 assessments performed by surgeon or reported by participant; 1 other

Bhatia 2002 *(Continued)*

All outcomes

Bulstrode 2004

Methods	Single-centre UK study Randomised controlled trial Recruitment dates not specified
Participants	15 participants All male Mean age: 61 years Inclusion criteria: yes: age < 70 years, Luck involutional stage, ≥ 2 rays on hand affected Exclusion criteria: not specified
Interventions	Intraoperative wound bath in 5-FU vs Wound bath in normal saline

Outcomes	• Time to wound healing
	  • No differences between groups
	• MCPJ, PIPJ and total active motion: preoperative, 3 months, 18 months
	  • No differences between groups
	• Loss of extension per ray: preoperative, 3 months, 18 months
	  • No differences between groups
	  • Measurements for all 3 outcomes performed by the same blinded therapist
	• Complications reported? yes
	• Details: "no intraoperative complications"

Notes	Length of follow-up: 18 months Low-quality evidence due to risk of bias and imprecision Funded by the RAFT Institute of Plastic Surgery; no conflicts of interest declared

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Envelopes containing randomisation
Allocation concealment (selection bias)	Unclear risk	Unmarked envelopes; unclear whether sealed or opaque
Incomplete outcome data (attrition bias) All outcomes	Low risk	No loss to follow-up

Bulstrode 2004 *(Continued)*

Selective reporting (reporting bias)	Low risk	All outcomes reported
Other bias	Low risk	No blocked randomisation in an unblinded study
Blinding of participants and personnel (performance bias) All outcomes	High risk	Surgeon administering treatment not blinded; study described as double-blinded: participant and assessor
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Measurements performed by blinded therapist

Chignon-Sicard 2012

Methods	Single-centre French study Randomised controlled clinical trial Recruitment between 2007 and 2010
Participants	68 participants 54 male:10 female; 4 excluded after randomisation not described Mean age: 61.4 (SD 8.8) years for intervention group; 66.0 (SD 7.7) years for control group Inclusion criteria: yes: "healthy individuals older than 18 years without any comorbidity who had been scheduled for elective McCash (open palm) surgery for Dupuytren disease" Exclusion criteria: yes: "Patients allergic to one of the dressing's components, with diabetes mellitus type 1, who were undergoing cancer treatment, who were pregnant, or who were unable to participate in follow-up visits were excluded"
Interventions	Leucocyte- and platelet-rich fibrin platelet concentrate applied to wound vs Petroleum jelly mesh applied to wound

Outcomes	• Healing delay
	  • Statistically significantly shorter healing delay in intervention group compared with control group (median 24 days vs median 29 days)
	• Pain (numerical visual analogue scale)
	  • No significant differences between groups at day 1, 7, 14, 21 or 28
	• Bleeding (absent/slight/moderate/abundant)
	  • No significant differences between groups at day 7, 14 or 21
	• Wound exudate (absent/slight/moderate/abundant)
	  • No significant differences at days 7 and 21; significantly more exudate in control group at day 14
	• Complications reported? yes
	• Details: 1 wound infection in control group; 1 pulmonary infection in intervention group

Notes	Length of follow-up: 60 days Low-quality evidence due to risk of bias and imprecision

Chignon-Sicard 2012 *(Continued)*

Funding source: academic grant from the French Ministry of Health

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Envelopes containing randomisation from a "predefined randomization list, constructed through random permuted blocks"
Allocation concealment (selection bias)	Low risk	"sealed, sequentially numbered, opaque envelopes containing treatment allocation"
Incomplete outcome data (attrition bias) All outcomes	Low risk	5% loss to follow-up; split between groups
Selective reporting (reporting bias)	Low risk	All outcomes reported
Other bias	Unclear risk	Blocked randomisation employed in single-blinded study (blinding of outcome assessment only)
Blinding of participants and personnel (performance bias) All outcomes	High risk	Randomisation performed before procedure; surgeon probably unblinded throughout operative procedure, including fasciectomy component of procedure
Blinding of outcome assessment (detection bias) All outcomes	Low risk	All assessors blinded

Citron 2003

Methods	Single-centre UK study Pseudorandomised controlled clinical trial Recruitment between 1996 and 2000
Participants	30 participants 24 male:6 female Mean age (at diagnosis): 67 years for treatment group; 66 years for control group Inclusion criteria: yes: "Dupuytren's contracture of a single ray confined to the palm and affecting only the MCPJ, a single cord of Dupuytren's tissue, no previous surgery for Dupuytren's disease in that ray, agreement to surgery" Exclusion criteria: not specified
Interventions	Longitudinal incision closed with z-plasty vs Transverse incision
Outcomes	• Recurrence (reappearance of palpable disease)

Citron 2003 *(Continued)*

- Lower recurrence in z-plasty group than in direct closure group (P value < 0.1)
- MCPJ flexion deformity: preoperative, postoperative
  - No statistical analysis presented
  - Both outcomes measured by 5 different unblinded assessors over the course of the study; outcomes assessed at 2 years postop
- Complications reported? yes
- Details: "no complications"

Notes	Mean length of follow-up: 2 years (range 2.0 to 3.5) Low-quality evidence, as pseudorandomised and at high risk of bias and imprecision No funding sources acknowledged; no conflicts of interest declared.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Alternation rather than randomisation
Allocation concealment (selection bias)	High risk	Alternation rather than randomisation
Incomplete outcome data (attrition bias) All outcomes	Low risk	10% loss to follow-up but balanced between groups
Selective reporting (reporting bias)	Low risk	Primary outcomes reported
Other bias	Unclear risk	Unblinded study with alternation rather than randomisation.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Surgeon unblinded
Blinding of outcome assessment (detection bias) All outcomes	High risk	Multiple unblinded assessors throughout study

Citron 2005

Methods	Single-centre UK study Randomised controlled trial Recruitment between February 1998 and August 2002
Participants	100 participants 63 male:16 female (21 incomplete) Mean age: 65 (SD 10) years Inclusion criteria: yes: Dupuytren's disease in 1 ray only and any degree of resultant contracture

Citron 2005 *(Continued)*

	Exclusion criteria: yes: bleeding diathesis, recurrent disease
Interventions	Bruner incision closed with Y-V plasties vs Longitudinal incision closed with z-plasties

Outcomes	• Recurrence (reappearance of palpable disease)
	  • No differences between groups
	• Deformity: preoperative, postoperative
	  • No differences between groups
	• Extension
	  • No differences between groups
	  • Outcomes measured "in a special review clinic mostly by a registrar who had not operated" at 1 year and 2 years after healing
	• Complications reported? yes
	• Details: total complications not different between groups; algodystrophy not different between groups; digital nerve injury not different between groups

Notes	Length of follow-up: 2 years Low-quality evidence, as high risk of performance bias, which may have influenced outcomes and imprecision No funding sources acknowledged; no conflicts of interest declared

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Random numbers in envelopes
Allocation concealment (selection bias)	Low risk	Sealed sequentially numbered envelopes
Incomplete outcome data (attrition bias) All outcomes	Low risk	Attrition unlikely to be related to true outcome
Selective reporting (reporting bias)	Low risk	All outcomes reported
Other bias	Low risk	No blocked randomisation in an unblinded study
Blinding of participants and personnel (performance bias) All outcomes	High risk	Surgeon unblinded; participant possibly unblinded
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Independent observer, but unclear whether blinded

Collis 2013

Methods	Single-centre New Zealand study Randomised controlled clinical trial Study period: 2010 to 2011
Participants	56 participants 45 male:11 female Mean age: 68 (SD 8) years in intervention group; 67 (SD 9) years in control group Inclusion criteria: yes: "Patients of all ages and surgery types were included, provided they attended their first postoperative hand therapy appointment within 14 days after surgery" Exclusion criteria: yes: "K-wiring of the proximal interphalangeal joint during surgery or inability to comply with hand therapy"
Interventions	Night extension orthosis plus standard hand therapy vs Hand therapy alone (apart from participants in this group who had a net loss of ≥ 20 degrees at the PIPJ and/or a net loss of ≥ 30 degrees at the MCPJ of the operated fingers, in which case a splint was given)

Outcomes	• Total active extension
	  • No significant differences at 3 months for little/ring/middle fingers
	• Total active flexion
	  • No significant differences at 3 months for little/ring/middle fingers
	• Composite finger flexion
	  • No significant differences at 3 months for little/ring/middle fingers
	• Grip strength
	  • No significant differences in mixed-effect model averaged across postoperative visits
	• Hand function (DASH)
	  • No significant differences in mixed-effect model averaged across postoperative visits

Notes	Length of follow-up: 3 months Low-quality evidence, as inadequate detail provided on study design and high risk of performance bias and imprecision Funding source: A grant was received through the Clinical Centre for Research and Effective Practice (CCREP) Innovation Fund

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Inadequate detail: "participant selecting a tag from an envelope with group allocation concealed"
Allocation concealment (selection bias)	Unclear risk	Inadequate detail: "participant selecting a tag from an envelope with group allocation concealed"
Incomplete outcome data (attrition bias) All outcomes	Low risk	Attrition described: split between groups; attrition unlikely to be related to true outcome

Collis 2013 *(Continued)*

Selective reporting (reporting bias)	Low risk	All outcomes reported
Other bias	Unclear risk	Inadequate details of randomisation in paper
Blinding of participants and personnel (performance bias) All outcomes	High risk	No blinding
Blinding of outcome assessment (detection bias) All outcomes	High risk	No blinding

Degreef 2014

Methods	Single-centre Belgian study Randomised controlled clinical trial Study period not stated
Participants	30 participants 26 male:4 female Mean age: 63.5 (SD 8) years Inclusion criteria: Adult patients scheduled for subtotal fasciectomy to treat Dupuytren's disease were eligible for inclusion if they had a D score > 4 Exclusion criteria: patients undergoing a reintervention for recurrent contractures; patients with a need for skin grafts or flaps; premenopausal women; patients using anti-inflammatory drugs; patients with a history of malignancy; patients with a known allergy to tamoxifen
Interventions	Segmental fasciectomy with 80 mg oral tamoxifen daily for 6 weeks before surgery continuing until 12 weeks after surgery vs Segmental fasciectomy with 80 mg oral placebo daily for 6 weeks before surgery continuing until 12 weeks after surgery

Outcomes	• Improvement in extension deficit by joint
	  • No differences at MCPJ at 3 months, 12 months or 24 months; significantly greater differences for tamoxifen group at PIPJ at 3 months and 12 months; not significantly different at 24 months
	• Tubiana index
	  • Significantly greater differences in tamoxifen group at 3 months; not significantly different at 12 months nor 24 months
	• Satisfaction visual analogue scale
	  • Significantly higher in tamoxifen group at 3 months; no significant differences at 12 months or 24 months
	• Hand function (DASH)
	• No significant differences at 12 months nor 24 months

Notes	Length of follow-up: 24 months

Degreef 2014 *(Continued)*

	Low-quality evidence, as inadequate details on study design and imprecision
	Funding source: Belgian Orthopaedic Society

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Inadequate detail: not described
Allocation concealment (selection bias)	Unclear risk	Inadequate detail: boxes used to store allocation, but opacity not described; second copies of allocations stored in envelopes with inadequate details provided
Incomplete outcome data (attrition bias) All outcomes	Low risk	Attrition described; systematic differences between groups unlikely
Selective reporting (reporting bias)	Unclear risk	No data presented for hand function (DASH) at 3 months
Other bias	Low risk	Blinded study; hence blocked randomisation not problematic
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Double-blind
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Blinded outcome measurements

Howard 2009

Methods	Single-centre UK study Randomised controlled trial Recruitment dates not specified
Participants	62 participants Gender ratio not presented Age data not presented Inclusion criteria: not specified Exclusion criteria: not specified
Interventions	Absorbable polyglactin suture closure vs Non-absorbable polypropylene suture closure
Outcomes	• Time spent managing wound at first postop visit

Howard 2009 *(Continued)*

- Less time spent in wound management for absorbable group once outliers excluded (P value = 0.003) (measured by the nurse reviewing the wound)
- Pain VAS at first postop visit (patient-reported)
- No difference between groups
- Complications described?: yes
- Details: group A - 1 × delayed wound healing, 1 × swollen hand; group B - 1 × wound infection, 2 × delayed healing, 2 × retained suture material

Notes	Length of follow-up: primary outcome assessed at 10 to 14 days Low-quality evidence, as review group was concerned that exclusion of outliers despite use of non-parametric statistics in analysis of primary outcome created significant differences and imprecision No funding sources acknowledged; no conflicts of interest declared

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer generated
Allocation concealment (selection bias)	Unclear risk	Unclear from paper
Incomplete outcome data (attrition bias) All outcomes	Low risk	3 of 62 missing
Selective reporting (reporting bias)	High risk	Protocol for exclusion of outliers not given; non-parametric statistics used after test of normality described; unclear why outliers excluded; outlier exclusion may have influenced outcome of study
Other bias	Low risk	No blocked randomisation in an unblinded study
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Blinded until start of procedure
Blinding of outcome assessment (detection bias) All outcomes	High risk	Assessor unblinded

Jerosch-Herold 2011

Methods	Multi-centre (5-centre) UK study Randomised controlled trial Recruitment between October 2007 and January 2009
Participants	154 participants 120 male:34 female Mean age: 67.2 years in splint group; 67.5 years in no splint group

Jerosch-Herold 2011 *(Continued)*

	Inclusion criteria: yes: Patients with Dupuytren's disease affecting ≥ 1 digit of either hand and requiring fasciectomy or dermofasciectomy were invited to participate. Patients had to be over 18 years of age and competent to give fully informed written consent Exclusion criteria: yes: contracture of the thumb or first webspace
Interventions	Static splint for 3 months postop vs No splint (apart from participants in this group who had a net loss ≥ 15 degrees at the PIPJ and/or a net loss ≥ 20 degrees at the MCPJ of the operated fingers, in which case a splint was given)

Outcomes	• DASH PROM: 3 months, 6 months, 12 months
	  • No differences between groups
	• Total active extension: 3 months, 6 months, 12 months
	  • No differences between groups
	• Total active flexion: 3 months, 6 months, 12 months
	  • No differences between groups
	• Patient satisfaction: 3 months, 6 months, 12 months
	  • No differences between groups
	  • DASH reported by participants; other measurements performed by 2 trained research associates
	• Complications described? no

Notes	Length of follow-up: 12 months Low-quality evidence due to risk of bias and imprecision Funded by Action Medical Research Charity; no conflicts of interest declared

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomisation process at central site not explained
Allocation concealment (selection bias)	Low risk	Central telephone cluster randomisation
Incomplete outcome data (attrition bias) All outcomes	Low risk	Attrition recorded and explained
Selective reporting (reporting bias)	Low risk	All outcomes reported
Other bias	Unclear risk	Cluster randomisation used in an unblinded study, but unclear it if would have introduced bias
Blinding of participants and personnel (performance bias) All outcomes	High risk	Not blinded
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Patient-reported outcome measure unblinded but unclear whether likely to be biased; independent observer measured range of motion but unclear whether blinded

Kemler 2012

Methods	2-Centre Dutch study Randomised controlled clinical trial Recruitment between 2007 and 2008
Participants	54 participants 46 male:8 female Mean age: 63 (SD 9) years in intervention group; 64 (SD 11) years in control group Inclusion criteria: yes: "DD (Dupuytren's disease) and a proximal inter-phalangeal (PIP) joint flexion contracture of at least 30°" Exclusion criteria: yes: "below 18 years of age, had undergone partial amputation or arthrodesis of a digit or were patients with insufficient knowledge of the Dutch language"
Interventions	3-Month splinting protocol together with hand therapy vs Hand therapy alone

Outcomes	• Extension deficit at PIPJ
	  • No significant differences
	• Participant perceived change
	  • No significant differences
	• Pain (numerical visual analogue scale)
	  • No significant differences
	• Haematoma
	  • No significant differences
	• Residual flexion deficit
	  • No significant differences

Notes	Length of follow-up: 1 year Low-quality evidence due to risk of bias and imprecision No specific funding sources declared

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Random numbers table
Allocation concealment (selection bias)	Unclear risk	Not specified; allocation concealed from outcome assessor but allocation concealment not clear
Incomplete outcome data (attrition bias) All outcomes	Low risk	No attrition
Selective reporting (reporting bias)	Low risk	All outcomes reported

Kemler 2012 *(Continued)*

Other bias	Low risk	No blocked randomisation in an unblinded study
Blinding of participants and personnel (performance bias) All outcomes	High risk	Surgeon blinded but therapist and participant not blinded
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	All assessments by "same independent third party, a resident who had no part in the operative procedure or postoperative treatment", although blinding status not specified

McMillan 2012

Methods	Single-centre Canadian study Randomised controlled trial Recruitment dates not specified
Participants	47 participants 41 male:6 female Mean age: 61.2 years Inclusion criteria: yes: "at least one joint contracture of at least 20°" Exclusion criteria: yes: "diabetes mellitus and those who had previously had hand surgery, including PNA, on the affected hand for any reason"
Interventions	Steroid injection at end of percutaneous needle fasciotomy, repeated at 6 weeks and 3 months, vs no steroid injection
Outcomes	• Change and % change in total active extension deficit, described per joint: 6 weeks, 3 months, 6 months • Significantly greater % improvement in TAED for all joints at at all time points, and for MCPJs and PIPJs at 6 months, for steroid group (unclear who performed outcome measurements) • Complications described? yes • Details: no infections; reported alterations in sensation or other side effects or complications
Notes	Length of follow-up: 6 months Low-quality evidence due to risk of bias and imprecision Funded by the Canadian Society of Plastic Surgeons; no conflicts of interest declared

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Electronic random number generator
Allocation concealment (selection bias)	Unclear risk	Not described

McMillan 2012 *(Continued)*

Incomplete outcome data (attrition bias) All outcomes	Low risk	No exclusions after randomisation
Selective reporting (reporting bias)	Low risk	Outcomes reported
Other bias	Low risk	No blocked randomisation in an unblinded study
Blinding of participants and personnel (performance bias) All outcomes	High risk	No blinding; no sham injection for control group
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not described

Ullah 2009

Methods	Single-centre UK study Randomised controlled trial Recruitment dates not specified
Participants	79 participants 65 male:14 female Mean age: 62.9 (range 27 to 85) years Inclusion criteria: yes: "primary Dupuytren's contracture greater than 30° of the PIP joint of a finger" Exclusion criteria: yes: "receiving anticoagulation treatment or were unable to complete questionnaires, give consent or attend for follow-up"
Interventions	Firebreak full-thickness skin graft closure vs z-plasty closure

Outcomes	• Degree of contracture: preoperative, 2 weeks, 3 months, 6 months, 12 months, 24 months, 36 months
	  • No differences in recurrence between groups
	• Time to recurrence
	  • No differences between groups
	• Range of motion
	  • No statistical analysis presented
	• Time for surgery
	  • Significantly longer for skin graft group (P value = 0.01)
	• Grip strength
	  • No differences between groups
	• PEM PROM
	  • No statistical analysis presented
	  • Outcome measurements performed by a single surgeon; PEM reported by participants

Ullah 2009 *(Continued)*

- Complications described? yes
- Details: infection, wound necrosis, wound dehiscence, altered sensation, algodystrophy, haematoma

Notes	Length of follow-up: 36 months Low-quality evidence due to risk of bias and imprecision No sources of funding acknowledged; no conflicts of interest declared

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Randomisation via sequential envelopes
Allocation concealment (selection bias)	Unclear risk	Sealed sequential envelopes but unclear whether opaque
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up not described
Selective reporting (reporting bias)	Unclear risk	2-Week postoperative data not presented; some data presented only graphically
Other bias	Low risk	No blocked randomisation in an unblinded study
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Randomisation not performed until after contracture excised
Blinding of outcome assessment (detection bias) All outcomes	High risk	Independent observer unlikely to be blinded

van Rijssen 2006

Methods	Single-centre Dutch study Randomised controlled trial Recruitment between August 2002 and January 2005
Participants	125 hands in 121 participants 94 male:19 female; 8 incomplete Mean age: 63 years Inclusion criteria: yes: "(1) a flexion contracture of at least 30° in the MCP, PIP, or DIP joints; (2) a clearly defined pathologic cord in the palmar fascia; and (3) willingness to participate in this trial" Exclusion criteria: yes: "(1) patients with postsurgical recurrence or extension of the disease, (2) patients who were not allowed to stop taking their anticoagulants, (3) patients generally unfit to have surgery, and (4) patients who were not willing to participate in this study or had a specific treatment wish"

van Rijssen 2006 *(Continued)*

Interventions	Percutaneous needle fasciotomy vs Limited fasciectomy

Outcomes	• Total passive extension deficit at MCPJ, PIPJ and DIPJ (presented as % change and converted in Tubiana stage): preoperative, 1 week, 6 weeks
	  • No differences between procedures for Tubiana I and II contractures by 6 weeks; fasciectomy superior for Tubiana III and IV contractures by 6 weeks
	• Flexion deficit (distal palmar crease - fingertip pulp): preoperative, 1 week, 6 weeks
	  • Data described but no comparative statistical analysis presented
	• DASH PROM: preoperative, 1 week, 2 weeks, 3 weeks, 4 weeks, 5 weeks
	  • No significant differences between procedures before surgery; significantly lower DASH scores for needle fasciotomy at all time points after surgery
	• Patient satisfaction: 6 weeks
	  • Angles measured by the surgeon; DASH and satisfaction reported by participants
	  • Significantly better after needle fasciotomy
	• Complications described? yes
	• Details: infection, haematoma, wound slough, skin fissure, sympathetic dystrophy, paraesthesia (defined as subjective tingling sensation without objective evidence of altered sensation), altered sensation, digital nerve injury, tendon injury, revision surgery

Notes	Length of follow-up: 6 weeks Low-quality evidence due to risk of bias and imprecision No sources of funding acknowledged; no conflicts of interest declared

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Randomisation via sealed sequential envelopes
Allocation concealment (selection bias)	Unclear risk	Sealed sequential envelopes but unclear whether opaque
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up not different between groups
Selective reporting (reporting bias)	Low risk	All data reported
Other bias	Low risk	No blocked randomisation in an unblinded study
Blinding of participants and personnel (performance bias) All outcomes	High risk	No blinding
Blinding of outcome assessment (detection bias) All outcomes	High risk	No blinding

van Rijssen 2012a

Methods	(as per van Rijssen 2006) Single-centre Dutch study Randomised controlled trial Recruitment between August 2002 and January 2005
Participants	93 participants (out of 113 patients studied in van Rijssen 2006) 76 male:17 female Mean age 62.8 years for needle fasciotomy; 63.1 years for limited fasciectomy Inclusion criteria: yes: "(1) a flexion contracture of at least 30° in the MCP, PIP, or DIP joints; (2) a clearly defined pathologic cord in the palmar fascia; and (3) willingness to participate in this trial" Exclusion criteria: yes: "(1) patients with postsurgical recurrence or extension of the disease, (2) patients who were not allowed to stop taking their anticoagulants, (3) patients generally unfit to have surgery, and (4) patients who were not willing to participate in this study or had a specific treatment wish"
Interventions	Percutaneous needle fasciotomy vs Limited fasciectomy

Outcomes	• Recurrence (defined as recurrent deformity of 20 degrees in a joint initially corrected to 0 to 5 degrees)
	  • Significantly higher recurrence after needle fasciotomy by 5 years (P value < 0.001)
	• Passive extension deficit (per joint)
	  • No comparative analysis presented
	• Patient satisfaction
	  • Significantly higher after fasciectomy (P value < 0.001)
	• Likelihood of selecting treatment again
	  • Significantly higher after fasciectomy (P value = 0.008)
	  • Satisfaction and likelihood of selecting again were patient reported; unclear who performed other measurements
	• Complications described? no: described previously in van Rijssen 2006

Notes	Length of follow-up: 5 years Low-quality evidence due to risk of bias and imprecision No sources of funding acknowledged; no conflicts of interest declared

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Sealed envelopes
Allocation concealment (selection bias)	Unclear risk	Unclear whether envelopes were numbered but were numbered in van Rijssen 2006, in which early outcomes of same study were reported; unclear whether opaque

van Rijssen 2012a *(Continued)*

Incomplete outcome data (attrition bias) All outcomes	High risk	Significantly different attrition between cohorts possibly because of differences in true outcomes
Selective reporting (reporting bias)	Low risk	All outcomes presented
Other bias	Low risk	No blocked randomisation in an unblinded study
Blinding of participants and personnel (performance bias) All outcomes	High risk	Unblinded
Blinding of outcome assessment (detection bias) All outcomes	High risk	Unblinded

Abbreviations:
5-FU: 5-Fluorouracil.
DASH: Disabilities of the Arm, Shoulder and Hand Scale.
DIPJ: Distal interphalangeal joint.
MCPJ: Metacarpophalangeal joint.
PIPJ: Proximal interphalangeal joint.
PROM: Patient-reported outcome measure.
TAED: Total active extension deficit.
VAS: Visual analogue scale.

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Atroshi 2014	Excluded on the basis of question 5 of Appendix 3; not a randomised or pseudorandomised trial
Barros 1997	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Bendon 2012	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Braga Silva 1999	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Braga Silva 2002	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Castro 1981	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Cervero 2013	Excluded on the basis of question 5 of Appendix 3; not a randomised or pseudorandomised trial
Craft 2011	Excluded on the basis of question 5 of Appendix 3; no concurrent control and intervention groups
Dias 2013	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions

Study	Reason for exclusion
Dib 2008	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Dickie 1967	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Erne 2014	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Evans 2002	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Ferry 2013	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Galbiatti 1995	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Glassey 2001	Excluded on the basis of question 5 of Appendix 3; retrospective service evaluation of participants treated with a splint and those treated without a splint based on clinical grounds rather than randomisation/pseudorandomisation
Gomes 1984	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Halliday 1966	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Herrera 2013	Excluded on the basis of question 5 of Appendix 3; not a randomised or pseudorandomised trial
Hovius 2011	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Jerosch-Herold 2008	Excluded on the basis of question 3 of Appendix 3; publication reports the protocol of a study; final study is described in Jerosch-Herold 2011, which is among the Included studies
Larson 2012	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Malta 1984	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Malta 2013	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Moraes Neto 1996	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Nancoo 2007	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Nydick 2013	Excluded on the basis of question 5 of Appendix 3; not a randomised or pseudorandomised trial
Orbezo 1999	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions

Study	Reason for exclusion
Ould-Slimane 2013	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Pereira 2012	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Pesco 2008	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Pess 2012	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Reuben 2006	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Rives 1992	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Skoff 2004	Excluded on the basis of question 5 of Appendix 3; no concurrent control and intervention groups
van Rijssen 2012b	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
Vollbach 2013	Excluded on the basis of question 5 of Appendix 3; not a randomised or pseudorandomised trial
von Campe 2012	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions
White 2012	Excluded on the basis of question 4 of Appendix 3; no comparison of an intervention vs control and no comparison of 2 interventions

Characteristics of studies awaiting assessment *[ordered by study ID]*

Gazdzik 1997

Methods	Unclear
Participants	
Interventions	
Outcomes	
Notes	

Hazarika 1979

Methods	Single-centre UK study Unclear study design Recruitment dates not specified

Hazarika 1979 *(Continued)*

Participants	39 participants 17 male:4 female; 18 incomplete Mean age: not presented, range 46 to 76 years Inclusion criteria: not specified Exclusion criteria: not specified
Interventions	Intermittent pneumatic postoperative compression vs Boxing glove dressing and roller towel elevation

Outcomes	• Hand volume: preoperative, postoperative (unclear when), differences
	  • Significantly less swelling for pneumatic compression group (P value < 0.001)
	• Wound discharge/dressing saturation
	  • No statistical analysis
	• Pain and analgesia use
	  • No statistical analysis
	• Haematoma formation
	  • No statistical analysis
	  • Outcome measurements performed during "at least one follow-up appointment", and from physiotherapy notes; unclear who performed measurements
	• Complications reported? yes
	• Details: haematoma formation as above; "no infections"

Notes	Length of follow-up: 7 days - "one follow-up appointment" Low-quality evidence, as extremely limited details of study design provided Funded by the Department of Health and Social Security; no conflicts of interest declared

Slullitel 1987

Methods	Unclear
Participants	
Interventions	
Outcomes	
Notes	

Ward 1976

Methods	Single-centre UK study Unclear study design Recruitment dates not specified

Ward 1976 *(Continued)*

Participants	20 participants 13 male:7 female Mean age: not reported (range 42 to 81 years) Inclusion criteria: yes: "previously untreated simple Dupuytren's disease" Exclusion criteria: yes: "any illness or medication that might influence fluid retention"
Interventions	Elevated hand table for surgery vs Intraoperative tourniquet

Outcomes	• Ratio of 28-day postop hand volume:preop hand volume
	  • Ratio significantly lower with elevated hand table than with tourniquet (P value < 0.001)
	  • Unclear who performed outcome measurements
	• Complications described? yes
	• Details: 1 infected hand excluded; otherwise described as "no complications"

Notes	Length of follow-up: 28 days Low-quality evidence No funding sources acknowledged; no conflicts of interest declared

Yoshida 1998

Methods	Unclear
Participants	
Interventions	
Outcomes	
Notes	

DATA AND ANALYSES

Comparison 1. Preoperative measurements

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 DASH	2	210	Mean Difference (IV, Random, 95% CI)	1.00 [-2.74, 4.74]
2 Total active extension	2	240	Mean Difference (IV, Random, 95% CI)	-1.89 [-7.72, 3.94]

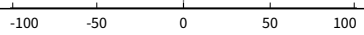
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2.1 Middle finger	1	13	Mean Difference (IV, Random, 95% CI)	-12.0 [-33.20, 9.20]
2.2 Ring finger	1	22	Mean Difference (IV, Random, 95% CI)	9.0 [-21.50, 39.50]
2.3 Little finger	1	51	Mean Difference (IV, Random, 95% CI)	-12.0 [-32.31, 8.31]
2.4 No subgroup by digit	1	154	Mean Difference (IV, Random, 95% CI)	-0.40 [-6.90, 6.10]
3 Total active flexion	2	232	Mean Difference (IV, Random, 95% CI)	2.42 [-4.98, 9.83]
3.1 Middle finger	1	13	Mean Difference (IV, Random, 95% CI)	6.0 [-11.52, 23.52]
3.2 Ring finger	1	22	Mean Difference (IV, Random, 95% CI)	11.00 [-0.47, 22.47]
3.3 Little finger	1	43	Mean Difference (IV, Random, 95% CI)	-9.0 [-21.26, 3.26]
3.4 No subgroup by digit	1	154	Mean Difference (IV, Random, 95% CI)	2.40 [-3.35, 8.15]

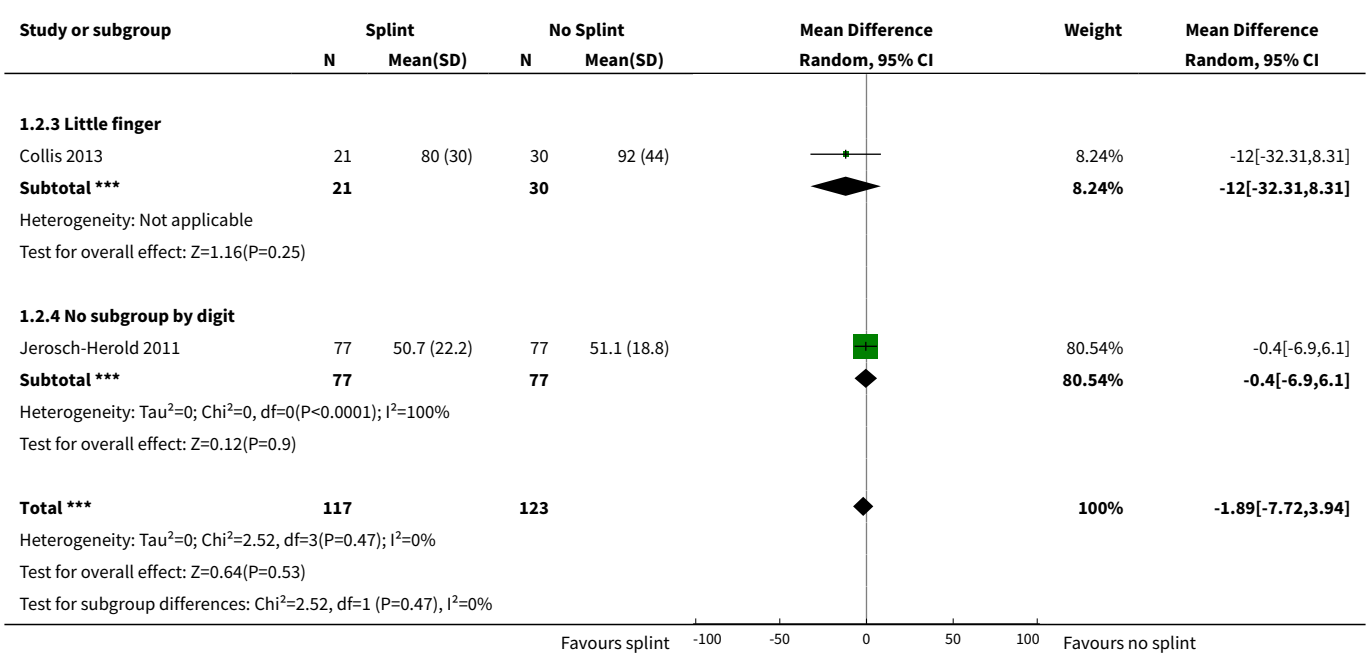
Analysis 1.1. Comparison 1 Preoperative measurements, Outcome 1 DASH.

Study or subgroup	Splint N	Splint Mean(SD)	No Splint N	No Splint Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Collis 2013	26	14 (12)	30	13 (14)		30.2%	1[-5.81,7.81]
Jerosch-Herold 2011	77	16.4 (15.1)	77	15.4 (13.2)		69.8%	1[-3.48,5.48]
Total ***	**103**		**107**			**100%**	**1[-2.74,4.74]**
Heterogeneity: Tau^2=0; Chi^2=0, df=1(P=1); I^2=0%							
Test for overall effect: Z=0.52(P=0.6)							

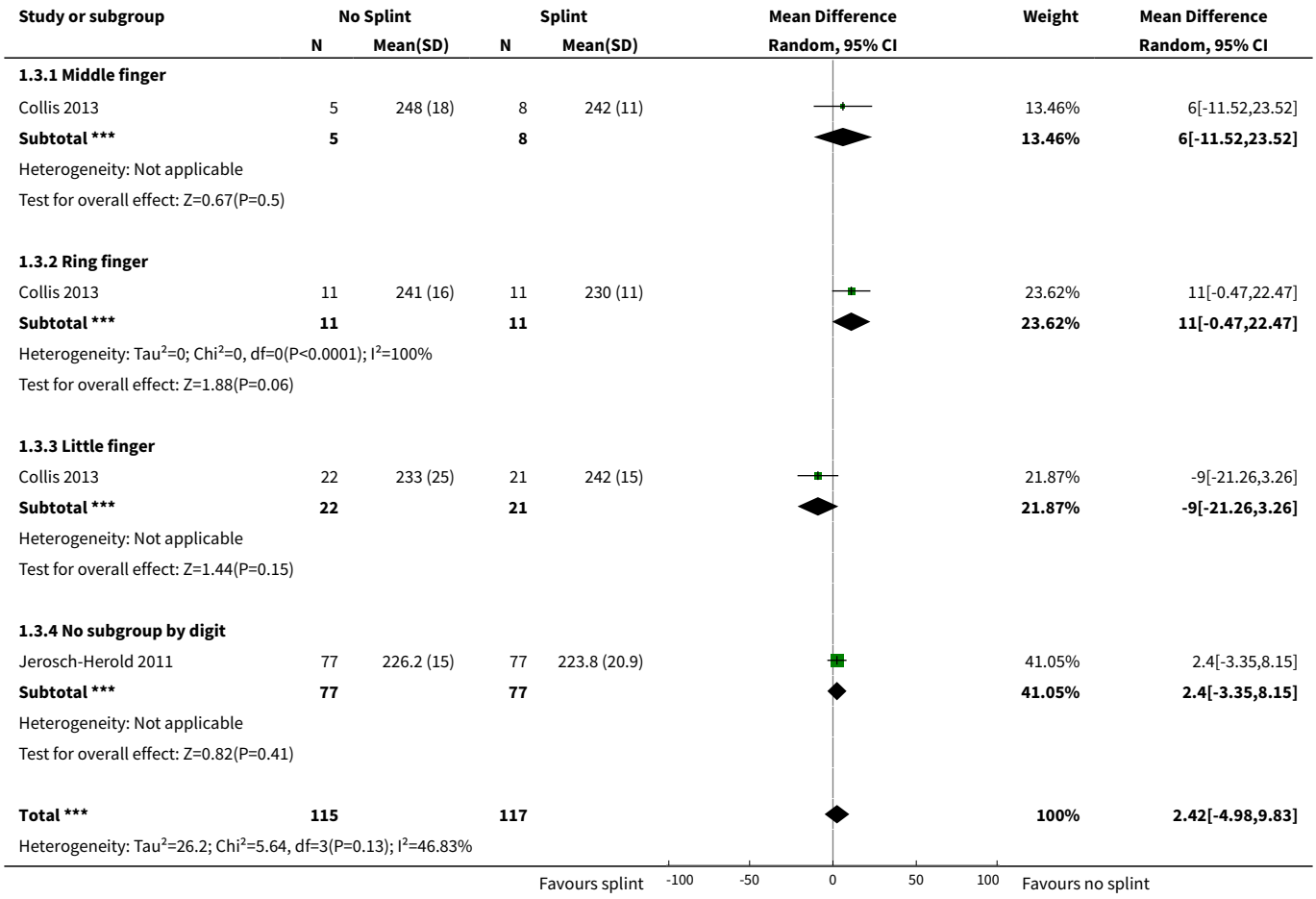
Analysis 1.2. Comparison 1 Preoperative measurements, Outcome 2 Total active extension.

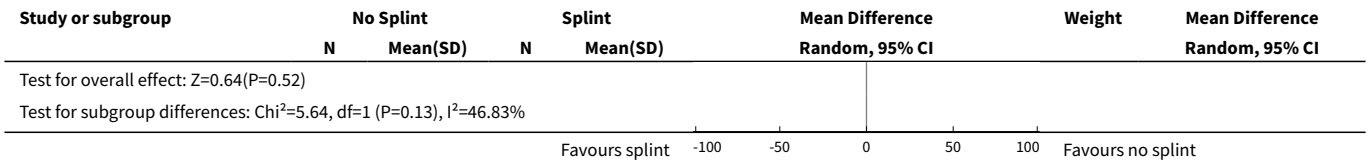
Study or subgroup	Splint N	Splint Mean(SD)	No Splint N	No Splint Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.2.1 Middle finger							
Collis 2013	8	59 (24)	5	71 (15)		7.57%	-12[-33.2,9.2]
Subtotal ***	**8**		**5**			**7.57%**	**-12[-33.2,9.2]**
Heterogeneity: Not applicable							
Test for overall effect: Z=1.11(P=0.27)							
1.2.2 Ring finger							
Collis 2013	11	73 (42)	11	64 (30)		3.65%	9[-21.5,39.5]
Subtotal ***	**11**		**11**			**3.65%**	**9[-21.5,39.5]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.58(P=0.56)							





Analysis 1.3. Comparison 1 Preoperative measurements, Outcome 3 Total active flexion.

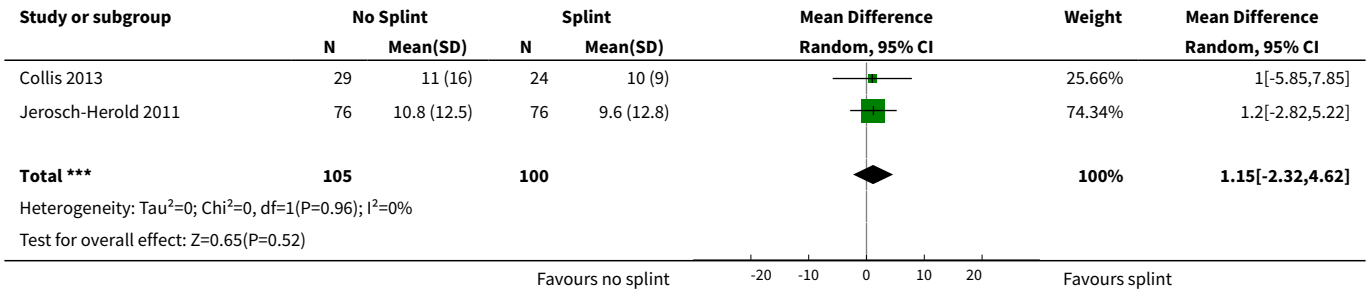




Comparison 2. Effects of 3 months of postoperative night splinting (intention-to-treat)

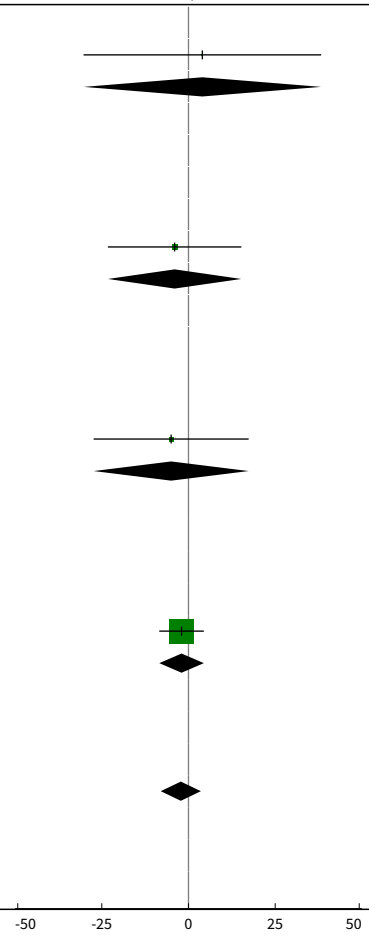
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 DASH score at 3 months	2	205	Mean Difference (IV, Random, 95% CI)	1.15 [-2.32, 4.62]
2 Total active extension at 3 months	2	225	Mean Difference (IV, Random, 95% CI)	-2.21 [-8.01, 3.59]
2.1 Middle finger	1	12	Mean Difference (IV, Random, 95% CI)	4.0 [-30.26, 38.26]
2.2 Ring finger	1	22	Mean Difference (IV, Random, 95% CI)	-4.0 [-23.24, 15.24]
2.3 Little finger	1	40	Mean Difference (IV, Random, 95% CI)	-5.0 [-27.35, 17.35]
2.4 No subgroup by digit	1	151	Mean Difference (IV, Random, 95% CI)	-2.0 [-8.43, 4.43]
3 Total active flexion at 3 months	2	225	Mean Difference (IV, Random, 95% CI)	12.36 [1.21, 23.50]
3.1 Middle finger	1	12	Mean Difference (IV, Random, 95% CI)	29.00 [3.96, 54.04]
3.2 Ring finger	1	22	Mean Difference (IV, Random, 95% CI)	24.0 [0.21, 47.79]
3.3 Little finger	1	40	Mean Difference (IV, Random, 95% CI)	9.0 [-9.12, 27.12]
3.4 No subgroup by digit	1	151	Mean Difference (IV, Random, 95% CI)	4.60 [-3.25, 12.45]

Analysis 2.1. Comparison 2 Effects of 3 months of postoperative night splinting (intention-to-treat), Outcome 1 DASH score at 3 months.



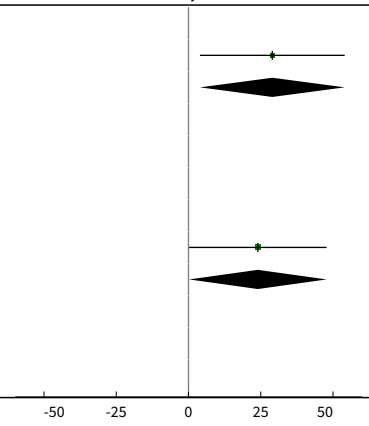
Analysis 2.2. Comparison 2 Effects of 3 months of postoperative night splinting (intention-to-treat), Outcome 2 Total active extension at 3 months.

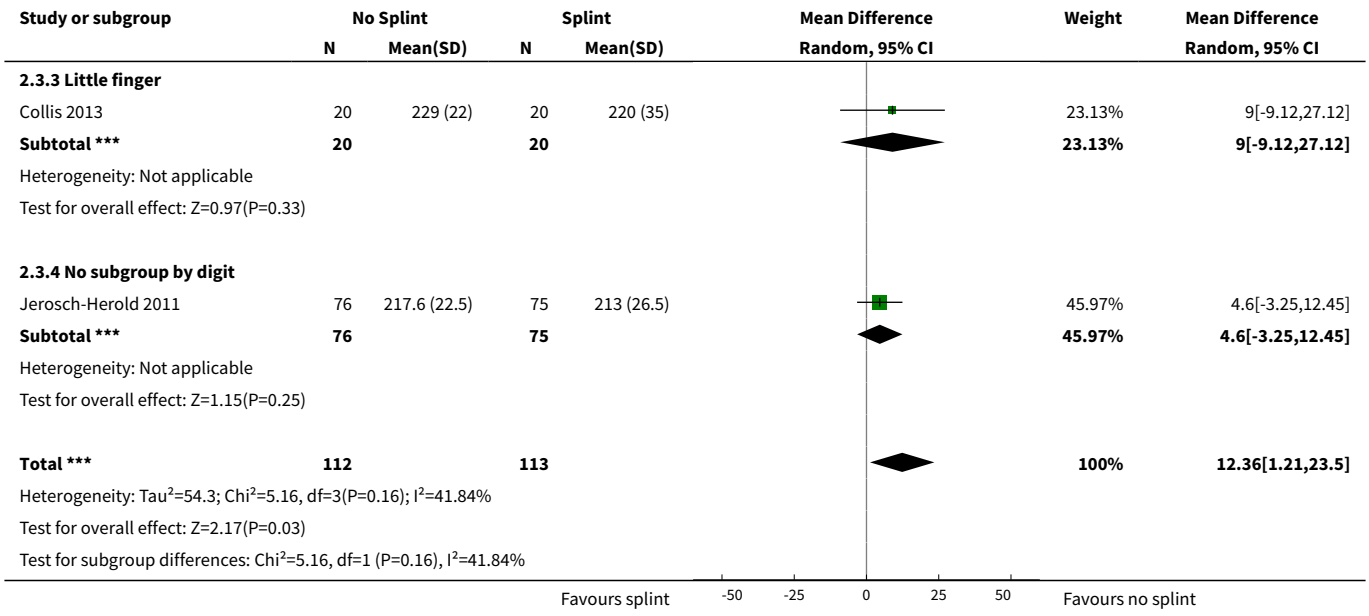
Study or subgroup	No Splint N	No Splint Mean(SD)	Splint N	Splint Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
2.2.1 Middle finger							
Collis 2013	5	30 (36)	7	26 (18)		2.86%	4[-30.26,38.26]
Subtotal ***	**5**		**7**			**2.86%**	**4[-30.26,38.26]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.23(P=0.82)							
2.2.2 Ring finger							
Collis 2013	11	24 (24)	11	28 (22)		9.08%	-4[-23.24,15.24]
Subtotal ***	**11**		**11**			**9.08%**	**-4[-23.24,15.24]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.41(P=0.68)							
2.2.3 Little finger							
Collis 2013	20	33 (34)	20	38 (38)		6.73%	-5[-27.35,17.35]
Subtotal ***	**20**		**20**			**6.73%**	**-5[-27.35,17.35]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.44(P=0.66)							
2.2.4 No subgroup by digit							
Jerosch-Herold 2011	76	30.9 (20.7)	75	32.9 (19.6)		81.32%	-2[-8.43,4.43]
Subtotal ***	**76**		**75**			**81.32%**	**-2[-8.43,4.43]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.61(P=0.54)							
Total ***	**112**		**113**			**100%**	**-2.21[-8.01,3.59]**
Heterogeneity: Tau^2=0; Chi^2=0.22, df=3(P=0.97); I^2=0%							
Test for overall effect: Z=0.75(P=0.45)							
Test for subgroup differences: Chi^2=0.22, df=1 (P=0.97), I^2=0%							



Analysis 2.3. Comparison 2 Effects of 3 months of postoperative night splinting (intention-to-treat), Outcome 3 Total active flexion at 3 months.

Study or subgroup	No Splint N	No Splint Mean(SD)	Splint N	Splint Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
2.3.1 Middle finger							
Collis 2013	5	245 (16)	7	216 (28)		14.86%	29[3.96,54.04]
Subtotal ***	**5**		**7**			**14.86%**	**29[3.96,54.04]**
Heterogeneity: Tau^2=0; Chi^2=0, df=0(P<0.0001); I^2=100%							
Test for overall effect: Z=2.27(P=0.02)							
2.3.2 Ring finger							
Collis 2013	11	232 (18)	11	208 (36)		16.04%	24[0.21,47.79]
Subtotal ***	**11**		**11**			**16.04%**	**24[0.21,47.79]**
Heterogeneity: Not applicable							
Test for overall effect: Z=1.98(P=0.05)							





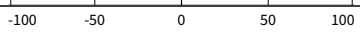
Comparison 3. Effects of 3 months of postoperative night splinting (per-protocol)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 DASH score at 3 months	2	184	Mean Difference (IV, Random, 95% CI)	1.01 [-2.85, 4.86]
2 Total active extension at 3 months [degrees]	2	206	Mean Difference (IV, Random, 95% CI)	-9.50 [-21.14, 2.15]
2.1 Middle finger	1	12	Mean Difference (IV, Random, 95% CI)	3.90 [-29.81, 37.61]
2.2 Ring finger	1	22	Mean Difference (IV, Random, 95% CI)	-16.9 [-33.79, -0.01]
2.3 Little finger	1	39	Mean Difference (IV, Random, 95% CI)	-22.20 [-41.05, -3.35]
2.4 No subgroup by digit	1	133	Mean Difference (IV, Random, 95% CI)	-1.90 [-8.77, 4.97]
3 Total active flexion at 3 months [degrees]	2	206	Mean Difference (IV, Random, 95% CI)	12.64 [3.68, 21.60]
3.1 Middle finger	1	12	Mean Difference (IV, Random, 95% CI)	28.60 [3.79, 53.41]
3.2 Ring finger	1	22	Mean Difference (IV, Random, 95% CI)	21.70 [-0.80, 44.20]
3.3 Little finger	1	39	Mean Difference (IV, Random, 95% CI)	13.10 [-4.61, 30.81]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
3.4 No subgroup by digit	1	133	Mean Difference (IV, Random, 95% CI)	6.80 [-1.42, 15.02]

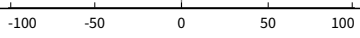
Analysis 3.1. Comparison 3 Effects of 3 months of postoperative night splinting (per-protocol), Outcome 1 DASH score at 3 months.

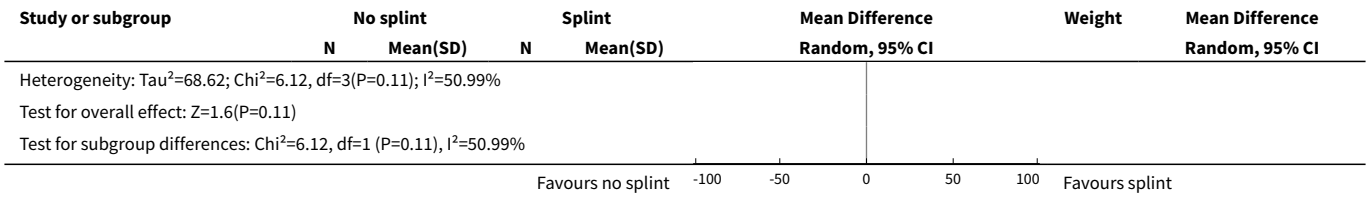
Study or subgroup	No splint N	No splint Mean(SD)	Splint N	Splint Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
Collis 2013	24	11 (16.5)	27	9.7 (9)		26.94%	1.3[-6.12,8.72]
Jerosch-Herold 2011	68	10.7 (13)	65	9.8 (13.5)		73.06%	0.9[-3.61,5.41]
Total ***	**92**		**92**			**100%**	**1.01[-2.85,4.86]**
Heterogeneity: Tau^2=0; Chi^2=0.01, df=1(P=0.93); I^2=0%							
Test for overall effect: Z=0.51(P=0.61)							



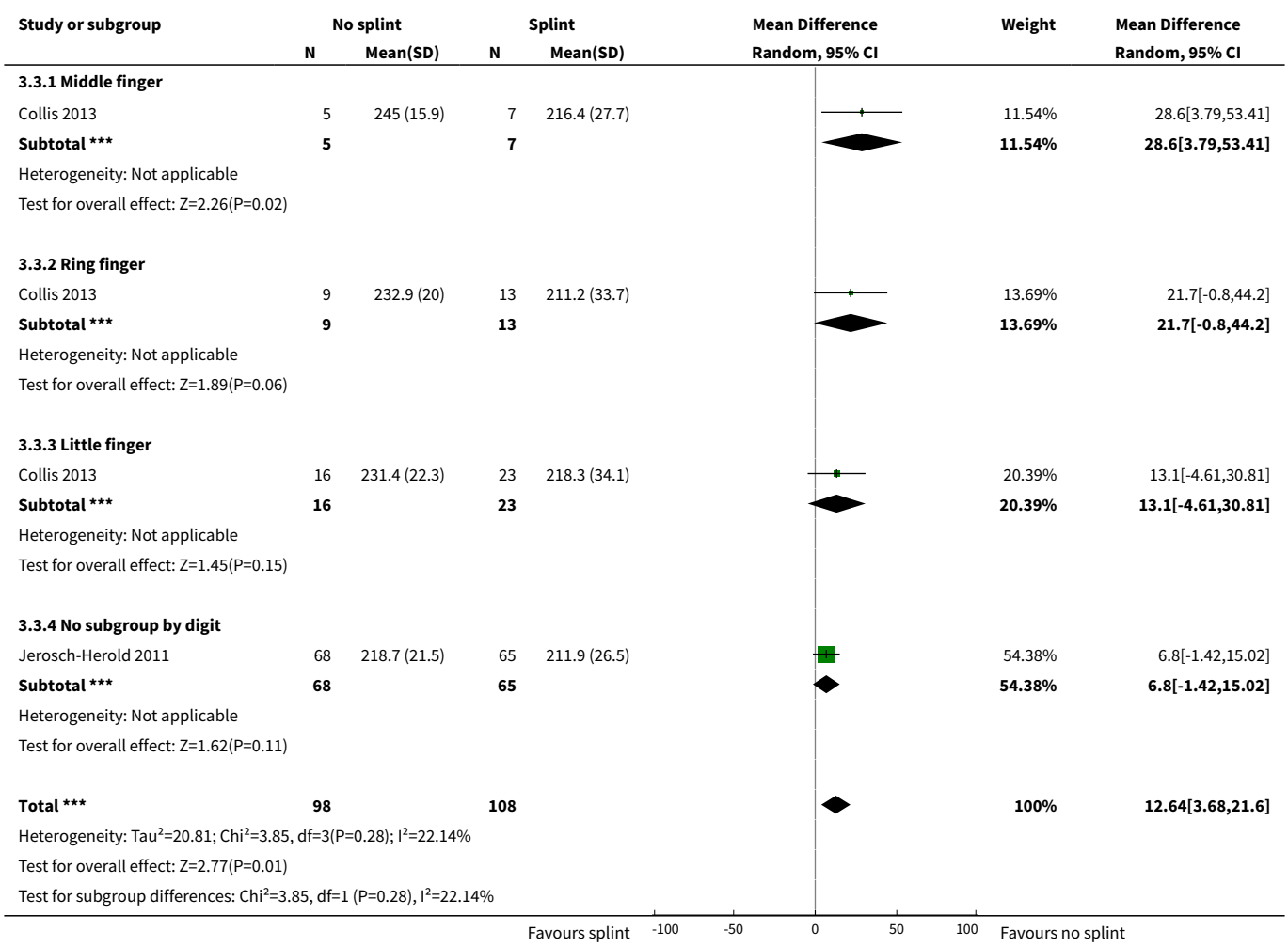
Analysis 3.2. Comparison 3 Effects of 3 months of postoperative night splinting (per-protocol), Outcome 2 Total active extension at 3 months [degrees].

Study or subgroup	No splint N	No splint Mean(SD)	Splint N	Splint Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
3.2.1 Middle finger							
Collis 2013	5	29.6 (35.5)	7	25.7 (17.5)		9.69%	3.9[-29.81,37.61]
Subtotal ***	**5**		**7**			**9.69%**	**3.9[-29.81,37.61]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.23(P=0.82)							
3.2.2 Ring finger							
Collis 2013	9	15.9 (16.1)	13	32.8 (24.3)		24.72%	-16.9[-33.79,-0.01]
Subtotal ***	**9**		**13**			**24.72%**	**-16.9[-33.79,-0.01]**
Heterogeneity: Not applicable							
Test for overall effect: Z=1.96(P=0.05)							
3.2.3 Little finger							
Collis 2013	16	21.4 (15.7)	23	43.6 (42.1)		21.92%	-22.2[-41.05,-3.35]
Subtotal ***	**16**		**23**			**21.92%**	**-22.2[-41.05,-3.35]**
Heterogeneity: Not applicable							
Test for overall effect: Z=2.31(P=0.02)							
3.2.4 No subgroup by digit							
Jerosch-Herold 2011	68	31.1 (21)	65	33 (19.4)		43.66%	-1.9[-8.77,4.97]
Subtotal ***	**68**		**65**			**43.66%**	**-1.9[-8.77,4.97]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.54(P=0.59)							
Total ***	**98**		**108**			**100%**	**-9.5[-21.14,2.15]**





Analysis 3.3. Comparison 3 Effects of 3 months of postoperative night splinting (per-protocol), Outcome 3 Total active flexion at 3 months [degrees].



ADDITIONAL TABLES

Table 1. Outcomes measured and length of study follow-up

Article	Aspect of care studied	Length of follow-up, months	Outcomes measured								
			Recurrence	Extension deficit	Flexion deficit	Total motion	PROM	Time	Complications as an outcome measure	Hand volume	Other
Bhatia 2002	Technical refinement	0.5	-	-	-	-	+	+	-	-	Wound appearance
Bulstrode 2004	Technical refinement	18	-	+	-	+	-	+	-	-	-
Chignon-Sicard 2012	Rehabilitation adjunct	2	-	-	-	-	-	+	+	-	-
Citron 2003	Technical refinement	24	+	-	+	-	-	-	-	-	-
Citron 2005	Technical refinement	24	+	+	-	-	-	-	-	-	-
Collis 2013	Rehabilitation adjunct	3	-	+	+	-	+	-	-	-	Grip strength, composite flexion
Degreef 2014	Technical refinement	24	+	+	-	-	+	-	+	-	-
Howard 2009	Technical refinement	0.5	-	-	-	-	+	+	-	-	-
Jerosch-Herold 2011	Rehabilitation adjunct	12	-	+	+	+	+	-	-	-	-
Kemler 2012	Rehabilitation adjunct	12	-	+	-	-	+	-	+	-	-
McMillan 2012	Technical refinement	6	-	+	-	-	-	-	-	-	-

Table 1. Outcomes measured and length of study follow-up *(Continued)*

Ullah 2009	Procedure type	36	+	+	-	+	+	+	-	-	Grip strength
van Rijssen 2006	Procedure type	1.5	-	+	+	-	+	-	+	-	-
van Rijssen 2012a	Procedure type	60	+	+	-	-	+	-	-	-	-

Table 2. Six-week outcomes described in van Rijssen 2006

Tubiana stage pre-op	% improvement in TPED for needle fasciotomy	% improvement in TPED for fasciectomy	Significance of differences between procedures
I	71	82	0.329
II	67	78	0.071
III	46	75	0.000
IV	47	79	0.004

APPENDICES

Appendix 1. CENTRAL search strategy

#1 MeSH descriptor: [Dupuytren Contracture] explode all trees 36

#2 MeSH descriptor: [Fibroma] explode all trees 4

#3 Dupuytren*:ti,ab,kw (Word variations have been searched) 49

#4 Fibromatosis 12

#5 MeSH descriptor: [Fascia] explode all trees 142

#6 palmar fibromatosis 1

#7 viking disease 1

#8 palmar fascia 7

#9 MeSH descriptor: [Fibroblasts] explode all trees 161

#10 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 357

Appendix 2. MEDLINE search strategy: Ovid (numbers of results from original search in 2012)

Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) <1948 to Present>Search Strategy:
---

1 exp Dupuytren Contracture/ (2121)

2 exp Fibroma/ (11134)

3 Fibromatosis.tw. (2482)

4 exp Fascia/ (7945)

5 Fibroblasts/ (93904)

6 (palmar adj3 fascia).tw. (212)

7 Dupuytren*.tw. (2087)

8 (palmar adj3 fibromatosis).tw. (65)

9 (viking adj3 disease).tw. (1)

10 or/1-9 (115275)

11 randomized controlled trial.pt. (336898)

12 controlled clinical trial.pt. (85168)

13 randomized.ab. (252166)

14 placebo.ab. (139534)

15 clinical trials as topic.sh. (162410)

16 randomly.ab. (184567)

17 trial.ti. (108505)

18 or/11-17 (807835)

19 exp animals/ not humans.sh. (3780560)

20 18 not 19 (746667)

21 10 and 20 (767)

Appendix 3. EMBASE search strategy

EMBASE Classic+EMBASE <1947 to 2012 September 17>

---

1 Dupuytren contracture/ (3303)

2 fibroma/ (12928)

3 Fibromatosis.tw. (3239)

4 fascia/ (9898)

5 *fibroblast/ (30576)

6 (palmar adj3 fascia).tw. (309)

7 Dupuytren*.tw. (3062)

8 (palmar adj3 fibromatosis).tw. (84)

9 (viking adj3 disease).tw. (1)

10 or/1-9 (59116)

11 random$.tw. (776280)

12 factorial$.tw. (20394)

13 crossover$.tw. (45803)

14 cross over.tw. (20874)

15 cross-over.tw. (20874)

16 placebo$.tw. (189116)

17 (doubl$ adj blind$).tw. (140770)

18 (singl$ adj blind$).tw. (12915)

19 assign$.tw. (216631)

20 allocat$.tw. (72946)

21 volunteer$.tw. (171262)

22 crossover procedure/ (35355)

23 double blind procedure/ (115561)

24 randomized controlled trial/ (331643)

25 single blind procedure/ (16422)

26 or/11-25 (1294294)

27 10 and 26 (1139)

Appendix 4. CINAHL search strategy

CINAHL via Ebscohost - 1985-2012

S18	S5 and S17
S17	S6 or S7 or S8 or S9 or S10 or S11 or S12 or S13 or S14 or S15 or S16
S16	TX allocat* random*
S15	(MH "Quantitative Studies")
S14	(MH "Placebos")
S13	TX placebo*
S12	TX random* allocat*
S11	(MH "Random Assignment")
S10	TX randomi* control* trial*
S9	TX ((singl* n1 blind*) or (singl* n1 mask*)) or TX ((doubl* n1 blind*) or (doubl* n1 mask*)) or TX ((tripl* n1 blind*) or (tripl* n1 mask*)) or TX ((trebl* n1 blind*) or (trebl* n1 mask*))
S8	TX clinic* n1 trial*
S7	PT Clinical trial
S6	(MH "Clinical Trials+")
S5	S1 or S2 or S3 or S4
S4	"Dupuytren"
S3	(MH "Fascia")
S2	"Fibromatosis"
S1	(MM "Dupuytren's Contracture")

Appendix 5. LILACS search strategy

LILACS (Latin American and Caribbean Health Sciences) - 1982 to current date

Search terms: dupuytren's contracture

Appendix 6. ProQuest Dissertations & Theses search strategy

ProQuest Dissertations & Theses (PQDT) (all years)

Set#	Searched for	Databases	Results
S1	dupuytren's contracture	ProQuest Dissertations & Theses (PQDT)	18
S2	Fibroma	ProQuest Dissertations & Theses (PQDT)	256
S3	Fibromatosis	ProQuest Dissertations & Theses (PQDT)	118
S4	palmar fibromatosis	ProQuest Dissertations & Theses (PQDT)	2
S6	palmar fascia	ProQuest Dissertations & Theses (PQDT)	86
S7	"viking disease"	ProQuest Dissertations & Theses (PQDT)	0
S8	ab(viking disease)	ProQuest Dissertations & Theses (PQDT)	1
S9	S1 OR S2 OR S3 OR S4 OR S6 OR S7 OR S8	ProQuest Dissertations & Theses (PQDT)	462

Appendix 7. ISI Web of Science search strategy

ISI Web of Science via Thomson Web of Knowledge Conference Proceedings Citation Index - Science (CPCI-S) -- 1990-present

Topic=(dupuytren contracture)

Refined by: Web of Science Categories=(SURGERY) AND Document Types=(PROCEEDINGS PAPER OR MEETING ABSTRACT)

Databases=CPCI-S Timespan=All Years

Lemmatization=On

Appendix 8. Clinicaltrials.gov search strategy

(advanced search screen)

Conditions: Dupuytren's contracture

Appendix 9. Study eligibility form

Study eligibility form - Surgery for Dupuytren's disease

Authors _____ **Journal** _____

Title _____ **Date of publication** _____

_____

(Continued)

Q1. Does the paper report the outcome of a clinical study? (i.e. not a review article or just a paper describing an operative technique description)?	Yes	No	Unclear
	Next question	Exclude	Refer
Q2. Participant **Have participants had a surgical intervention for Dupuytren's contracture of a finger?**	Yes	No	Unclear
	Next question	Exclude	Refer
Q3. Outcomes **Did the study report short-term or long-term outcomes (recurrence) of surgery?**	Yes	No	Unclear
	Next question	Exclude	Refer
Q4. Intervention **Did participants receive an intervention compared with a control group, or were at least 2 interventions compared?**	Yes	No	Unclear
	Next question	Exclude	Refer
Q5. Type of study **Was the study randomised or quasi-randomised?**	Yes	No	Unclear
	Include	Exclude	Refer

Appendix 10. Assessment of potential for bias in report (tool of The Cochrane Collaboration for assessing risk of bias)

Paper title
Paper authors
Reviewer

(Continued)

Domain	Support for judgement	Review authors' judgement
Selection bias	***Insert description, preferably a direct quote from report or correspondence, and add comment***	***One of : "Low risk", "High risk", "Unclear risk"***
Random sequence generation	Describe the method used to generate the allocation sequence in sufficient detail to allow an assessment of whether it should produce comparable groups	Selection bias (biased allocation to interventions) due to inadequate generation of a randomised sequence
Allocation concealment	Describe the method used to conceal the allocation sequence in sufficient detail to determine whether intervention allocations could have been foreseen in advance of, or during, enrolment	Selection bias (biased allocation to interventions) due to inadequate concealment of allocations before assignment
Performance bias		
Blinding of participants and personnel *Assessments should be made for each main outcome (or class of outcomes)*	Describe all measures used, if any, to blind study participants and personnel from knowledge of which intervention a participant received. Provide any information related to whether intended blinding was effective	Performance bias due to knowledge of allocated interventions by participants and personnel during the study
Detection bias		
Blinding of outcome assessment *Assessments should be made for each main outcome (or class of outcomes)*	Describe all measures used, if any, to blind outcome assessors from knowledge of which intervention a participant received. Provide any information related to whether intended blinding was effective	Detection bias due to knowledge of allocated interventions by outcome assessors
Attrition bias		
Incomplete outcome data *Assessments should be made for each main outcome (or class of outcomes)*	Describe completeness of outcome data for each main outcome, including attrition and exclusions from analysis. State whether attrition and exclusions were reported, numbers in each intervention group (compared with total randomised participants), reasons for attrition/exclusions when reported and any re-inclusions in analyses performed by review authors	Attrition bias due to amount, nature or handling of incomplete outcome data
Reporting bias		
Selective reporting	State how the possibility of selective outcome reporting was examined by the review authors, and what they found	Reporting bias due to selective outcome reporting
Other bias		
Other sources of bias	State any important concerns about bias not addressed in other domains of the tool If particular questions/entries were pre-specified in the review protocol, responses should be provided for each question/entry	Bias due to problems not covered elsewhere in the table

Appendix 11. Paper assessment form

Surgery for Dupuytren's disease - Study checklist					
Authors and year					
Title					
Journal/Source if not published					
Study ID (Revman)			Date of extraction		
Study design					
Single/Multi-centre			Study setting (country)		
Number of participants			Mean (SD:range) age		
Male:Female					
Inclusion criteria			Exclusion criteria		
Randomisation technique	• Random numbers • Quasi-random • Not stated		Concealment of allocation sequence?	Yes (envelopes, etc.) No Unclear	
Blinding of participant	Yes No Unclear		Incomplete outcome data (%FU)	Yes No Unclear	
Interventions					
Intervention			Control intervention		
Length of follow-up (mean, SD, median, min, max)			Withdrawals (and why)		
Number lost to follow-up					
Outcomes assessed					
Recurrence			Recurrence	No. Rec.	Total
	Treatment				
	Control treatment				
Pre-op contracture (mean/SD)	MCP	PIP	Combined		
Imm post-op contracture	MCP	PIP	Combined		
Final contracture	MCP	PIP	Combined		

(Continued)

Complications of surgery	Infection (definition)
	Digital nerve injury
	Tendon injury
	Other
Other outcomes	
Quality of evidence	

HISTORY

Protocol first published: Issue 10, 2012
Review first published: Issue 12, 2015

Date	Event	Description
14 November 2008	Amended	Converted to new review format

CONTRIBUTIONS OF AUTHORS

Jeremy Rodrigues

Contributed to authoring of the protocol. Referenced the protocol. Contributed to the design of the search strategy. Screened abstracts. Assessed risks of bias. Extracted data. Performed meta-analysis. Co-authored the main text. Read and approved the final version.

Giles Becker

Contributed to the design of the review. Contributed to the design of the statistical analysis. Screened abstracts. Read and approved the final version.

Cathy Ball

Contributed to the design of the protocol. Contributed to the search strategy. Assessed risks of bias. Extracted data. Read and approved the final version.

Weiya Zhang

Re-designed the methodology and statistics components of the protocol, following review. Read and approved the final version.

Henk Giele

Contributed to the design of the review. Tested different search strategies to compare effectiveness and appropriateness. Read and approved the final version.

Jonathan Hobby

Contributed to the design of the protocol. In particular, contributed to the design of the statistical analysis. Read and approved the final version.

Anna L. Pratt

Contributed to the interpretation of results, particularly of the meta-analysis. Read and approved the final version.

Tim Davis

Conceived of the review. Acted as guarantor of the review. Served as primary author of the protocol. Resolved conflicts in study selection, risk of bias assessment and data extraction. Contributed to the authorship of the review. Read and approved the final version.

DECLARATIONS OF INTEREST

None to declare.

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- No sources of support supplied

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  Contributed to funding Catherine Ball

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

As the result of difficulty gaining access, the following resources were not searched.

- Cochrane Wounds Group Specialised Register BNI (British Nursing Index and Archive).
- Sciverse.
- Zetoc.

As the journals listed for handsearching are currently indexed in databases searched electronically, we deemed handsearching to be redundant and we did not perform a handsearch.

Two additional resources were searched: ISI Web of Science was chosen as a source of conference abstracts, and clinicaltrials.gov was searched.

Given the comprehensive and inclusive nature of the search strategies listed in Appendix 1 and Appendix 2, and the large number of references retrieved (2464), we believe that this search was comprehensive.

The primary outcomes studied have been reordered to reflect the increasing importance of patient-reported outcomes among clinical studies since the time the protocol was first written.

INDEX TERMS

Medical Subject Headings (MeSH)

Controlled Clinical Trials as Topic; Dupuytren Contracture [*surgery]; Fasciotomy; Fingers [*surgery]; Randomized Controlled Trials as Topic

MeSH check words

Humans