Complications after flexor tendon repair: a systematic review and meta-analysis

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CRD summary
The authors concluded that the evidence was supportive of using the modified Kessler repair technique with epitendinous suture to minimise complications after flexor tendon repair. A lack of information on study characteristics and potential limitations of the meta-analysis mean the authors’ conclusions should be interpreted with caution.

Authors' objectives
To examine the incidence of complications, and factors that may predict these, after flexor tendon repair.

Searching
PubMed, Cochrane Central Register of Controlled Trials (CENTRAL) and EMBASE were searched to January 2011; search terms were reported. Only papers published in English were included.

Study selection
 Eligible studies were of patients who had experienced flexor tendon repair. This included children, patients with concomitant neurovascular injuries and ruptures of the flexor pollicis longus. Studies were excluded if they were not related to the upper extremity, focused on flexor tendon reconstruction, or staged flexor tendon repair. Case reports, purely technical descriptions (without associated data), studies with less than three months follow-up or that did not report data on tenolysis or rupture were also excluded.

No information was provided on participant characteristics of included studies.

The authors did not state how many reviewers selected studies for inclusion.

Assessment of study quality
Non-randomised studies were quality assessed using the Methodologic Index for Non-Randomized Studies (MINORS) which had a maximum score of 16 for non-comparative studies and 24 for comparative studies. Randomised studies were quality assessed using the Detsky quality score which had a maximum score of 20. Studies receiving at least 75% on the Methodologic Index for Non-Randomized Studies or Detsky score were considered high quality.

The authors did not state how many reviewers assessed the quality of included studies.

Data extraction
Outcomes (rupture, reoperation, adhesion) were extracted from each study to calculate the proportion of patients who experienced the outcome and 95% confidence intervals (CIs).

Two reviewers extracted the data.

Methods of synthesis
Studies were pooled using a random-effects model if statistically significant heterogeneity was identified. Otherwise a fixed-effect model was used. Statistical heterogeneity was examined using the Q statistic and I². Freeman-Tukey arcsine square root transformation was used to stabilise the variances.

Meta-regression was used to investigate the impact of mean follow-up, age, zone of injury, surgical technique, use of epitendinous suture, study quality and date of publication.

Results of the review
Thirty-nine studies were included in the systematic review which consisted of 3,852 tendons. All 39 studies reported data on repair rupture and reoperation and 20 studies reported data on adhesion. There were two randomised trials, one was rated high quality and the other was low quality. Of the observational studies, 27 were rated as low quality and eight high quality. Four were compared with another group and the rest were not.
The pooled rupture rate was 4% (95% CI 3 to 5; 39 studies; $I^2=47.8\%$), pooled reoperation rate was 6% (95% CI 4.3 to 7.4; 39 studies; $I^2=71.4\%$) and the pooled adhesion rate was 4% (95% CI 2.2 to 6; 20 studies; 72.6%).

None of the covariates were statistically significant predictors of repair rupture. Epitendinous suture was associated with a 84% reduced odds of experiencing reoperation, no other covariates were found to predict reoperation. Techniques other than exclusively using a modified Kessler were associated with a 134% increase in odds of developing adhesions, no other covariates predicted adhesions.

**Authors' conclusions**

There was minimal reduction in reported complications after flexor tendon repair before or after 2000, but such complications were rare. The modified Kessler repair technique with an epitendinous suture was supported by published data to minimise complications.

**CRD commentary**

The review question and inclusion criteria were clear. There was good coverage of electronic databases searched, but there did not appear to have been any attempt to identify unpublished studies. Appropriate methods for reducing errors and bias were used for data extraction but it was unclear if this was the case for study selection and quality assessment.

Minimal details were provided on characteristics of included studies which limited the ability to evaluate the results of the meta-analyses. Some potential problems with the meta-analysis were identified. Firstly, there were six comparative trials included in the meta-analysis, but this data was not used to compare the intervention with control for these trials. Such a comparison would have been less susceptible to bias and would have provided an important contrast with the data from non-comparative studies. Secondly, it appeared that it was possible more than one data point (rate of complication for a tendon) from a patient could be entered in the meta-analysis. Such clustering of data within a patient could bias effect estimates if not adjusted for in the analysis. It was unclear if there was any adjustment for clustering and how often multiple data points from a patient were included. Suitable methods were used to assess statistical heterogeneity.

A lack of information on study characteristics and potential limitations of the meta-analysis mean the authors' conclusions should be interpreted with caution.

**Implications of the review for practice and research**

**Practice:** The authors stated that while there were limitations in the current evidence base, the use of modified Kessler repair technique with epitendinous suture was supported to minimise complications after flexor tendon repair.

**Research:** The authors stated that further research was needed to examine the factors that predict complications after flexor tendon repair.

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