Review title

Prognostic factors for return to work following Carpal Tunnel Release: Systematic Review.

Reviewers

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Review objective

The objective of the systematic review is to synthesise the best available evidence on the effect of early prognostic factors on return to work outcomes in patients who have undergone carpal tunnel release surgery.

Background

Carpal Tunnel Syndrome (CTS) is the most common peripheral compression neuropathy in the upper extremity[1] and is caused by compression of the median nerve at the wrist.[2] Work-related Carpal Tunnel Syndrome has been reported to be a leading cause of prolonged disability.[1,3-5]. Surgery to release the carpal tunnel, commonly called Carpal Tunnel Release (CTR), is a commonly performed intervention used to increase the volume of the carpal tunnel and, consequently, reduce the pressure on the compressed median nerve to reduce symptoms.[2]

Although the work- relatedness of carpal tunnel syndrome is a controversial topic,[1,6,7], it has been documented to account for approximately 14% of upper extremity disorders in industrial settings.[8] Surgery for CTS, or CTR, has a reported work-related prevalence of approximately 6% in jobs with high physical demands.[9]

Time to return to work following CTR continues to pose a heavy economic burden on both insurers and employers.[8] Workers undergoing carpal tunnel surgery require time off work to recover from the surgery itself, and often, to be rehabilitated back to work, causing considerable economic impact to the individual, insurer and employer.

Total time incapacitated following CTR is highly variable in the literature. Some studies report the average time patients were away from work was as low as 4.3 days,[10] and others as high as 3 months.[11,12] A recent systematic review of outcomes, following open and small incision CTR in 2011 by Sanati et al.[13] found that return to work timeframes reported in the literature were highly variable. These differences in return to work timeframes and outcomes have thought to be influenced by a number of prognostic factors.

Prognosis has been described as "the probable course and outcome of a health condition over time". [14] Knowledge of prognostic factors has been recognised as being important in the development of models used in intervention planning and clinical reasoning.[14] Differences in return to work timeframes following CTR have been thought to be strongly influenced by a number of these prognostic factors including compensation status of the patient,[15-18] type of surgery,[17,19-23], surgeon's recommendations,[24] early diagnosis of CTS pre-operatively and length of time to surgery.[3,25] A number of studies have also investigated several prognostic factors including clinical, demographic, psychosocial, work-related and economical determinants, with variable results in return to work outcomes.[20,26-31] This leads us to the assumption that the wide variability in timeframes for return to work may not be purely medical in nature and may be impacted on by a number of prognostic factors, both modifiable e.g. type of work and non-modifiable factors e.g. age or gender. Identification of modifiable factors are especially pertinent to clinicians, as the identification of these factors predictive of poor outcomes, including return to work or function, have the potential to be modified or treated to enable improved patient outcomes.

Whilst there have been a number of factors that have investigated the impact of prognostic factors on a number of outcomes, there has been no consensus, or systematic review on which of these factors is most predictive of poor outcome. A number of outcome measures have been used to determine the effect of a prognostic factor on the patient following CTR. Outcomes have included return to work outcomes (such as recorded time off work[20,32,33]), functional outcomes (using validated scales such as the Disabilities of the Arm, Shoulder and Hand[34,35]), symptom resolution (as recorded by the patient,[28] or using a specific symptom checklist e.g. Carpal Tunnel Questionnaire[34,36] or Levin Score,[37] or using a validated measurement tool such as sensibility or strength measurements,[38] or Nerve Conduction Study[39]), quality of life outcomes (using a validated tool such as SF-12[19]), patient satisfaction outcomes (as reported by the patient[35,38,40]), and economic impact (measured using an

economic analysis[15]). The identification of factors predictive of poor return to work outcomes are also necessary for the development of appropriate assessment tools used to identify these factors. This enables clinicians to use this information to direct appropriate treatment pathways which assist the worker in returning to work in a safe and supported manner within the shortest timeframe.

Given the multifactorial nature of work disability, a formal systematic review and synthesis of the current knowledge in the field will be undertaken. The objective of this study is to review the evidence on early prognostic factors of return to work (RTW) following carpal tunnel release and to assess the methodological strengths and weaknesses of the relevant studies. Our conceptual approach to the review will be based on the multi-factorial understanding of work disability; that postulates that factors related to the injury, to the worker and their occupation, to pre- and post-injury psychosocial functioning will influence RTW and the amount of time lost from work due to injury.[41,42] As no previous systematic review has systematically reviewed and meta-analysed this topic, it is clearly warranted. The specific aim of this systematic review is to identify the consistent prognostic factors, both modifiable and non-modifiable, of RTW outcomes for people who have had carpal tunnel release surgery.

An initial search of the Joanna Briggs Library of Systematic Reviews, the Cochrane Library, Medline and CINAHL, have revealed that no other systematic review has been published or is underway on this topic.

Inclusion criteria

Types of participants

This review will consider articles for inclusion according to the following criteria:

- Studies included patients/participants that have undergone a primary carpal tunnel release and are returning to work;
- Patients/participants included those employed for a wage at the time of the surgery;
- Studies included those investigating at least one prognostic factor; and,
- Study design was longitudinal and the paper reported results with statistical analysis appropriate to prognostic studies.

There will be no restrictions on age, gender, type of work, or type of carpal tunnel surgery i.e. open, minimally invasive, single or double portal endoscopic surgery.

Phenomena of interest

The focus of interest for this systematic review is the association between a number of prognostic factors, and return to work outcomes.

Types of Prognostic Factors

This review will consider prognostic factors in the following domains:

- Demographic factors, e.g. age, education, hand-dominance;
- Worker clinical factors e.g. pre-operative physical status, smoker, diabetes, obesity, pre-operative pain reporting, baseline symptom severity and duration of symptoms;
- Psychosocial factors e.g. depression, self-efficacy;
- Economic considerations: workers compensation status, income;
- Workplace physical demands ;
- Workplace psychosocial demands; e.g. psychological work demands, supervisor support, and job control; and,
- Organisational factors e.g. legislative process.
- Surgical factors e.g. bilateral surgery, type of release

Types of Outcomes

This review will consider studies that examine the association between prognostic factors and the following outcome measures:

- return to work timeframe or length of absence from work;
- return to work capacity outcomes, that is the time workers returned to work in a defined capacity:
    - return to normal duties
    - return to reduced capacity duties
    - return to alternate duties or host employment
    - did not return to work

Secondary outcomes may include:

- symptom resolution as recorded by the patient or using a specific symptom checklist/assessment or validated measurement tool
- Quality of Life measured using a validated tool
- functional outcome measured using a validated measurement tool
- patient satisfaction measured using patient report or a validated tool
- economic impact measured using appropriate economic analysis

Types of studies

This review will consider all comparative analytical observational studies including case control, cohort studies and analytical cross-sectional studies. Randomised controlled trials will be included if they meet the inclusion criteria and review at least one prognostic factor. Both prospective and retrospective studies will be included in the systematic review.

Search strategy

The search strategy aims to find both published and unpublished studies from 1990 to December 2011. This timeframe was chosen due to the high popularity of endoscopic surgery for workers and patients in the 1990s, which was purported to improve return to work and functional outcomes for patients. The search strategy will not be limited to English only publications.

A three-step search strategy will be utilised to identify studies for this systematic review. An initial limited search of MEDLINE and CINAHL will be undertaken followed by analysis of the text words contained in the title and abstract, and of the index terms used to describe each article. A second search using all identified keywords and index terms will then be undertaken across all included databases. Thirdly, the reference list of all identified reports and articles will be searched for additional studies.

The databases to be searched include:
Medline
Cinahl
Embase
OTseeker
PEDro
ProQuest
ScienceDirect
PsychInfo
PubMed
Web of Science

The search for unpublished studies will include:
Dissertation Abstracts
MedNAr
Proquest for dissertations and theses

Initial keywords to be used will be:

'carpal tunnel syndrome' OR 'carpal tunnel' OR 'carp$ synd$' OR 'carp$ tunn$' OR 'tunn$ synd$' OR 'median nerve entrapment' OR 'median nerve compression'
'surgery' OR 'surg$' OR 'decompression' or 'epineurotomy'
'return to work' OR 'sick leave' OR 'sick$ absence' OR 'time off work' OR 'return to employment' OR 'work loss' OR 'work disability' OR 'work resumption' or 'absenteeism'
'cohort studies' OR 'prospective study' OR 'retrospective study' or 'predict$' or 'prognost$' OR 'determ$' or 'course' or 'follow-up studies'

The Medline OVID search strategy is outlined in Appendix I.

The references (title and abstract) identified from the searches will be entered into a bibliographic software package, EndNote X4. Titles and abstracts will be assessed against the inclusion/exclusion criteria independently by two reviewers and those which appear to meet the inclusion criteria will be retrieved. A Verification of Study Eligibility Form will be used (Appendix II). If the title and abstract of a study are inconclusive, the full text will be retrieved for further review. If any data is missing from the trial report, attempts will be made to obtain full data by contacting authors. Studies that have been published in duplicate will be included only once. Decisions regarding study eligibility will be made by two reviewers, and any disagreements resolved by the third reviewer.

Assessment of methodological quality

Prior to inclusion in the review, papers selected for retrieval will be assessed independently by two independent reviewers for methodological validity and quality prior to inclusion in the review using a validated tool for systematic review of prognostic studies.[43,44] Only those papers of sufficient quality will be included. The critical appraisal tool that will be used for this systematic review, is the JBI critical appraisal tool for cohort/case series studies with an additional question, specific to address prognostic factors. An additional question was added so that all the sources of bias in prognostic studies will be more adequately addressed[45]. If any Randomised Controlled Trials are retrieved that are suitable to be included in a systematic review of prognostic factors, they will be assessed using the appropriate JBI tool with the additional question specific to prognostic factors. Please refer to Appendix III for the Critical Appraisal Tools to be utilised in this systematic review.

Any disagreements that arise between the reviewers will be resolved with a third reviewer.

Data collection

Data will be extracted from the eligible studies by two reviewers working independently, using a modified version of the JBI-MAStARI data extraction tool (Appendix IV). Additional sections have been added to the JBI-MAStARI tool, specifically to ensure adequate data is extracted from studies regarding the prognostic factors, collected from each study. The data extracted will include specific details about the prognostic factors, populations, study methods and outcomes of significance to the review question and specific objectives. The data extraction tool will be piloted, on a selection of studies, to assess its ability to record key information from the eligible studies. It will consist of the following sections:

1) Description of the study: type of study design, timing, setting.
2) Prognostic Factor: description and measurement of prognostic/risk factor.
3) Participants; inclusion criteria, exclusion criteria, number of participants.
4) Methodological quality of the study:
5) Outcome Measures: Definition of outcome and method of assessment of outcome
6) Results

7) Reviewer Comments

If any data is missing from the trial report, attempts will be made to obtain full data by contacting authors.

Data synthesis

Retrieved papers will, where possible, be pooled in statistical meta-analysis using Review Manager (RevManv5.1, The Cochrane Collaboration), as the reviewers are more familiar with the RevMan software. All results will be subject to double data entry. Odds ratio (for categorical data) and weighted mean differences (for continuous data) and their 95% confidence intervals will be calculated for analysis. Heterogeneity will be assessed using the standard Chi-square. Where statistical pooling is not possible the findings will be presented in narrative form.

For studies examining the effect of a similar or same prognostic factor, a meta-analysis will be performed, to estimate a weighted measure of effect across studies. We will estimate pooled effects using a random effects model to allow for heterogeneity due to inherent biases within the studies. Where it is not possible to perform a meta-analysis, the data will be summarised in narrative summary.

If substantial heterogeneity is detected between the studies, the reasons for heterogeneity will be explored, based on the date of publication, definition of the prognostic fact and/or outcome measured.

Data will be analysed using Review Manager (v5.1).

Conflicts of interest

None of the authors have any conflicting interests to report.

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Appendix I – Medline OVID Search Strategy

1	Carpal Tunnel Syndrome.mp. or Carpal Tunnel Syndrome/
2	(carp$ tunn$ or tunn$ syndrom$ or carp$ syndrom$).mp. [mp=protocol supplementary concept, rare disease supplementary concept, title, original title, abstract, name of substance word, subject heading word, unique identifier]
3	(nerve entrapment or nerve compression or entrapment neuropath$).mp. [mp=protocol supplementary concept, rare disease supplementary concept, title, original title, abstract, name of substance word, subject heading word, unique identifier]
4	median nerve entrapment.mp.
5	nerve compression syndrome/s or nerve compression syndrom$.mp. [mp=protocol supplementary concept, rare disease supplementary concept, title, original title, abstract, name of substance word, subject heading word, unique identifier]
6	1 or 2 or 3 or 4 or 5
7	epineurotomy.mp.
8	reconstruct$.mp.
9	Release.mp.
10	SURGERY.mp. or General Surgery/
11	Surgical Procedures, Operative/ or SURGICAL PROCEDURES.mp.
12	Carpal tunnel release.mp.
13	Surgical approach.mp.
14	Surgical technique.mp.
15	(surgery or surgical or operation).mp. [mp=protocol supplementary concept, rare disease supplementary concept, title, original title, abstract, name of substance word, subject heading word, unique identifier]
16	7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15
17	Exp work/
18	Exp employment/
19	Sick Leave/ or return to work.mp.
20	Return to employment.mp.
21	Exp absenteeism/
22	unemployment.mp. or Unemployment/
23	(sick$ absence or sick list$).mp. [mp=protocol supplementary concept, rare disease supplementary concept, title, original title, abstract, name of substance word, subject heading word, unique identifier]
24	Time off work.mp.
25	Workloss.mp.
26	Work resumption.mp.
27	Work disability.mp.
28	17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27
29	Exp cohort study/
30	Exp follow-up study/
31	Exp prospective study/

32	Exp retrospective study/
33	Incidence.mp. or Incidence/
34	Mortality.mp. or Mortality/
35	(prognos$ or predict$ or determin$).mp. [mp=protocol supplementary concept, rare disease supplementary concept, title, original title, abstract, name of substance word, subject heading word, unique identifier
36	Course.mp.
37	29 or 30 or 31 or 32 or 33 or 34 or 35 or 36
38	6 and 16 and 28 and 37 129

Appendix II: Verification of Study Eligibility Form

Study Name:
Author:

Inclusion Criteria	**YES**	**NO**
Studies included patients that have undergone a carpal tunnel release and are returning to work		
Participants included those employed for a wage at the time of the surgery		
Study design was longitudinal and the paper reported results with statistical analysis appropriate to prognostic studies		
Studies included investigation of at least one prognostic factor		
INCLUDE **YES / NO** Comments:		

Appendix III - Appraisal instruments

Critical Appraisal of Cohort/Case Control Studies

Name of Reviewer: _____

Record Number: _____

Paper: _____

Year: _____ Author: _____

Criteria	YES	NO	Unclear
JBI Cohort/Case Control Specific Questions			
1. Is sample representative of patients in the population as a whole?			
2. Are the patients at a similar point in the course of their condition?			
3. Has bias been minimised in relation to selection of cases and of controls?			
4. Are confounding factors identified and strategies to deal with them stated?			
5. Are outcomes assessed using objective criteria and were the outcomes defined in adequate detail?			
6. Was follow-up carried out over a sufficient time period?			
7. Were the outcomes of people who withdraw described and included in the analysis?			
8. Were outcomes measured in a reliable way?			
9. Was appropriate statistical analysis used and was there enough information provided to interpret the results provided?			
Question Specific to identifying bias for Prognostic Factors Review			
10. Was there clearly defined and justified constructs of what prognostic factor was measured ?			
OVERALL JBI APPRAISAL: ***INCLUDE / EXCLUDE / SEEK FURTHER INFO*** ***COMMENTS:***			

Critical Appraisal of RCT / Pseudo-Randomised Studies

Name of Reviewer: _____

Record Number: _____

Paper: _____

Year: _____ Author: _____

Criteria	YES	NO	Unclear
JBI RCT / Pseudo-Randomised Specific Questions			
1. Was the assignment to treatment groups truly random?			
2. Were participants blinded to treatment allocation?			
3. Was allocation to treatment groups concealed from the allocator?			
4. Were the outcomes of people who withdrew described and included in the analysis?			
5. Were those assessing outcomes blinded to treatment allocation?			
6. Were the control and treatment groups comparable on entry?			
7. Were groups treated identically other than for the named interventions?			
8. Were outcomes measured in the same way for all groups?			
9. Was appropriate statistical analysis used and was there enough information provided to interpret the results adequately?			
Question Specific to identifying bias for Prognostic Factors Review			
10. Was there clearly defined and justified constructs of what prognostic factor /intervention was measured ?			
OVERALL JBI APPRAISAL: ***INCLUDE / EXCLUDE / SEEK FURTHER INFO*** ***COMMENTS:***			

Appendix IV: Data Extraction Instrument

DATA EXTRACTION INSTRUMENT – PROGNOSTIC STUDY

Study: Author/s: Year:	
Reviewer:	
DESCRIPTION OF STUDY	
Study Design:	
Method:	
Setting:	
Participants: Inclusion/Exclusion Criteria: No of Participants:	
Timing:	
PROGNOSTIC FACTOR/S INVESTIGATED	
DEFINITION OF FACTOR/S	METHOD OF MEASUREMENT
OUTCOME MEASURES	
DEFINITION OF OUTCOME/S	METHOD OF MEASUREMENT
RESULTS	
AUTHORS CONCLUSIONS	
REVIEWERS COMMENTS	
COMPLETE YES / NO	
QUALITY OF STUDY:	