

# Analysis of reporting return to work in studies comparing open with endoscopic carpal tunnel release: A review of randomized controlled trials

Olubimpe Ayeni MPH<sup>1</sup>, Achilleas Thoma MD MSc FRCSC FACS<sup>1,2</sup>, Ted Haines MD MSc FRCPC<sup>2,3</sup>, Sheila Sprague MSc<sup>1</sup>

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**BACKGROUND:** In studies comparing open with endoscopic carpal tunnel release, return to work (RTW) is often cited as a primary outcome.

**OBJECTIVE:** The present study assessed the reporting of RTW and evaluated its usefulness in studies comparing these two methods of carpal tunnel release.

**METHODS:** A computerized search was conducted to find randomized controlled trials that compared open with endoscopic carpal tunnel release, with RTW as an outcome measure. The factors that were compared across the studies included definition of RTW, units quantifying RTW, measures of hand function, patients' type of employment, worker's compensation or insurance status, patients' handedness, unilateral or bilateral carpal tunnel release, and use of rehabilitation.

**RESULTS:** Fifteen studies met the inclusion criteria for the present systematic review. Of the 15 studies reviewed, there were seven definitions of RTW. All studies defined whether the patients underwent unilateral or bilateral carpal tunnel release but there was variability in the calculation of RTW when bilateral releases were performed. The impact of worker's compensation or insurance, type of work, handedness and rehabilitation were inconsistently addressed as factors affecting RTW.

**CONCLUSIONS:** Although RTW ideally reflects function and recovery, it is inadequately measured and reported. The present review revealed that, in studies comparing open carpal tunnel release with endoscopic carpal tunnel release, there is lack of uniformity in reporting RTW, which may contribute to the inconclusive results for RTW. Future research needs to ensure that RTW is used in a consistent manner.

**Key Words:** *Carpal tunnel release; Outcome measures; Return to work; Systematic review*

Open carpal tunnel release (OCTR) is the standard procedure for the surgical treatment of carpal tunnel syndrome. With the advent of minimally invasive surgery, endoscopic carpal tunnel release (ECTR) was introduced as an alternative to OCTR. Proponents of ECTR claimed that by dividing the transverse carpal ligament from within the carpal tunnel, structures above the ligament are left intact and this may hasten

## Les déclarations de retour au travail dans des études comparant la libération ouverte à la libération endoscopique du tunnel carpien : Une analyse d'essais aléatoires et contrôlés

**HISTORIQUE :** Dans les études comparant la libération ouverte à la libération endoscopique du tunnel carpien, le retour au travail (RAT) est souvent cité comme une issue primaire.

**OBJECTIF :** La présente étude vise à évaluer les déclarations de RAT et son utilité dans des études comparant ces deux méthodes de libération du tunnel carpien.

**MÉTHODOLOGIE :** Une recherche informatisée a été menée pour trouver des essais aléatoires et contrôlés comparant la libération ouverte à la libération endoscopique du tunnel carpien, le RAT constituant une mesure d'issue. Les facteurs qui étaient comparés dans les études sont la définition de RAT, les unités quantifiant le RAT, les mesures de la fonction de la main, le type d'emploi des patients, la rémunération des patients ou leur situation du point de vue de l'assurance, la prévalence manuelle des patients, la libération unilatérale ou bilatérale du tunnel carpien et le recours à la réadaptation.

**RÉSULTATS :** Quinze études respectaient les critères d'inclusion dans la présente analyse systématique. Elles comportaient sept définitions différentes du RAT. Toutes les études définissaient si les patients avaient subi une libération unilatérale ou bilatérale du tunnel carpien, mais on remarquait une variabilité dans le calcul de RAT en cas de libération bilatérale. Les répercussions de la rémunération ou de l'assurance des travailleurs, de leur type de travail, de leur prévalence manuelle et de leur réadaptation ne convergeaient pas toutes comme des facteurs influant sur le RAT.

**CONCLUSIONS :** Bien que le RAT reflète de manière idéale la fonction et le rétablissement, il est mesuré et déclaré de manière inadéquate. La présente analyse révèle que, dans des études comparant la libération ouverte à la libération endoscopique du tunnel carpien, la déclaration de RAT n'est pas uniforme, ce qui peut contribuer aux résultats non concluants quant au RAT. Dans le cadre de futures recherches, il faudrait s'assurer d'utiliser le RAT de manière uniforme.

recovery and decrease postoperative morbidity (1). In addition, they posit that the smaller incision, which is made away from the middle of the palm, results in less pain and scarring (2). These benefits of ECTR are tempered by the cost of endoscopic equipment and training, the complexity of the surgery and the scarcity of studies about its long-term safety (3). Initial reports that compared OCTR with ECTR concluded that

<sup>1</sup>Department of Surgery, Division of Plastic and Reconstructive Surgery, St Josephs Healthcare, Surgical Outcomes Research Centre (SOURCE) and McMaster University; <sup>2</sup>Department of Clinical Epidemiology and Biostatistics, McMaster University; <sup>3</sup>Occupational Health Program, Health Sciences Centre, McMaster University, Hamilton, Ontario  
Correspondence: Dr Achilleas Thoma, 206 James Street South, Suite 101, Hamilton, Ontario L8P 3A9. Telephone 905-523-0019, fax 905-523-0229, e-mail athoma@mcmaster.ca

although ECTR has a shorter recovery period, it may also have a higher risk of complications (4).

A recent review (5) comparing the two methods of carpal tunnel release found no difference in terms of symptom relief, but there was conflicting evidence about hand function and return to work (RTW). Similarly, a meta-analysis (6) of studies that evaluated RTW in comparing the two techniques found a pooled odds ratio of 1.52 (95% CI 0.28 to 8.34) favouring ECTR; the studies' results were statistically heterogeneous. These findings reflect the controversy over which method of carpal tunnel release offers better postoperative outcomes. They also raise the question of the degree to which differences or imprecision in the measurement of RTW could play a role in this inconclusiveness. Although both of these studies assessed RTW while comparing ECTR with OCTR, they focused on comparing the postoperative outcomes of the two techniques as opposed to addressing the factors that cause the heterogeneity in the reporting of RTW.

In studies investigating work-related upper extremity disorders, RTW is often cited as a primary outcome measure because it is helpful in assessing patient recovery and it provides information about the social and medical costs of surgery. On the contrary, RTW may be less helpful as a result of work- and nonwork-related confounding factors such as patient motivation, job availability, medicolegal issues and social concerns, which obscure the relationship between RTW and the surgical treatment (5). Despite these possible confounding factors, RTW is still a useful and easily calculated outcome measure.

When RTW is compared for different hand conditions in a study, the clinical and workplace factors that influence recovery can be difficult to distinguish. In choosing a single hand condition to study, carpal tunnel syndrome is ideal because its prevalence, clinical presentation and postoperative outcome are well established (7).

Given the controversy over the choice between ECTR and OCTR, valid results for RTW could have an impact on the choice of procedure when assessing their risks and benefits. The aim of the present study was to assess the quality and usefulness of reporting of RTW in published randomized controlled trials comparing OCTR with ECTR.

## METHODS

To identify eligible studies, a computerized search was conducted in the electronic database MEDLINE (January 1966 to January 2005) and in the Cochrane Central Register of Controlled Trials (updated for the fourth quarter of 2004) for the period from 1990 to 2004, inclusive. The search was limited to this period because the first reports of ECTR were published in 1989 (8). The following search terms and boolean operators were combined: "open OR endoscopic" AND "carpal tunnel release OR carpal tunnel surgery". The bibliography of each article that met the inclusion criteria (described below) was reviewed to find additional eligible studies. Translated versions of studies published in French, Dutch, German and Portuguese were obtained.

To be included, a study had to meet the following criteria: the study had to be designed as a randomized controlled trial; the study had to compare OCTR with ECTR; and RTW had to be an outcome measure. Two investigators (OA and SS) independently reviewed the citations for relevance and carried out data abstraction. Consensus was used to resolve disagreements.

For each study, time to RTW following ECTR and OCTR was recorded. The following data from eligible studies were then

abstracted: definition of RTW, units used to quantify RTW, measures of hand function, patients' type of employment, worker's compensation or insurance status, patients' handedness, unilateral or bilateral carpal tunnel release and use of rehabilitation.

## RESULTS

Fifteen studies met the inclusion criteria set for the present study (8-22) and the studies' features are summarized in Tables 1 to 3. Of the ineligible studies, 11 were excluded because they were not randomized (23-33), four because they did not compare ECTR with OCTR (34-37) and two because RTW was not an outcome measure (38-39).

Of the 15 included studies, there were seven different definitions of RTW. These definitions were: time to RTW (9,11,17,20,22); sick leave (16); absence from work (8); time to RTW or activities of daily living (13); time off from work (14,15,18); inability to work (10,19,21); and per cent of patients returning to work at two weeks, one month and three months (12).

RTW was quantified using three different units. Twelve studies (9-11,13-15,16-18,20-22) used days and two (8,19) used weeks as the unit of time. One study (12) calculated the per cent of patients returning to work at two weeks, one month and three months, thereby quantifying RTW as a percentage of patients and using a combination of weeks and months.

Hand function was assessed across the studies using similar measures. In 14 of 15 studies (8-15,17-22), grip and/or pinch strength were measured. With regard to hand function, 10 of 14 studies (8-13,17,20-22) found that patients in the ECTR group recovered grip and/or pinch strength sooner than those in the OCTR group. Three studies (14,18,19) found no significant differences in hand function between the two groups and one study (15) found an improvement in strength in one of its OCTR groups. In addition, in seven of 10 studies (9-11,13,20-22) where there was faster recovery of grip and/or pinch strength in the ECTR group, there was also faster RTW for the ECTR group. In the remaining three studies with faster recovery of grip and/or pinch strength in the ECTR group, there was no difference in RTW between the two groups (8,12,17).

Patient occupation was defined in 11 of 15 studies (10-14,16,18-22). In four of these studies (8,10,12,18), associations were made between type of work and ability to RTW with all four finding no significant differences in RTW based on occupation. None of the studies provided ergonomic information about the jobs such as hand forces, postures, paces or task duration.

Worker's compensation was addressed in five studies. In one study, none of the enrolled patients received compensation (16). In two studies, no comparison was made about RTW in patients receiving and not receiving compensation (11,22). Finally, one study (9) found that RTW was slower for patients receiving compensation, while the last study found no difference (17). In the studies reviewed, there was no documentation of insurance or benefits status other than worker's compensation.

Ten studies (10,11,13-15,16,18,20-22) stated the number of dominant hand operations that were performed and if the ECTR and OCTR groups were comparable in terms of the number of patients having operations on their dominant hand. Although most studies listed this factor as a patient characteristic, none of the studies discussed how having surgery on the dominant or nondominant hand affected RTW.

**TABLE 1**  
**Characteristics of studies comparing endoscopic carpal tunnel release (ECTR) and open carpal tunnel release (OCTR)**

First author	Patients/ hands (n)	ECTR & OCTR (n)	ECTR technique	OCTR technique	Unilateral or bilateral releases or both	Primary and secondary outcomes	Overall difference in RTW between ECTR and OCTR
Agee (9)	122/147	82 ECTR 65 OCTR	One-portal Agee	Classic incision	Both	RTW, complications, employment status, return of hand use for ADL, postoperative symptoms, clinical examination (grip and pinch strength, monofilament sensory exam, motor testing)	Faster RTW for ECTR (25 days vs 46.5 days) P<0.01
Benedetti (10)	45/45	22 OCTR 23 ECTR	One-portal Agee	Longitudinal incision	Unilateral	RTW, grip and pinch strength, complications, fitness of hand, symptom relief	Faster RTW for ECTR (24.5 days vs 41.9 days) P=0.003
Brown (11)	145/169	84 ECTR 85 OCTR	Two-portal extrabursal Chow	Classic incision	Both	Relief of symptoms, patient satisfaction. Secondary outcomes: interstitial carpal pressure, grip and pinch strength, two-point discrimination, scar and pillar, tenderness, monofilament testing, ADL, RTW, time and cost, complications	Faster RTW for ECTR (14 days vs 28 days) P<0.05
Dumontier (12)	96/96	40 OCTR 56 ECTR	Two-portal extrabursal Chow	Short incision	Unilateral	RTW, numbness, pain, grip strength, finger mobility, complications	RTW was sooner in OCTR group, but difference was not significant (P=0.13)
Erdmann (13)	71/105	53 ECTR 52 OCTR	Two-portal extrabursal Chow	Short incision	Both	Time to RTW or ADL, grip and pinch strength, complication rate, carpal tunnel pain, nerve conduction	Faster RTW for ECTR (14 days vs 39 days) P<0.005
Ferdinand (14)	25/50	25 ECTR 25 OCTR	One-portal Agee	Classic incision	Bilateral	Time off work, operating times, return of muscle strength, hand function, grip strength, manual dexterity, sensation	No difference
Foucher (15)	249/251	54 ECTR 69 OCTR 59 AL1 69 AL2	One-portal Agee	Classic incision <sup>†</sup>	Both	Time off work, postoperative strength, palmar pain	No difference
Hoefnagels (8)	176/176	85 ECTR 91 OCTR	One-portal Agee	Classic incision	Unilateral	Absence from work, palmar pain, complications, patient satisfaction, cost	No difference; 38 patients absent from work after ECTR vs 41 patients absent from work after OCTR
Jacobsen (16)	29/32	16 ECTR 16 OCTR	Two-portal transbursal Chow	Longitudinal incision	Both	Sick leave, symptom relief, total number of analgesics, two-point discrimination	No significant difference (ECTR mean sick leave 17 days, OCTR mean sick leave 19 days)
MacDermid (17)	123/ Unknown	91 ECTR 32 OCTR	Two-portal Chow	Standard long incision	Not mentioned	Symptom severity, nerve/vascular complications. Secondary outcomes: RTW, McGill pain questionnaire, grip strength, pinch strength, sensory threshold	No significant difference
Saw (18)	150/150	74 ECTR 76 OCTR	One-portal Agee	Standard 2 cm incision	Unilateral	Sick leave. Secondary outcomes: operation time, carpal tenderness, grip strength, Levine symptoms severity scale, cost-effectiveness analysis, complications	Faster RTW for ECTR (18 days vs 26 days off work) P=0.005
Schafer (19)	101/101	54 OCTR 47 ECTR	One-portal Agee	Short incision	Unilateral	Inability to work, pain, thenar atrophy, grip and pinch strength, distal motor latency, two-point discrimination	Faster RTW for ECTR (inability to work 3.9 days vs 5.3 weeks)
Sennwald (20)	47/47	25 ECTR 22 OCTR	One-portal Agee	Longitudinal incision	Unilateral	Time out of work, pain, grip and key-strength, complications	Faster RTW for ECTR (time out of work significantly reduced after ECTR compared with OCTR) P=0.0000
Stark (21)	20/40	20 ECTR 20 OCTR	One-portal Agee	Classic incision	Bilateral	Inability to work, pain, grip and key-strength, complications, two-point discrimination	Faster RTW for ECTR (inability to work lasted 20 days, ECTR; 30 days, OCTR) P<0.001
Trumble (22)	147/192	97 ECTR 95 OCTR	One-portal Agee	Longitudinal incision	Both	Time to RTW, pinch and grip strength, Jepsen-Taylor hand function test, carpal tunnel syndrome functional status score, carpal tunnel syndrome symptom severity score, satisfaction. Secondary outcome: complications	Faster RTW for ECTR (median time to work 18 days ECTR and 38 days OCTR) P=0.0086

\*Primary outcomes are listed for all studies and secondary outcomes are listed only when indicated; <sup>†</sup>With anterior ligamentoplasty. ADL Activities of daily living; AL Anterior ligamentoplasty types 1 and 2; RTW Return to work; vs Versus

TABLE 2

**Definitions of return to work (RTW), hand function, hand dominance and worker's compensation in studies comparing endoscopic carpal tunnel release (ECTR) and open carpal tunnel release (OCTR)**

First author	Definition of RTW	Units	Hand function	Type of work	Hand dominance	Worker's compensation
Agee (9)	Time for RTW	Days	Pinch and grip strength	Not mentioned	Not mentioned	Patients receiving compensation RTW later (71 days vs 78 days)
Benedetti (10)	Inability to work	Days	Pinch grip, grip strength	Light and heavy work	Mentioned	Not mentioned
Brown (11)	Interval until patient can RTW	Days	Grip strength and key pinch strength	Work at home, retired, work outside home (professional, managerial, manual, clerical/technical, business)	Mentioned	Mentioned. No association made to RTW
Dumontier (12)	Time to RTW; % pts returning to work at 2 weeks, 1 month and 3 months	% pts*	Grip strength	Manual vs clerical/retired/unemployed	Not mentioned	Not mentioned
Erdmann (13)	Time to RTW or ADL	Days	Pinch and grip strength	Carpentry, weightlifting, typing, refuse collecting, bricklaying	Mentioned	Not mentioned
Ferdinand (14)	Time out of work	Days	Grip strength, Jebsen hand function test	Retired, employed (specific job listed for all nonretired pts)	Not mentioned	Not mentioned
Foucher (15)	Time out of work	Days	Grip strength	Not mentioned	Mentioned	Not mentioned
Hoefnagels (8)	Absence from work	Weeks	Pinch and grip strength	Not mentioned	Not mentioned	Not mentioned
Jacobsen (16)	Sick leave	Days	No measures of pinch or grip strength; symptom relief measured	Employed	Mentioned	No patients received compensation
MacDermid (17)	Time that those who were employed took to RTW	Days	Pinch and grip strength, symptom severity scale	Not mentioned	Not mentioned	Mentioned. No association made to RTW
Saw (18)	Number of days off work	Days	Grip strength, Levine's symptom severity and functional status scales	Employed vs self-employed; manual vs nonmanual work	Mentioned	Not mentioned
Schafer (19)	Inability to work	Weeks	Grip strength	Occupation recorded	Not mentioned	Not mentioned
Sennwald (20)	Time out of work	Days	Grip and key pinch strength	Patients had similar occupation status	Mentioned	Not mentioned
Stark (21)	Inability to work	Days	Grip strength	Light vs heavy work; use of vibrating tools at work	Mentioned	Not mentioned
Trumble (22)	Time until RTW	Days	Pinch and grip strength, Jebsen-Taylor hand function test, carpal tunnel syndrome functional status score, carpal tunnel syndrome symptom severity score	Work at home, work outside, retired	Mentioned	Mentioned. No association made to RTW

\*RTW at 2 weeks, 1 month and 3 months. ADL Activities of daily living; pts Patients; vs Vs

There were eight studies that involved bilateral release in which there were three scenarios. In four studies (9,16,21,22), patients had surgeries on two different days, in two studies (13,14) the patients had the surgeries on the same day and in one study (11) there were both same day and different day operations. The timing of the operations was unclear in another study involving bilateral releases (15).

With respect to the calculation of RTW in the studies involving bilateral releases, two (14,21) of the studies involved only bilateral releases. In addition, one study (9) excluded the patients that underwent bilateral releases from the calculation of RTW, two studies (11,22) rated RTW separately after each procedure and in four studies (14,15,16,21), it was unclear how RTW was computed for the bilateral releases. Finally, postoperative hand therapy was mentioned in two of 15 studies (21,22).

## DISCUSSION

The present systematic review included 15 randomized controlled trials comparing OCTR with ECTR. Although the

nine factors that were assessed in the present study may have an impact on RTW, the present review reveals that they have been defined or addressed inconsistently. This variability raises concerns about the reliability of the reporting of RTW, which in turn has an impact on making a treatment choice between ECTR and OCTR. The seven different definitions of RTW that were revealed in the present review exemplify the lack of uniformity in conceptualizing it. While some definitions were similar ('time off from work' and 'inability to work'), others differed widely ('sick leave,' 'time to RTW,' 'time to RTW or activities of daily living' and 'per cent of patients returning to work at two weeks, one month and three months'). In addition to the varying definitions of RTW, days, weeks and months were used to quantify time in the different studies. Imprecision would result from combining these to a single unit.

Despite the universal reporting of grip and pinch strength, there was inconsistent use of hand function tests with some studies using tools such as the Jebsen hand function test (14,22), the Levine symptom severity and functional status

TABLE 3

Factors affecting return to work (RTW) in studies comparing endoscopic carpal tunnel release (ECTR) and open carpal tunnel release (OCTR)

First author	Impact of hand function on RTW	Impact of type of work on RTW	Impact of hand dominance on RTW	Impact of rehabilitation on RTW	Impact of worker's compensation
Agee (9)	ECTR group returned to preoperative or greater strength more quickly than OCTR group	Patients had 'similar employment status'	Not mentioned	Not mentioned	Patients receiving compensation RTW later (71 days vs 78 days)
Benedetti (10)	ECTR group regained strength faster post-operation and at 3 months	No difference between light and heavy work	Mentioned; not linked back to RTW	Not mentioned	Not mentioned
Brown (11)	ECTR group had better pinch strength	Mentioned; not linked to RTW	Mentioned; not linked back to RTW	Not mentioned	Mentioned; no association made to RTW
Dumontier (12)	Better grip strength recovery at 1 month and 3 months for ECTR group	Grip strength recovery faster for ECTR group at 3 months for light and heavy manual workers	Mentioned; not linked back to RTW	Not mentioned	Not mentioned
Erdmann (13)	Improvement in grip and pinch strength for ECTR group in postoperation period	Diverse	Mentioned; not linked back to RTW	Not mentioned	Not mentioned
Ferdinand (14)	No significant differences in Jebsen hand function test or grip strength between ECTR and OCTR groups	Occupations listed; bilateral	Mentioned; not linked back to RTW	Not mentioned	Not mentioned
Foucher (15)	Strength improved in the anterior ligamentoplasty group	Not mentioned	Mentioned; not linked back to RTW	Not mentioned	Not mentioned
Hoefnagels (8)	Better grip strength for ECTR group at 3 months	No difference in RTW between light and heavy work	Not mentioned	Not mentioned	Not mentioned
Jacobsen (16)	No measures of pinch or grip strength	Employed; no association to RTW	Mentioned; not linked back to RTW	Not mentioned	No patients received compensation
MacDermid (17)	Better grip strength at 1 and 6 weeks in ECTR group	No association to RTW	Not addressed	Not mentioned	Mentioned; no association made to RTW
Saw (18)	No difference	Adjusting for manual and nonmanual workers made no difference in RTW	Mentioned; not linked back to RTW	Not mentioned	Not mentioned
Schafer (19)	Similar recovery of strength after 4 to 12 weeks	Occupation recorded	Not mentioned	Not mentioned	Not mentioned
Sennwald (20)	Better grip strength at 12 weeks for ECTR group	Patients had similar occupation status; no association made to RTW	Mentioned	Not mentioned	Not mentioned
Stark (21)	Better strength in ECTR group at 2 and 4 weeks	Light or heavy work	Mentioned	Offered to patients	Not mentioned
Trumble (22)	Faster recovery of grip and pinch strength for ECTR	Work at home, work outside, retired	Mentioned	Offered to patients	Mentioned; no association made to RTW

vs Versus

scales (8,18) and the carpal tunnel release questionnaire (22). The use of these various tools to assess hand function results in difficulty when comparing the studies.

Occupational characteristics are an important consideration because it is important to know the type of job the patient had both before and after surgery (40). Some employers offer employees the chance to return to modified work, with a smaller workload or different duties, after surgery. In addition, some employers encourage their employees to RTW the day after their surgery and the employees undertake nonstrenuous work duties with the normal hand. In this way, the employer may incur lower compensation or sick benefit costs. The ergonomic characteristics of work – hand and wrist forces, paces, postures and durations – may have played a role in the causation of the

patient's carpal tunnel syndrome and are likely to affect recovery (41,42). The nature of the workplace was unclear in nine of the studies that were reviewed (8,9,15-20,22), and it was unclear if the patient was returning to the same or different duties in all of the studies reviewed.

There is evidence that among patients receiving compensation, RTW is slower among those not receiving compensation (17,43). This is most likely because there is less financial incentive to RTW more quickly if the employee's income is being replaced. With respect to compensation status, 11 studies were conducted in Europe (8,10,12-16,18-21), three were conducted in North America (9,17,22) and one was a collaborative effort between European and North American researchers (11). The country where the studies were conducted

may have an impact on compensation as a result of international variations in compensation but this is difficult to conclude if compensation status is not recorded.

It is anticipated that there would be a difference in recovery, or RTW, if surgery was performed on the patient's dominant hand as opposed to the nondominant hand. This factor was assessed because it has an impact on how balanced the study groups are and if it is not addressed, it could introduce a selection bias, with regard to RTW as an outcome. Since carpal tunnel syndrome may affect one or both hands, it is also important to note if patients have had bilateral or unilateral surgery.

Having both hands operated has obvious implications for RTW. For the patients that underwent unilateral release, the calculation of RTW was simple, but it was more challenging to determine the impact of bilateral release when the releases did not occur closely in time (for instance, within a few days of each other). In the six studies that involved both bilateral and unilateral releases, RTW was not compared between the patients undergoing bilateral and unilateral releases (9,11,13,15,16,22).

Flaws in study design were revealed in some of the studies involving bilateral releases. In two studies, patients underwent bilateral releases on the same day with one hand randomly assigned to ECTR and the other to OCTR (13,14). As a result, it is difficult to assess how each procedure contributed to RTW and the first surgery may have influenced the outcome of the second. In another study, two patients crossed over from the ECTR group to the OCTR group (8). Since these patients were excluded from the calculation of RTW, an intention to treat analysis was not used. Finally, in one study, some patients did not receive the procedure that they were randomly assigned to receive because they refused to undergo OCTR after having ECTR on the first hand (9). This can destroy the prognostic balance of random assignment, thereby introducing bias into the study.

Rehabilitation or hand therapy after surgery is beneficial (44) yet this factor was mentioned in only two studies (21,22). In those two studies, the details about the amount and type of

therapy were not stated and it was unclear if the therapy had an impact on the patients' ability to RTW. It is important to report such information because therapy after hand surgery could potentially affect patient recovery as well as RTW.

Because there is conflicting evidence about the postoperative benefits of ECTR and OCTR, RTW would, ideally, be a useful aid in choosing a technique, but its usefulness depends on how it is defined and reported. To refine the definition of RTW in future research, certain specific changes can be made. We would recommend, as a definition of RTW, the time to RTW, calculated from the day of operation until the first day back to work. The most precise unit to use is days. Hand function can be better defined by using the same questionnaires or tests to assess hand function and tests of hand function should be separated from activities of daily living.

It is important to record type of work and how job characteristics, including ergonomic variables, impact on RTW rates. Worker's compensation, or insurance status, and rehabilitation are other factors worth noting. Interpretation of RTW can also be improved by ensuring that there are a comparable number of dominant hand operations in the groups being compared. The impact of bilateral release can be compared with unilateral release, if the procedures are conducted within a few days of each other.

Future research can examine other factors that affect RTW such as employers' wishes or pressure, insurance carriers and the role that company doctors or RTW programs play in employee recovery. Geographic variations in RTW, additional hand surgeries at time of carpal tunnel release, and variations in technique could also offer insight into trends that occur in RTW.

RTW is challenging to interpret and the present review revealed the heterogeneity that exists in the reporting of RTW in addition to the inconsistent reporting of patient and physician factors that may affect RTW. This outcome measure can be further refined to ensure that it can be a valuable, standardized tool for assessing patient recovery after carpal tunnel release.

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