**Vasiliadis HS, Georgoulas P, Shrier I, et al. Endoscopic release for carpal tunnel syndrome. Cochrane Database Syst Rev. 2014;1;CD008265.**

**PMID: 24482073**

Design: meta-analysis of clinical trials

Purpose of study: to compare the effectiveness and safety of endoscopic (ECTR) versus open carpal tunnel release (OCTR) in patients with carpal tunnel syndrome (CTS)

PICOS:

* Patient population: patients with a clinical diagnosis of CTS with or without electrodiagnostic confirmation, undergoing surgical treatment for CTS
* Interventions: ECTR
* Comparison: OCTR and its variants
  + These included OCTR with mini-open technique and OCTR with concomitant interventions such as lengthening of the flexor retinaculum, internal neurolysis, epineurotomy, or tenosynovectomy
  + Different techniques of ECTR were also eligible for comparison interventions
* Outcomes: primary outcome was overall improvement of symptoms wherein patients indicated the intensity of their complaints compared to the preoperative status, with ratings of the kind “improved” or “not improved” assessing overall satisfaction
  + Secondary outcomes included scores on Levine’s Symptom Severity Scale (SSS), Levine’s Functional Status Scale (FSS), questionnaire scores on the Disabilities of the Arm, Shoulder, and Hand (DASH), grip strength, and time to return to work (RTW)
  + Complication risks such as recurrence, reoperation, nerve and tendon injuries, and scar and postoperative pain were used to assess safety
  + Both short-term (3 months) and long term (greater than 3 months) were taken into consideration
* Study types: both randomized and quasi-randomized studies were eligible for inclusion

Study selection and analysis:

* Databases were searched in November 2013 and included the Cochrane Central Register, MEDLINE, and EMBASE, as well as reference lists and trial registers; authors were contacted for some articles
* The Cochrane Risk of Bias tool was used to assess the quality of studies, with criteria such as random sequence generation, allocation concealment, level of blinding, incomplete outcome data, and selective outcome reporting
  + Trial sponsorship was also considered as a potential source of bias, and if the trial was sponsored by the manufacturer of ECTR instrumentation, this was considered as a potentially biased study
* Standardized mean differences (SMD) were used for comparison of most outcomes which were reported in terms of means and standard deviations; by convention, a SMD of 0.2 is considered small, a SMD of 0.5 is considered moderate, and a SMD of 0.8 or greater is considered to be a large difference in the measured outcome
* When pooled studies were judged to be heterogeneous, the authors pre-planned two types of subgroup analysis: (1) standard OCTR versus modified incision OCTR (mini-open techniques, with or without concomitant procedures such as neurolysis or transverse ligament reconstruction), (2) different ECTR techniques—one or two portals

Results:

* 663 records were identified through the database searches, 72 were identified as potentially eligible, 49 were assessed for eligibility (42 full-text and 7 abstracts), 28 studies were included in a qualitative synthesis, and 25 studies were included in a quantitative synthesis (meta-analysis)
* 18 studies presented data on the short-term (3 months or less) effects of ECTR/OCTR, of which 11 showed no difference in outcomes and 7 favored ECTR
  + Data were pooled from 5 studies for Levine’s SSS, all of which had ECTR as the experimental arm, with 4 studies having standard OCTR and 1 study having modified OCTR as the control arm
  + ECTR and OCTR were statistically equivalent; the point estimate was that ECTR was favored with a SMD of 0.13 with a 95% confidence interval from 0.47 in favor of ECTR to 0.21 in favor of OCTR
  + The same five studies were pooled for Levine’s FSS, and the results remained statistically equivalent (0.23 in favor of ECTR with a 95% CI from 0.60 in favor of ECTR to 0.14 in favor of OCTR)
  + Data from 9 studies assessing short-term pain scores did not demonstrate a difference between ECTR and OCTR
  + Data from 5 studies did not show a difference between OCTR and ECTR with respect to numbness in the short-term
  + The only short-term outcome for which there was a statistical difference between operations was grip strength; dat from 6 studies favored ECTR, but the estimate of the effect size was a mean difference of 4 kg, which was judged to be low and probably not clinically significant
* 11 studies reported longer term symptom outcomes, and only two studies reported differences, one favoring ECTR and the other favoring OCTR, with similar scores for pain, numbness, and overall satisfaction
* Long-term function as measured by grip strength was derived from two studies, favoring ECTR over OCTR by approximately 11 kg (95% CI from 6.2 to 18.1 kg)
* RTW was assessed in 20 studies, expressed in many formats
  + In 10 of the 20 studies, ECTR led to significantly earlier RTW than OCTR, and 1 study reported earlier RTW with OCTR; 7 studies reported a non-significant difference
  + RTW data could be pooled from 4 studies with 274 patients; the pooled difference was 8.0 days in favor of ECTR (95% CI from 1.92 to 14.28 days)
    - Despite the heterogeneity of RTW in settings with different national health systems, the authors judged that the difference between randomized groups is likely to be a reliable outcome
* Safety was broken down into “major” and “minor” complications
  + Major complications were defined as permanent damage or major nerve impairments, severe pain, and complex regional pain syndrome (CRPS)
    - These complications were rare and did not differ between ECTR and OCTR
  + Minor complications were defined as transient nerve problems (i.e., neurapraxia, numbness, and paraesthesias) and wound problems (i.e., infection, hypertrophic scarring, and scar tenderness)
    - Data from 19 studies appeared to show that ECTR was safer than OCTR, but minor complications were also not common
    - There were 45 minor events among 816 ECTR patients and 89 events among 785 ECTR patients, representing 45% less risk with ECTR than with OCTR for all minor complications combined
    - ECTR was associated with more transient nerve problems, and OCTR with more wound problems (numerical data not given)
* The need for reoperations did not differ statistically between ECTR and OCTR; a total of 17 out of 602 ECTR and 13 out of 514 OTR operations had repeat surgery
* Subgroup analyses compared different ECTR techniques (one-portal versus two-portal), but no important differences in any outcome were discovered
* Attempts were made to discover whether the quality of the studies affected the estimates of the outcome results, but these explorations did not show many differences with the main results
  + When the analysis was restricted to studies which had adequate control of incomplete or missing outcome data, ECTR and OCTR were not different with respect to grip strength or complication rates
  + The effects of adequate allocation concealment could not be explored, because only two studies were judged to have clearly concealed the allocation sequence

Authors’ conclusions:

* The quality of the evidence was quite low, with an unclear risk of bias in most studies, even though blinding was not considered in the quality assessment
* Grip strength was greater in ECTR at 3 months or less after surgery; but the difference was probably not clinically important
* At a time point greater than 3 months after surgery, grip strength was better with ECTR than OCTR, and this difference may have been clinically significant
* Return to work was faster with ECTR than with OCTR by about 8 days
* ECTR is as safe as OCTR, and may have a lower rate of minor complications
* For patients in whom early recovery of grip strength and early return to work is important, ECTR may be a better option than OCTR

Comments:

* The ability of the authors to draw conclusions was limited by the generally poor quality of the evidence available to them
* There was no mention of the Knifelight®, which is probably a type of mini-open OCTR intervention; although two of these studies were in the “ongoing studies” section of the meta-analysis, there was no mention of two studies of Knifelight which were published in 2003 and 2004
  + The two ongoing studies have not been completed according to clinicaltrials.gov; one is still recruiting patients and the other is of “unknown” status
* The data on early recovery and early return to work are relevant to the guideline and appear to have had evidence, albeit of low quality, to warrant a “some evidence” statement supporting ECTR over OCTR
* The number of studies which were pooled for the symptom and patient-reported functional outcome data, despite the problems with study quality, warrant a “good evidence” statement that the two operations have similar outcomes for pain, numbness, and general hand function.
* One of the high-quality studies (Atroshi 2006 and 2009) reporting one-year and five-year followup data found no difference in symptom and function scores at five years between OCTR and two-portal ECTR, and has recently (Atroshi 2015) published extended (11 to 16 year) followup data from the same randomized trial
  + Of the 128 patients originally randomized (65 to OCTR and 63 to ECTR), 124 patients provided long term followup data at 11.3 to 15.7 years
  + The followup symptom severity scores maintained the improvements seen in the first year of followup, and no between-group differences were seen in any patient-reported outcomes
  + The study is useful in having enrolled employed patients, but the long term followup did not report on employment status at 11 years and longer
* Ejiri 2012 was identified as a potentially eligible trial at the time that the authors were completing their report, and was deferred to the next revision
  + While this study meets the authors’ inclusion criteria, and is methodologically sound, the outcomes differ in methods of ascertainment and measurement
  + For example, the SSS and FSS were not measured, but culturally important functional outcomes (such as chopstick use) were reported, and there were no differences between ECTR and OCTR with respect to activities of daily living when the groups were compared at 12 weeks
  + Other outcomes, such as shifts in motor nerve distal latency to thenar muscles, are less relevant to worker functional outcomes
  + However, Ejiri further supports the evidence base that the symptom and functional outcomes of the two operations are similar
* Larsen 2013 randomized patients into three groups each of size n=30: ECTR, OCTR with a classical 7 cm curved incision, and OCTR with a short 3 cm mid-palm incision
  + The study outcomes included pain, paresthesia, grip strength, range of motion, and sick leave (time to return to work)
  + The outcomes were reported graphically, and without numerical data on means, standard deviations, and measures of uncertainty; however, the groups did not differ with respect to postoperative pain or paresthesia, while ECTR had an unspecified “tendency” towards earlier return to grip strength
  + ECTR had a median sick leave of 7 days, compared to 16 days in the short-incision OCTR and 20 days in the classic incision OCTR groups: again, presented graphically without further reporting of numerical data
  + The study had satisfactory control of the most important sources of bias, such as blinding and adequate randomization, and lends further support to the evidence base that ECTR shortens return to work time compared to ECTR; however, the lack of precision in the reporting of data is an important limitation to the study
  + Larsen 2013 also lends further support to the evidence base that OCTR and ECTR lead to very similar relief of symptoms and restoration of long term function

Assessment: high quality meta-analysis of generally low-quality studies, providing good evidence that in patients with carpal tunnel syndrome requiring surgery, ECTR leads to earlier recovery of grip strength and earlier return to work than OCTR. There is strong evidence that ECTR and OCTR are nearly equivalent with respect to short-term and long-term pain, numbness, and patient-reported general hand function.

References:

Atroshi I, Larsson G-U, et al. Outcomes of endoscopic surgery compared with open surgery for carpal tunnel syndrome among employed patients: randomised controlled trial. BMJ, doi:10.1136/bmj.38863.632789.1F

Atroshi I, Hofer M, et al. Open Compared With 2-Portal Endoscopic Carpal Tunnel Release: A 5-Year Follow-Up of a Randomized Controlled Trial. J Hand Surg 2009;34A:266–272.

Atroshi I Hofer M, et al. Extended Follow-up of a Randomized Clinical Trial of Open vs Endoscopic Release Surgery for Carpal Tunnel Syndrome. JAMA 2015;314:1399-1401.

Ejiri S, Kikuchi S, et al. Short-term results of endoscopic (Okutsu method) versus palmar incision open carpal tunnel release: a prospective randomized controlled trial. Fukushima J Med Sci. 2012;58(1);49-59. PMID: 22790892

Larsen M B, Sorensen A I, Crone K L et al. Carpal tunnel release: a randomized comparison of three surgical methods. J Hand Surg Eur Vol. 2013;38(6);646-50. 23340761