Chapter 4. Conclusions

Carpal Tunnel Syndrome

There is a great diversity of diagnostic tests for carpal tunnel syndrome. As a result, the available evidence in support of any given test is limited, making it difficult to draw firm evidence-based conclusions. Because all of the studies of diagnostics that were included in this evidence report used healthy asymptomatic persons as controls, their results may overestimate the specificity of nerve conduction measurements in typical practice.

ECRI's meta-analyses of distal motor latency studies found the sensitivity of the test to be 57% to 66% and the specificity to be 98%. Meta-analysis of palmar sensory latency studies found a sensitivity of 76% and a specificity of 98%. No other electrodiagnostic tests provided sufficient evidence for meta-analysis to be conducted. As implied above, the estimate of specificity derived from this meta-analysis may be an overestimate.

The sensitivity of Phalen's maneuver was lower than its specificity, and two trials reported sensitivity of 80% to 90%. All of the studies of Tinel's sign found that its sensitivity was lower than its specificity, and none found a sensitivity of 75 percent or greater. There was too much heterogeneity in the results for us to conclude that one test was superior to the other, or to compare these tests to nerve conduction testing.

One well-designed study suggests that nerve conduction measurement may be able to identify some workers at risk of developing CTS in the future. By itself, this evidence is not sufficient for us to conclude that nerve conduction screening for CTS is effective, but there could be sufficient unpublished results from this study to confirm the findings of the one reported test.

Patients who have undergone surgery for carpal tunnel syndrome are predominantly middle aged and female. Because of underreporting, no firm evidence-based conclusions can be drawn regarding the signs, symptoms, neuroelectrical characteristics and comorbidities of these patients.

No controlled trials have been published testing whether surgical transection of the transverse carpal ligament is an effective treatment for carpal tunnel syndrome. However, lack of evidence for a treatment does not constitute evidence against a treatment. The existence of studies comparing the effects of different types of surgery suggests that surgery does exert an effect.

Meta-analysis of studies comparing global treatment outcome among patients receiving open and endoscopic carpal tunnel release show a small but statistically significant advantage to endoscopic release. In addition, the data show a trend toward faster return to work and to activities of daily living among patients receiving endoscopic release. The results of this analysis are suggestive rather than not definitive. This is because four of the five studies included in this were neither randomized nor blinded. Endoscopic release may have a higher complication rate as well as a higher rate of reoperation compared to open release because of incomplete transection of the transverse carpal ligament. The exact complication rates cannot be determined from presently available data. Presently available data do not allow one to reach firm

evidence-based conclusions about the relative effects of open and endoscopic surgery on function.

Meta-analysis of global outcomes demonstrates a benefit from not performing neurolysis following open carpal tunnel surgery that was not apparent from examination of the individual studies. As above, the results of this analysis are suggestive rather than definitive. This is because this analysis included studies that were neither randomized nor blinded. Available return to work data also shows a trend toward an advantage of not performing neurolysis. There is insufficient data to determine the effect of neurolysis on pain and function. The available evidence suggest there is little or no benefit from performing neurolysis along with surgical release of the carpal tunnel. The possibility remains that neurolysis may be helpful is special cases, such as in the presence of marked scarring or neural adhesion, but no available evidence specifically documents the benefits and harms of neurolysis among such patients.

Injection of steroid into the carpal tunnel yields superior global outcomes compared to no treatment, placebo or oral steroids. Carpal tunnel injection was significantly better than intramuscular injection at a one month followup time. Because no further time points were reported, we are unable to determine whether this difference persists beyond this time. There are no data available that indicate whether any type of steroid may be superior to any other, or whether any particular dose is optimum. Although the effects of steroid injection may wear off over time, there is no information indicating the expected duration of relief for the average patient, or whether any patients can expect to experience permanent relief.

Two double-blinded randomized controlled trials suggest that oral steroids may lead to a reduction in symptoms of CTS. However, the effects of oral steroids are short-lived and may not be sufficient for patient satisfaction. The effects of higher steroid doses or longer treatment regimens have not been examined in published controlled trials

A single published randomized controlled trial indicates that oral tenoxicam (an NSAID) and trichlormethiazide (a diuretic) do not reduce the symptoms of CTS under the dosing regimens described. Further trials are needed to confirm this observation, and to test the effects of additional drugs and dosing regimens.

Some forms of physical therapy may have some use in the treatment of carpal tunnel syndrome, but because of a lack of blinding and low statistical power one cannot conclude that this trend is real. A large, blinded, randomized controlled trial is necessary to confirm these results.

Other treatments were addressed only by single studies of suboptimal design, making it difficult to come to an evidence-based conclusion as to whether they are effective. These treatments include:

- Ultrasound
- Splinting after surgery
- Ligament reconstruction

- Vitamin B_6 therapy.

Although no firm evidence-based conclusion can be reached, tendencies in the available evidence do not support the use of these treatments.

There is only limited evidence of any relationship between patient characteristics and treatment outcome. The only clinical finding variable shown by more than one study to significantly predict treatment outcomes was electrodiagnostic testing. Patients with mildly impaired or normal results of electrodiagnostic tests had longer sick leave and were less likely to be satisfied with the results of treatment. This finding was statistically significant in three of the four studies that examined it.

This apparent lack of consistency of results could indicate that, although the relationship between electrodiagnostic tests and treatment outcomes is statistically significant, it may not be substantial. The possibility that this relationship is small is supported by the results of stratified studies that examined the relationship between electrodiagnostic test results and global outcomes. Six of seven studies did not find a statistically significant relationship.

There is some disagreement in the available evidence concerning a relationship between duration of symptoms and global treatment outcome. The highest quality study (prospective with multiple regression analysis) suggested that there was no statistically significant correlation between duration of symptoms and global outcome after surgery. One prospective and two retrospective stratified studies found similar results. Two retrospective studies (one performing multiple regressions, one stratified) found a statistically significant relationship between shorter duration of symptoms and symptom resolution or patient satisfaction after surgery. The retrospective nature of these trials could have created bias that influenced these findings. Additional high quality studies would provide a better evidence base for determining whether there is a relationship between symptom duration and treatment outcome.

The available evidence suggests that patients who are not receiving workers' compensation tend to return to work faster than those receiving such compensation. This is suggested by one of two "multiple regression" studies of this relationship and by a combination of 10 prospective and retrospective stratified studies. These are correlational studies, so the possibility that there may be a relationship does not imply that workers compensation status causes slower return to work..

Some evidence also suggests that patients who are not receiving workers' compensation have better global outcomes, but this evidence is derived exclusively from retrospective studies. Therefore, these latter findings require confirmation.

Available evidence suggests that there is no strong relationship between gender, employment status, or hand dominance and return to work or global outcomes.

There is insufficient evidence to arrive at a firm evidence-based conclusion on the relationship between type of work, presence of diabetes, or age and patient outcomes.

Three prospective cohort trials have indicated that the SF-36 is not a useful instrument for assessing functional limitations in individuals with carpal tunnel syndrome. The SF-36 was reported to be unresponsive to treatment and to be unable to predict ability to work. In contrast, four prospective cohort trials have indicated that the Levine CTS-I may be a useful instrument for assessing functional limitations in individuals with carpal tunnel syndrome. This instrument was reported to be responsive to treatment, and to have concurrent validity as measured by grip and pinch strength. However, none of the studies included in this evidence report evaluated the Levine CTS-I's content validity, or prediction of the ability to perform activities of daily living. In addition, the Levine CTS-I has been reported by one study to not be able to predict ability to work.

No other instruments were evaluated by more than one study. This limited evidence base makes it difficult to reach an evidence-based conclusion about the usefulness of these other instruments evaluated in this report due to the limited evidence base.

There is some evidence to suggest that most untreated patients with carpal tunnel syndrome have mild to moderate functional difficulties before treatment. However, this evidence is derived from only two studies comprised of a total of 51 patients. This is too few patients and too few studies to allow one to reach a firm evidence-based conclusion. Although studies of non-surgical therapies suggested that most patients experience only mild difficulty with functional activities after treatment, it is unclear whether the results of these two studies are generalizable to the larger patient population. Studies with surgical outcomes suggested that most patients report no-to-moderate difficulty with functional activities (mean 1.4-2.6 on the Levine CTS-I) after surgery. The available data are insufficient to determine a cutoff point on measuring scales above which patients are unable to work.

Cubital Tunnel Syndrome

The evidence base of literature about cubital tunnel syndrome is limited in both quantity and quality, which makes it difficult to come to any definitive conclusions about the disorder and how to diagnose or treat it.

A survey of 32 studies indicates that the typical patient who has been enrolled in a clinical trial of surgery for cubital tunnel syndrome is middle-aged and likely to be male. No further typical characteristics could be gleaned from the limited evidence available.

There are no controlled trials available addressing the effectiveness of non-surgical treatment. Three controlled trials addressed the effectiveness of various types of surgical treatment, but no conclusion can be reached from the available data as to whether any type of surgical treatment is superior.

A survey of 17 studies indicates that age, sex, workers' compensation status, and duration of symptoms before treatment are not well correlated with the success of surgical treatment. However, patients who present with milder symptoms and patients whose cubital tunnel syndrome was precipitated by trauma had better outcomes after surgery than did other patients.

Epicondylitis

Due to limited data, one cannot determine, in an evidence-based fashion, the optimal method for diagnosing epicondylitis. Thirty-eight randomized controlled trials, four randomized crossover trials, and eight controlled trials of a total of 3147 patients evaluated eighteen different types of treatments for epicondylitis and reported 73 different outcomes. Only two of these trials included patients with medial epicondylitis; the rest reported exclusively on lateral epicondylitis. The studies tended to be small, and there are too few studies addressing each treatment to allow any definitive conclusions to be made. The only treatment for which a sufficient number of studies had been published to allow a meta-analysis was laser therapy. A meta-analysis of these data suggests that laser therapy is no more effective than sham laser therapy for treating epicondylitis.

Five studies did not find a statistically significant correlation between the duration of symptoms and the success of treatment. Three studies reported that a patient's age and sex have no correlation with the success of treatment for epicondylitis. One study each reported that grip strength and timing of symptom onset (acute vs. chronic) had no correlation with the success of treatment. One study each reported that the presence of ulnar neuritis or severe pain were correlated with a poorer outcome.

A survey of nineteen studies indicated that the typical patient who received surgery for epicondylitis was middle-aged (mean 44.3 years of age), and almost equally likely to be male or female. Due to a lack of reported data, no other trends or characteristics of surgical patients could be derived. It must be kept in mind that because patients enrolled in clinical trials often differ from the general population of patients.

DeQuervain's Disease

There is limited evidence that addresses some of the questions about de Quervain's disease, but not enough to allow any firm evidence-based conclusions about either its diagnosis or treatment. For indications for surgery, two of three studies reported that surgery was performed only on patients who did not benefit from conservative treatment. However, many patient characteristics were unreported, so one cannot assume that these patients are representative of the larger patient population. Only one non-randomized controlled trial addressed the question of relative benefits and harms of various treatments. Although the study found that corticosteroid plus lidocaine injection produced more treatment successes than immobilization splints, no conclusion can be reached based on one study of suboptimal design. One retrospective study addressed the questions of relationships between specific clinical findings and treatment outcomes, duration of symptoms and treatment outcomes, and patient demographic variables and treatment outcomes. No firm evidence-based conclusions can be reached from one retrospective study.

There were no studies that met our inclusion criteria for the questions involving early identification and diagnosis of de Quervain's disease, effectiveness of methods to prevent recurrence of disease, instruments to assess functional limitations, or functional limitations before and after treatment of de Quervain's disease.