Randomized Controlled Trials for Surgical Treatment of Carpal Tunnel Syndrome: A Systematic Review

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**INTRODUCTION:** Randomized controlled trials (RCTs) are considered the gold standard in evidence-based medicine. We conducted a systematic review to evaluate the quantity, quality, and trends of RCTs that assess surgical treatment of carpal tunnel syndrome (CTS).

**METHODS:** We identified RCTs comparing two or more surgical interventions for CTS in PubMed, Cochrane, Scopus, Google Scholar, and Clinicaltrials.gov. Two independent reviewers assessed manuscripts for inclusion. RCT characteristics including year, journal, country, funding, study size, methodology, follow-up, and intention-to-treat analysis were collected. For all studies, we calculated the Jadad scale1 (0–5), a validated instrument for assessing the methodological quality of RCTs. The Kendall rank correlation was used to assess trends of RCTs over time.

**RESULTS:** Of 2253 identified studies, 58 met full inclusion criteria. They were published between 1985–2015, with a significant increase in the number published over time (p=0.003). The majority were published in *Journal of Hand Surgery – European Volume* (n=15, 25.9%), *Journal of Bone and Joint Surgery* (n=9, 15.5%), and *Journal of Hand Surgery – American Volume* (n=8, 13.8%). Most RCTs were single-center studies (n=54, 93.1%) conducted in the UK (n=13, 22.4%) or the US (n=10, 17.2%), with a mean study size of 80.1±55.5 patients. Funding source was unknown in 62.1% (n=36).

Three-quarters (n=44, 75.9%) of RCTs did not define primary outcome measure(s); of those that did, less than half (n=6, 42.9%) specified them before beginning the RTC. <30% (n=17) of RCTs conducted a power analysis. In regards to follow-up, 31.0% (n=18) had complete follow-up, 36.2% (n=21) lost some patients to follow-up, 1.7% (n=1) did not incorporate follow-up in study design, and the remainder were unknown. Only four studies with patients reported lost to follow-up provided an explanation for each patient. 10.3% (n=6) of RCTs conducted intention-to-treat analysis. The mean Jadad score was 2.14±1.26, with no significant improvement over time (p=0.245).

**CONCLUSION:** We showed a significant increase in the number of RCTs published studying surgical treatment of CTS over time, however a mean Jadad score of 2.14 with no significant change over time suggests a need for improvement in quality. Although RCTs are level one evidence and there are many comparing surgical interventions for CTS, the majority employ flawed methodology. Proper study design is key to avoiding introduction of bias and ensuring the validity of conclusions drawn.

Reference Citations:
1. Jadad AR, Moore RA, Carroll D, et al. Assessing the quality of reports of randomized clinical trials: is blinding necessary? Control Clin Trials. 1996;17:1–12.
outcomes of revision surgery for recurrent or persistent carpal tunnel syndrome may be improved by the novel use of both nerve wrapping and adipofascial flap.

**METHODS:** The records of patients with recurrent or persistent carpal tunnel syndrome treated with revision decompression, collagen nerve wrap, and adipofascial flap from a 4-year period were retrieved from the Computerized Patient Record System database. Each record was reviewed for pre-operative and post-operative visual-analog pain scale measurements, opioid usage, and severity of symptoms.

**RESULTS:** 22 patients were identified, with 22 revision surgeries for recurrent carpal tunnel syndrome and 3 revision surgeries for persistent carpal tunnel syndrome. The mean age of the patients was 67.8 years and ranged from 51 to 85 years. There was an average follow up of 52 weeks. The average pre-operative median motor nerve conduction velocity was 47.7 m/s. 80% of patients had hypertension as a comorbidity. 76% reported subjective resolution of their symptoms by most recent follow up. Post-operative average visual-analog pain score decreased to 0.20 from an average pre-operative average visual-analog pain score of 5 (p<0.001). Post-operative opiate medication use average decreased to 20% from an average pre-operative opioid average use of 36% (P=0.31). No patient required repeat decompression by latest follow up.

**CONCLUSION:** Revision decompression with collagen nerve wrap and adipofascial flap can successfully treat recurrent and persistent carpal tunnel syndromes. This means of treatment may currently be the optimal way to treat recurrent or persistent carpal tunnel syndrome and should be compared to treatments with isolated nerve wrapping or adipofascial flap for revision carpal tunnel treatment in future prospective studies.

**Reference Citations:**
1. Cobb TK, Amadio PC, Leatherwood DF, et al. Outcome of reoperation for carpal tunnel syndrome. *YJHSU*. 1996;21(3):347–356.
2. Soltani AM, Allan BJ, Best MJ, et al. Revision Decompression and Collagen Nerve Wrap for Recurrent and Persistent Compression Neuropathies of the Upper Extremity. *Annals of plastic surgery*. 2014;72(5):572–578.
3. Strickland JW, Idler RS, Lourie GM, et al. The hypothenar fat pad flap for management of recalcitrant carpal tunnel syndrome. *YJHSU*. 1996;21(5):840–848.

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**Examining Surgical and Patient-Reported Outcomes in the Operative Management of Peripheral Neurofibromas**

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**INTRODUCTION:** Peripheral nerve tumors, especially of the extremities, impart significant disability with potential malignant transformation, yet surgical management risks permanent deficits. Outcomes with peripheral nerve tumor excision and comparative results with surgical intervention for neurofibromas and schwannomas remain to be elucidated.

**METHODS:** Patients undergoing excision of peripheral nerve neurofibromas or schwannomas from 2009 to 2015 were reviewed. Outcomes, including results of a post-operative outcome survey, were compared between the two groups.

**RESULTS:** Ninety-two peripheral nerve tumors were excised; 72 neurofibromas (78.3%) were removed from 26 patients while 20 schwannomas (21.7%) were removed from 17 patients. Average age in the neurofibroma and schwannoma groups were 34.69 and 39.65 years (p=0.2291). Patients in the neurofibroma group were significantly more likely to carry a diagnosis of neurofibromatosis type 1 or 2 while the schwannoma group was significantly more likely to be diagnosed with schwannomatosis (p<0.0001). Patients in the neurofibroma group were significantly more likely to present complaining of pain (p=0.0144); those in the schwannoma group were significantly more likely to present with motor weakness (p=0.0047). Anatomic tumor distribution to the upper or lower extremities, head/neck, or trunk was equivalent (p=0.3663). Follow-up was significantly greater in the schwannoma group (p=0.0015).

Tumors had an equal size distribution between the two groups (p=0.1520). Excised schwannomas were significant more likely to be associated with a motor or named sensory nerve compared to excised neurofibromas (p=0.0377). Nerve monitoring was employed in an equivalent fashion...