Table 179. Clinical Trial Results: Ulnar Motor Nerve Conduction Velocity at the Elbow for Diagnosis of Cubital Tunnel Syndrome

Study	TP	FN	FP	TN	Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)	Prevalence
[a]Odusote, 1979 [489]	72	181	10	229	28.5% 23.2% 34.4%	95.8% 92.4% 97.7%	87.8% 78.8% 93.3%	55.9% 50.9% 60.7%	51.4%
[b]Eisen, 1977 [298]	12	6	0	60	66.7% 43.3% 84.0%	100% 93.8% 100%	100% 75.0% 100%	90.9% 81.3% 95.8%	23.1%
[a, b]Kingery, 1995 [499]	16	34	2	68	32.0% 20.6% 46.1%	97.1% 90.0% 99.2%	88.9% 66.7% 97.0%	66.7% 56.9% 75.2%	41.7%

Insufficient data for meta-analysis

[a]Data reported on a per-arm basis, rather than per-patient.

[b]Counts for control group (false positive, true negative) estimated by ECRI from threshold reported by authors

Figure 44. Clinical Trial Results: Ulnar Motor Nerve Conduction Velocity at the Elbow for Diagnosis of Cubital Tunnel Syndrome

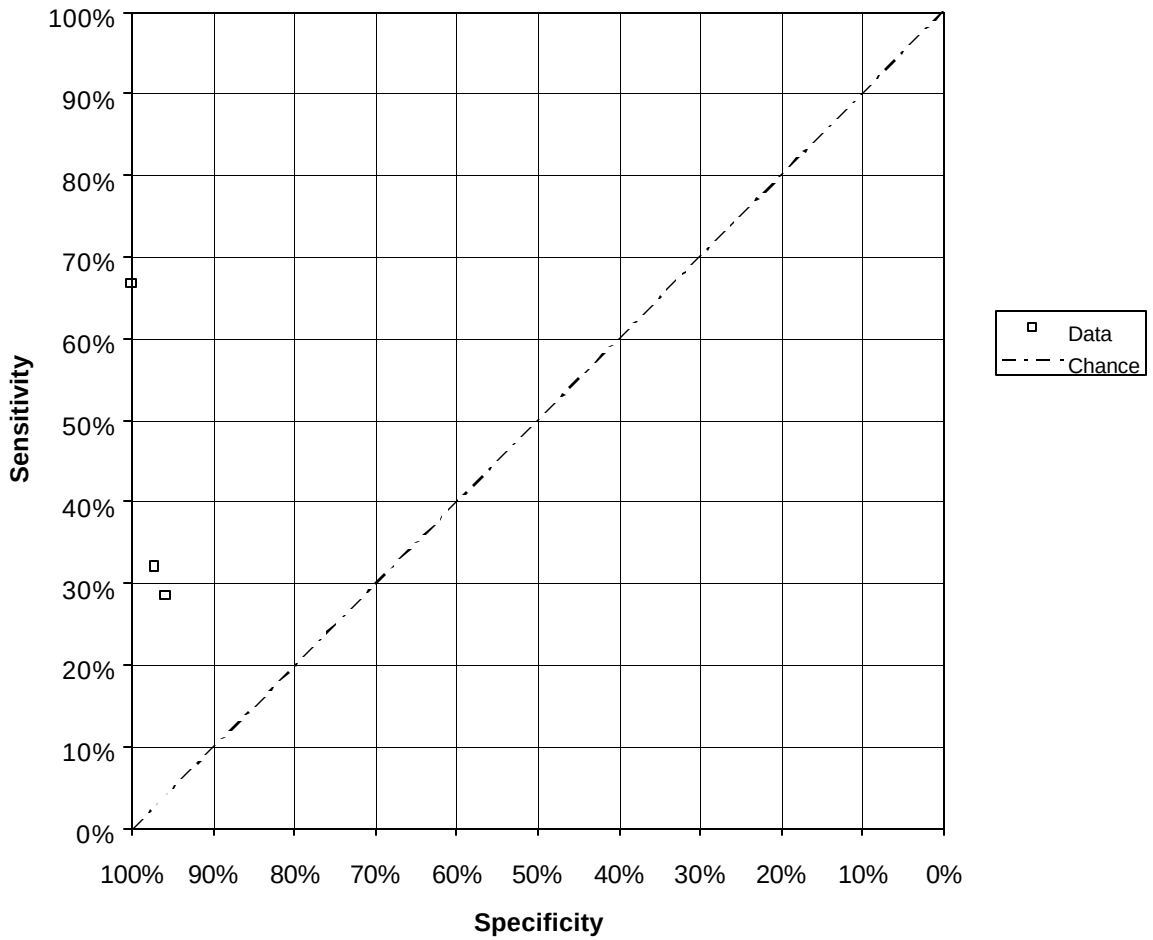
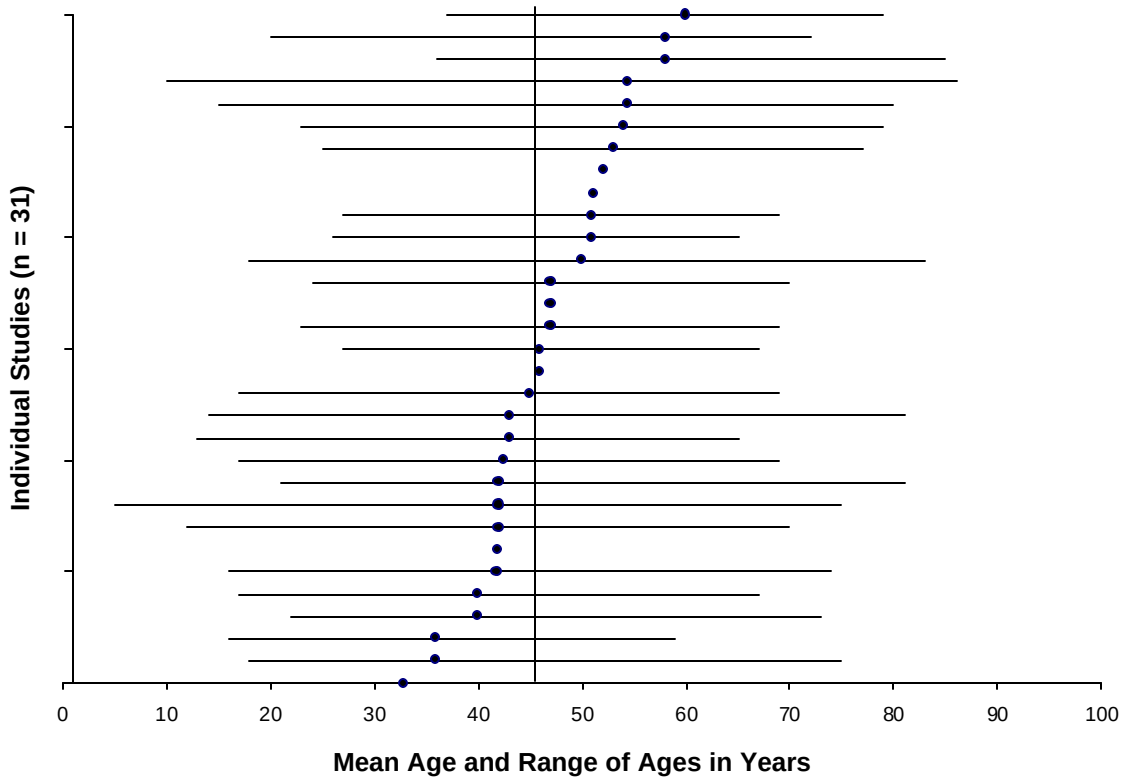
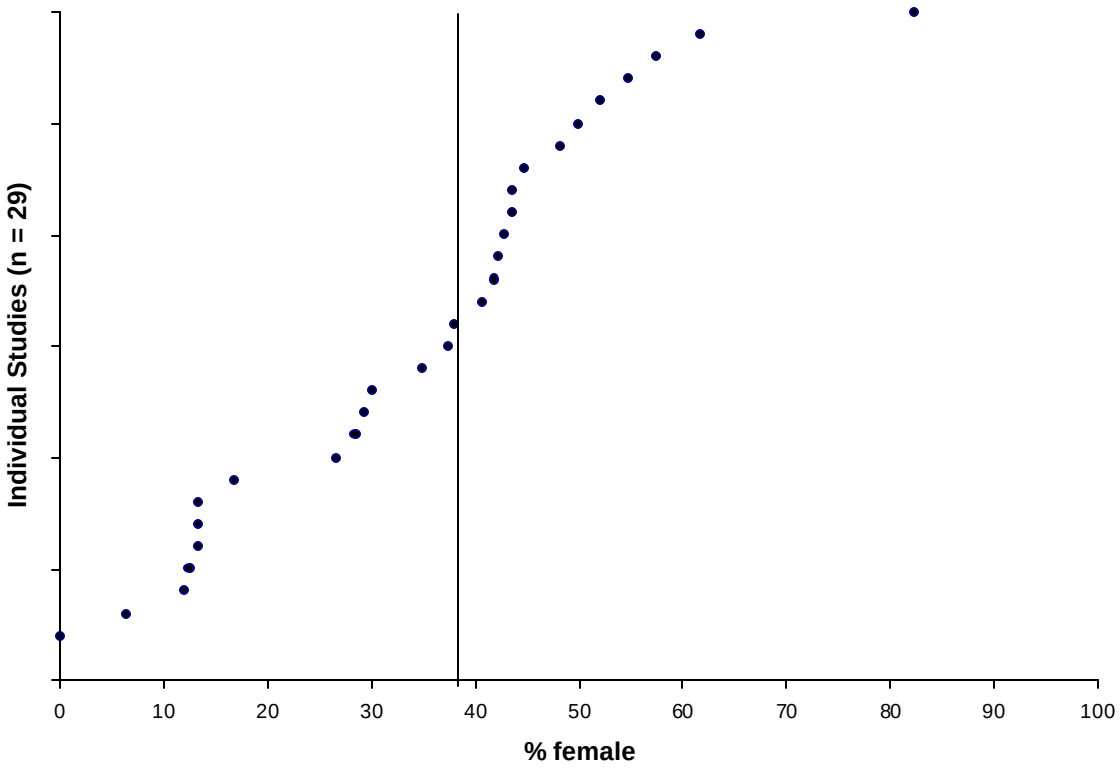


Figure 45. Mean ages and ranges of ages of patients treated surgically for cubital tunnel syndrome



The vertical line indicates the mean age

Figure 46. Gender composition of patient groups treated surgically for cubital tunnel syndrome



The vertical line indicates the mean % of females

Signs and symptoms

The signs and symptoms of patients before surgical treatment for cubital tunnel syndrome are listed in Table 185. The number of studies reporting on the proportion of patients in the study group having each sign and symptom are listed in Table 186 and shown in Figure 47. The mean percentage of patients reported to have each sign and symptom, and the range of reported percentages, are shown in Figure 48. In addition to the clinical signs and symptoms, some studies reported on the conduction velocity of the ulnar nerve. Nine of the 32 studies simply reported that all of the patients treated with surgery had "abnormal" nerve conduction velocities. One of the 32 studies reported that 31% of the patients had "abnormal" nerve conduction velocities. The definition of abnormal varied from study to study, and often no definition was supplied. Five of the 32 studies did not measure the nerve conduction velocity of the ulnar nerve before treating the patients with surgery. In 17 of the 32 studies it was not clear from the reported information whether nerve conduction velocities were measured.

Fifteen of the 32 studies reported how long the patients had had symptoms before being treated with surgery. The reported mean durations and ranges are shown in Figure 49. On average, patients had symptoms for 10 to 24 months before treatment.

Figure 47. Percentage of studies reporting on the proportion of patients with each sign and symptom

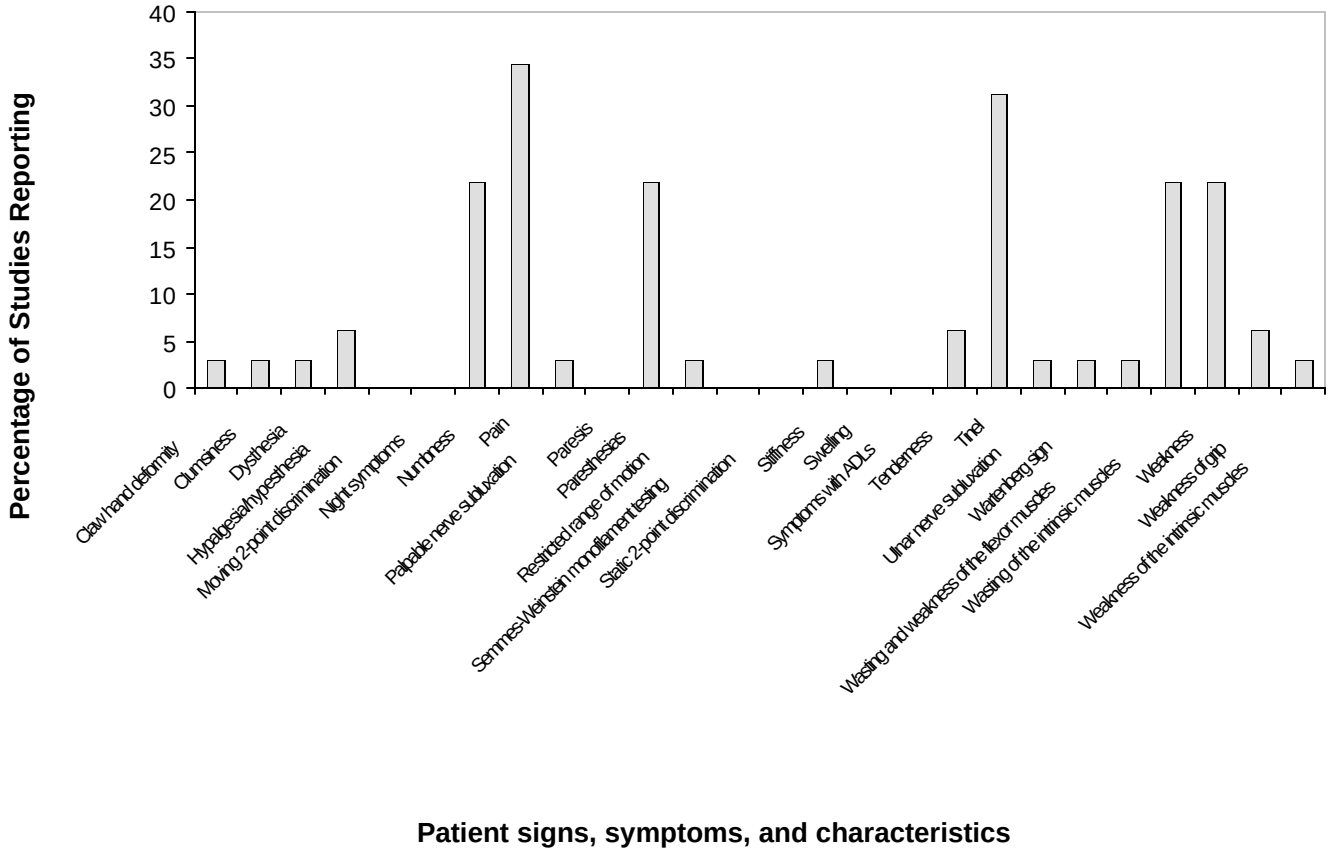


Figure 48. Mean percentage and range of percentages of patients reported to have each sign and symptom

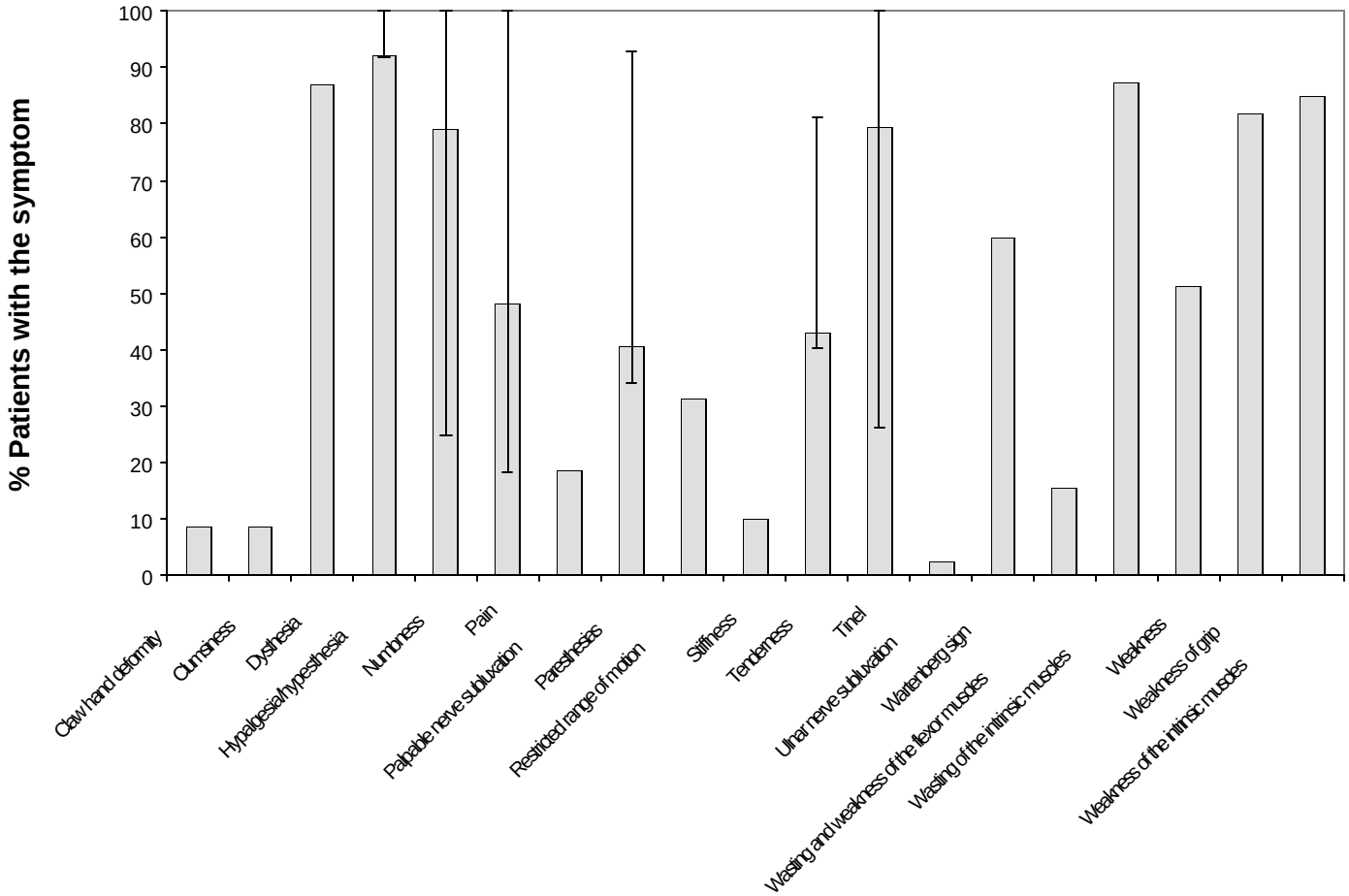
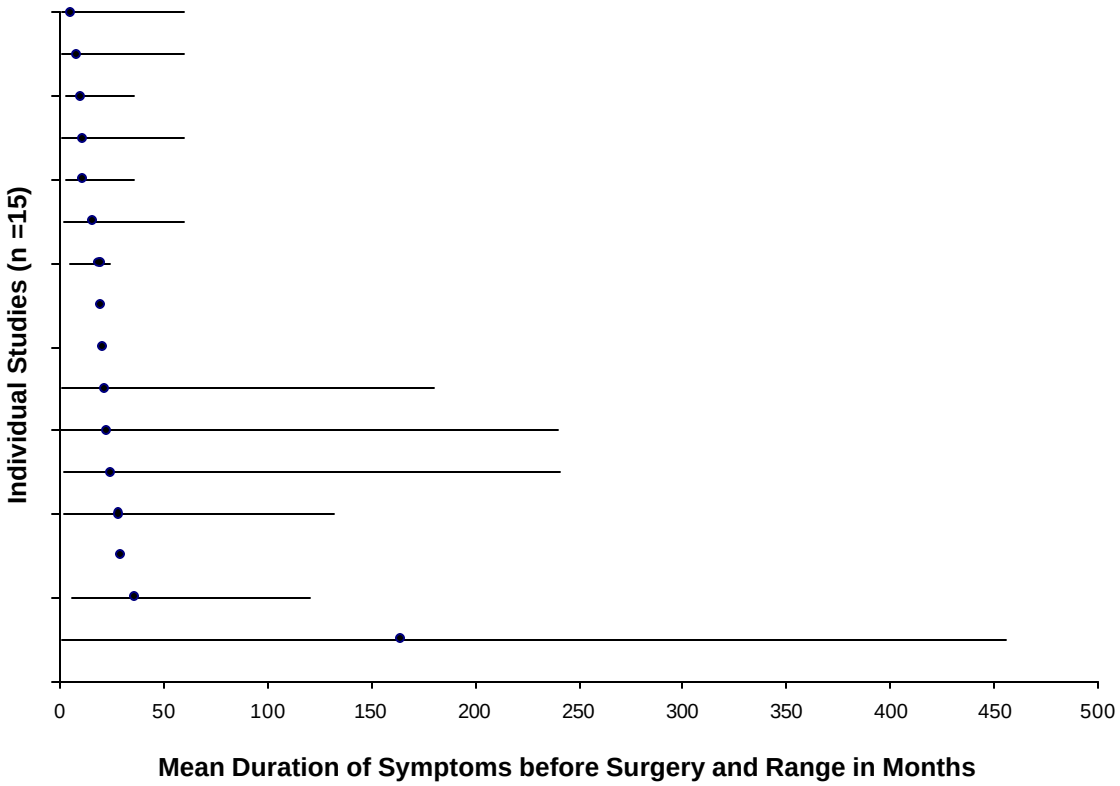


Figure 49. Mean and range of duration of symptoms before treatment



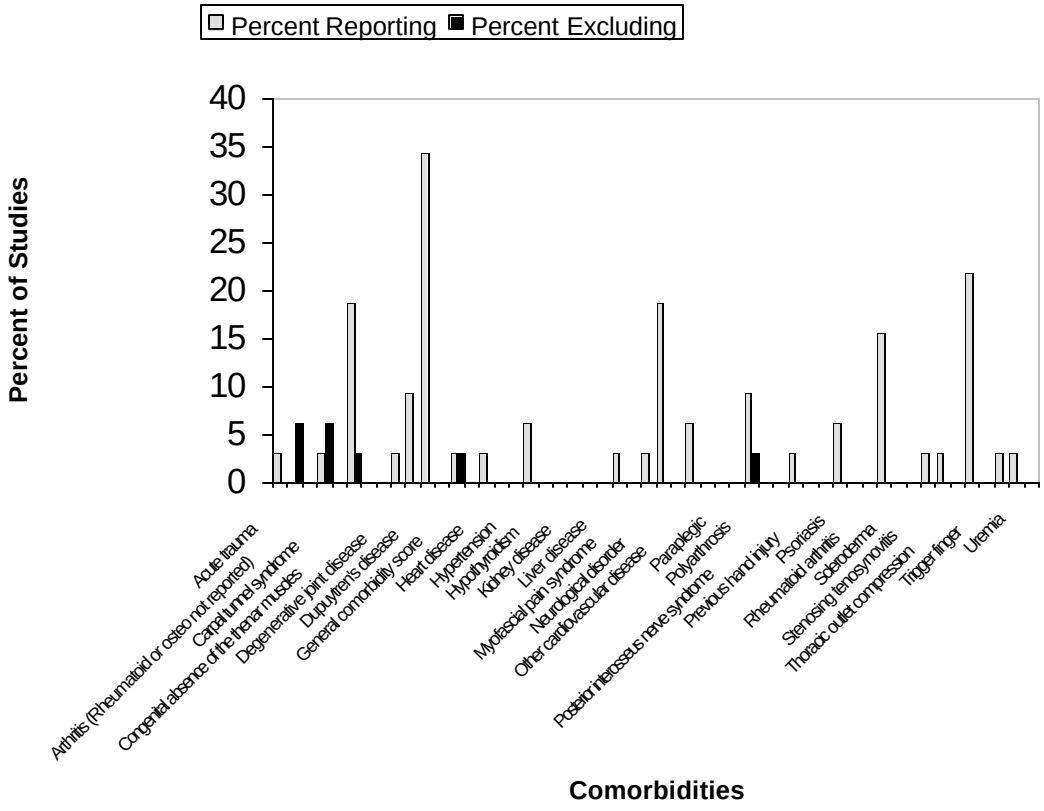
Occupations and work history

Of the 32 studies describing patients receiving surgery for cubital tunnel syndrome only one study reported the specific occupations of its patient group. Six studies reported on the percentages of patients receiving Workers' Compensation. One study reported on the percentage of patients able to work, and one study reported on the percentage of patients not able to work. Because so few studies reported data pertaining to the occupations and work history of their patient groups, it is difficult to make generalizable statements.

Comorbidities

The number of patients with comorbidities is incompletely reported in published studies of surgical treatment for cubital tunnel syndrome, as can be seen in Figure 50. The number of studies reporting the presence of a given comorbidity never exceeds 35% of the available studies. Further complicating analysis is the fact that some studies exclude patients with comorbidities. Because comorbidities are both underreported and patients with them may be excluded from clinical trials, it is difficult to reach conclusions about the presence of comorbidities among patients receiving surgery for cubital tunnel syndrome or the impact of comorbidities on whether a patient is a candidate for surgery.

Figure 50. Percentage of studies reporting and excluding comorbidities



Conclusions

Thirty-two studies of patients who received surgery for cubital tunnel syndrome were identified. Due to a lack of reported data, few trends or characteristics of patients who received surgery could be identified. The mean age of patients who received surgery for cubital tunnel syndrome was 46 years. The patients were slightly more likely to be male (62% male), and on average had symptoms 10 to 24 months before receiving surgical treatment.

Figure 51. Success of surgical treatment: statistical tests comparing anterior transposition to other types of surgery

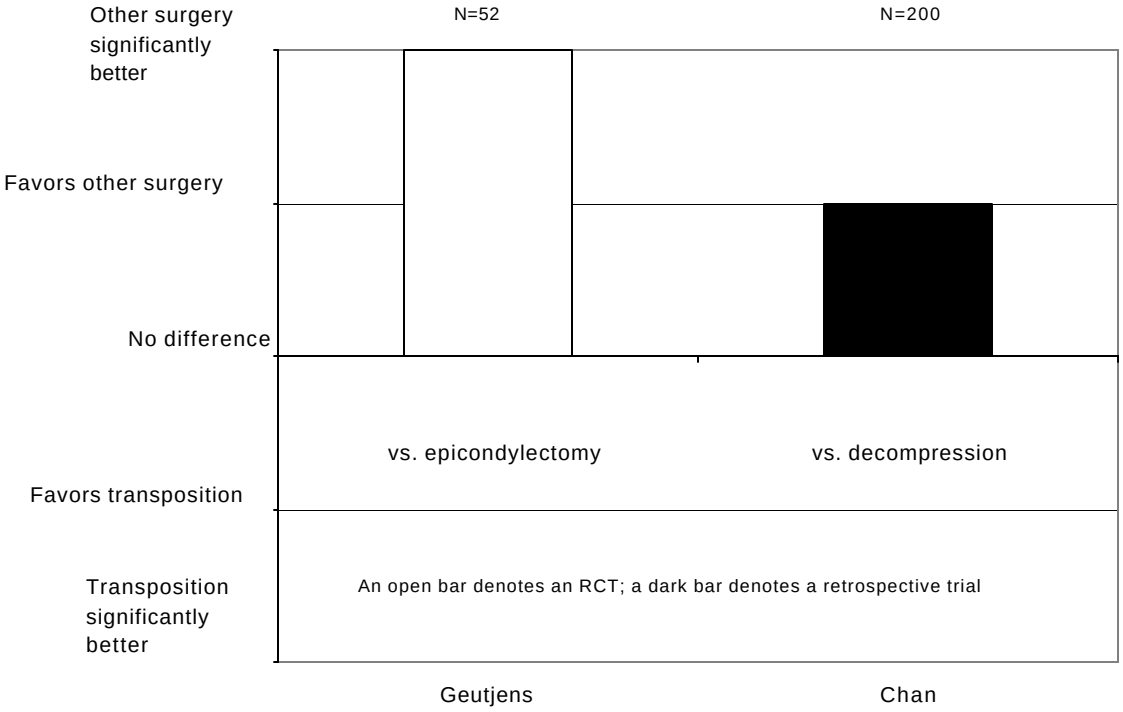
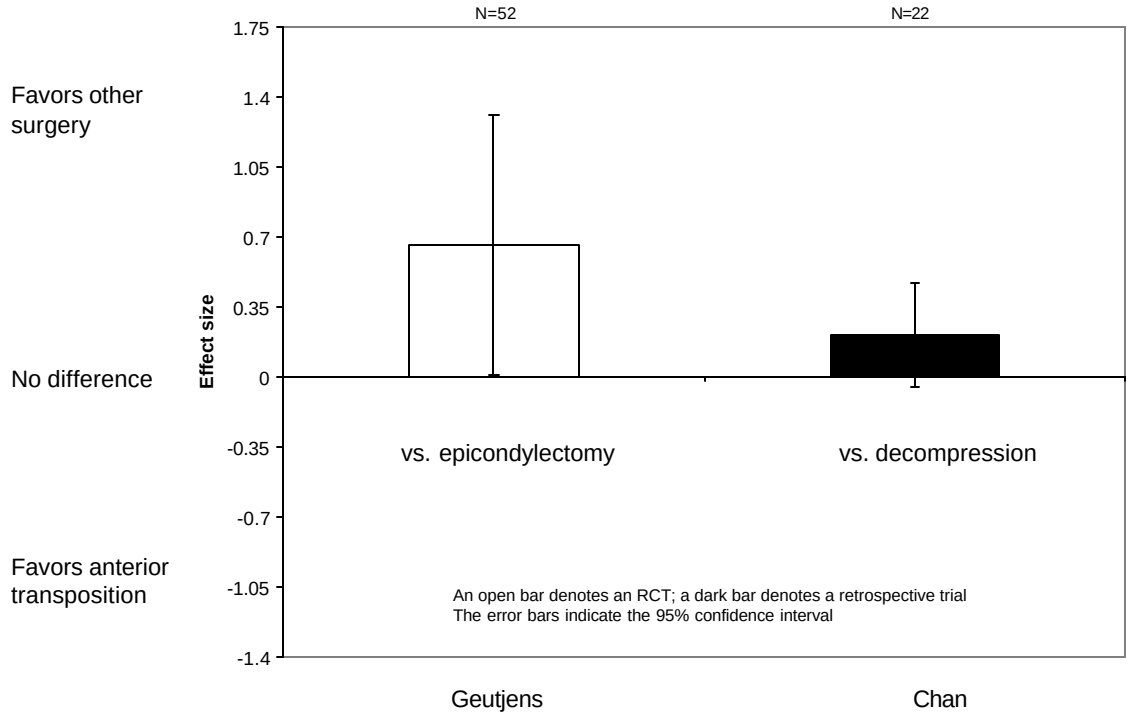


Figure 52. Success of surgical treatment: effect sizes of different types of surgery compared to anterior transposition



Work Status

None of the trials reported on this outcome.

Pain

Three trials of a total of 301 patients reported on the relative success of different surgical techniques in treating the pain of cubital tunnel syndrome. One of the studies had patients rate their pain after treatment on a five-point scale. The other two studies asked the patients whether their pain had been relieved. These two studies reported their data in terms of the number of arms, not the number of patients. The extent to which this affects the validity of the statistical analysis may be small, as was discussed in the section on Study quality. The reported data and effect sizes are summarized in Table 193. We could not compensate for attrition in either study due to the nature of the reported data. The effect of surgical treatment on pain is summarized in Table 193. The results of the statistical tests are shown graphically in Figure 53. The effect sizes we calculated are shown in Figure 54.

Transposition with preservation of the extrinsic vessels was found to relieve pain to a greater extent than without the extrinsic vessels, but the effect size of this result did not reach statistical significance. The data from the study by Geutjens 1996 indicates that patients treated with epicondylectomy had a greater relief of pain than did patients treated with anterior transposition.

Figure 53. Effect of surgery on pain: statistical tests of anterior transposition vs. other types of surgery

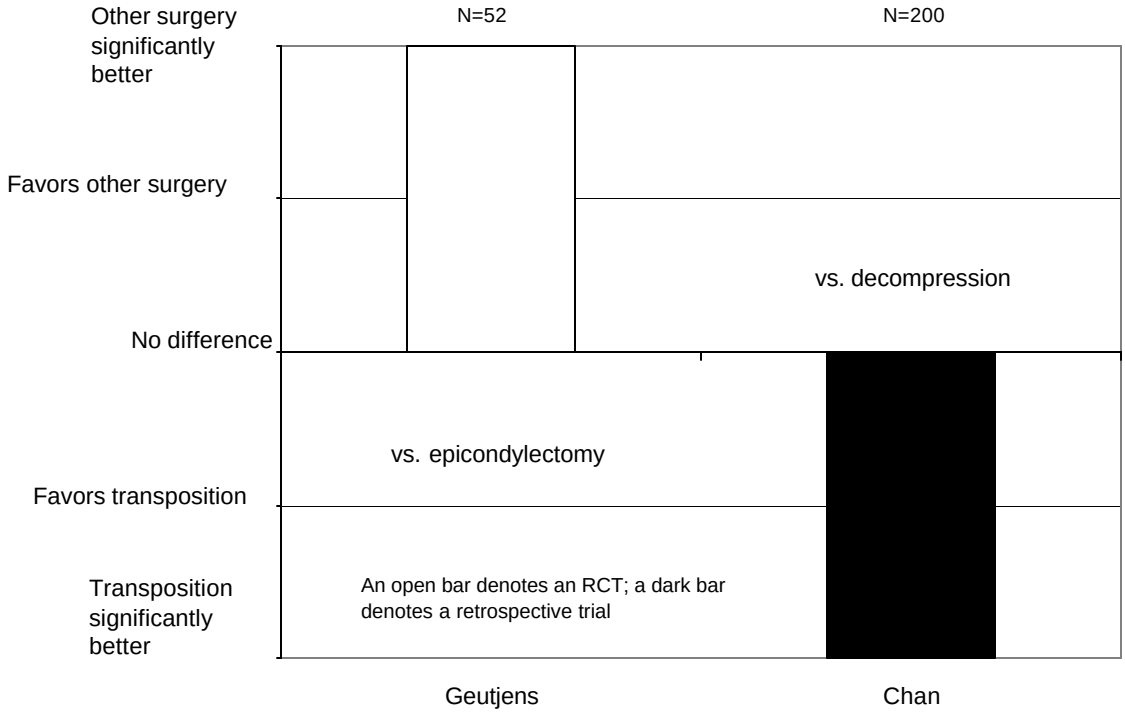
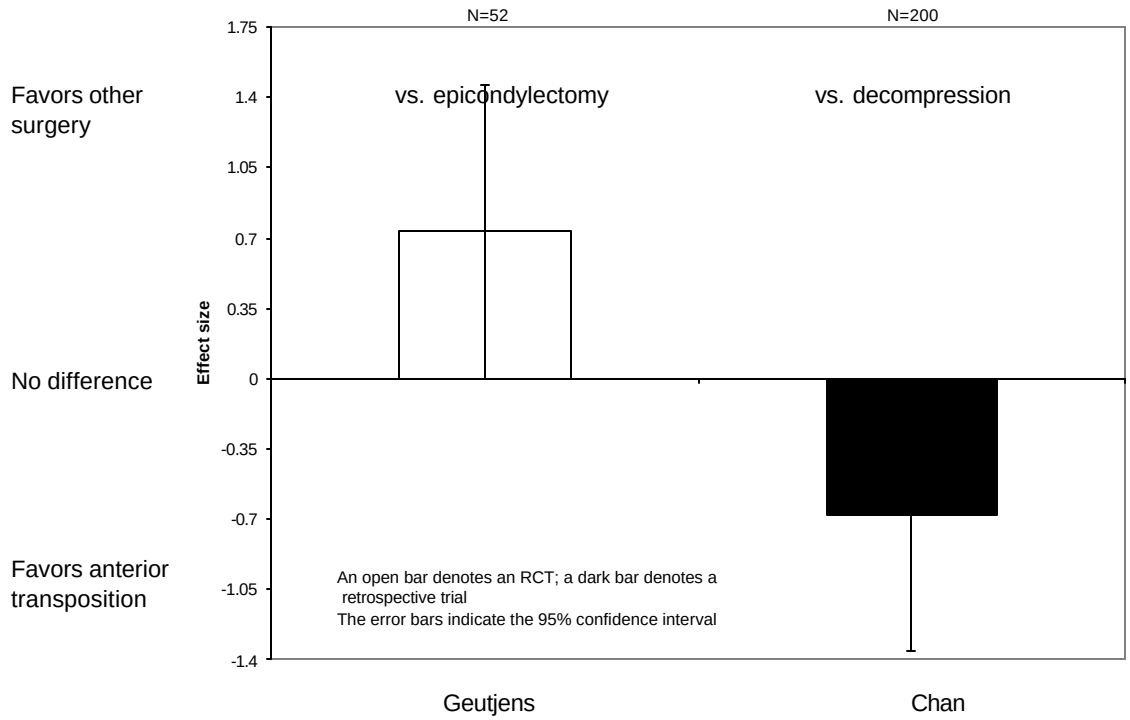


Figure 54. Effect of surgery on pain: effect sizes of anterior transposition vs. other types of surgery



Function and activities

None of the studies reported patient-oriented outcomes addressing the ability of the patient to function and resume normal activities.

Quality of life

None of the studies reported on this outcome.

Morbidity and Complications

None of the included studies reported on this outcome. However, various authors have reported complications that may occur with certain types of surgery. These complications are listed in Table 194. The frequencies with which these complications may occur cannot be determined.

Figure 55. Studies reporting no significant correlation between the severity of symptoms and success of treatment may be underpowered

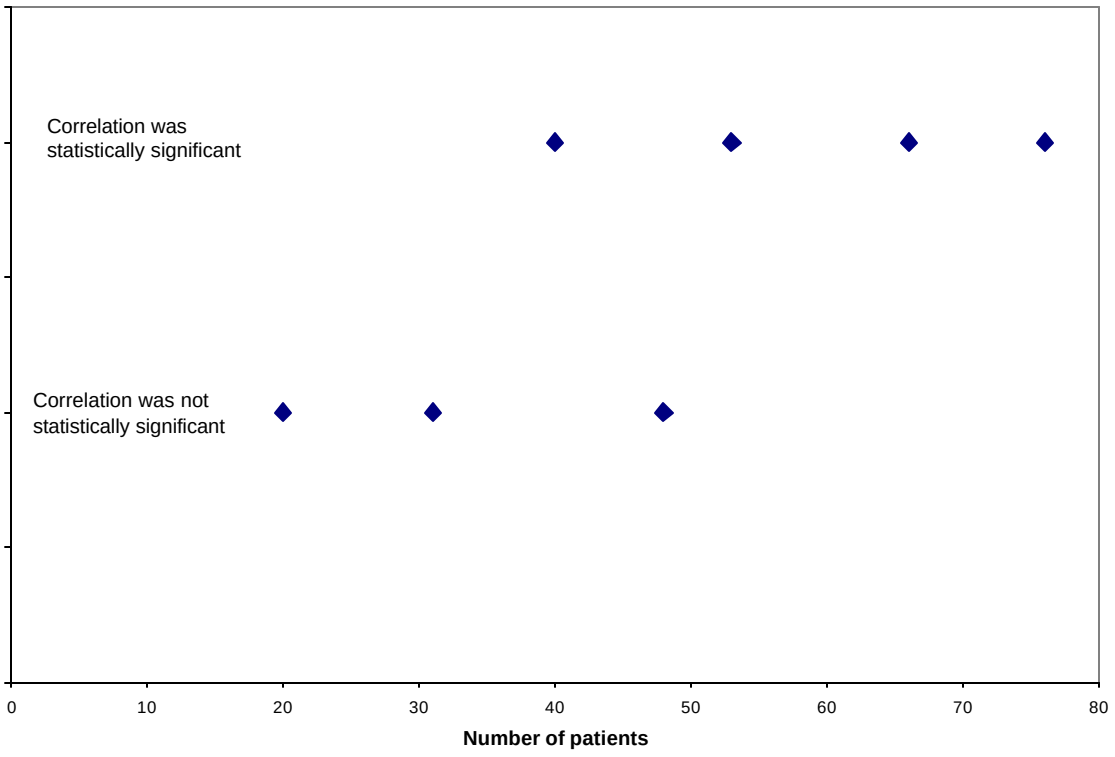
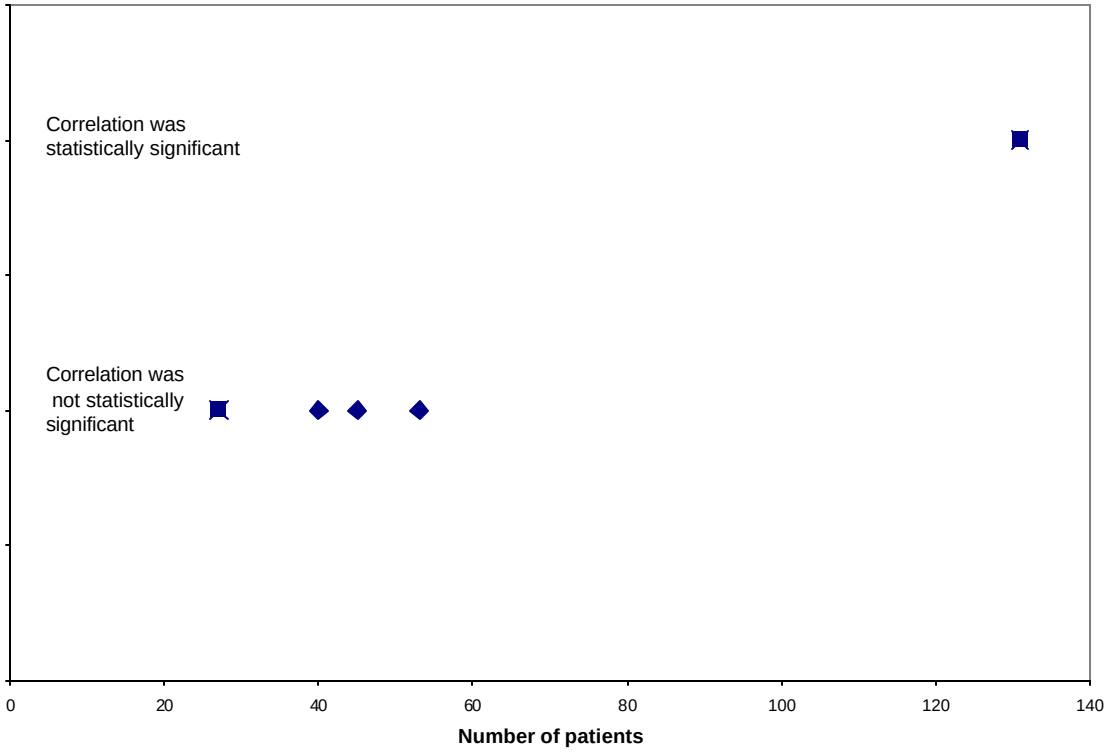


Figure 56. Studies reporting no significant correlation between nerve conduction velocity and success of treatment may be underpowered

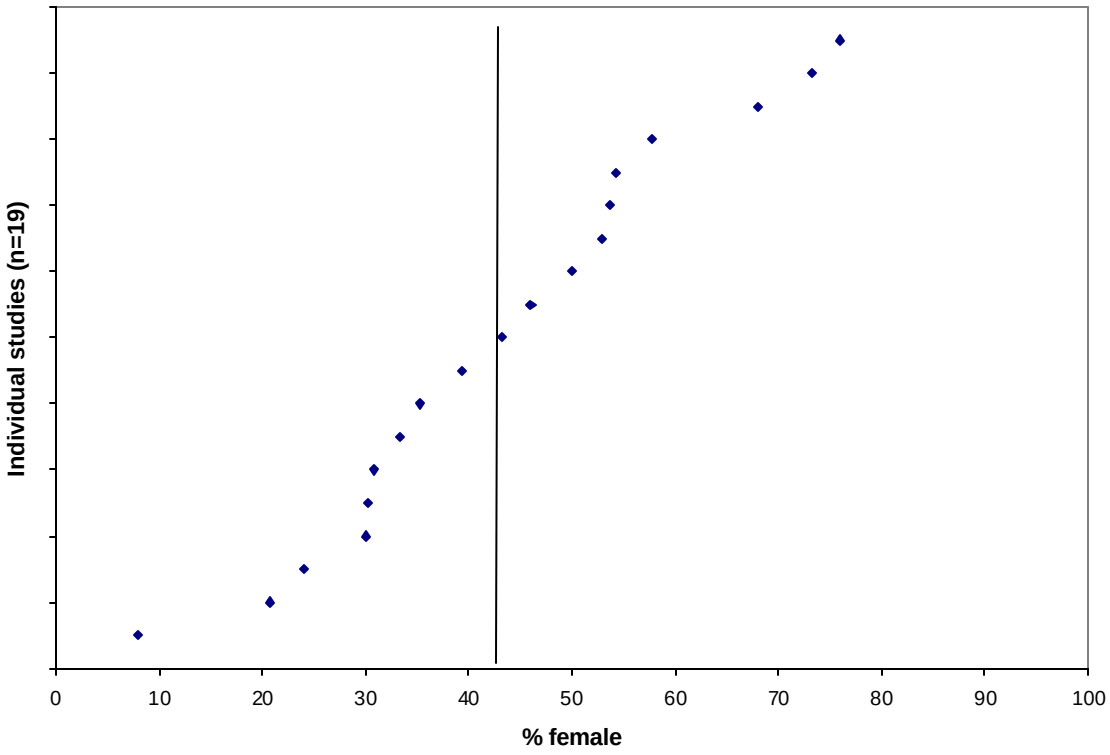
Squares denote studies that performed multiple regressions. Diamonds denote studies that used stratification.



Conclusions

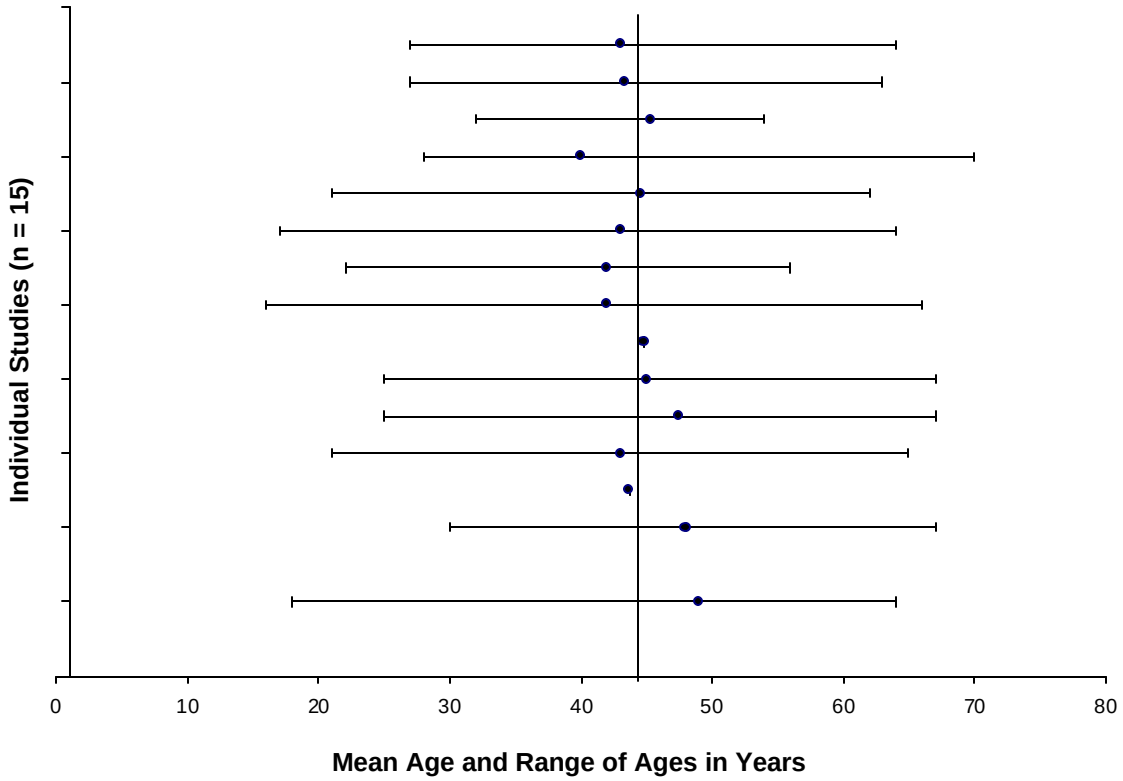
The only clinical finding variable shown by more than one study to significantly predict treatment outcomes was severity of symptoms. This correlation was statistically significant in four out of seven studies that examined it. The studies that did not find a statistically significant correlation may have been underpowered. Therefore, currently available evidence tentatively suggests that there is a correlation between having less severe symptoms and having a higher global outcome score after surgical treatment for cubital tunnel syndrome. There are insufficient data to reach evidence-based conclusions about the relationships between other clinical findings and treatment outcomes.

Figure 57. Sex distribution in trials of surgical treatment for epicondylitis



The vertical line indicates the mean % of females

Figure 58. Distribution of patient ages in studies of surgical treatment for epicondylitis



The vertical line indicates the mean age

Signs and symptoms

Descriptions of signs and symptoms of the patients before treatment were incompletely reported. The number of studies reporting on each sign and symptom are listed in Table 220. Only six different signs and symptoms were reported on, and less than 16% of the studies reported on the presence of any given symptom or sign, as is shown in Figure 59. The mean percentages of patients with each sign and symptom reported by the studies are listed in Table 221 and shown in Figure 60.

Only three out of the 19 studies reported the duration of symptoms before treating the patients with surgery. These data are listed in Table 222. The mean duration before treatment was 27.7 months, with a range of 3 to 126 months.

Because so few studies reported on signs and symptoms, or duration of symptoms, it is difficult to arrive at a generalized characterization of patients who received surgical treatment for epicondylitis.

Figure 59. Reporting of symptoms and signs in studies of surgical treatment for epicondylitis

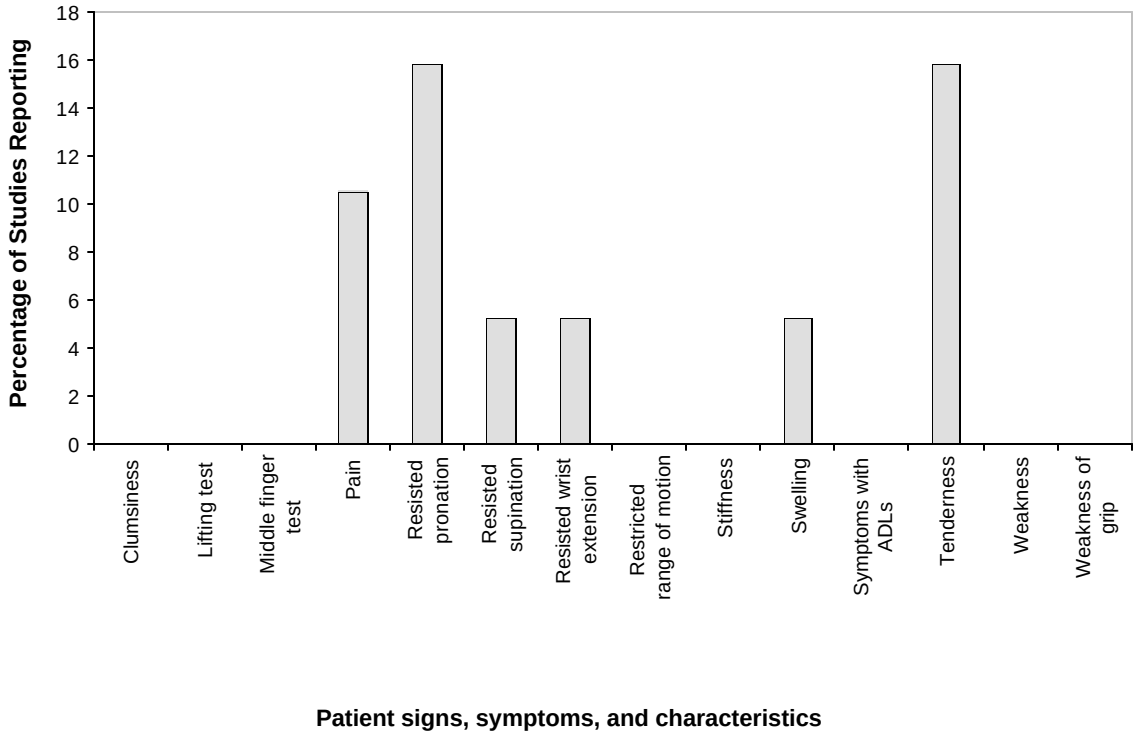


Table 221. Signs and symptoms of patients treated with surgery for epicondylitis

Study	Number of patients	Sign or symptom	Number of patients with sign or symptom	Percentage of patients
Almquist 1998 [83]	61	Pain	61	100.0
Goldberg 1988 [563]	30	Pain	30	100.0
Gabel 1995 [555]	26	Resisted pronation	26	100.0
Verhaar 1993 [559]	63	Resisted pronation	34	54.0
Baumgard 1982 [566]	34	Resisted pronation	34	100.0
Verhaar 1993 [559]	63	Resisted supination	31	49.2
Verhaar 1993 [559]	63	Resisted wrist extension	63	100.0
Goldberg 1988 [563]	30	Swelling	3	10.0
Almquist 1998 [83]	61	Tenderness	61	100.0
Gabel 1995 [555]	26	Tenderness	26	100.0
Verhaar 1993 [559]	63	Tenderness	63	100.0

Figure 60. Symptoms of patients with epicondylitis

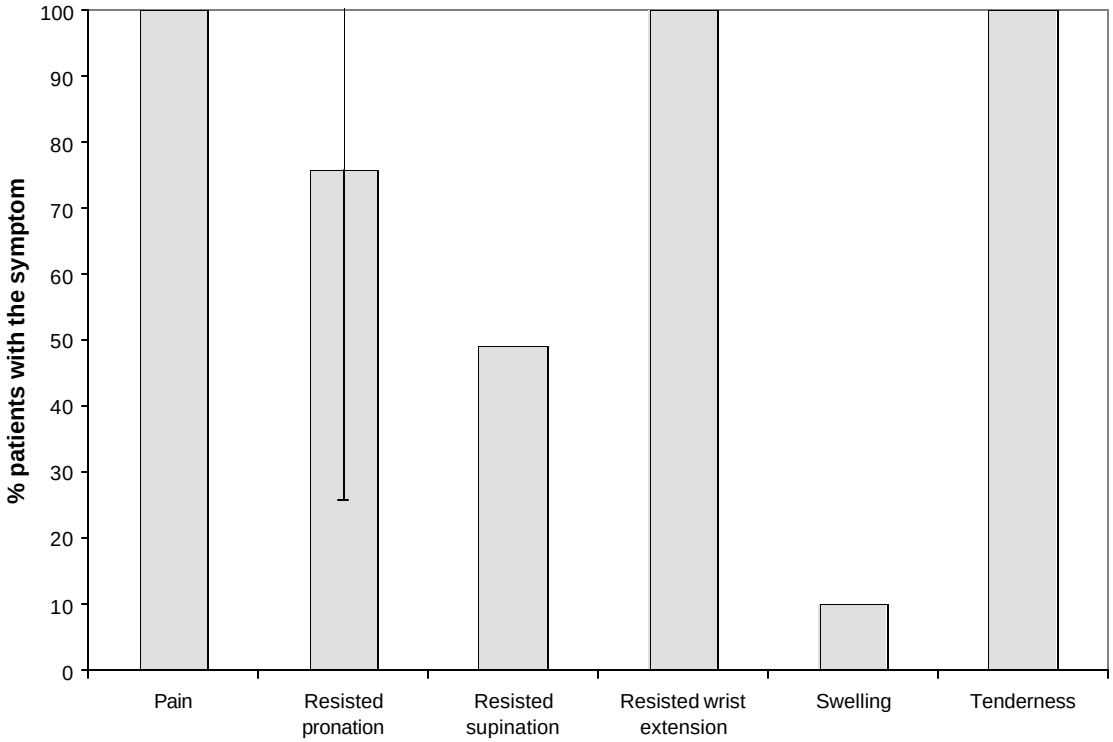


Table 222. Duration of symptoms before surgical treatment for epicondylitis

Study	Number of patients	Mean duration, months	Shortest duration, months	Longest duration, months
Grundberg 2000 [552]	34	18	3	66
Almquist 1998 [83]	61	31.3	6	72
Bankes 1998 [553]	24	32.2	11	126

Employment characteristics

Only five of the 19 studies reported employment-related data on their patients. The occupations of patients receiving surgery for epicondylitis and the percentage of patients in each study with that occupation are listed in Table 223. The number of studies reporting each occupational category are shown in Figure 61, and the reported percentages of patients with each occupation are shown in Figure 62.

Figure 61. Percentage of studies reporting occupations of patients with epicondylitis

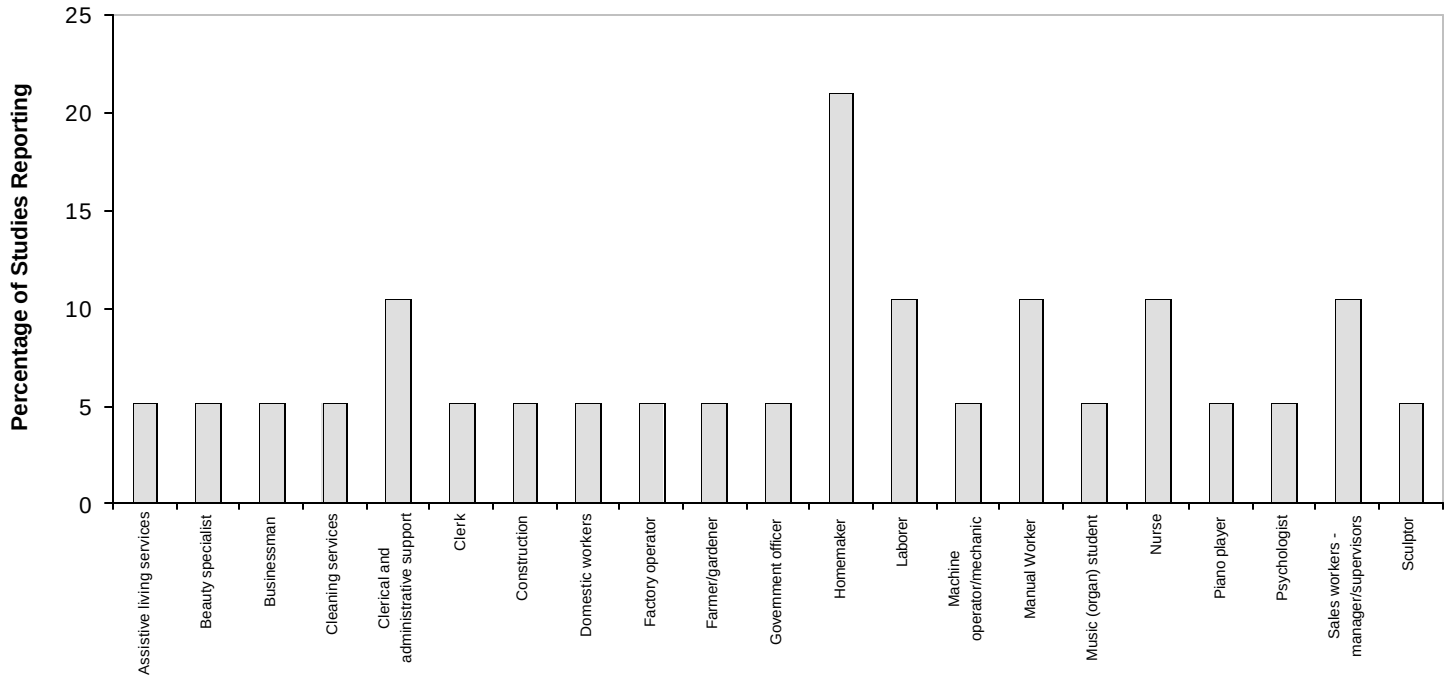


Figure 62. Percentage of patients with reported occupations receiving surgery for epicondylitis

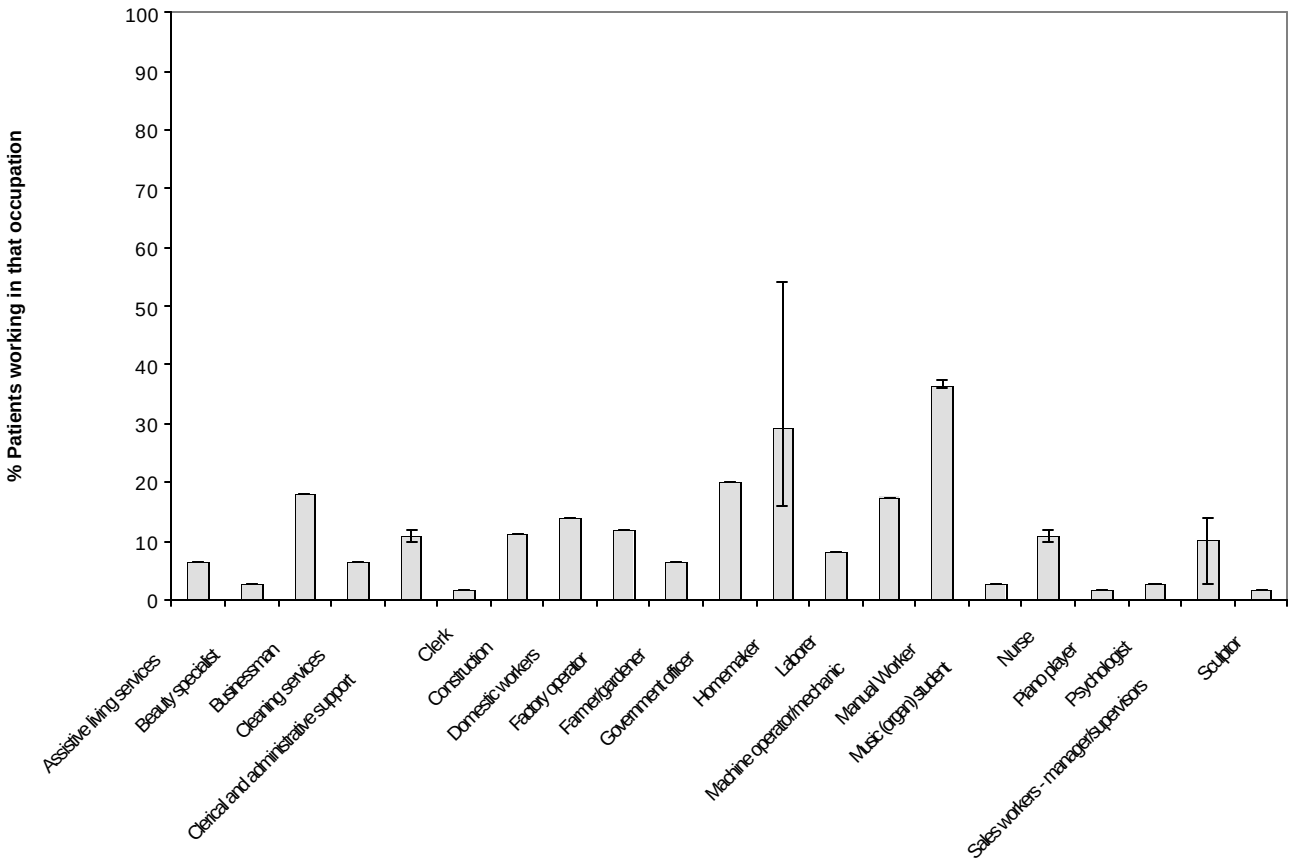


Figure 63. Effect sizes of laser therapy compared to sham therapy as a treatment for epicondylitis, 1 to 1.5 months of followup

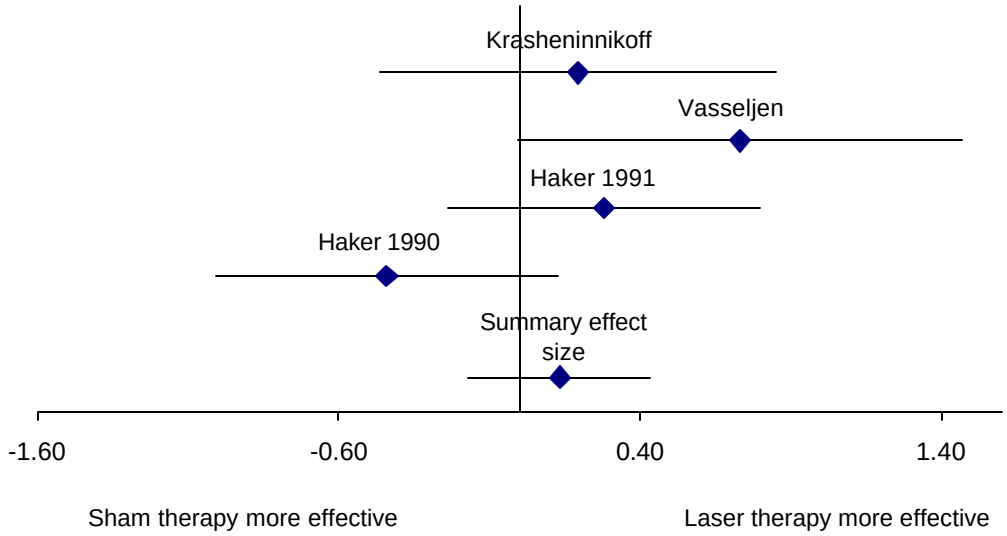


Figure 64. Effect sizes of laser therapy compared to sham therapy as a treatment for epicondylitis, longest times of followup

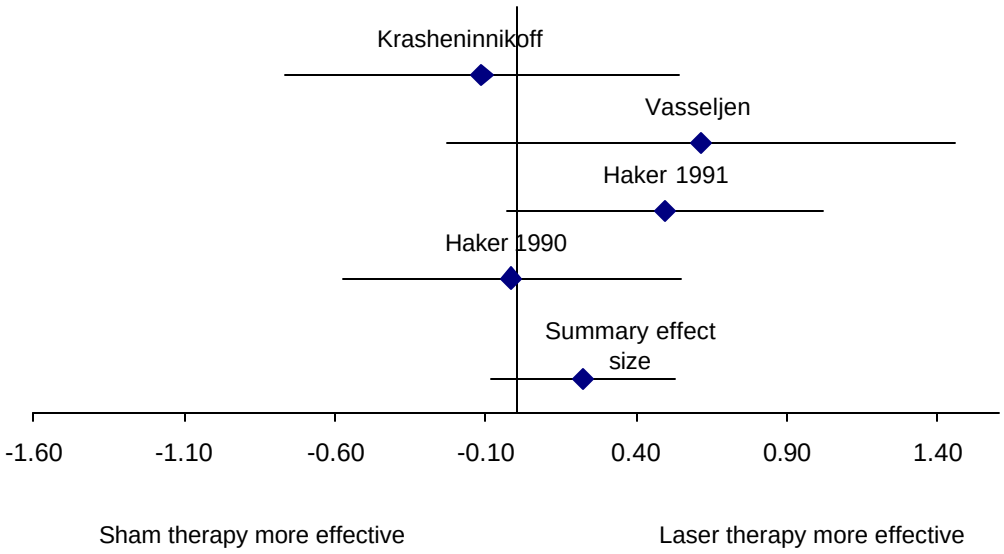


Figure 65. Overlap of effect size distributions in patients receiving laser or sham therapy, 1-1.5 months of followup

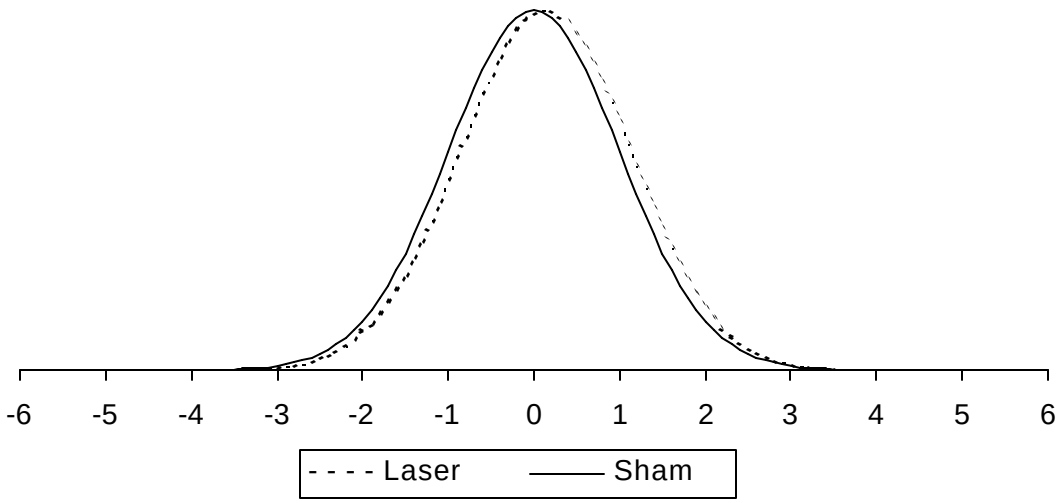
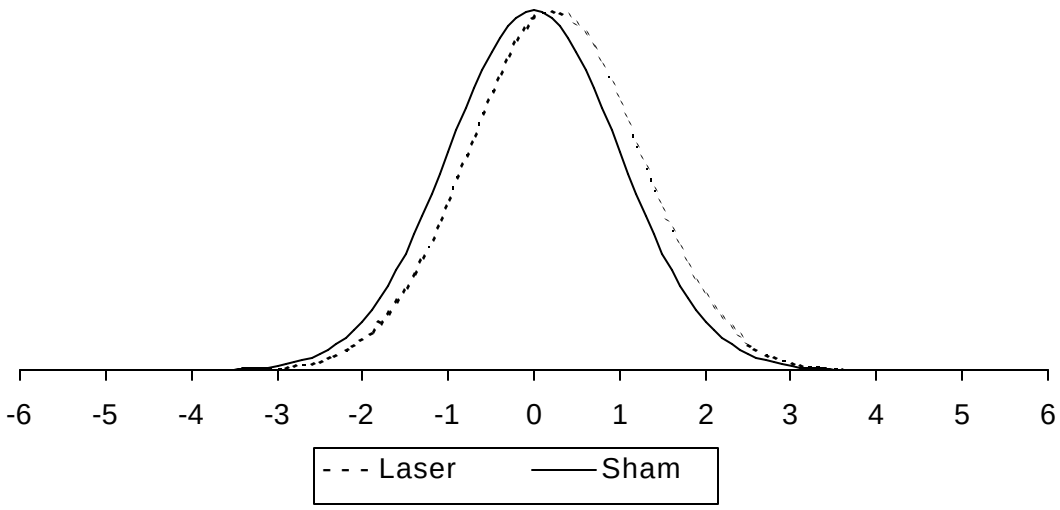


Figure 66. Overlap of effect size distributions in patients receiving laser or sham therapy, longest times of followup



Work Status

Only one study of 30 patients reported this outcome. The study counted the number of patients working or not working 5.6 months after the study began. The data from this study are summarized in Table 231 and Table 232. A statistically nonsignificant difference in work status was reported between sham treated and laser treated patients. This study could have detected a 26% or greater difference between groups, so statistical power may not be a substantial issue with it.

Figure 67. Effectiveness of laser therapy at treating pain

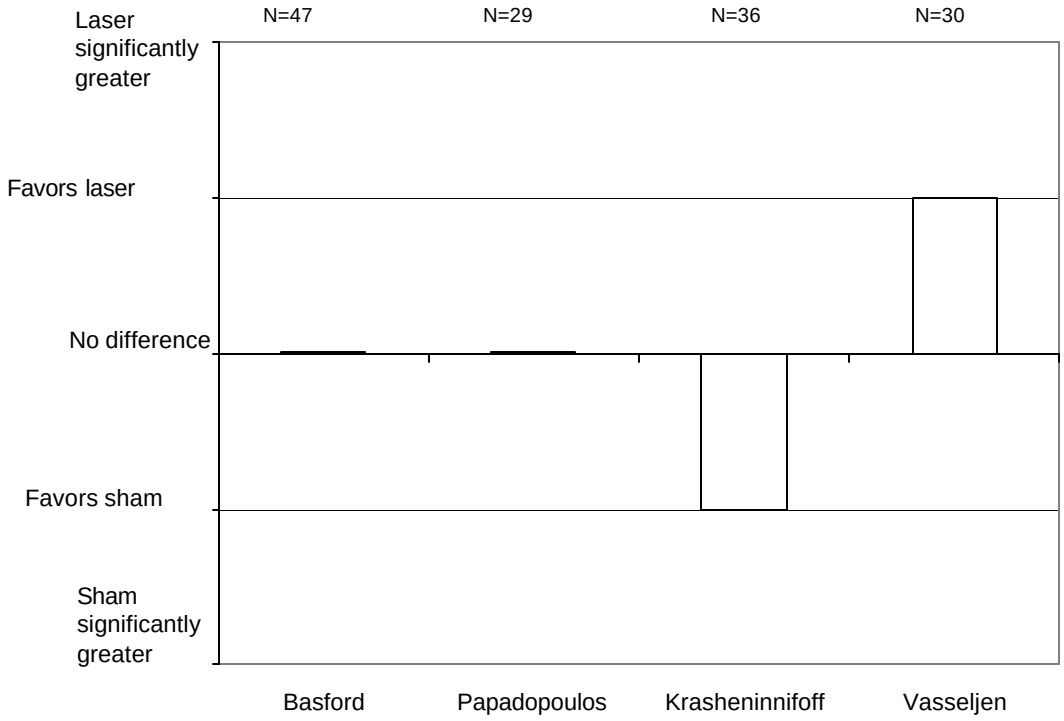
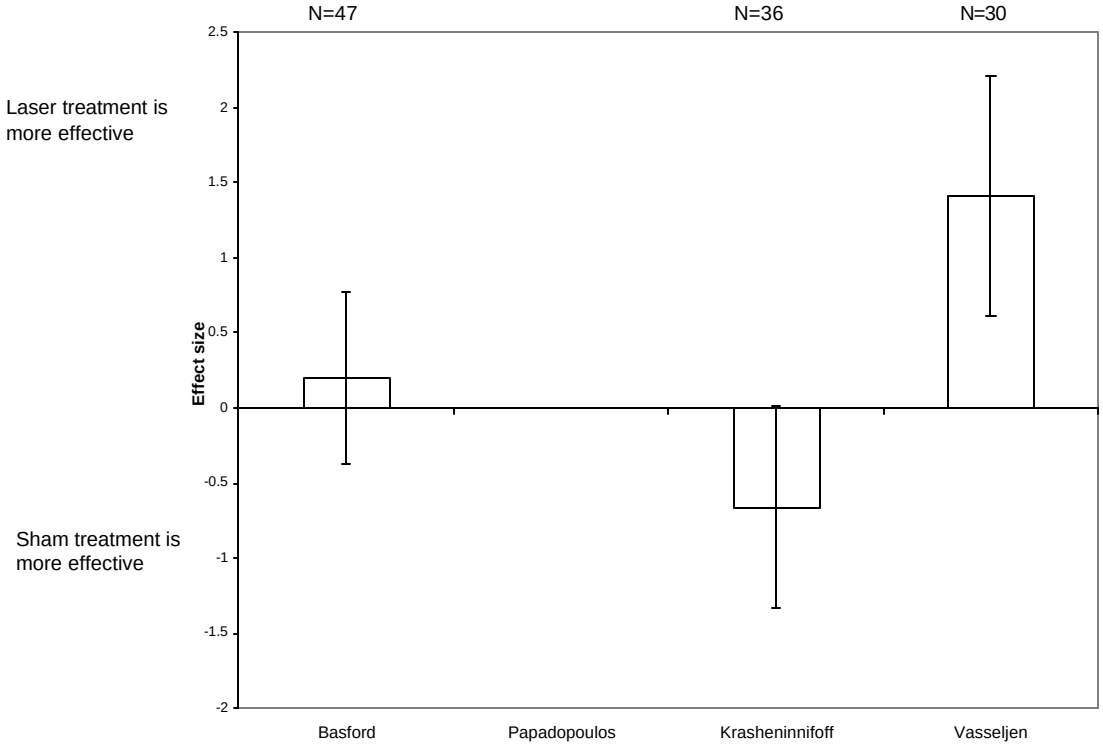


Figure 68. Effect sizes: laser treament on pain



Function and Activites of Daily Living

None of the studies reported a patient-oriented measure of these outcomes.

Quality of Life

None of the studies reported on this outcome.

Morbidity and Complications

None of the studies reported any side effects or complications of laser therapy.

Conclusions

Seven studies that included a total of 320 patients were identified that evaluated low-level laser therapy for treating epicondylitis. All seven studies were double-blinded randomized controlled trials that compared laser therapy to sham laser therapy.

Figure 69. Success of treating epicondylitis with NSAIDs: naproxen vs. diflunisal

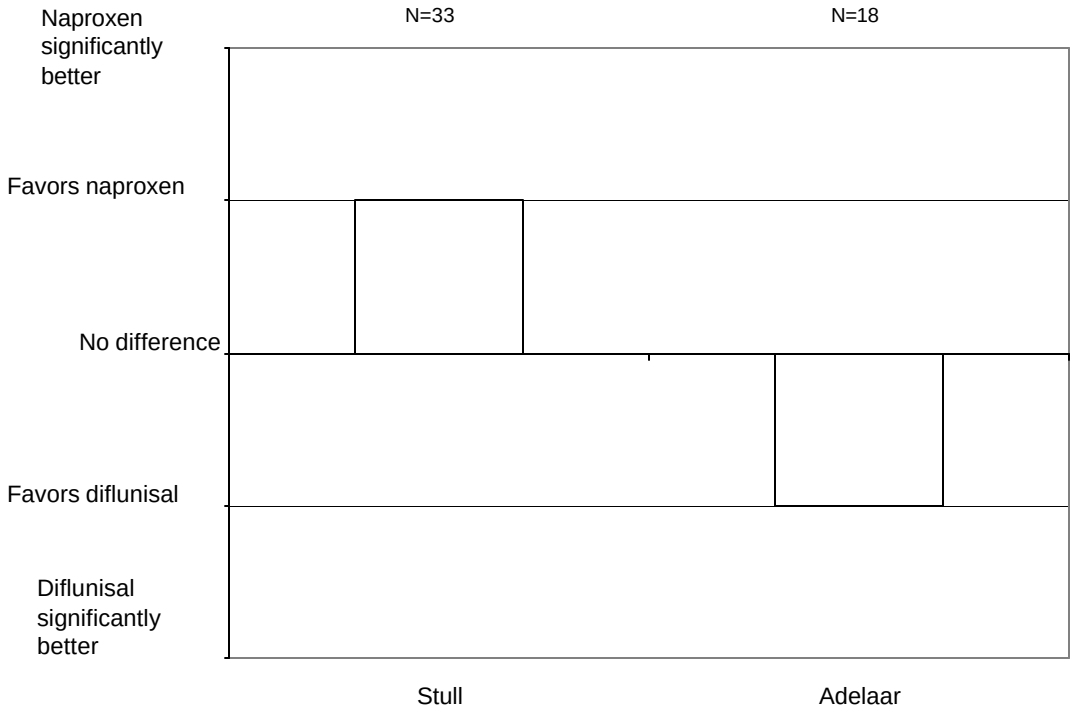
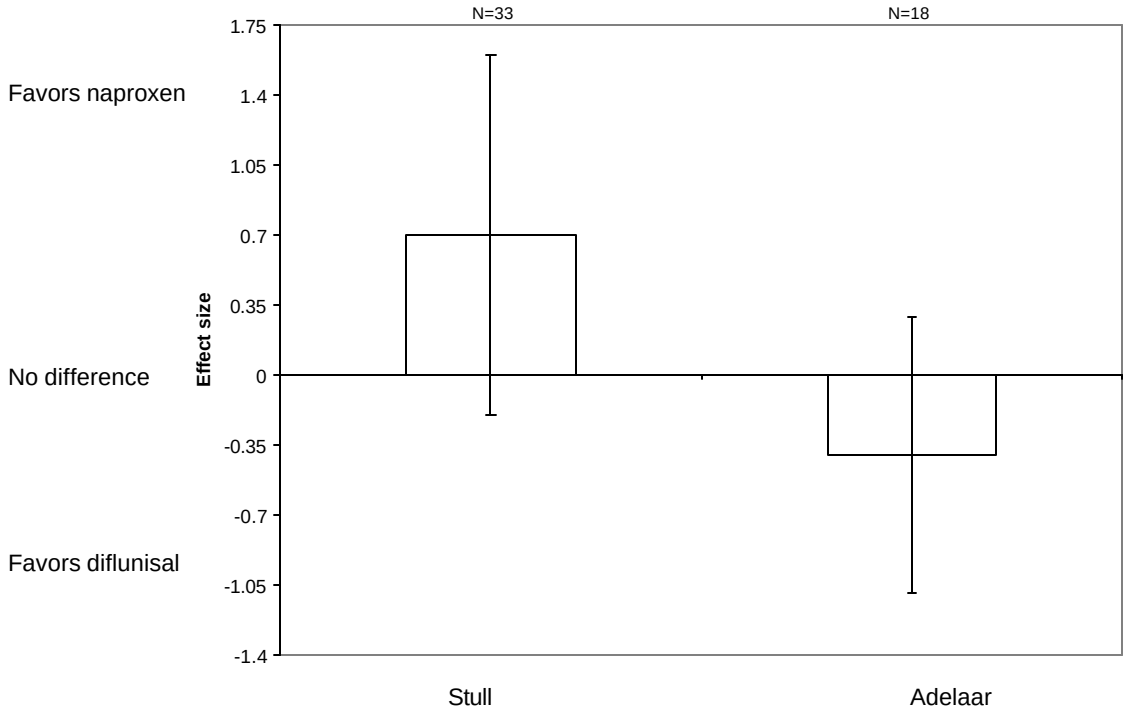


Figure 70. Effect sizes of diflunisal vs. naproxen



Success of treatment- DMSO

The trial by Percy 1981, which compared topical DMSO treatments to sham topical treatments, did not report any patient-oriented outcomes. For this reason, we have not tabled results or calculated effect sizes. However, this trial did report global outcome as rated by the treating physician. There was a trend towards the sham topical group being rated as having better outcomes than the topical DMSO group, but the difference was not statistically significant. There was insufficient information for us to calculate the statistical power of this study to detect differences between groups.

Work Status

One trial of 128 patients reported that there was no statistically significant difference in the number of work days missed due to epicondylitis between a group treated with diclofenac and a group treated with placebo. These data are shown in Table 241.

Figure 71. Success of acupuncture: statistical tests

The results of Haker were statistically significant at 1 month only.

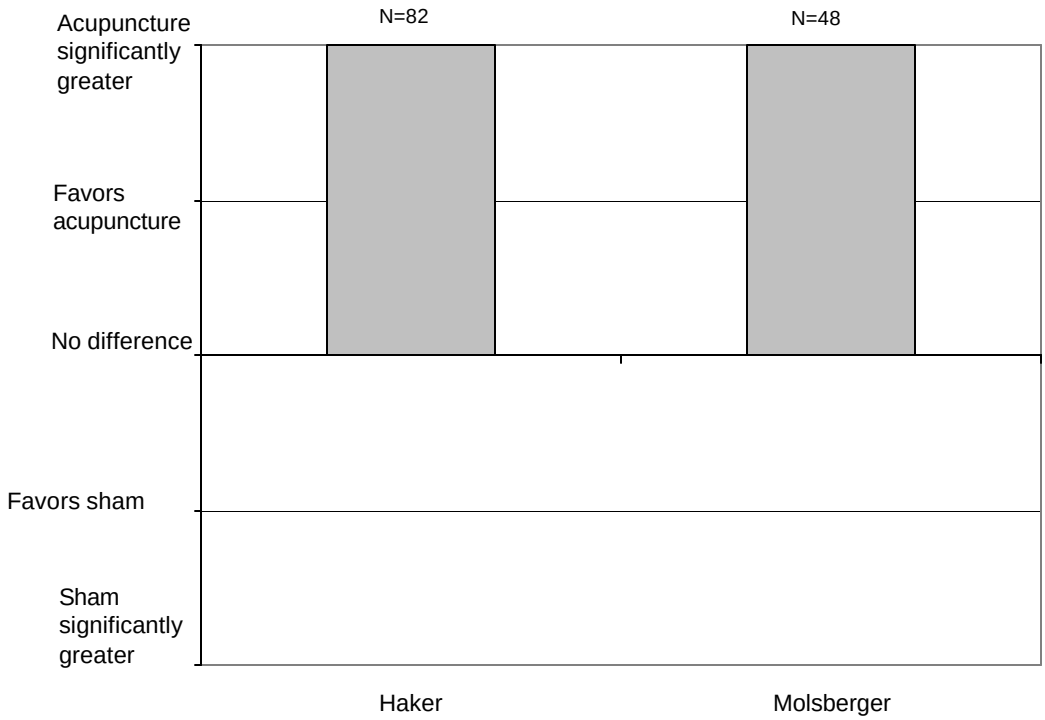
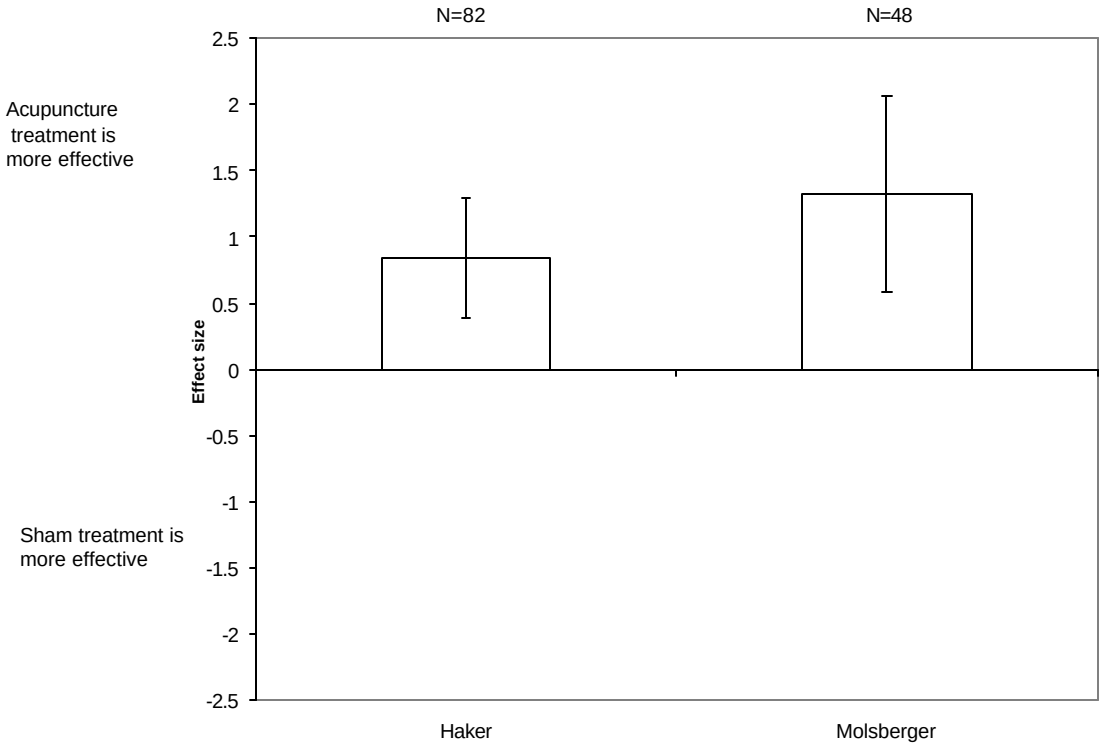


Figure 72. Success of acupuncture: effect sizes



The results of Haker are presented for the 1 month time point only.

Work Status

Neither of the included studies reported on this outcome.

Pain

The study by Molsberger 1994 reported on the degree of relief the patients had from their pain and on how long the relief lasted after the treatment. The group treated with acupuncture had significantly greater pain relief and the pain relief lasted significantly longer than it did in the control group. The data reported for this outcome are shown in Table 283 and summarized in Table 284.