

Incidence of Carpal Tunnel Syndrome Requiring Surgical Decompression: A 10.5-Year Review of 2,309 Patients

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Purpose To describe the demographics, neurophysiological grading, and incidence of patients undergoing carpal tunnel decompression (CTD) for carpal tunnel syndrome (CTS) in a single region.

Methods A retrospective review of 2,313 patients aged greater than 16 years who underwent 3,073 CTDs between January 2000 and August 2010. Crude annual and age- and sex-specific incidences were calculated for the study period. Nerve conduction study grades were recorded and compared with age and sex.

Results Of the 2,313 patients 1,419 (61%) were female and 890 (39%) were male. Mean age at surgery was 56 years (range, 16–93 years). Females had a significantly higher CTD incidence compared with males (161 vs 108/100,000 person-years, respectively). The highest rates of CTD were seen in the 70- to 79-year age group for both men and women (307/100,000 person-years). Neurophysiological grade increased in severity with increasing age despite using an age-adjusted grading system, with higher grades in patients aged greater than 65 years.

Conclusions This study suggests that carpal tunnel syndrome has the highest incidence in older people who tend to have more severe neurophysiological changes. (*J Hand Surg Am.* 2015;40(12):2427–2434. Copyright © 2015 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Prognostic II.

Key words Carpal tunnel syndrome, epidemiology, incidence.

CARPAL TUNNEL SYNDROME (CTS) is the most common upper limb entrapment neuropathy. Traditionally, it has been considered a disease of middle-aged women. In 1966, Phalen¹ stated that “the typical patient with this syndrome is a middle-aged housewife.” Other studies have shown that it

can occur frequently in older people and in young working individuals.^{2–5} Recently, a higher surgical incidence has been reported in older women.⁶ In our experience, CTS is often seen in both the elderly and in younger working individuals and middle-aged women.^{2,3} It is a major cause of disability and has impacts both socially and economically, including lost days at work and sleep disturbance.^{7,8} Refractory cases not responsive to conservative treatment will usually be treated with carpal tunnel decompression (CTD).⁹

The diagnosis is usually a clinical one based on history and examination.^{10,11} Neurophysiological testing can be useful to confirm a clinical diagnosis of CTS and provide information on the severity of median nerve compression. It also allows for

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TABLE 1. Nerve Conduction Study Grading System, Otago, New Zealand

Grade	Palmar Latency	Sensory Conduction Velocity	Distal Motor Latency	Sensory Amplitude	Motor Amplitude
6 (severe)				Absent	Absent
5 (very marked)				> 7.0 SD or absent	and > 4.0 SD
4 (marked)		> 5.0 SD	or > 5.0 SD	and > 4.5 to < 7.0 SD or absent	or > 4.0 SD
3 (moderate)		> 4.0–5.0 SD	or > 4.0 to < 5.0 SD	and < 4.5 SD	or < 4.0 SD
2 (mild)	> 3.0 SD	or > 3.0–4.0 SD	or > 3.0 to < 4.0 SD	and < 3.0 SD	and < 3.0 SD
1 (borderline)	2.5–3.5 SD	and < 3.0 SD	and < 3.0 SD	and < 3.0 SD	and < 3.0 SD
0 (normal)	All < 2.5 SD	and < 2.5SD	and < 2.5 SD	and < 2.5 SD	and < 2.5 SD

For conduction velocity and amplitudes, SD refers to SDs less than the mean. For distal motor latencies and palmar latencies, SD refers to SDs greater than the mean.

monitoring unexpected outcomes such as incomplete decompression or nerve injury.⁹

The purpose of this study was to describe the epidemiology of CTS severe enough in a single region to require surgical release. Nerve conduction studies (NCS) were used to compare severity of median nerve compression with the age and sex of patients. This may then allow an estimate of the appropriate demand for CTD in a given population based on age and sex.

MATERIALS AND METHODS

Our region has a population estimate of 193,800 people, with 130,000 people living in the main city. It covers a large geographical area of 31,000 km², which is predominantly rural.¹² There is one university public hospital and a private hospital. Rural centers are serviced periodically by a publicly funded mobile surgical bus.

After we gained ethical approval from the Health and Disability Ethics Committee to perform a retrospective review, we collected details of all patients aged 16 years or older undergoing CTD between January 2000 and August 2010. These included public and private hospital patients, cases performed on the mobile surgical bus, and those performed as office procedures in private offices. Data were collected through a combination of hospital International Classification of Diseases codes, local surgical audit, surgical bus records, and private clinic and hospital records.

During the study period, all NCS were performed by the sole neurophysiologist in our region using standardized techniques. Nerve conduction study grades were expressed as SD away from an age- and body mass-adjusted population mean (Table 1).^{3,13,14} Neurophysiological data were analyzed on 1,104 patients in the latter part of the study from 2005 to 2010.

In patients with bilateral disease, the hand with the higher-grade neurophysiological change was used for the analysis. Our practice is to perform an open carpal tunnel release under local anesthesia as a day case. During the time of the study, all carpal tunnel procedures were performed by 1 of the 9 orthopedic surgeons or their residents. Indications for surgery were symptomatic CTS with confirmatory neurophysiological testing usually showing at least grade 3 (moderate) compression. Our country has free public surgery, and our region has good access to family doctors. During the study period, there was no noteworthy limitation on access to publicly funded carpal tunnel surgery.

Crude annual and age- and sex-specific incidences were calculated for the study period. The national census (2006) was used to obtain local population data.¹² The incidences were also standardized using World Health Organization European Standard population as the reference population.¹⁵ We used Student *t* test to evaluate statistical differences in crude age- and sex-specific incidences. Chi-square test was used to evaluate statistical differences between a population aged less than 65 years and aged 65 years and older.

RESULTS

From January 2000 to August 2010, 2,313 patients underwent 3,073 CTDs. A total of 760 patients had bilateral procedures (simultaneous or staged); 1,419 patients were female (61%) and 890 were male (39%). Mean age at surgery was 56 years (confidence interval [CI], 55.7–57.0) for both males (range, 17–91 years) and females (range, 16–93 years).

Mean number of CTDs per year was 217. There was no significant change in number of CTDs over the first and second halves of the study period. Mean

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