

Trends in the Surgical Treatment of Cubital Tunnel Syndrome: An Analysis of the National Survey of Ambulatory Surgery Database

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Purpose To ascertain trends in the surgical treatment of ulnar nerve compression at the elbow within the United States.

Methods We analyzed the National Survey of Ambulatory Surgery to study trends in the treatment of cubital tunnel syndrome from 1994 to 2006. The National Survey of Ambulatory Surgery provides a comprehensive overview of ambulatory surgical procedures performed in the United States. Patients identified in the database with surgically treated cubital tunnel syndrome were verified by members of our research staff and compiled into these 3 groups: decompression, transposition, and other. The data were then statistically analyzed for trends in treatment, utilization, and demographics.

Results A total of 52,133 surgical procedures were recorded in the National Survey of Ambulatory Surgery for the treatment of ulnar nerve compression in 2006. This represents an increase from 26,283 in 1994 and 35,406 in 1996. In the 11 years from 1996 to 2006, the total surgical procedures on the ulnar nerve increased by 47%. Transposition went from 49% of all cubital tunnel procedures in the 1990s to 38% in 2006. In 2006, women were much more likely to have a simple decompression (70%) than a transposition or other technique. Decompression had a mean surgical time of 48 minutes, and transposition had a mean surgical time of 59 minutes.

Conclusions The percentage of transpositions used in the treatment of cubital syndrome has decreased to 37% in the last survey. Possible reasons include expanded indications or changing surgical preferences. (*J Hand Surg* 2013;38A:1551–1556. Copyright © 2013 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Prognostic II.

Key words Cubital tunnel syndrome, hand surgery, healthcare survey, peripheral nerve surgery, ulnar nerve compression.

COMPRESSION NEUROPATHY OF the ulnar nerve at the elbow, or cubital tunnel syndrome, is the second-most common nerve compression syndrome after carpal tunnel syndrome.^{1–6} Its incidence

has been estimated at 25 cases per 100,000 person-years.^{7–8} Prior reports have shown that men are affected at a higher rate than women.^{8–9} Surgical treatment of cubital tunnel syndrome is varied and, most

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often, is based on surgeon preference.^{8,10} There have been a multitude of reports on surgical techniques of the cubital tunnel, with simple decompression and transposition of the ulnar nerve being the 2 most common techniques. Decompressions have been reported via the traditional open or the newer endoscopic method.^{3,4,6,8,10-19} Transposition can be performed by the subcutaneous, submuscular, intramuscular, or subfasial techniques.^{8,10,20-24} Before 2005, there were only case series and expert opinion studies on the clinical outcomes of the surgical treatment of primary cubital tunnel syndrome. However, since then, there have been 4 prospective, randomized clinical trials assessing the efficacy of these different techniques.^{1,11,13,17} Most notably, a recent large meta-analysis demonstrated no difference in clinical outcomes or motor nerve conduction velocities between the differently treated groups, decompression or transposition.²⁵ In the absence of superiority of one technique, most surgeons would prefer to perform the surgery with the least morbidity. In addition, with the advent of insurance-driven cost containment, most hand surgery procedures such as carpal tunnel release, Dupuytren fasciectomy, and cubital tunnel release are done on an outpatient basis. These ambulatory procedures can be done in a freestanding surgery center or hospital. We sought to study the demographics, utilization, and surgical technique patterns of the treatment of cubital tunnel syndrome in the United States, and studied the associated costs, operative times, and comorbid conditions found in the latest survey data.

MATERIALS AND METHODS

National Survey of Ambulatory Surgery

The National Survey of Ambulatory Surgery (NSAS) was analyzed to study current trends in the surgical treatment of compression neuropathy of the ulnar nerve at the elbow. This study was classified as exempt for institutional review board purposes. The NSAS provides a comprehensive overview of ambulatory surgical procedures performed in the United States.²⁶ The NSAS is a national study of ambulatory surgical care in both hospital-based and freestanding ambulatory surgery centers. The survey was conducted by the National Center for Health Statistics at the Centers for Disease Control and Prevention. The primary objective of the NSAS sample selection was to obtain a representative sample of outpatient surgery in the United States for surveillance. The NSAS was conducted in 1994 and again in 1996 and 2006.

Inclusion criteria

The International Classification of Diseases (ICD), Ninth Revision, Clinical Modification was used to identify patients diagnosed with cubital tunnel syndrome. Cases with diagnosis code 354.2 were identified and selected. The medical information that was recorded on the sample patient abstracts was coded by National Center for Health Statistics contract staff. Cases with the ICD-9-Clinical Modification procedure coding indicating surgical treatment of cubital tunnel syndrome were included in the study. The current ICD coding has different treatment codes for surgical procedures treating compression neuropathy of the ulnar nerve. Codes 04.49 and 04.04 indicate simple decompression of the ulnar nerve at the elbow, code 04.60 indicates transposition of the ulnar nerve at the elbow, and code 04.79 indicates surgical treatment of cubital tunnel syndrome by other method. These diagnosis and treatment codes were then verified by 2 members of our research staff and compiled into 3 groups: decompression, transposition, and other. All data presented by the NSAS were then recorded for each of these groups, including sex, age, facility type, insurance type, surgical time, recovery time, anesthesia, diagnoses, and procedures. For the 2006 data year, surgical times were compiled by the formula (time surgery ended - time surgery started). Surgical costs were provided by the NSAS and reflect the direct total costs of the operating room.

Statistical methods

We analyzed the 1994, 1996, and 2006 NSAS data using a sampling weighting method. The NSAS data were collected based on a probabilistic sample scheme. Therefore, we used sampling weights (the inverse of selection probability) provided by the Centers for Disease Control and Prevention to account for unequal sampling probabilities and to produce estimates for all visits to ambulatory centers in the United States. Due to sampling differences between years, we did not make statistical comparisons between years, but within sample years, we did use statistical methods to draw conclusions. We analyzed the 1994, 1996, and 2006 NSAS databases separately. We used the Rao-Scott chi-square statistic to evaluate differences in categorical variables and a regression analysis for continuous variables, with resultant *P* values. A Taylor linearization model provided by the Centers for Disease Control and Prevention estimates was used to calculate the standard error and confidence intervals of the data. We selected a 95% confidence interval along with a point estimate to define population parameters. These confidence intervals, when compared between years, can be suggestive of

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