

Effects of Hand Fellowship Training on Rates of Endoscopic and Open Carpal Tunnel Release

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Purpose To investigate rates, trends, and complications for carpal tunnel release (CTR) related to fellowship training using the American Board of Orthopaedic Surgery Part II Database.

Methods We searched the American Board of Orthopaedic Surgery database for patients with carpal tunnel syndrome who underwent either open carpal tunnel release (OCTR) or endoscopic (ECTR) from 2003 to 2013. Cases with multiple treatment codes were excluded. Data were gathered on geographic location, fellowship, and surgical outcomes. Data were then divided into 2 cohorts: hand fellowship trained versus non—hand fellowship trained. We performed analysis with chi-square tests of independence and for trend.

Results Overall, 12.4% of all CTRs were done endoscopically. Hand fellowship—trained orthopedists performed about 4.5 times the number of ECTR than did non—hand fellowship—trained surgeons. An increasing trend over time of ECTR was seen only among the hand fellowship cohort. The northwest region of the United States had the highest incidence (23.1%) of ECTR, and the Southwest the lowest incidence (5.9%). The complication incidence associated with CTR overall was 3.6%, without a significant difference between ECTR and OCTR. Within the hand fellowship cohort the complication incidence for ECTR was significantly less than for OCTR. There was no difference in overall complication rates with ECTR and OCTR between the 2 cohorts. Wound complications were higher with OCTR (1.2% vs 0.25%) and nerve palsy with ECTR (0.66% vs 0.27%); with postoperative pain equivalent between techniques independent of fellowship training.

Conclusions Within the United States from 2003 to 2013, the rate of ECTR increased, as did complications. However, complication rates remained low in the first 2 years of practice. Hand fellowship—trained surgeons performed more ECTR than did non—hand fellowship—trained orthopedic surgeons, and both groups had similar complication rates. (*J Hand Surg Am.* 2016;41(4):e53–e58. Copyright © 2016 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Therapeutic IV.

Key words American Board of Orthopaedic Surgeons, endoscopic versus open carpal tunnel release, hand fellowship, rate, trend.



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Received for publication June 16, 2015; accepted in revised form December 14, 2015.

No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.

Views and opinions expressed in this manuscript do not represent those of the American Board of Orthopaedic Surgery.

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0363-5023/16/4104-0020\$36.00/0
<http://dx.doi.org/10.1016/j.jhsa.2015.12.027>

CARPAL TUNNEL SYNDROME (CTS) is the most commonly treated compression neuropathy within the United States. It represents 1 to 3 cases/1,000 patients per year^{1–3} with greater than 600,000 carpal tunnel releases (CTR) cases performed annually.³ Soltani et al⁴ recently demonstrated a trend toward minimally invasive and endoscopic techniques for the treatment of cubital tunnel syndrome using the National Survey of Ambulatory Surgery. We chose to perform a similar study regarding the preference for open versus endoscopic CTR in the United States.

The primary aims of this study were to assess the current rates of open versus endoscopic CTRs performed by hand fellowship-trained versus non-hand fellowship-trained orthopedic surgeons and to assess trends on both a regional and national level. As a secondary objective, we aimed to assess the complication rates between endoscopic CTR (ECTR) and open CTR (OCTR) within the fellowship-trained hand surgeon and non-hand fellowship-trained orthopedist cohorts.

MATERIALS AND METHODS

We queried the American Board of Orthopaedic Surgeon Part II database from 2003 through 2013. The database was searched for patients with CTS based on International Classification of Diseases (ICD)-9 code 354.0 who had undergone CTR either open (64721) or endoscopic (29848) based on Current Procedural Terminology code. Case submissions were included in our data set if they both matched the ICD-9 code diagnosis and underwent OCTR or ECTR based on reported Current Procedural Terminology code. Cases including multiple procedures or ones with multiple ICD-9 codes were excluded. For each case submission, additional data were gathered regarding geographic location, subspecialty declaration, and degree(s) of fellowship training. All outcomes data were requested including surgical or technical complications of chronic regional pain syndrome, tendon or ligament injury, infection, nerve palsy or injury, skin ulcer or blister, vascular injury, limb ischemia, wound-healing delay or failure, hematoma or seroma, pain (recurrent, persistent, or uncontrollable), and stiffness or arthrofibrosis based on the categories of complications required during case submission. Finally, outcomes data on any medical or systemic complication were requested for each case submission matching our selection criteria.

We then divided data into 2 cohorts based on surgeon level of training: hand fellowship trained versus non-hand fellowship trained, the latter of which

represented all other surgeons: general orthopedic surgeons and those with other subspecialty fellowship training. Further subdivision of our data was performed for regional analysis and for fellowship-based rates of endoscopic and open CTR and associated complications. Data were analyzed with either a chi-square test of independence or the Fisher exact test to test for equality of proportions in a contingency table. We used the chi-square test for trend to test whether a detectable trend existed. Two-sided *P* values were determined in all analyses. We performed a power analysis to estimate the power of the chi-square test for trend through simulations in which we mimicked the non-hand fellowship cohort. Assuming a linear increasing trend in the cohort, the chi-square test for trend had a power of 92% to detect an average increase of 2 cases of ECTR each year. Complications not pertinent to our study and likely not related to the actual procedures were excluded from our analyses. These included medical complications such as stroke and myocardial infarction.

RESULTS

Rates of ECTR versus OCTR and trends

We identified 32,053 cases of isolated CTR, 3,967 of these cases (12.4%) were performed endoscopically and 28,086 (87.6%) were performed open. When examining hand fellowship-trained surgeons alone, 18% were performed endoscopically. This compared with 4% performed endoscopically by non-hand fellowship-trained orthopedic surgeons (Fig. 1). In addition, there was a strong trend toward increasing proportions of ECTR being done by fellowship-trained hand surgeons ($P < .01$), which was not seen in the non-hand fellowship cohort (Fig. 1).

Regional rates and trends

We subdivided data for regional evaluation and performed a similar analysis. Figure 2 depicts the proportion of cases performed endoscopically within each of our cohorts based on geographical region. The northwest region performed the highest percentage of ECTR over this time span whereas the southwest performed the lowest.

All regions homogeneously demonstrated a statistically significant increasing trend toward ECTR; the strongest was seen within the southeast and midwest regions, and the weakest was within the southwest region.

Complications

The overall complication incidence for CTR independent of technique and without regard for fellowship training

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