Predicting Revision Following *In Situ* Ulnar Nerve Decompression for Patients With Idiopathic Cubital Tunnel Syndrome

Michael P. Gaspar, MD,*† Patrick M. Kane, MD,*† Dechporn Putthiwara, MD,* Sidney M. Jacoby, MD,*† A. Lee Osterman, MD*†

Purpose To determine the incidence of revision and potential risk factors for needing revision surgery following *in situ* ulnar nerve decompression for patients with idiopathic cubital tunnel syndrome (CTS).

Methods We conducted a retrospective chart review of all patients treated at 1 specialty hand center with an open *in situ* ulnar nerve decompression for idiopathic CTS from January 2006 through December 2010. Revision incidence was determined by identifying patients who underwent additional surgeries for recurrent or persistent ulnar nerve symptoms. Bivariate analysis was performed to determine which variables had a significant influence on the need for revision surgery.

Results Revision surgery was required in 3.2% (7 of 216) of all cases. Age younger than 50 years at the time of index decompression was the lone significant predictor of need for revision surgery. Other patient factors, including gender, diabetes, smoking history, and workers' compensation status were not predictive of the need for revision surgery. Disease-specific variables including nerve conduction velocities, McGowan grading, and predominant symptom type were also not predictive of revision.

Conclusions For patients with idiopathic CTS, the risk of revision surgery following *in situ* ulnar nerve decompression is low. However, this risk was increased in patients who were younger than 50 years at the time of the index procedure. The findings of this study suggest that, in the absence of underlying elbow arthritis or prior elbow trauma, *in situ* ulnar nerve decompression is an effective, minimal-risk option for the initial surgical treatment of CTS. *(J Hand Surg Am. 2016;41(3):427–435.*

Type of study/level of evidence Prognostic III.

Key words Cubital tunnel syndrome, *in situ* release, decompression, revision surgery, ulnar nerve.

*From *The Philadelphia Hand Center, PC; and the †Department of Orthopedic Surgery, Thomas Jefferson University Hospital, Philadelphia, PA.*

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Corresponding author: Michael P. Gaspar, MD, The Philadelphia Hand Center, PC, The Franklin, Suite G114, 834 Chestnut St., Philadelphia, PA 19107; e-mail: michaelpgaspar@gmail.com.

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CUBITAL TUNNEL SYNDROME (CTS) IS second only to carpal tunnel syndrome in incidence among compression neuropathies of the upper extremity.[1–3] Despite its commonality, there is no established consensus regarding the optimal surgical treatment. This is evidenced by a wide range of surgical options including *in situ* decompression, medial epicondylectomy, and subcutaneous, intramuscular or submuscular transposition of the ulnar nerve. In addition, in recent years, surgeons have also advocated for

endoscopic or minimal incision release of the ulnar nerve, with or without transposition, to further minimize soft tissue trauma and potential vascular insult to the nerve while allowing for faster recovery, thus further expanding the number of treatment options.[4–6]

Technique selection can depend on a variety of factors including surgeon preference, patient anatomy, patient desires, underlying pathology, and complication rates. Transposition, for example, often requires extensive dissection around the nerve, which may compromise its extrinsic vascular supply. Thus, it may be contraindicated in patients with diabetes, for instance, who may have a tenuous vascular system at the level of the cubital tunnel.[7,8] In addition, with an increasing focus on health care economics in the United States, the relative cost-effectiveness of different treatment options for CTS may progressively factor into surgical decision making, thus potentially clouding the treatment decision even further.[9–11]

Generally, *in situ* decompression offers the least invasive surgical option but may increase the risk of revision surgery.[12,13] A recent study found that prior history of trauma around the elbow was a notable predictor of need for revision after *in situ* decompression of the ulnar nerve, whereas other postulated factors including patient age had no effect.[14] However, risk factors for revision in patients with *idiopathic* CTS, that is, those without an underlying traumatic, arthritic, or other predisposing etiology, remain unclear. Because revision surgery yields inferior outcomes versus primary surgery for CTS, information on risk factors leading to revision in these patients with idiopathic CTS could provide a valuable addition to the overall treatment algorithm.[15]

The purpose of this study was to determine the incidence of needed revision after *in situ* ulnar nerve decompression for patients with idiopathic CTS and to investigate which patient risk factor(s) may contribute to an increased likelihood of needing revision.

MATERIALS AND METHODS

This study was approved by our institutional review board. Using our departmental electronic billing database search for Current Procedural Terminology (American Medical Association, Chicago, IL) code 64718 (surgery on ulnar nerve at elbow), we identified all patients who had undergone *in situ* ulnar nerve decompression surgery from January 2006 through December 2010. Patients who demonstrated intraoperative subluxation of the ulnar nerve following *in situ* decompression were excluded, because these patients subsequently underwent either anterior transposition of the ulnar nerve or medial epicondylectomy. Patients were also excluded if they underwent *in situ* ulnar nerve decompression for reasons other than treatment of CTS symptoms (eg, prophylactic release performed in conjunction with elbow arthroplasty or fracture fixation) or had previously undergone operative treatment for CTS. In addition, patients with a prior history of fracture or trauma at the elbow were excluded, as were those with a history of degenerative, posttraumatic, or inflammatory arthritis at the elbow. However, patients with a known history of inflammatory or systemic arthritis without evidence of local arthritic changes at the surgical elbow were not excluded. Finally, patients with less than 6 months of follow-up at our institution were excluded from data analysis unless a revision surgery occurred in that time interval. Records for those patients with less than 6 months of follow-up were reviewed in an effort to predict their clinical course. In addition, attempts were made to contact those patients via telephone with the goal of identifying any patients that may have had additional surgery performed elsewhere.

Diagnostic work-up

Patients seen at our institution are generally evaluated by the treating surgeon prior to obtaining additional studies, including imaging or electrodiagnostic testing. Exceptions to this practice typically occur only in patients who are seen at our institution for a second opinion and have already undergone electrodiagnostic testing prior to presentation. During initial evaluation, a comprehensive clinical examination, including disease-specific tests and provocative maneuvers, is performed. This includes 2-point discrimination, vibratory discrimination testing, comparative grip strength testing, cross-finger testing, Froment sign, Tinel sign, elbow flexion-compression test, and testing for nerve mobility. When a patient is suspected of having CTS based on clinical history and physical examination, standard elbow radiographs are routinely obtained to rule out contributory bony abnormalities or deformities in addition to electrodiagnostic testing. Nerve conduction tests are considered abnormal if conduction velocity across the affected elbow is less than 50 m/s or is decreased by more than 10 m/s across the elbow. The diagnosis of CTS is based on clinical findings in conjunction with nerve testing results.

In addition, effort is made to elucidate any nerve symptoms not originating at the elbow, such as proximally based cervical pathology or distal compression of the ulnar and median nerves at the wrist. When the diagnostic work-up suggests pathology at those distal sites, it is not uncommon in our practice to perform concomitant release of the ulnar and median nerves at