EDITOR'S CHOICE

Comparative Morbidity of Cubital Tunnel Surgeries: A Prospective Cohort Study

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Purpose Randomized controlled trials have not identified a superior surgical approach to cubital tunnel syndrome surgery. This study evaluates the early morbidity of open *in situ* decompression and transposition.

Methods This prospective cohort study enrolled 125 adult patients indicated for cubital tunnel surgery at a tertiary institution. Exclusion criteria included preoperative use of narcotics and concurrent elbow procedures. *In situ* decompressions (n = 47) and ulnar nerve transpositions (n = 78) were performed. Data were collected by independent clinicians at 3 postoperative intervals: 1 to 3 weeks, 4 to 8 weeks, and longer than 8 weeks. Postoperative data quantified surgical morbidity: visual analog scale (0−10) surgical site pain, narcotic consumption, patient-reported disability (Levine-Katz, Patient-Reported Elbow Evaluation [PREE] scores). Olecranon paresthesia and wound complications (hematoma, drainage, infection) were recorded.

Results No preoperative differences in age, sex, or the presence of pain existed between the surgical groups. Surgical site pain was not significantly different at any time. Following transposition, a significantly greater percentage of patients were using narcotics at 4 to 8 weeks after surgery and the average total morphine equivalents consumed per patient was significantly greater. Both Levine-Katz and PREE scores indicated greater disability at 1 to 3 and 4 to 8 weeks after transposition, but this significant difference resolved by final follow-up. Olecranon paresthesias occurred after both procedures but were significantly less frequent at 4 to 8 weeks and longer than 8 weeks after decompression. Twelve hematomas occurred following transposition (15%) with 1 requiring operative debridement and 5 hematomas resolved with nonsurgical treatment after *in situ* decompression (11%).

Conclusions Ulnar nerve transposition imparts greater surgical morbidity than decompression with greater narcotic consumption, more patient-reported disability up to 8 weeks after surgery, and more persistent olecranon paresthesia. However, most differences in surgical morbidity are transient with resolution after 8 weeks following surgery. *(J Hand Surg Am. 2017;■(■):■−■.*

Type of study/level of evidence Therapeutic II.

Key words Cubital tunnel, *in situ* decompression, morbidity, transposition.

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In recent decades, the rate of surgical management for cubital tunnel syndrome has increased in the United States and in Europe.[1,2] Despite the increased incidence of surgical management, there is neither a consensus on the best surgical procedure nor a standardized treatment algorithm for idiopathic cubital tunnel syndrome.[3–9]

Whereas multiple studies have compared outcomes of *in situ* decompression with anterior transposition and/or medial epicondylectomy,[3,5–7,10,11] no procedure has proven superior. A meta-analysis of randomized control trials confirmed no difference in clinical and functional outcome between the various treatment methods.[12] Previous studies have also failed to inform surgical decision making according to disease severity.[4,13–15] Thus, surgeons are left to determine their operation of choice for cubital tunnel syndrome on a case-by-case basis.[16]

Assuming a similar ultimate neurological outcome, differences in the early morbidity between procedures becomes more relevant when recommending surgery. The primary aim of this study was to compare the morbidity of common cubital tunnel surgeries (*in situ* decompression and anterior transposition). We tested the null hypothesis that each surgery would impart similar early surgical morbidity (surgical site pain, narcotic usage, functional impairment, complications).

METHODS

Study design

Institutional review board approval was obtained prior to initiating this prospective cohort study. We obtained consent from 125 individuals ($\geq$ 18 years of age) and enrolled them in the study. Patients were informed that the study was designed to assess outcomes after their type of cubital tunnel surgery but enrollment did not involve descriptions of the alternative procedure. Patients were diagnosed with cubital tunnel syndrome based on a combination of symptoms, signs, and electrodiagnostic testing including paresthesias in ring and little finger, atrophy or weakness of ulnar nerve–innervated hand intrinsic musculature, positive nerve percussion or flexion-compression testing over the ulnar nerve at the elbow, and decreased nerve conduction velocity across the elbow. For each patient, the diagnosis was established based on the overall clinical impression of a hand fellowship–trained, attending surgeon (C.A.G. or R.P.C.). Patients underwent operative intervention at a single tertiary-care center after failing nonsurgical management (night-time pillow orthosis wearing and activity modification). Forty-seven patients underwent *in situ* decompression and 78 patients underwent ulnar nerve transposition (35 subcutaneous, 43 submuscular). Inclusion required English proficiency and anticipated follow-up at our institution. Exclusion criteria included preoperative use of narcotics determined by patient self-report, a history of cervical myelopathy or radiculopathy affecting the operative extremity, revision cubital tunnel surgery, and concurrent elbow surgery. The choice to perform an open *in situ* decompression or ulnar nerve transposition was left to the discretion of the attending physician's clinical judgment and did not affect enrollment in the study. Five of 6 surgeons offer both procedures whereas 1 surgeon offers only transposition and contributed 11 transpositions to this study. In our practice, both *in situ* decompressions and transpositions are performed with longitudinal incisions that are placed over the course of the ulnar nerve centered on the posteromedial elbow. Although exact incision lengths are not standardized, *in situ* decompressions are consistently performed through smaller skin incisions than transpositions. Querying surgeons regarding incision length indicated that decompressions routinely require 2- to 4-cm incisions, whereas transpositions are completed with 8- to 10-cm incisions. After surgery, *in situ* decompressions were placed in long-arm soft dressings and transpositions were immobilized in long-arm plaster orthoses until the first postoperative visit at 8 to 10 days, after which both groups were allowed full elbow motion.

Data collection

Patients completed patient-reported questionnaires before surgery and then at 1 to 3 weeks, 4 to 8 weeks, and more than 8 weeks (mean, 12 weeks; range, 9–26 weeks) after surgery. Visual analog scales (VAS) quantified preoperative pain related to the cubital tunnel syndrome and also assessed general pain perception from common experiences (pain from stubbing toe, pain from a paper cut).[17] The general pain questions were collected to examine for potential differences in pain tolerance between the groups because such standardization for sensory experiences has been suggested in other fields using VAS scoring.[18] Postoperative VAS scores quantified surgical pain (incisional pain at rest, while moving, while placing the arm on a surface). We quantified the number of pain pills consumed since surgery by counting pills remaining in bottles at the subsequent 3 postoperative visit intervals (1–3, 4–8, and $>$ 8 weeks). Because a variety of narcotic prescriptions