Patient Risk Factors of Revision Cubital Tunnel Surgery

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INTRODUCTION: Cubital tunnel syndrome (CTS) is the second most common nerve compression syndrome seen in the upper limb, resulting in symptoms of paresthesia and weakness. If left untreated, cubital tunnel syndrome can lead to nerve damage that can cause irreversible loss of function of the distal upper extremity [1]. Prevalence of CTS is high and increasing [2]. Using lax criteria and strict criteria, 6.8% and 1.8% of patients in a representative metropolitan sample exhibited symptoms of CTS, respectively [2]. If conservative management is not successful, surgery may be indicated. Three main types of operations exist to treat cubital tunnel syndrome: simple decompression, anterior transposition, or medial epicondylectomy [1]. Recurrent symptoms after surgery are possible, and revision surgery is usually warranted [1]. While the pathological and non-pathological causes of revision surgery are well understood, there is a gap in the current literature surrounding which demographic factors and comorbidities are predictive of the need for revision. In this study, cubital tunnel surgery recipients were evaluated to determine the prevalence of revision and the presence of certain demographic factors, lab values and comorbidities.

METHODS: (i) Data assembly: 102 patients who received a cubital tunnel release operation at an urban tertiary-care facility were identified. Some patients also received carpal tunnel releases, ulnar nerve transpositions, Guyon's canal release, or De Quervain's release concomitantly. Data was obtained via Epic chart review, and 10 patients who received a reoperation were identified. 20 patients who did not receive reoperation were randomly selected. All 30 patients were assessed for demographic factors, preoperative lab values, perioperative data, and comorbidities. The data points assessed included age, sex assigned at birth, race, ethnicity, diabetes status (and most recent HbA1C value if present), cervical disease/radiculopathy, B12, TSH, and magnesium levels. Perioperative parameters included laterality, time from diagnosis to primary operation, operation type, number of postoperative PT/OT visits, postoperative infection, and number of persistent symptoms. For patients who received a reoperation, other data such as the time between operations, reason for reoperation, and type of secondary operation were collected. (ii) Statistical analysis: For the comorbidities and demographic data, Chi-square tests were conducted and p-values were obtained **(Table 1)**. For lab values and perioperative data, independent samples T-tests were conducted to evaluate differences in the mean values and p-values were obtained **(Tables 2 & 3)**.

RESULTS: From the 102 total charts, 10 reoperation patients and 20 control patients were identified. Demographic data (i.e., gender, race, ethnicity) along with comorbidity data is presented in **Table 1**. Significant results were found in the gender distribution among the reoperation and control cases. The reoperation cases were 80% female and 20% male, but the control cases were 65% female and 35% male (**Table 1**). This difference was statistically significant (p=0.02). There were no significant differences between the two groups regarding race/ethnicity or presence of comorbidites. Lab value data is shown in **Table 2**. Parameters assessed were HbA1c, TSH, B12, and Mg. There were no significant differences in these lab values between the reoperation and control groups. Perioperative data showed more significance (**Table 3**). Parameters assessed were time from diagnosis to primary operation, number of PT/OT sessions attended following primary operation, and number of persistent symptoms following primary operation. The reoperation group attended a significantly higher number of PT/OT sessions following primary operation ($p < 0.05$). The reoperation group also experienced a significantly higher number of persistent symptoms following primary operation ($p = 0.003$). Time from diagnosis to primary operation was shorter in the reoperation group compared to the control group. This approached statistical significance ($p = 0.09$).

DISCUSSION: The purpose of this study was to determine what patient factors increase the likelihood of needing cubital tunnel reoperation. From data collected on demographics and comorbidities (**Table 1**), there were no significant differences in race, ethnicity, or comorbidities, but females were more likely to have cubital tunnel reoperation than males (p=0.02). As per **Table 2**, none of the lab values assessed approached statistical significance. These findings seem to indicate that the need for a reoperation for cubital tunnel syndrome is not dependent on HbA1c, B12, TSH, or Mg. As expected, perioperative data showed the most significance (**Table 3**). A significant decrease in PT/OT visits from reoperation patients to control patients was observed. This may indicate that reoperation patients have more persistent postoperative symptoms (**Table 3**) and therefore need to continue with PT or OT. Another significant data point was the mean number of persistent symptoms. Reoperation patients were significantly more likely to have more persistent symptoms after their primary operation (p=0.013) (**Table 3**). This follows with established literature that more persistent symptoms after primary operation leads to patients seeking additional treatment. Interestingly, as shown in **Table 1**, cervical disease was not correlated with the need for reoperation. The limitations of this study include the limited sample size (n = 30) and single origin of all patients seen at one urban tertiary-care facility. A larger study with subjects from multiple clinics is likely warranted in the future.

Background		Reoperation (n = 10)	Control (n=20)	p-value
Sex	Male	2 (20%)	13 (65%)	**0.02**
	Female	8 (80%)	7 (35%)	
Race	White	3 (30%)	5 (25%)	0.954
	Black or African American	5 (50%)	11 (55%)	
	Other	2 (20%)	4 (20%)	
Ethnicity	Hispanic, Latino/a, or Spanish origin	1 (10%)	1 (5%)	0.605
	Non-Hispanic, Latino/a, or Spanish origin	9 (90%)	19 (95%)	
Comorbidities				
	Type 2 DM	4 (40%)	11 (55%)	0.44
	Cervical Disease	5 (50%)	9 (45%)	0.79

Table 1. Demographics and Comorbidities of patients undergoing reoperation vs. primary operation.

Lab Values	Reoperation (n = 10, mean ± std. deviation)	Control (n = 20, mean ± std. deviation)	p-value
Hemoglobin A1c	6.31 ± 2.28	7.64 ± 2.23	0.22
TSH	2.28 ± 3.96	1.28 ± 0.66	0.31
B12	912.17 ± 704.59	884.08 ± 574. 06	0.93
Mg	1.88 ± 0.23	1.95 ± 0.24	0.58

Table 2. Lab values of patients undergoing reoperation vs. primary operation.

Perioperative Data	Reoperation (n= 10, mean ± std. dev)	Control (n=20, mean ± std dev)	p-value
Time from diagnosis to primary operation (months)	9.25 ± 9.11	27.55 ± 28.73	0.09
Number of PT/OT sessions following primary operation	18.0 ± 11.61	8.45 ± 7.93	**0.013**
Number of persistent symptoms following primary operation	2.50 ± 0.37	1.10 ± 0.24	**0.003**

Table 3. Peri-operative Data comparison between Re-operations group and Control group

SIGNIFICANCE: Our findings showed that patients who received reoperation for cubital tunnel syndrome were more likely to be female, attend more physical/occupational therapy sessions after their primary operation, and had more persistent symptoms after their primary operation. This indicates the need to screen for these factors after a patient's primary cubital tunnel release to decrease the likelihood of needing reoperation.

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REFERENCES: [1] A Thakker *et al.*, 2020, [2] T An *et al.*, 2017, [3] K Davidge *et al.*, 2019