Simultaneous carpal tunnel release with forearm fasciotomy: are we doing enough?

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INTRODUCTION:

Acute compartment syndrome (ACS) is a true emergency of the upper extremity and requires emergent fasciotomy to relieve pressure in the affected compartments. Several authors have reported performing simultaneous carpal tunnel release (sCTR) at the time of emergent forearm fasciotomy due to the close proximity of the carpal tunnel to standard volar fasciotomy incisions and the risk of median nerve compression.

Simultaneous carpal tunnel release(sCTR) with emergent forearm fasciotomy in the setting of ACS has been previously reported in the literature, but the national incidence, as well as the cost of delayed CTR, is unknown. This large database study aims to examine how often sCTR is being performed, how often patients require delayed CTR when not performed simultaneously, and the cost associated with these procedures. We hypothesized that the majority of emergent forearm fasciotomies would be associated with sCTR, and that delaying CTR rather than performing the two procedures simultaneously would result in higher direct costs associated with each individual procedure.

The PearlDiver Mariner database was used to query for patients who had undergone forearm fasciotomies from 1/1/2015 through 10/31/2022, and then grouped into cohorts based on the timing of CTR (simultaneous, within 2 weeks, from 2 weeks to 1 year, from 1 year to 5 years, or no CTR). Demographic data included age, sex, Charlson Comorbidity Index (CCI), and mean family income of each patient. The reimbursement for each procedure was also queried, and the number of patients in each cohort and the associated cost were analyzed.

Demographic data was compared between cohorts using student t-tests for continuous variables and chi-squared test for categorical variables. One-way analysis of variance (ANOVA) test with a post hoc Tukey test was run to analyze differences in age, CCI, reimbursement, and mean family income based on timing of fasciotomy. Reimbursement data was reported as a mean and standard deviation within each cohort. Student t-tests were run on the reimbursement data using these descriptive statistics with p<0.05 considered significant.

RESULTS:

A total of 24,098 patients who underwent forearm fasciotomy in the specified time period were identified. The overall rate of CTR after fasciotomy was 70%, with 85% of all CTR, including sCTR, occurring within two weeks of forearm fasciotomy. Females were significantly more likely to undergo sCTR and CTR overall at any time point (p<0.01). Of the patients who did not undergo sCTR, 31% and 35% went on to require CTR within one year and five years respectively.

The average cost associated with a diagnosis of forearm compartment syndrome resulting in forearm fasciotomy alone was \$2639, and \$2502 for patients who underwent fasciotomy and sCTR. There was a significantly increased cost of \$4220 for fasciotomy in the cohort of patients who subsequently underwent CTR within two weeks (p<0.01), dropping back down in the two weeks to one year, and one year to five year period. The total cost associated with the concomitant procedure of fasciotomy and CTR was highest when CTR was performed outside of the same day as the fasciotomy and within one year. Beyond one year, the additional cost of the CTR was no different from patients who did not undergo fasciotomy.

DISCUSSION AND CONCLUSION:

In this large database study, over a third of the remaining patients who do not undergo sCTR at the time of emergent forearm fasciotomy went on to require it within one year, at significantly increased cost. Although costs associated with hospitalization such as facility, anesthesia, and ICU costs within this two week time period were not captured, the higher cost of fasciotomy and CTR itself may correlate with higher complexity and worse clinical status in these patients. Our finding that 54% surgeons performing fasciotomies are already doing sCTR is also in line with several suggestions in the literature advocating for the inclusion of sCTR due to its proximity to the fasciotomy incision and the desire to provide complete release of the median nerve at all potential sites of compression. Inclusion of sCTR should be considered to avoid delayed care and increased costs. Future areas of study should focus on risk profiling for patients who may undergo delayed CTR after fasciotomy, as well as a comparative study on clinical outcomes in patients who undergo sCTR.





	Total	Simultaneo	Within 2	2 weeks - 1	1 year - 5	P-
	Fasciotomy	us CTR	weeks	year	years	vak,
N	24,098	12,917	1,384	2,108	408	
Sex						<0.0
Female (%)	12,749	707.03.03	20102	120215-01		
	(52.9)	/03/ (31/8)	763 (5.2)	7500 (3:3)	235 (1.0)	
Male (%)	11,349	1200.01.01	0000	0100	172.00.71	n
	(47.1)	2100 (11.0)	013 (2.0)	023 (3.4)	1/5 (0.7)	
Age	52.5 ± 13.4	56.0 ± 14.9	52.7±12.7	56.2±13.3	57.5±18.8	<0.0
Charlson	1.42 ± 2.19	1.17 ± 1.90	0.71 ± 1.33	1.17 ± 1.80	1.18 ± 1.72	<0.0
Comorbidity						
Index						
Mean family	\$73,113±	\$72,971±	\$72,748±	\$72,752±	\$71,873±	0.5
income	\$17,183	\$16,540	\$14,666	\$16,969	\$16,148	

Demographics of patients included in for (CTR). P-values reported per category. alysis, grouped by tirring of carpal tur

Table 2. Reimbursement of forearm fasciotomy and carpal tunnel release grouped by timing of CTR

	Fasciotomy Reimbursement (\$)	CTR Reimbursement (\$	
No CTR	2638.92 ± 9537.88		
Simultaneous CTR	2502.08 ± 5523.4	386.73 ± 1426.75	
Within 2 weeks	4220.35 ± 6358.5*	629.57±1784.92*	
2 weeks-1 year	2136.49 ± 3321.43	707.54 ± 1901.6*	
1 year-5 years	2638.92 ± 9537.88	326.15±1061.7	

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