Taking a Step Back: Analyzing Demographics and Mortality of Below-Knee Amputation in Charcot Neuroarthropathy

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INTRODUCTION: Charcot neuroarthropathy (CN) is characterized by progressive joint destruction as a consequence of neuropathic and microtraumatic joint injury most commonly in diabetic patients. Surgical intervention to avoid amputation in patients with CN involves minimizing foot and ankle deformities and instabilities which otherwise can lead to ulceration and infection. Below-knee amputation (BKA) may be used in patients with advanced CN but is not without risk for further morbidity and mortality in this patient population. Currently there are no major guidelines surrounding indications for BKA as opposed to other surgical procedures (e.g., arthrodesis). Here we provide demographic and all-cause mortality in CN patients who underwent BKA at a single institution.

METHODS:

Institutional review board approval was obtained. Patients who underwent BKA between 1/1/2000 and 1/31/2022 were assembled with CPT and ICD codes with a diagnosis of CN. Demographic and all-cause mortality were collected including patient sex, race, smoking status, and birth date. BKA patients were identified as amputations through the tibia and fibula. Patients were placed into either a single procedure group or two procedure group (i.e., amputation revision or BKA in the opposing limb). Patients with three or more procedures were excluded. Following BKA, this institution offers CN patients physical therapy, individualized prosthetics, and prompt out-patient orthopaedic follow up. Statistical analysis of background demographics and all-cause mortality between groups was conducted with student's t-tests and chi-squared tests using a significance level of 0.05.

RESULTS: Of the total 2,066 patients identified: 385 underwent a single BKA while 58 patients underwent two procedures, contralateral BKAs or BKA revision. Differences in sex, age, race, and rate of tobacco use between the one and two procedure groups were not statistically significant (Table 1). Patients who underwent BKA for CN were predominantly white and male with approximately half of patients being tobacco users. Overall, all-cause mortality of the 443 CN patients who underwent at least one BKA was 35.4%. The all-cause mortality rate of patients who underwent a single BKA was 34.3%, while all-cause mortality increased to 43.1% in patients who had a BKA revision or BKA in the opposing limb (p=0.19).

DISCUSSION AND CONCLUSION: The results of our study showed an all-cause mortality rate in CN patients who underwent BKA of 35.4%. This is lower than reported mortality rates following BKA (47.7%-52.0%). We propose that the increased access to personalized prosthetics, physical therapy, and orthopaedic follow up could be the contributing factors for increased overall survival in our study group. Furthermore, BKA revision or amputation of the opposing limb did not lead to a statistically significant increase in mortality compared to patients who underwent a single BKA.

	1 Procedure (n=385)	2 Procedures (n=58)	*p-value*
Male, n (%)	280 (72.7%)	43 (74.1%)	0.82
Female, n (%)	105 (27.3%)	15 (25.9%)	
Average Age ± SD	61.5 ± 13.2	59.9 ± 13.5	0.39
Tobacco Use, n (%)	188 (48.8%)	29 (50.0%)	0.87
Race, n (%)			0.85
White	335 (87.0%)	52 (89.7%)	
Black or African American	25 (6.5%)	4 (6.9%)	
Two or More Races	8 (2.1%)	0 (%)	
Other Race	17 (4.4%)	2 (3.4%)	
Mortality (%)	132 (34.3%)	25 (43.1%)	0.19

Table 1. Demographics and mortality in patients who underwent one or two BKAs for CN.