

Diabetes Mellitus Independently Predicts Higher Amputation Level in Critical Limb Ischemia: A Retrospective Cohort Analysis

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INTRODUCTION

- Critical limb ischemia (CLI) is the most severe form of peripheral arterial disease (PAD)
- Diabetes mellitus (DM) increases CLI risk by 4 times¹
- Revascularization aims to preserve the limb
- Above-knee amputation (AKA) worsens functionality, quality of life, and survival²⁻⁴
- The impact of DM on amputation level in CLI remains unclear
- **Objective:** Assess the relationship between DM and amputation level in CLI patients
- **Hypothesis:** DM increases risk of AKA, readmission, reamputation, and mortality in CLI patients

METHODS

- Study Design: Retrospective review of 308 CLI patients undergoing major lower extremity amputation at UMMC (Mar 2014 - Mar 2024)
- Cohorts: Diabetic vs. nondiabetic CLI patients
- Primary Outcome: Risk of AKA vs. below-knee amputation (BKA)/through-knee amputation (TKA)
- Secondary Outcomes:
 - Readmission, reamputation, and mortality
 - Among DM patients: AKA risk by preoperative HbA1c, insulin, and DM complications (retinopathy and neuropathy)
- Statistical Analysis: Chi-square and Kruskal-Wallis (significance: $p < 0.05$)

RESULTS

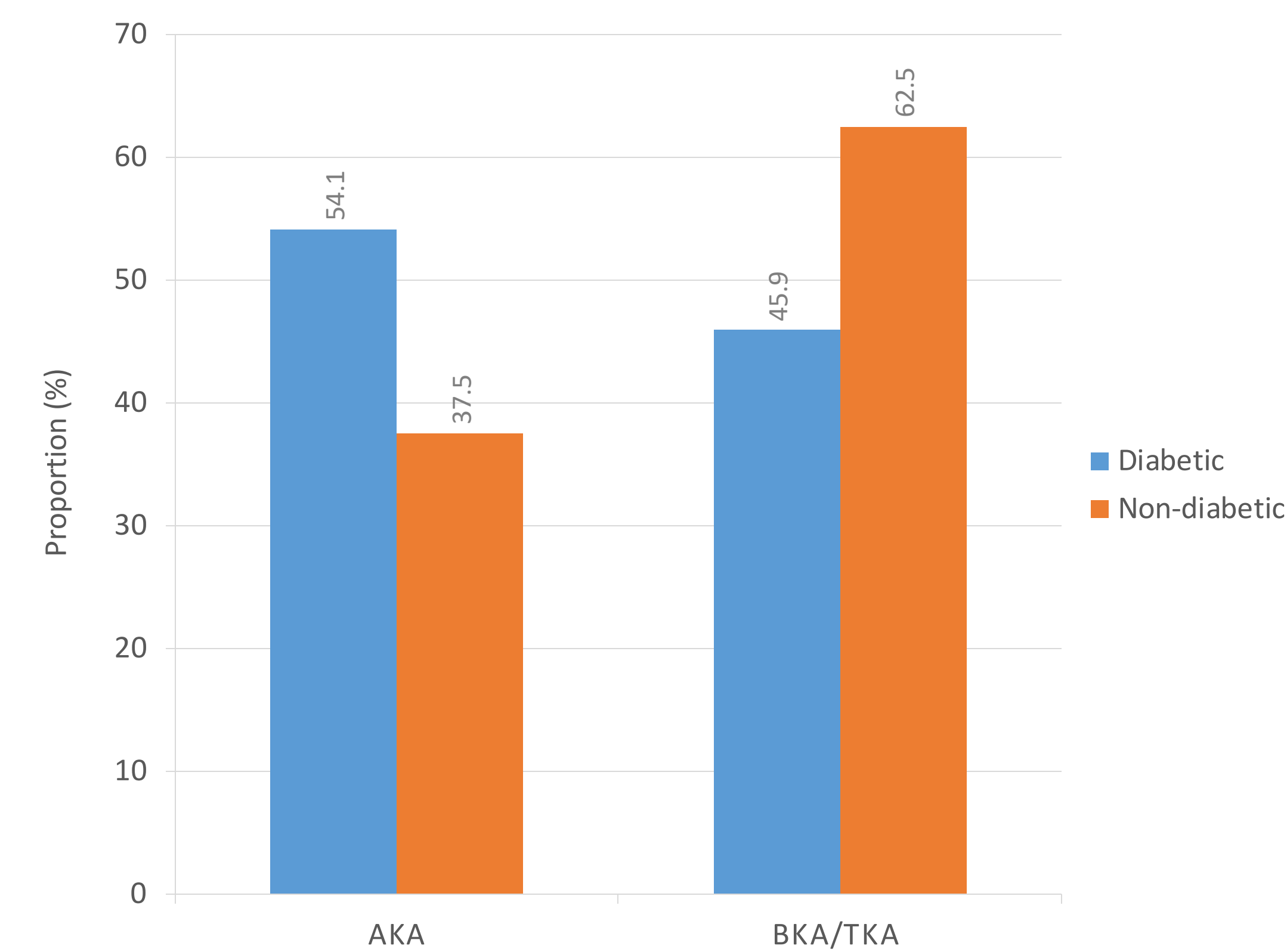
Table 1. Demographics and Comorbidities

Variable	Diabetic (n = 196)	Nondiabetic (n = 112)	Total (n = 308)	P-value
Age	57.3 ± 11.5	57.0 ± 15.2	57.2 ± 13.0	0.86
Sex				0.45
Female	75 (66.4)	38 (33.6)	113 (36.7)	
Male	121 (62.1)	74 (37.9)	195 (63.3)	
Race				0.01
Black	129 (70.1)	55 (29.9)	184 (59.7)	
Caucasian	62 (53.0)	55 (47.0)	117 (38.0)	
Other	5 (71.4)	2 (28.6)	7 (2.3)	
Ethnicity				0.88
Not Hispanic or Latino	192 (63.6)	110 (36.4)	302 (98.1)	
Hispanic or Latino	4 (66.7)	2 (33.3)	6 (1.9)	
Body Mass Index				<0.001
≥ 30	75 (78.9)	20 (21.1)	95 (30.8)	
< 30	121 (56.8)	92 (43.2)	213 (69.2)	
Smoking History				<0.001
Current	46 (50.0)	46 (50.0)	92 (29.9)	
Former	86 (64.7)	47 (35.3)	133 (43.2)	
Never	60 (81.1)	14 (18.9)	74 (24.0)	
Unknown	4 (44.4)	5 (55.6)	9 (2.9)	
Primary Care Provider				<0.001
Yes	179 (67.5)	86 (32.5)	265 (86.0)	
No	17 (39.5)	26 (60.5)	43 (14.0)	
Primary Insurance				0.35
Medicare	125 (64.4)	69 (35.6)	194 (63.0)	
Medicaid	32 (61.5)	20 (38.5)	52 (16.9)	
Private	25 (65.8)	13 (34.2)	38 (12.3)	
None	11 (73.3)	4 (26.7)	15 (4.9)	
VA/Military	3 (33.3)	6 (66.7)	9 (2.9)	
Worker's Comp	0 (0.0)	0 (0.0)	0 (0.0)	
Marital Status				0.21
Married	66 (65.3)	35 (34.7)	101 (32.8)	
Single	67 (57.3)	50 (42.7)	117 (38.0)	
Widowed	26 (65.0)	14 (35.0)	40 (13.0)	
Separated/Divorced	37 (74.0)	13 (26.0)	50 (16.2)	
COPD				1.00
Yes	42 (63.6)	24 (36.4)	66 (21.4)	
No	154 (63.6)	88 (36.4)	242 (78.6)	
HTN				0.03
Yes	175 (66.0)	90 (34.0)	265 (86.0)	
No	21 (48.8)	22 (51.2)	43 (14.0)	
HLD				0.004
Yes	126 (70.4)	53 (45.7)	179 (58.1)	
No	70 (54.3)	59 (45.7)	129 (41.9)	
CAD				<0.001
Yes	104 (74.3)	36 (25.7)	140 (45.5)	
No	92 (54.8)	76 (45.2)	168 (54.5)	
HF				0.13
Yes	67 (69.8)	29 (30.2)	96 (31.2)	
No	129 (60.8)	83 (39.2)	212 (68.8)	

N (%) or mean (SD). COPD = Chronic Obstructive Pulmonary Disease, HTN = Hypertension, HLD = Hyperlipidemia, CAD = Coronary Artery Disease, HF = Heart Failure

RESULTS

Table 2. Amputation Level by Diabetes Status



Primary Outcome

- DM was associated with higher odds of AKA vs. BKA/TKA (OR = 1.96, $p = 0.014$)

Secondary Outcomes

- Readmission (30-day, 90-day): No significant difference by DM status ($p = 0.0843, 0.500$)
- Reamputation (30-day, 1-year, 5-year): No significant difference ($p = 0.217, 0.586, 0.066$)
- Mortality:
 - 30-day: Significantly higher in non-diabetic patients ($p = 0.013$)
 - 1-year, 5-year: No difference ($p = 1.000, 0.810$)
- Among diabetic patients, amputation level was not associated with HbA1c, insulin use, or diabetes-related complications (all $p > 0.05$)

CONCLUSIONS

- Diabetes independently predicts higher odds of AKA in CLI patients
- This study is among the first to assess amputation level, not just amputation risk, in relation to diabetic status
- Non-diabetic patients had higher 30-day mortality, raising concerns for delayed presentation or overlooked perioperative risk
- Within the diabetic cohort, HbA1c levels, insulin use, and diabetes-related complications did not correlate with amputation level, suggesting that factors beyond glycemic control may influence surgical decisions
- **Limitations:**
 - Retrospective nature
 - Lack of outside institution procedure data

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