

Impact of Peripheral Vascular Disease on Gait Function in Patients with Below Knee Amputation

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INTRODUCTION

- Peripheral vascular disease (PVD) is commonly associated with peripheral neuropathy, both of which are exacerbated by comorbidities such as diabetes, congestive heart failure, and end-stage renal disease.
- PVD increases the risk of lower extremity amputation, particularly below-knee amputation (BKA), significantly impacting patients' mobility and leading to functional challenges
- This study quantifies the combined effects of PVD and BKA on patients' gait and mobility, which remain largely unexplored.

METHODS

- A single-center study was conducted from June 2021 to July 2024.
- Adult patients who could safely ambulate unassisted without pain and had no open wounds or lower extremity surgery in the past three months were included.
- PVD status and BKA history were documented through retrospective chart review.
- Participants completed a **120s walk test** and a **30s Romberg sway test** using wearable sensors.
- Gait data were collected through **Motility Lab software**, analyzing **7 parameters** found in Table 1
- Root-mean-square (RMS) sway (m/s²)** was extrapolated to assess **postural stability and sway area**.

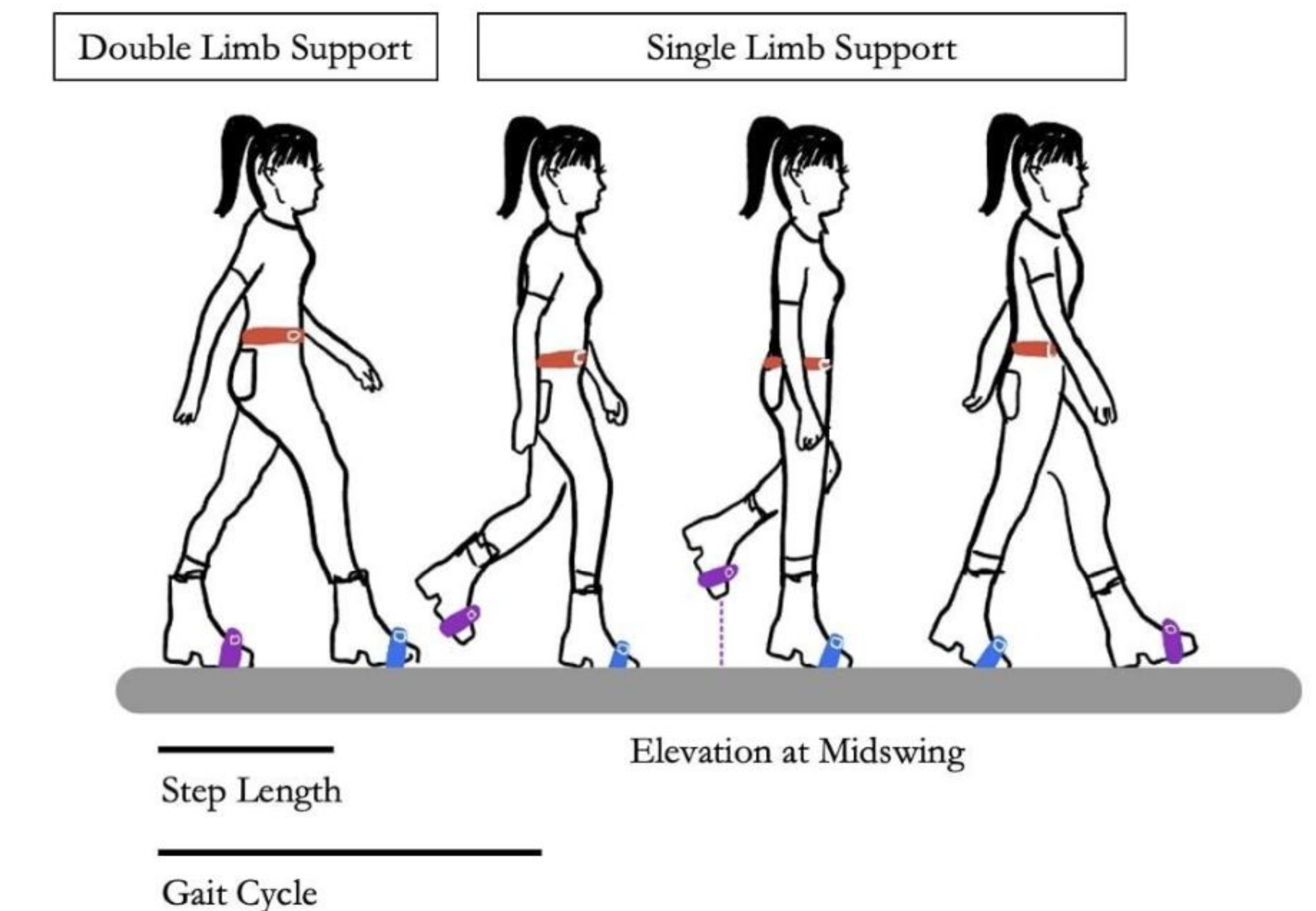


Figure 1. Gait cycle variables and definitions evaluated in this study

RESULTS

	Overall	No PVD	PVD	P-Value
Gait Speed, m/s	0.72 ± 0.26	0.89 ± 0.08	0.58 ± 0.28	0.009
Elevation Mid-Swing, cm	1.46 ± 0.56	1.46 ± 0.57	1.46 ± 0.58	0.998
Step Duration, s	0.66 ± 0.09	0.62 ± 0.06	0.70 ± 0.10	0.067
Cadence, steps/min	93.06 ± 12.95	98.54 ± 8.95	88.67 ± 14.37	0.110
Single Limb Support, %	33.56 ± 3.40	35.91 ± 1.50	31.68 ± 3.37	0.005
Double Limb Support, %	32.89 ± 6.98	28.13 ± 2.99	36.71 ± 6.99	0.005
Stride Length, m	0.77 ± 0.11	0.85 ± 0.08	0.71 ± 0.11	0.008
RMS Sway, m/s ²	0.15 [0.26]	0.16 [0.05]	0.13 [0.31]	0.929
LEFS	37.50 [8.75]	35.50 [12.25]	39.50 [2.50]	0.856

- Patient characteristics** such as age, BMI, and CCI were comparable between groups
- Significant differences were observed between Non-PVD (n=14) and PVD (n=12) groups in:**
 - Gait speed** (0.88 ± 0.14 vs 0.61 ± 0.27, **p=0.003**)
 - Step duration** (0.62 ± 0.07 vs 0.69 ± 0.09, **p=0.039**)
 - Single limb support** (36.12 ± 1.78 vs 32.70 ± 3.93, **p=0.007**)
 - Double limb support** (35.99 [2.62] vs 33.03 [3.63], **p=0.020**)
 - Stride length** (0.84 ± 0.08 vs 0.73 ± 0.10, **p=0.006**)

CONCLUSION

BKA patients with PVD may experience more pronounced ambulatory dysfunction than their counterparts without PVD.

- A vasculo-plastic approach that incorporates a team of both plastic and vascular surgery should be used to manage and surveille this complex patient population.