# Impact of Upper Extremity Amputation on Mortality in Patients with Peripheral Artery Disease

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**INTRODUCTION:** Peripheral artery disease is a well-established risk factor for lower extremity amputation and is associated with poor outcomes and increased mortality following these procedures. In contrast, the mortality risk for patients with peripheral artery disease undergoing upper extremity amputation remains poorly understood. This study aimed to clarify the mortality risk associated with upper extremity amputation in patients with peripheral artery disease.

**METHODS:** The TriNetX database was retrospectively queried to identify patients with peripheral artery disease who did or did not undergo upper extremity amputation, using International Classification of Diseases, Tenth Revision, and Current Procedural Terminology codes. Patients were divided into two cohorts: those with peripheral artery disease who underwent upper extremity amputation and those who did not. Propensity score matching was performed in a 1:1 ratio based on age, sex, body mass index, diabetes status, and other comorbidities. The Elixhauser Comorbidity Index (ECI) was utilized to minimize confounding factors. Kaplan–Meier survival analyses, along with risk ratios and hazard ratios, were used to assess mortality at 1, 5, and 10 years following upper extremity amputation.

**RESULTS:** A total of 1,627,799 patients with peripheral artery disease were identified, including 677,510 female and 809,041 male patients recorded. Of the total patient cohort, 1,568 underwent upper extremity amputation and 1,626,231 did not. After one-to-one propensity score matching, each cohort included 1,525 patients. Patients who underwent upper extremity amputation had consistently higher mortality rates at 1 year (25.24% vs 11.77%), 5 years (54.65% vs 36.43%), and 10 years (74.28% vs 52.66%) compared to those without amputation (Table 1). Upper extremity amputation was associated with significantly increased mortality risk at all time points: 1 year (hazard ratio, 2.24; 95% confidence interval, 1.85–2.70), 5 years (hazard ratio, 1.92; 95% confidence interval, 1.68–2.19), and 10 years (hazard ratio, 1.88; 95% confidence interval, 1.66–2.14) (Table 2).

**DISCUSSION:** Our findings demonstrate that patients with PAD who undergo UEA have poorer outcomes compared to the cohort that did not undergo amputation. These results carry important clinical implications for patients considering amputation for progressive upper extremity vascular disease, underscoring the need for timely risk mitigation strategies and comprehensive patient education on disease severity. Given the rising prevalence of PAD and associated comorbidities in the United States, providing clear clinical guidance on disease management, and emphasizing healthy lifestyle practices are crucial for improving long-term survival.

**SIGNIFICANCE/CLINICAL RELEVANCE**: Our study demonstrates a significantly increased mortality risk among patients with peripheral artery disease who undergo upper extremity amputation compared to those who do not. This study may serve to inform orthopedic surgeons on the risks of amputation for patients with underlying peripheral artery disease, emphasizing the importance of communicating early risk mitigation and preventive strategies to avoid progression to need for amputation.

**IMAGES AND TABLES**:

**Table 1.** Mortality Rates Between Patients with Peripheral Artery Disease with Upper Extremity Amputation (UEA) and without (noUEA) at 1, 5, and 10 years (n=number of outcomes).

| Cohort | 1-year Mortality Rate | 5-year Mortality Rate | 10-year Mortality Rate |
|---|---|---|---|
| UEA | **25.24**% (n=320) | **54.65**% (n=533) | **74.28**% (n=570) |
| noUEA | **11.77**% (n=162) | **36.43**% (n=376) | **52.66**% (n=431) |

**Table 2.** Risk and Hazard Ratios for Mortality of Patients with Peripheral Artery Disease with Upper Extremity Amputation and without.

| Time Point | Risk Ratio (95% CI) | Hazard Ratio (95% CI) |
|---|---|---|
| 1-year | **1.982** (1.664- 2.361) | **2.237** (1.851- 2.703) |
| 5-years | **1.422** (1.273- 1.589) | **1.915** (1.677- 2.187) |
| 10-years | **1.327** (1.197- 1.471) | **1.884** (1.660- 2.137) |