Racial Disparities in Outcomes of Endovascular Procedures for Peripheral Arterial Disease: An Evaluation of California Hospitals, 2005–2009

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Background: Racial/ethnic disparities in treatment outcomes of peripheral arterial disease (PAD) are well documented. Compared with non-Hispanic (NH) whites, blacks and Hispanics are more likely to undergo amputation and less likely to undergo bypass surgery for limb salvage. Endovascular procedures are being increasingly performed as first line of therapy for PAD. In this study, we examined the outcomes of endovascular PAD treatments based on race/ethnicity in a contemporary large population-based study.

Methods: We used Patient Discharge Data from California's Office of Statewide Health Planning and Development to identify all patients over the age of 35 who underwent a lower extremity arterial intervention from 2005 to 2009. A look-back period of 5 years was used to exclude all patients with prior lower extremity arterial revascularization procedures or major amputation. Cox proportional hazards regression was used to compare amputation-free survival and time to death within 365 days. Logistic regression was used for comparison of 1-month myocardial infarction, 1-month major amputation, 1-month all-cause mortality, 12-month major amputation, 12-month reintervention, and 12-month all-cause mortality rates among NH white, black, and Hispanic patients. These analyses were adjusted for age, gender, insurance status, severity of PAD, comorbidities, history of coronary artery angioplasty or bypass surgery, or history of carotid endarterectomy.

Results: Between 2005 and 2009, a total of 41,507 individuals underwent PAD interventions, 25,635 (61.7%) of whom underwent endovascular procedures. There were 17,433 (68%) NH whites, 4,417 (17.2%) Hispanics, 1,979 (7.7%) blacks, 1,163 (4.5%) Asian/Native Hawaiians, and 643 (2.5%) others in this group. There was a statistically significant difference in the amputation-free survival within 365 days among the NH white, Hispanic, and black groups ($P < 0.0001$); the hazard ratio for amputation within 365 days was 1.69 in Hispanics (95% confidence interval [CI] 1.51–1.90, $P < 0.0001$) and 1.68 in blacks (95% CI 1.44–1.96, $P < 0.001$) compared with NH whites following endovascular procedures after adjusting for age, gender, insurance status, comorbidities, severity of PAD, history of coronary artery angioplasty or bypass surgery, or history of carotid endarterectomy. After adjusting for the aforementioned

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confounders, the first reintervention within 12 months was also significantly associated with race/ethnicity ($P = 0.002$). Odds ratio for reintervention was 1.17 in blacks (95% CI 1.06–1.30, $P = 0.002$) and 1.084 in Hispanics (95% CI 1.00–1.16, $P = 0.04$) compared with NH whites.
Conclusions: In this contemporary large population-based study, we demonstrated that even among matched cohorts Hispanics and blacks have worse amputation-free survival than NH whites following endovascular therapy. Our study also found that Hispanics and blacks are more likely to undergo lower extremity arterial reinterventions than NH whites. Further research is crucial in understanding if higher reintervention rates in Hispanics and blacks are because of more severe disease and/or poor access to proper follow-up care and optimal medical management.

INTRODUCTION

In the last decade, there has been a major paradigm shift in the management of peripheral arterial disease (PAD) with an increase in endovascular interventions and a decrease in open surgical bypass procedures with a subsequent decrease in lower extremity amputation rates.[1–3] However, despite changes in practice patterns in lower extremity arterial interventions, significant racial/ethnic differences remain in outcomes of PAD treatment. According to recent analyses of Medicare and Nationwide Inpatient Sample data, blacks and Hispanics with PAD are more likely to undergo amputation and less likely to be offered lower extremity arterial revascularization or to undergo aggressive surgical therapy for limb salvage compared with non-Hispanic (NH) whites.[3–6] These disparities have been attributed to differences in socioeconomic status, access to care, insurance status, and/or severity of disease.[5]

Epidemiologic studies of PAD have demonstrated significant differences in the prevalence of PAD based on race/ethnicity. Blacks have been demonstrated to have the highest prevalence of PAD across all age groups compared with NH whites and Hispanics.[7] For instance, in men between the ages of 60 and 69, 5.4% of whites, 4.3% of Hispanics, and 13.2% of blacks have PAD. Among men over the age of 80, 59% of blacks have PAD compared with 22.6% of whites and 22.5% of Hispanics. The prevalence of PAD in Hispanics is similar to NH whites across all age groups.[7] This racial/ethnic disparity in the prevalence of PAD holds true among women as well. More severe arterial occlusive disease in every segment of the infragenicular arteries are found in blacks compared with whites.[8] A recent evaluation of a large national database demonstrated that blacks and Hispanics undergo more open revascularization procedures involving tibial arteries compared with whites.[9]

Previous studies on PAD management have reported a disparity in lower extremity revascularization procedures offered to black and Hispanic patients who present with complications of PAD.[10,11] Few studies have evaluated outcomes of endovascular PAD interventions based on race/ethnicity in matched cohorts. Even fewer large database studies have access to ambulatory surgery (AS) data or longitudinal follow-up to evaluate reintervention rates. The aim of our study was to evaluate short- and long-term outcomes of endovascular PAD interventions in patients based on race/ethnicity in a contemporary series using a large state-wide all-payer database.

MATERIALS AND METHODS

With approval from the state of California institutional review board, we used Patient Discharge Data (PDD) from California's Office of Statewide Health Planning and Development (OSHPD). PDD is a population-based all-payer dataset that allows longitudinal tracking within California of morbidity outcomes for both inpatient and ambulatory procedures performed at nonfederal hospitals. Multiple admissions within California for each unique patient are linked by encrypted identifiers provided by the PDD to follow a patient over a specified period of time. This database is also linked to the state's vital statistics records. Inpatient data using The International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) have been used in OSHPD since 1990. Since 2005, OSHPD has captured outpatient or AS data, where the more anatomically specific current procedural terminology (CPT) procedure codes are recorded (Appendix I).

All patients over the age of 35 who had an admission for a primary or secondary diagnosis of PAD or diabetes mellitus (DM) associated with diagnosis of lower extremity disease or tissue loss from 2005 to 2009 were evaluated for this study. We used ICD-9-CM codes 440.20–440.24 for the diagnosis of PAD specifying intermittent claudication, rest pain, ulceration, or ischemic gangrene to characterize the target population (Appendix I). Subsequently, we used the ICD-9-CM codes for inpatient or CPT codes for outpatient endovascular lower extremity