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American Heart Journal Plus: Cardiology Research and Practice

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Research Letter

Association between lower extremity peripheral arterial disease and in-hospital outcomes among patients undergoing trans-catheter mitral valve edge-to-edge repair

ARTICLE INFO

Lower extremity peripheral arterial disease (LE-PAD) is highly prevalent in the United States and worldwide and associated with significant mortality and morbidity [1,2]. The global burden of PAD has been increasing and almost doubled during the past two decades [3]. PAD shares common risk factors with severe valvular heart diseases such as advanced age and traditional cardiovascular risk factors. PAD has been linked with worse outcomes among patients undergoing transcatheter aortic valve replacement (TAVR) [4], however similar data for patients undergoing mitral valve transcatheter edge to edge repair (M-TEER) are scarce. We aimed to investigate the rates and in-hospital outcomes of LE-PAD among patients undergoing M-TEER from a large national database.

The National Inpatient Sample (NIS) years October 2015 to 2019 was used to identify admissions ≥18 years old who underwent M-TEER using International Classification of Diseases, Tenth Revision (ICD-10) "02UG3JZ". Patients were classified into two cohorts based on presence of LE-PAD [5]. Baseline characteristics were compared using a Pearson chi-square test, Fisher's exact test for categorical variables, and independent samples t-test for continuous variables. A propensity matched model was used to assess the independent association of PAD with in-hospital outcomes after adjusting for patient-level factors as age, sex, race, comorbidities as well as hospital related characteristics. The statistical analysis was performed using STATA 17.0 (StataCorp, Texas), and $p < 0.05$ was considered statistically significant. Owing to the de-identified nature of the dataset, the institutional review board approval was waived.

During the study period, there were 7925 weighted admissions for M-TEER procedures. Of those,1093 patients (13.8 %) had LE-PAD. The LE-PAD patient group were younger (77 vs 80 years, $p < 0.0001$), less likely women (42.4 % vs 46.7 %, $p < 0.0001$), and had a higher prevalence of comorbidities, including hypertension (91.2 % vs 83.6 %, $p < 0.0001$), diabetes mellitus (48.6 % vs 24.6 %, p < 0.0001), hyperlipidemia (72.9 % vs 59.7 %, $p < 0.0001$) and coronary artery disease (78.9 % vs 60.3 %, p < 0.0001) (Table 1).

In the unadjusted analysis, there was no difference in the rate of in-hospital mortality (2.1 % vs 2.05 %), and major bleeding (5.9 % vs 5.3 %), but LE-PAD group had higher rates of vascular complications (6.6 %

vs 2.4 %) and acute kidney injury (AKI) (22.7 % vs 14.3 %). Unadjusted procedure-related complications are summarized in Table 1. In adjusted analyses, there was no significant difference in in-hospital mortality between the two cohorts (adjusted odds ratio [OR] 0.85, 95 % confidence interval [CI] 0.66 to 1.08, $p = 0.24$). LE-PAD group was associated with significantly higher incidence of cardiogenic shock (aOR 1.32, 95 % CI 1.13–1.54, $p < 0.001$), utilization of mechanical circulatory support (MCS)(aOR 1.36, 95 % CI 1.11–1.68, $p < 0.001$), vascular complications (aOR 2.28, 95 % CI 1.90–2.73, p < 0.001), and AKI (aOR 1.48, 95 % CI 1.374–1.61, $p < 0.001$). There was no significant difference in incidence of major bleeding between both groups (aOR 1.12, 95 % CI 0.96–1.30, p 0.14). In terms of resource utilization, the median length of stay was similar in both the groups (median: 2 [IQR 1–6] vs. 2 [1–4]) with higher median costs of hospitalization in the LE-PAD ($43,632 ($32,419- $61,311) vs $41,349 ($31,356- $56,516)).

In this nationwide analysis of 7925 admissions undergoing M-TEER, we found that the prevalence of LE-PAD was 13.8 %. LE-PAD was not associated with significantly higher rates of in-hospital mortality and major bleeding, but was associated with higher rates of vascular complications, AKI, cardiogenic shock and need for MCS. In a secondary analysis of the COPAT trial, LE PAD was associated with higher incidence of 2-year mortality but no difference in the rates of heart hospitalizations among patients undergoing M-TEER [6]. Our study extended our knowledge by demonstrating that LE-PAD does not seem to influence the short-term mortality but is associated with higher rates of periprocedural complications.

These findings should be interpreted in the context of some limitations. The study lacks information on the echocardiographic data and other important clinical variables such as the NYHA classification. In addition, this is a retrospective analysis of an administrative database which is subject to coding errors. Note standing these limitations, our findings could help with shared-decision making for patients undergoing M-TEER.

In conclusion, LE PAD is associated with LE-PAD was not associated with significantly higher rates of in-hospital mortality but higher rates of in-hospital periprocedural complications among patients undergoing M-TEER.

Table 1

Baseline characteristics and outcomes of patients undergoing Mitral-TEER with LE-PAD vs. No LE-PAD.

Variables, No. (%)	LE-PAD ($N = 1094$)	No LE- PAD ($N = 6831$)	P value
Median age, years	77	80	<0.0001
Female	42.3	46.7	<0.0001
Race			
White	77.0	80.1	<0.0001
Black	10.6	8.5	
Hispanic	6.0	6.1	
Asian or pacific islander	3.0	2.7	
Native American	0.6	0.4	
Others	2.8	2.1	
Comorbidities and risk factors			
Alcohol abuse	1.0	1.1	0.10
Malignancy	2.4	1.6	0.0001
Smoking	47.3	36.6	<0.0001
Chronic lung disease	34.9	22.8	<0.0001
Neurological disorders	4.9	5.2	0.34
Diabetes mellitus	48.6	24.6	<0.0001
Drug abuse	1.3	0.9	0.004
Hypertension	91.2	83.7	<0.0001
Hyperlipidemia	72.9	59.7	<0.0001
Liver disease	5.03	4.03	0.0006
Obesity	13.5	10.7	<0.0001
Chronic kidney disease	45.2	34.9	<,0.0001
End stage renal disease	7.2	3.7	<0.0001
Atrial fibrillation	57.5	59.9	0.0006
Coronary artery disease	79.0	60.3	<0.0001
Prior myocardial infarction	21.7	14.9	<0.0001
Prior CABG	31.4	19.0	<0.0001
Prior PCI	3.7	2.8	0.0001
Outcomes			
Variables, No. (%)	PAD (N = 1094)	No- PAD (N = 6831)	P value
Mortality	2.1	2.0	0.20
Cardiogenic shock	6.4	4.7	0.0004
Mechanical circulatory support	3.7	2.1	0.003
Major bleeding	5.9	5.3	0.14
Vascular complications	6.6	2.4	<0.0001
Acute kidney injury	22.7	14.3	<0.0001
Length of stay (median days, IQR)	2 (1–6)	2 (1–4)	
Total hospitalization charges in $ (median, IQR)	$43,632 ($32,419-$61,311)	$41,349 ($31,356-$56,516)	

Ethical statement

All procedures were performed in compliance with relevant laws and institutional guidelines and have were exempted from Institutional Review Board due to the de-identified nature of the dataset.

Disclosures

None.

CRediT authorship contribution statement

Asmaa Ahmed: Conceptualization, Investigation, Methodology, Writing – original draft. **Mohammed Faisaluddin:** Conceptualization, Investigation, Methodology, Writing – original draft. **Islam Y. Elgendy:** Conceptualization, Methodology, Supervision, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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