

Coronary: Short Report

Racial Disparities in Atrial Fibrillation After Coronary Artery Bypass: Impact of Left Atrial Volume



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ABSTRACT

BACKGROUND Prior studies have demonstrated a lower prevalence of postoperative atrial fibrillation (POAF) in Black, Hispanic, Asian, and Native American patients compared with White cohorts after coronary artery bypass grafting. We hypothesized that preoperative differences in left atrial size may explain this disparity.

METHODS We assessed the incidence of new POAF in 1218 patients (215 minority patients and 1003 White patients) undergoing isolated, first-time coronary artery bypass grafting from January 2017 through September 2022. Preoperative left atrial volume index (LAVi) was assessed by transthoracic echocardiography.

RESULTS Minority patients were younger and more likely to be female, with more comorbidities, including diabetes, prior stroke, and dialysis. There was no difference in postoperative mortality, stroke, renal failure, or reoperation for bleeding between minority and White patients. Whereas minority patients had higher blood product use and longer intensive care unit and postoperative lengths of stay, they experienced a lower incidence of new POAF (19.5% [42/215] vs 29.5% [292/1003]; $P = 0.02$). Mean LAVi was similar between minority and White patients (30.3 ± 12.6 mL/m² vs 29.9 ± 10.1 mL/m²; $P = .64$). However, for White patients, LAVi was higher for patients with POAF than for patients without POAF (31.3 ± 10.9 mL/m² vs 29.3 ± 9.7 mL/m²; $P = .007$), whereas for minority patients, LAVi was similar for patients with and without POAF (30.7 ± 26.0 mL/m² vs 30.3 ± 11.7 mL/m²; $P = .84$).

CONCLUSIONS Despite more comorbidities, higher transfusion rates, and longer length of stay, minority patients had a significantly lower incidence of POAF compared with White patients but no difference in preoperative LAVi. Larger LAVi may be predictive of POAF in White patients but not in minority patients.

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New-onset postoperative atrial fibrillation (POAF) is the most common complication after coronary artery bypass grafting (CABG) and is associated with an increased incidence of adverse outcomes, including mortality, stroke, prolonged hospital length of stay, and increased hospital costs.^{1,2} Prior

studies have demonstrated a lower prevalence of POAF after CABG in Black, Hispanic, Asian, and Native American patients vs White cohorts.^{3,4} Whereas the mechanisms underlying this racial and ethnic disparity are poorly understood, one hypothesis is that minority subgroups may have smaller preoperative left atrial

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sizes with less left atrial enlargement affecting POAF.⁵ We sought to assess the impact of left atrial volume index (LAVi) on the incidence of POAF in minority and White patients undergoing isolated first-time CABG.

PATIENTS AND METHODS

We performed a retrospective review of prospectively collected data from patients undergoing first-time isolated CABG at a single institution (Hartford Hospital, Hartford HealthCare Heart and Vascular Institute, Hartford, Connecticut) to evaluate the hypothesis that smaller preoperative left atrial volume contributes to lower rates of new-onset POAF in minority patients compared with White patients. Initial screening included all patients undergoing CABG from January 2017 through September 2022. Patients undergoing concomitant procedures or who had a history of atrial fibrillation or prior sternotomy were excluded, as were patients in whom preoperative left atrial volume measurements were unavailable. Perioperative data were obtained from an institutionally maintained database containing all elements submitted to The Society of Thoracic Surgeons national registry. The LAVi (ratio of

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- In a group of 1218 patients undergoing isolated coronary artery bypass grafting, including 215 minority patients and 1003 White patients, minority patients had less postoperative atrial fibrillation.
- There was no difference in preoperative mean left atrial volume index between White patients and minority patients.
- Larger left atrial volume index was predictive of postoperative atrial fibrillation in White patients but not in minority patients.

left atrial volume to body surface area) was obtained from preoperative echocardiograms. Statistical analyses were performed with SPSS 19 (IBM) and Excel (Microsoft). Categorical variables are reported as percentages. Continuous variables were assessed for normality and are reported as mean \pm SD if normally distributed or median (interquartile range) if nonnormally distributed. Association between outcomes of continuous variables was performed by analysis of variance and Kruskal-Wallis testing. The χ^2 test, independent *t*-test, and nonparametric tests were performed for univariable analyses when appropriate. A *P* value $<$.05 was considered statistically significant. This study was approved and individual patient consent waived by the institutional review board.

RESULTS

Between January 2017 and September 2022, 1837 patients with no history of atrial fibrillation underwent isolated, first-time CABG at Hartford Hospital. Left atrial volume assessments were available in 1218 patients. Of these, 1003 were White patients and 215 were minority patients (133 were Hispanic [61.9%], 51 were Black or African American [23.7%], 28 were Asian [13.0%], and 3 were Native American or Inuit [1.4%]). In comparing baseline characteristics between White and minority patients, minority patients were younger, smaller (significantly shorter and lighter with a trend toward lower body mass index), and more likely to be female. Minority patients had a higher prevalence of diabetes, previous stroke, and end-stage renal disease on dialysis and had trends toward increased rates of hypertension, chronic lung disease, and liver disease. Minority patients also had a lower mean left ventricular ejection fraction. There was no difference in preoperative or postoperative use of beta-blockers or incidence of preoperative cardiogenic shock requiring inotropes. Preoperative data comparisons are presented in [Table 1](#).

There was a significantly higher rate of intraoperative blood product use with minority patients and a trend toward an increased use of blood products

TABLE 1 Comparison of Comorbidities and Perioperative Outcomes Between White and Minority Patients

Variable	Minority Patients (n = 215)	White Patients (n = 1003)	P Value
Age, y	62.3 \pm 10.4	67.0 \pm 9.8	<.001
Female	62 (28.9)	208 (20.7)	.009
Body mass index, kg/m ²	28.9 \pm 5.7	29.7 \pm 5.7	.06
Diabetes	146 (67.9)	467 (46.6)	<.001
Hypertension	202 (94.0)	906 (90.3)	.09
Prior or current smoker	122 (56.7)	616 (61.4)	.19
Prior myocardial infarction	142 (66.0)	645 (64.3)	.81
Prior stroke	36 (16.7)	67 (6.7)	<.001
Peripheral vascular disease	33 (15.3)	131 (13.1)	.37
Dialysis	16 (7.4)	14 (1.4)	<.001
Chronic lung disease	56 (26.0)	204 (20.3)	.06
Liver disease	10 (4.7)	25 (2.5)	.09
Left ventricular ejection fraction, %	50.5 \pm 14.4	52.6 \pm 12.8	.048
Preoperative beta-blockers used	210 (97.7)	955 (95.2)	.11
Intraoperative blood products used	70 (32.6)	247 (24.6)	.02
Postoperative blood products used	70 (32.6)	268 (26.7)	.08
Death	3 (1.4)	7 (0.7)	.30
Stroke	3 (1.4)	18 (1.8)	.68
Renal failure requiring dialysis	7 (3.3)	12 (1.2)	.06
Reoperation for bleeding	5 (2.3)	23 (2.3)	.98
Permanent pacemaker/defibrillator	2 (0.9)	5 (0.5)	.45
Deep sternal wound infection	1 (0.5)	4 (0.4)	.89
Intensive care unit length of stay, h	47.3 (71.0)	42.0 (47.6)	.005
Postoperative length of stay, d	6 (3)	5 (3)	.003

Categorical variables are presented as number (percentage). Continuous variables are presented as mean \pm SD or median (interquartile range).

postoperatively. Whereas there was a trend toward increased rates of renal failure with minority patients compared to White patients, rates of death, stroke, reoperation for bleeding, need for permanent pacemaker or defibrillator implantation, and deep sternal wound infections were similar between the groups. Compared with White patients, minority patients had a longer median intensive care unit length of stay and postoperative hospital length of stay. Perioperative data comparisons are presented in [Table 1](#).

The incidence of new-onset POAF was significantly lower in minority patients compared with White patients (19.5% vs 29.1%; $P = .02$). Analysis of LAVi showed no difference between the groups. Breaking the patients down to those with POAF and those without, there were still no differences in LAVi between White patients and minority patients. However, in comparing LAVi within each group, we found that although there was no difference in LAVi between minority patients with or without POAF (30.7 ± 16.9 mL/m² vs 30.3 ± 11.7 mL/m²; $P = .84$), White patients who had POAF had a significantly larger LAVi than those who did not have POAF (31.1 ± 10.9 mL/m² vs 29.3 ± 9.7 mL/m²; $P = .007$; [Table 2](#); [Figure](#)).

COMMENT

Similar to previously published reports, we found a lower incidence of POAF in minority vs White patients undergoing isolated CABG. Notably, the incidence of POAF was lower in minority patients despite a higher burden of cardiovascular risk factors and comorbidities and greater intraoperative blood transfusion. However, despite a lower incidence of POAF, mean LAVi values for minority patients were not lower than those of their White counterparts. Moreover, higher LAVi values were predictive of POAF in White patients but not so for minority patients.

Race and ethnicity have previously been shown to be strong predictors of POAF after CABG. In a 2010 study by Nazeri and coworkers³ examining outcomes in 5823 isolated patients undergoing CABG, the incidence of POAF was 32.4% in Caucasians and 21.3% in non-Caucasians. Multivariable logistic regression revealed that Caucasian race was an independent predictor of POAF (odds ratio, 1.8; 95% CI, 1.5-2.0; $P < .001$); additional propensity score matching further confirmed this observation. Similarly, in a 2011 study by Rader and colleagues⁴ examining 20,282 White and 3242 Black, Hispanic, and Asian patients undergoing CABG with and without valve surgery, propensity score-adjusted analyses revealed a 35% vs 22% incidence of POAF. However, despite multiple reports citing a lower incidence of POAF in minority patients, there appears to be worse long-term CABG outcomes

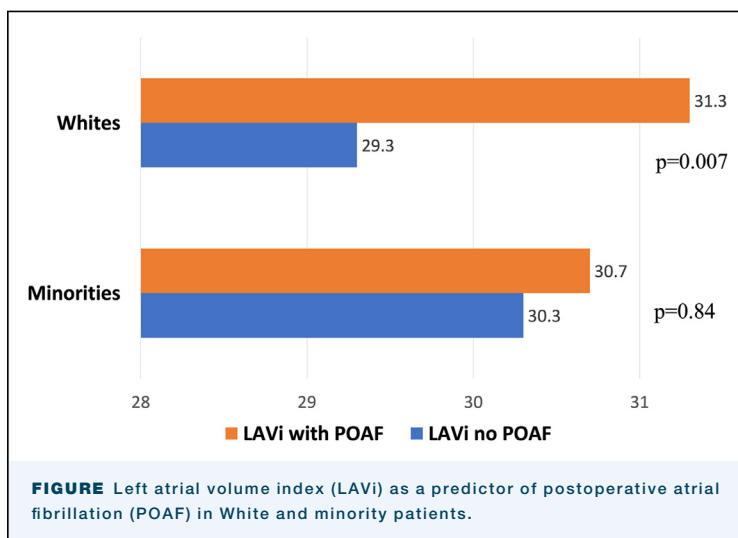
Variable	Minority Patients (n = 215)	White Patients (n = 1003)	P Value
POAF	42 (19.5)	292 (29.1)	.02
LAVi, mL/m ²	30.3 ± 12.6	29.9 ± 10.1	.63
LAVi with POAF, mL/m ²	30.7 ± 16.0	31.3 ± 10.9	.81
LAVi without POAF, mL/m ²	30.3 ± 11.7	29.3 ± 9.7	.34

Categorical variables are presented as number (percentage). Continuous variables are presented as mean ± SD.

in Black patients who have POAF compared with their White counterparts.⁶

Left atrial enlargement has been correlated with the occurrence of POAF after CABG. In a 2020 study by Karimi and associates,⁷ a multivariable logistic regression model identified age >75 years, hypertension, prior stroke, and left atrial enlargement as the strongest predictors of POAF in 3047 patients with isolated CABG. In this model, moderate to severe left atrial enlargement had an odds ratio of 2.2 (95% CI, 1.2-3.8; $P = .01$) as a predictor of POAF. Higher left atrial diameter, higher LAVi, and reduced longitudinal left atrial strain have been associated with POAF after cardiac surgery.^{8,9}

In light of prior reports citing both a lower risk of POAF in minority subgroups and a predictive impact of left atrial size on POAF, several investigators have hypothesized that minority patients undergoing CABG may have a lower POAF risk because of smaller preoperative left atrial volumes. Some support for this hypothesis is derived from a 2021 study by Badertscher and coworkers⁵ describing racial differences in left atrial size in



patients with hypertension. In a study group of 326 Caucasian and 129 Black hypertensive patients, left atrial size was significantly smaller in Black patients despite similar degrees of left ventricular hypertrophy and presence of heart failure with preserved ejection fraction. The authors suggested that racial disparities in left atrial remodeling might explain the decreased risk of atrial fibrillation in hypertensive Black patients. The results of our study were not in agreement with this hypothesis as we found that minority and White patients with differing rates of POAF had similar LAVi values before CABG. Moreover, whereas larger LAVi values were predictive of POAF in White patients, this relationship was not observed in the minority cohort.

LIMITATIONS. This study is inherently limited by its retrospective and single-center nature. Propensity score matching was not performed between minority and White cohorts, potentially leading to confounding variables. Minority patients had more cardiovascular risk factors and comorbidities (eg, diabetes, prior myocardial infarction, prior stroke,

dialysis, lower left ventricular fraction) and had higher rates of blood product transfusion as positive risk factors for POAF but were younger, were more likely to be female, and had lower body weights as negative POAF predictors. Moreover, the relatively small size of the minority cohort may have limited the ability to detect statistically significant differences in the data.

CONCLUSION. In this single-center retrospective study, despite having more comorbidities, higher transfusion rates, and longer length of stay, minority patients had a significantly lower incidence of POAF compared with White patients but no difference in preoperative LAVi. Higher LAVi values were predictive of POAF in White patients but not in minority patients.

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DISCLOSURES

The authors have no conflicts of interest to disclose.

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