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RAPID COMMUNICATION

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Impact of obesity on catheter ablation of ventricular tachycardia: In-hospital and 30-day outcomes

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Abstract

Background: Evidence on the impact of obesity on catheter ablation for ventricular tachycardia (VT) is scarce.

Method and Results: We queried the Nationwide Readmissions Database to determine the hospital outcomes and procedural complications of VT ablation among the obese and nonobese populations. Obesity was associated with a more prolonged length of stay ($p < .01$), higher cost of hospitalization ($p < .01$), and higher rates of pericardial effusion or hemopericardium ($p = .05$) and vascular complications ($p = .05$). There was no significant difference in early mortality, 30-day readmissions, and other procedural complications.

Conclusion: VT ablation could be performed relatively safely among patients with obesity.

KEYWORDS
catheter ablation, in-hospital outcomes, obesity, procedural complications, ventricular tachycardia

1 | BACKGROUND

Catheter ablation for ventricular tachycardia (VT) has been increasingly used in recent decades. While it is estimated that 42% of adults in the United States are obese,[1] the impact of obesity on VT ablation procedures remains unclear.[2]

2 | METHODS

Hence, we queried the all-payer, nationally representative Nationwide Readmissions Database (NRD) to analyze patients aged ≥18 years who underwent VT ablation between January 2017 and November 2020. Patients with BMI ≥30 kg/m^2 were identified

TABLE 1 Baseline patient and hospital characteristics for patients with and without obesity.

	Patients with obesity		Patients without obesity		
	n	%	*n*	%	*p*-value
No. of admissions	835	19.75	3393	80.25	
Baseline characteristics					
Age, mean ± SD, year	60.07 ± 11.98		63.50 ± 13.75		<.01
Female sex	188	22.51	646	19.04	.02
Alcohol abuse	27	3.23	94	2.77	.47
Anemia	33	3.95	80	2.36	.01
Chronic kidney disease	231	27.66	851	25.08	.13
Chronic liver disease	44	5.27	130	3.83	.06
Chronic pulmonary disease	193	23.11	655	19.30	.01
Coagulation disorder	70	8.38	223	6.57	.07
Coronary artery disease	523	62.63	2120	62.48	.94
Diabetes mellitus	349	41.80	923	27.20	<.01
Heart failure	656	78.56	2578	75.98	.12
Hyperlipidemia	535	64.07	1948	57.41	<.01
Hypertension	688	82.40	2416	71.21	<.01
Malignancy	16	1.92	75	2.21	.60
Nonischemic cardiomyopathy	166	19.88	564	16.62	.03
Obstructive sleep apnea	297	35.57	433	12.76	<.01
Peripheral arterial disease	450	53.89	1943	57.26	.08
Prior coronary artery bypass graft	138	16.53	736	21.69	<.01
Prior implantable cardioverter defibrillator placement	426	51.02	1810	53.35	.23
Prior myocardial infarction	269	32.22	1136	33.48	.49
Prior pacemaker placement	17	2.04	101	2.98	.14
Prior percutaneous coronary intervention	188	22.51	826	24.34	.27
Prior stroke/transient ischemic attack	55	6.59	277	8.16	.13
Pulmonary hypertension	68	8.14	180	5.31	<.01
Smoking	381	45.63	1555	45.83	.92
Substance use disorder	28	3.35	103	3.04	.64
Valvular heart disease	114	13.65	519	15.30	.23
Elixhauser comorbidity score					<.01
<4	70	8.38	934	27.53	
≥4	765	91.62	2459	72.47	
Charlson comorbidity index ()					.01
0	75	8.98	409	12.05	
1	98	11.74	458	13.50	
≥2	662	79.28	2526	74.45	
Hospital variables					
Hospital size					.89
Small	34	4.07	126	3.71	
Medium	146	17.49	593	17.48	
Large	655	78.44	2674	78.81	
Hospital teaching status					.29
Metropolitan non-teaching	66	7.90	250	7.37	
Metropolitan teaching	765	91.62	3108	91.60	

TABLE 1 (Continued)

	Patients with obesity		Patients without obesity		
	n	%	*n*	%	*p*-value
Non-metropolitan	4	0.48	35	1.03	
Cost of hospitalization, median (Q1–Q3), USD	$39982.85 ($28175.05–$60752.58)		$37014.68 ($26084.25–$56233.49)		<.01
Length of hospital stay after procedure, mean ± SD, day	6.96 ± 7.16		6.43 ± 8.07		<.01
Prolonged length of stay (>7 days)	314	37.60	1058	31.18	<.01
Disposition					.53
Home	745	89.22	3070	90.48	
Facility	60	7.19	211	6.22	
Against medical advice/unknown	30	3.59	112	3.30	

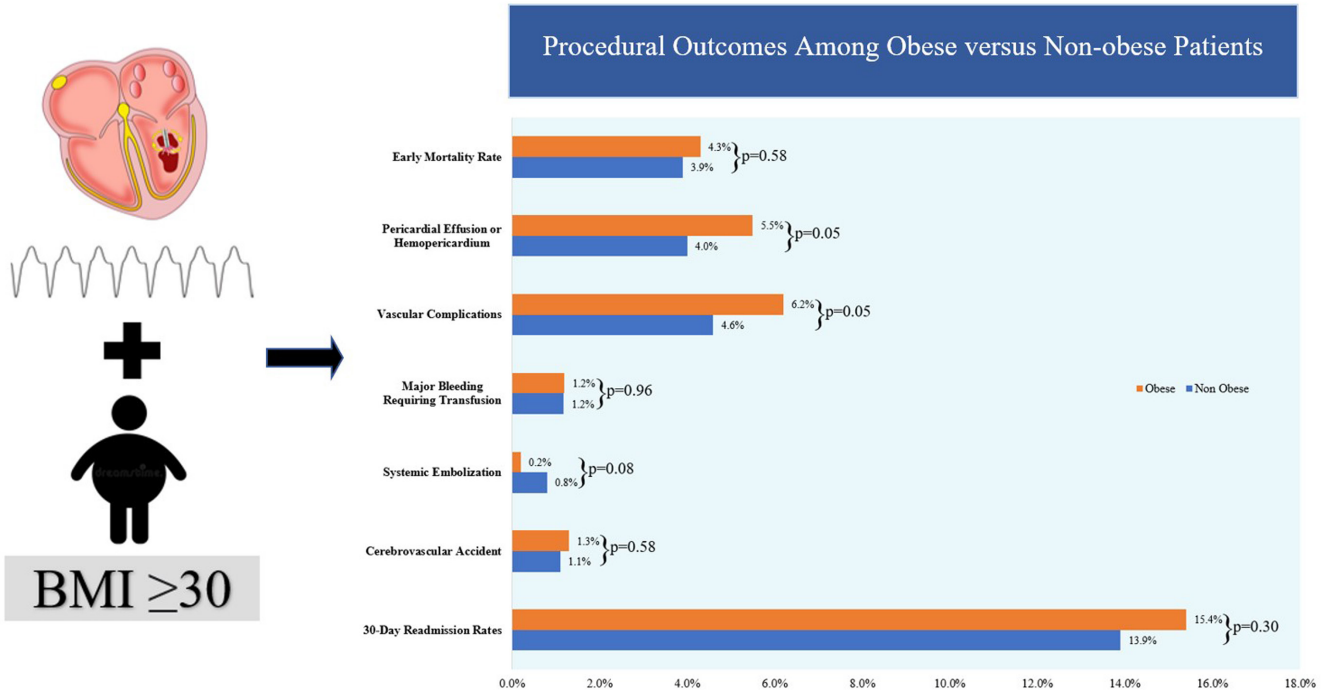

FIGURE 1 Procedural outcomes among obese and nonobese patients.

as obese. The main outcomes examined were (1) length of stay, (2) cost of hospitalization, (3) early mortality, (4) procedural complication, and (5) 30-day readmission rates between obese and nonobese groups. Additional focus analysis was performed to evaluate the temporal trend in early mortality post-VT ablation among obese patients. To identify the association of obesity with in-hospital outcomes, multivariable logistic regression was performed by including the covariates that had univariate significance ($p < .1$). Multivariable regression was also performed to identify independent predictors of 30-day hospital readmissions post-VT ablation among obese patients. NRD is publicly available and contains deidentified patient data, institutional review board approval was not required.

3 | RESULTS AND DISCUSSIONS

Our study included a total of 835 (19.7%) obese patients (60.1 ± 12.0 years of age, 22.5% females) and 3393 (80.3%) nonobese patients (63.5 ± 13.8 years of age, 19.0% females) who underwent catheter ablation for VT. Table 1 shows the patient baseline characteristics and hospital characteristics of both groups. The outcomes after the procedure among these two groups are depicted in Figure 1. Compared with nonobese patients, obese patients had a higher rate of prolonged length of stay (>7 days) (37.6% vs. 31.2%, $p < .01$) and a higher cost of hospitalization (median: $39 983 vs. $37 015, $p < .01$). Overall, there was no significant difference in early mortality (≤30 days postprocedure) (4.3% vs. 3.9%, $p = .58$),

and apart from increased pericardial effusion or hemopericardium (5.5% vs. 4.0%, $p=.05$) and increased vascular complications among obese patients (6.2% vs. 4.6%, $p=.05$), there were no significant differences in other procedural complications between the obese and nonobese groups, namely major bleeding requiring transfusion (1.20% vs. 1.18%, $p=.96$), systemic embolization (0.2% vs. 0.8%, $p=.08$), and cerebrovascular accident (1.3% vs. 1.1%, $p=.58$). There was also no significant difference in 30-day readmission rates between obese and nonobese groups (15.4% vs. 13.9%, $p=.30$).

We performed additional analyses in obese patients which revealed a nonsignificant decreasing trend in the rate of early mortality following the VT ablation procedure (5.4% to 4.8%, $p_{trend}=.66$) between 2017 and 2020. Risk factors in obese patients associated with early readmissions include congestive heart failure [adjusted odds ratio (OR): 3.01; 95% CI: 1.62–5.61; $p<.01$], prior implantable cardioverter defibrillator placement (adjusted OR: 2.02; 95% CI: 1.35–3.02; $p<.01$), prior coronary artery bypass graft (adjusted OR: 1.66; 95% CI: 1.05–2.65; $p=.03$), peripheral vascular disease (adjusted OR: 1.85; 95% CI: 1.24–2.77; $p<.01$), chronic kidney disease (adjusted OR: 1.75; 95% CI: 1.17–2.62; $p=.01$), and prolonged index hospitalization (adjusted OR: 1.60; 95% CI: 1.09–2.36; $p=.02$). On multivariable logistic regression analysis, the independent predictor of early readmission among the obese patients was congestive heart failure (adjusted OR: 2.00; 95% CI: 1.01–3.99; $p=.05$).

This study is the first, to our knowledge, to provide some insights into in-hospital procedural outcomes of catheter ablation for VT between obese and nonobese patients in real-world settings. Our study suggests that VT ablation in obese patients has no significant difference in 30-day mortality or 30-day readmissions, but they do have prolonged hospital stay (>7 days) and higher cost of hospitalization, which could be attributed to their higher comorbid burden leading to more in-hospital adverse events and requiring additional management. Catheter ablation of VT in obese patients was associated with increased vascular complications, likely due to more difficult vascular access and postprocedural hemostasis.[3] The higher rate of pericardial complication in obese patients could be attributed to poorer quality of fluoroscopic imaging and more difficulty in manipulating catheters through the femoral region with substantial adiposity.[4] The main limitation of this study is similar to most of the large administrative database studies, coding errors of primary diagnoses, and under-reporting of secondary diagnoses cannot be excluded. Furthermore, more granular details such as the disease classification and severity, duration of VT, antiarrhythmic medications, procedural details of the VT ablation, and details on the causes of deaths are not available in our database.

4 | CONCLUSIONS

In conclusion, our study suggests that catheter ablation for VT can be performed relatively safely in obese patients without significant differences in 30-day mortality and readmission outcomes. Patients should not be excluded from VT ablation on the basis of obesity.

CONFLICT OF INTEREST STATEMENT

Authors declare no conflict of interests for this article.

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