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RAPID COMMUNICATION

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In-hospital outcomes among amyloidosis patients with atrial fibrillation: A propensity score-matched analysis

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Abstract

Background: The impact of atrial fibrillation (AF) among patients with amyloidosis on in-hospital outcomes is not well-established. We aimed to examine in-hospital outcomes among patients admitted with a primary diagnosis of AF with and without amyloidosis.

Methods and Results: We queried the Nationwide Readmissions Database to compare the in-hospital outcomes among AF patients with and without amyloidosis. Our study demonstrated that in-hospital all-cause mortality, adverse events, and 30-day readmission were comparable between the two groups.

Conclusions: Patients with AF and concurrent amyloidosis did not have worse in-hospital outcomes than those with AF alone.

KEYWORDS
amyloidosis, atrial fibrillation, in-hospital outcomes, propensity score matching

1 | BACKGROUND

Primary- or light-chain amyloidosis (AL) is the most common type of amyloidosis that affects multi-organ system.[1] Both AL and transthyretin (ATTR) amyloidosis contribute to up to 95% of cardiac amyloidosis cases.[2] Infiltration of misfolded and insoluble extracellular protein fibrils in the heart may lead to restrictive cardiomyopathy and arrhythmias. These remain the leading causes of morbidity and mortality in patients with amyloidosis.[2–4] Nearly half of the patients with cardiac amyloidosis have concomitant atrial fibrillation (AF).[5] While amyloidosis is associated with an increased risk of AF, updated real-world data on in-hospital outcomes among patients with concomitant AF and amyloidosis are lacking. Thus, we conducted a nationwide retrospective study to evaluate in-hospital outcomes among patients with concomitant amyloidosis and AF in the United States.

2 | METHODS

We queried the Nationwide Readmissions Database (NRD). NRD is one of the nation's largest publicly available all-payer inpatient care

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databases, including approximately 17 million discharges yearly from 2017 to 2020. On the basis of the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) codes, the patient's diagnoses and procedures during each admission were recorded. Using ICD-10-CM, we searched for all the patients aged 18 years or older admitted for AF (ICD-10 I48) between the years 2017 and 2020. We stratified the cohort into two groups: AF patients with versus without amyloidosis (ICD-10 E85). The main outcomes examined were: (1) in-hospital adverse events, (2) length of stay, (3) discharge disposition, (4) 30-day readmission, and (5) early mortality (mortality during index hospitalization and readmission). The patients were followed through their index hospitalization, and the first readmission within 30 days after discharge was included. Statistical analyses were conducted using Stata version 12.1 (Stata Corporation, College Station, Texas). Propensity score matching (caliper of 0.2, 1:1 ratio) was performed. Further analyses were conducted using propensity score-matched study populations. NRD is publicly available and contains de-identified patient data; institutional review board approval was not required.

3 | RESULTS

Our study included 388 420 patients admitted for AF during the study period: 661 (0.2%, aged 78.1 ± 9.8, length of stay 4.1 ± 5.8 days) with amyloidosis and 387 759 (99.8%, aged 71.6 ± 12.4, length of stay 3.2 ± 3.7 days) without amyloidosis. Table 1 shows the baseline characteristics of both groups (crude analysis and propensity score matching analysis). The number of AF-related admissions among patients with amyloidosis (% = number of patients admitted with AF who have amyloidosis/number of patients admitted with AF [regardless of the status of amyloidosis]) had increased over the study period (Figure 1). After propensity score matching, AF patients with amyloidosis had comparable rates of early mortality (2.9% vs. 2.4%,

TABLE 1 Baseline characteristics of patients admitted for atrial fibrillation with and without amyloidosis (crude analysis and propensity score matching analysis).

	Crude analysis					Propensity score matching analysis				
	With amyloidosis		Without amyloidosis			With amyloidosis		Without amyloidosis		
	n	%	*n*	%	*p*-value	*n*	%	*n*	%	*p*-value
No. of admissions	661	0.17	387 759	99.83		661	50.00	661	50.0	
Age, mean (SD), year	75.07 (9.81)		71.62 (12.45)			75.07 (9.81)		75.68 (10.38)		
Female sex	261	39.49	200 516	51.71		261	39.49	325	49.20	
Baseline characteristics										
Anemia	26	3.93	16 200	4.18	.99	26	3.93	29	4.39	.98
Chronic kidney disease	248	37.52	76 225	19.66	<.01	248	37.52	202	30.56	.07
Chronic liver disease	32	4.84	12 617	3.25	.15	32	4.84	39	5.90	.87
Coagulation disorder	51	7.72	18 707	4.82	.01	51	7.72	64	9.68	.66
Congestive heart failure	180	27.23	55 582	14.33	<.01	180	27.23	129	19.52	.01
Coronary artery disease	210	31.77	128 078	33.03	.92	210	31.77	256	38.73	.07
Diabetes mellitus	173	26.17	110 905	28.60	.59	173	26.17	212	32.07	.13
Hyperlipidemia	382	57.79	213 183	54.98	.55	382	57.79	366	55.37	.85
Hypertension	533	80.64	314 688	81.16	.99	533	80.64	539	81.54	.98
Obstructive sleep apnea	119	18.00	70 546	18.19	1.00	119	18.00	98	14.83	.49
Peripheral arterial disease	79	11.95	39 990	10.31	.59	79	11.95	80	12.10	1.00
Prior coronary artery bypass graft	34	5.14	26 785	6.91	.36	34	5.14	47	7.11	.53
Prior implantable cardioverter defibrillator placement	26	3.93	11 669	3.01	.59	26	3.93	16	2.42	.48
Prior myocardial infarction	65	9.83	34 066	8.79	.82	65	9.83	62	9.38	.99
Prior pacemaker placement	45	6.81	26 308	6.78	1.00	45	6.81	46	6.96	1.00
Prior percutaneous coronary intervention	53	8.02	41 470	10.69	.18	53	8.02	72	10.89	.36
Prior stroke/transient ischemic attack	165	24.96	49 338	12.72	<.01	165	24.96	125	18.91	.07
Pulmonary hypertension	96	14.52	33 524	8.65	<.01	96	14.52	94	14.22	1.00
Valvular heart disease	178	26.93	82 901	21.38	.01	178	26.93	170	25.72	.97

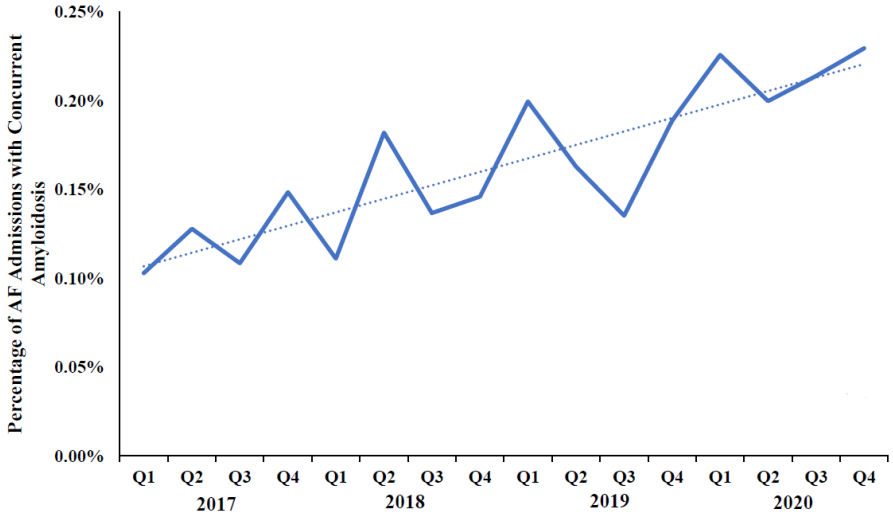

FIGURE 1 Percentage of atrial fibrillation admissions with amyloidosis from 2017 to 2020.

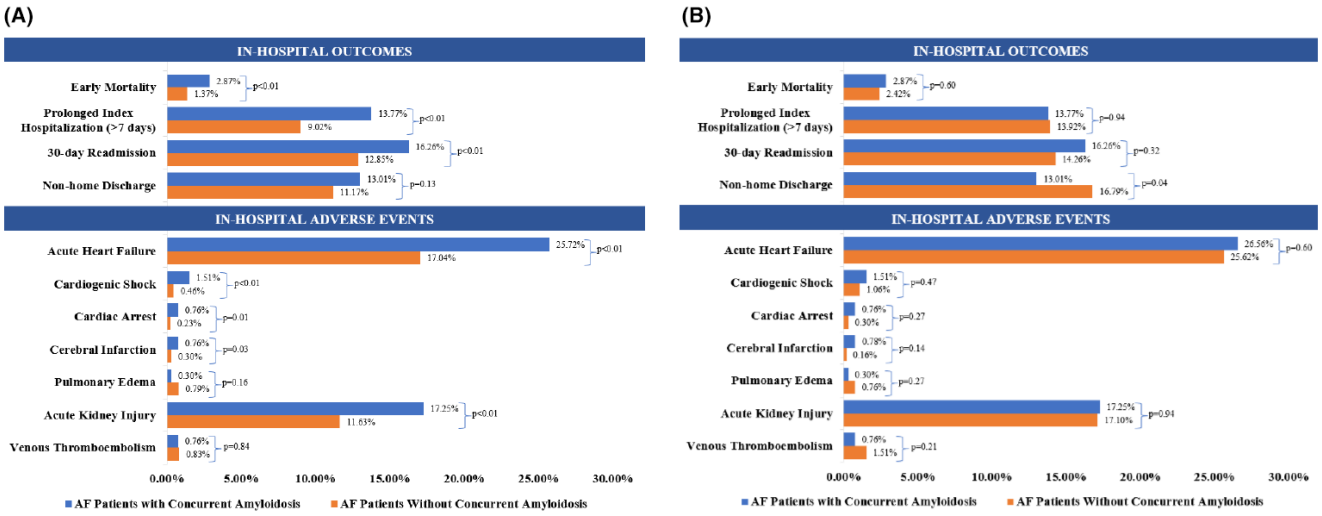

FIGURE 2 Comparison of in-hospital outcomes between atrial fibrillation admissions with and without amyloidosis. (A) Before propensity score matching. (B) After propensity score matching.

$p = .60$), prolonged index hospitalization (>7 days) (13.8% vs. 13.9%, $p = .94$), and 30-day readmissions (16.3% vs. 14.3%, $p = .32$) compared to those without amyloidosis. Of note, AF patients with amyloidosis had significantly lower rates of non-home discharge (13.0% vs. 16.8%, $p = .04$) (Figure 2).

In-hospital adverse event rates, namely acute heart failure (with amyloidosis 26.6% vs. without amyloidosis 25.6%, $p = .60$), cardiogenic shock (1.5% vs. 1.1%, $p = .47$), cardiac arrest (0.8% vs. 0.3%, $p = .27$), cerebral infarction (0.8% vs. 0.2%, $p = .14$), pulmonary edema (0.3% vs. 0.8%, $p = .27$), acute kidney injury (17.3% vs. 17.1%, $p = .94$), and venous thromboembolism (0.8% vs. 1.5%, $p = .21$), were not significantly different between the two groups (Figure 2).

4 | CONCLUSIONS

With the advancements in AF management and increased amyloidosis recognition, this study provides contemporary insight into the impact of amyloidosis on hospital outcomes among patients with AF-related admissions in the real-world setting. The deposition of misfolded protein in the atrium may act as a substrate for atrial arrhythmias. Hence, patients with amyloidosis might have a higher risk of developing AF.[5] Patients with cardiac amyloidosis have restrictive cardiac physiology. Hence, they tend to have higher heart rates at baseline in sinus rhythms to maintain cardiac output. This poses an additional challenge in rate control for AF management, with experts suggesting potential benefits from early rhythm control.[2] Thus, early rhythm control, either with ablation or with antiarrhythmic medication, is crucial in patients with cardiac amyloidosis to avoid any potential acute decompensated heart failure. Nevertheless, our study suggested that AF patients with amyloidosis did not have worse in-hospital outcomes than patients without amyloidosis. Firstly, since amyloidosis is a progressive disease, its chronic effects may not immediately impact the acute in-hospital outcomes and adverse events observed in our study. Secondly, the increased recognition of amyloidosis may have elevated clinician awareness, leading to earlier multidisciplinary involvement and

greater confidence in managing these patients. This might also explain the increasing trend of admission for AF with amyloidosis, as observed in our study. Besides, our study showed that patients with AF and concurrent amyloidosis had higher rates of being discharged home compared to those without amyloidosis. In the absence of individual-level data, such as the frailty index, it is difficult to establish an explanation for this observation. Our study has a few limitations. Firstly, as with other database studies, the results depend on coding accuracy. Secondly, the temporal relationship between amyloidosis and in-hospital adverse events could not be ascertained. Thirdly, clinical information, including the type of amyloidosis and affected organs, duration of AF, and antiarrhythmic medications, was unavailable. Despite these limitations, our results emphasize the need to continue optimizing AF management in all patients, regardless of the presence of amyloidosis, to improve clinical outcomes.

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CONFLICT OF INTEREST STATEMENT

Authors declare no conflict of interests for this article.

ETHICS APPROVAL STATEMENT

N/A.

PATIENT CONSENT STATEMENT

N/A.

CLINICAL TRIAL REGISTRATION

N/A.

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