IMPACT OF ATRIAL FIBRILLATION ON MORTALITY AND IN-HOSPITAL OUTCOMES IN ACUTE PANCREATITIS

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ABSTRACT

INTRODUCTION
Acute pancreatitis (AP) is a leading cause of gastrointestinal hospitalization. The impact of concurrent atrial fibrillation (AF) on AP outcomes is understudied. We assessed AF prevalence in AP admissions and its association with mortality and resource use.

METHODS
We queried the National Inpatient Sample (2018–2022) to identify AP hospitalizations with and without AF and compared patient populations and outcomes.

RESULTS
AF occurred in 7.8% of AP cases (n=168,515). AF patients were older (70.4 vs. 50.7 years), had higher comorbidity burdens (Charlson index 2.02 vs. 1.23), and were more often male (58.3% vs. 52.4%) and white (77.4% vs. 61.3%) (all p<0.001). AF was linked to longer stays (7.72 vs. 5.47 days), higher charges ($102,751 vs. $69,171), and higher mortality (6.66% vs. 2.03%; adjusted OR 1.68, 95% CI 1.59–1.78; p<0.001).

DISCUSSION
AF affects 1 in 12 AP hospitalizations, increasing mortality risk by 68%, lengthening hospital stays, and increasing costs. Future studies should explore early rhythm control, anticoagulation and new hydration strategies to improve outcomes.

INTRODUCTION

Atrial fibrillation (AF), the most prevalent sustained cardiac arrhythmia affecting an estimated 10.55 million adults in the United States, is strongly associated with systemic inflammation, atrial remodeling, and a prothrombotic state. Its incidence has risen by 31% from 1997 to 2017, with projections indicating a potential increase of over 60% by 2050. Acute pancreatitis (AP), characterized by local and systemic inflammatory responses, is increasingly recognized for its interactions with cardiovascular diseases, including arrhythmias and thrombotic complications. Epidemiological evidence suggests a significant association between AF and an increased risk of AP, independent of traditional etiologies such as alcohol use or biliary disease. Shared pathophysiological mechanisms, including inflammatory pathways, endothelial dysfunction, and coagulation activation, likely underpin this relationship. Furthermore, AP can precipitate cardiac complications, such as arrhythmias and intracardiac thrombus formation, particularly in patients with pre-existing AF or structural heart disease, potentially exacerbating adverse outcomes. The Framingham Heart Study highlights the elevated mortality risk associated with AF, with odds ratios of 1.5 for men and 1.9 for women, often occurring shortly after diagnosis. Despite these insights, the precise impact of AF on the incidence, severity, and prognosis of AP remains poorly understood due to limited prospective data. This study aims to elucidate the interplay between AF and AP, focusing on their shared mechanisms, clinical outcomes, and implications for risk stratification and management. By integrating epidemiological, clinical, and mechanistic perspectives, this research seeks to enhance understanding of the complex interactions between cardiac arrhythmias and pancreatic inflammation.

METHODOLOGY

We conducted a retrospective, cross-sectional analysis of the National Inpatient Sample (NIS, 2018–2022), identifying 2,167,954 hospitalizations with acute pancreatitis (AP). Cases were stratified by atrial fibrillation (AF) presence or absence. Continuous variables (e.g., age, LOS) were compared using design-based t-tests, and categorical variables (e.g., sex, race) using χ^2 tests. Survey-weighted logistic regression estimated crude and adjusted odds ratios for in-hospital mortality, adjusting for patient demographics (age, sex, race/ethnicity), income quartile, Charlson Comorbidity Index, and hospital characteristics (region, bed size). Secondary outcomes included LOS, total charges, and complications. The study used de-identified data, exempt from IRB approval, and adhered to HCUP data use agreements.

RESULTS

Table 1: Characteristics of Patients with Acute Pancreatitis by Atrial Fibrillation Status

Characteristic	No AF (%)	AF (%)	Total (%)	P-value
N (% of Total)	92.2	7.8	100.0	
Total Patients	1 999 439	168 515	2 167 954	
Age (years, mean ± SD)	50.79(1748)	70.43(1358)	52.30(1800)	<0.001
Length of Stay (days, mean ± SD)	5.46(816)	7.72(932)	5.64(828)	<0.001
Total Charges (USD, mean)	69 170.79	102 751.30		<0.001
Sex				<0.001
Male	52.38	58.32	52.84	
Female	47.62	41.68	47.16	
Race/Ethnicity				<0.001
White	59.83	75.64	62.58	
Black	16.04	9.94	15.96	
Hispanic	15.07	7.18	14.82	
Asian	2.51	2.47	2.57	
Native American	1.05	0.44	1.02	
Other	3.05	2.04	3.05	
Charlson Comorbidity Index				<0.001
0	35.39	14.09	33.73	
1	29.40	19.69	28.64	
2	14.59	18.55	14.90	
≥3	20.63	47.68	22.73	
Median Household Income (ZIP Code)				<0.001
Quartile 1	31.93	28.40	31.66	
Quartile 2	26.57	27.16	26.61	
Quartile 3	23.67	24.59	23.74	
Quartile 4	17.83	19.85	17.99	
Hospital Region				<0.001
Northeast	15.96	16.89	16.03	
Midwest	21.64	24.03	21.82	
South	40.41	38.77	40.28	
West	22.00	20.31	21.87	
Hospital Bed Size				<0.001
Small	25.08	23.13	24.93	
Medium	29.39	29.49	29.40	
Large	45.53	47.38	45.67	

Table 2: Comorbidities of Patients with Acute Pancreatitis by Atrial Fibrillation Status

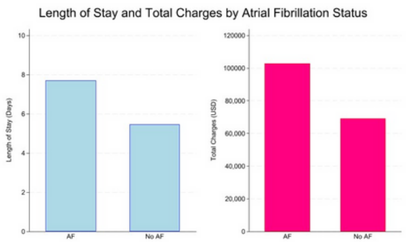
Comorbidity	No AF (%)	AF (%)	P-value
Hypertension	42.10	37.42	<0.001
Obstructive Sleep Apnea	4.69	11.62	<0.001
Diabetes Mellitus Type 2	28.20	37.62	<0.001
Coronary Artery Disease	9.75	33.53	<0.001
History of CABG	4.38	13.80	<0.001
Hyperlipidemia	31.79	51.14	<0.001
Peripheral Artery Disease	1.07	3.13	<0.001
COPD	9.19	20.20	<0.001
Thyroid Disorders	9.14	17.29	<0.001
Cancer	3.35	6.15	<0.001
HIV	0.39	0.23	0.001
Cirrhosis	2.25	3.65	<0.001
CKD Stage 3	7.48	21.17	<0.001
ESRD	2.30	5.23	<0.001
Heart Failure (HFrEF)	1.71	10.22	<0.001
Heart Failure (HFpEF)	2.26	14.69	<0.001
Obesity (Class 1)	5.65	5.58	0.614
Obesity (Class 2)	4.48	4.63	0.259
Obesity (Class 3)	5.98	7.13	<0.001
Systemic Lupus Erythematosus	0.68	0.55	0.013
Rheumatoid Arthritis	2.50	3.67	<0.001
Malnutrition	6.13	8.80	<0.001
Smoking	44.22	37.59	<0.001
Alcohol Use	29.80	15.71	<0.001
Marijuana Use	4.40	1.46	<0.001
Cocaine Use	1.45	0.66	<0.001

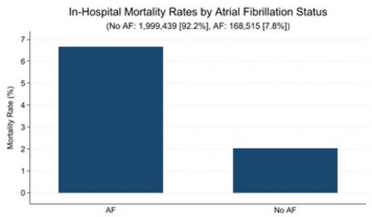
Table 3: In-Hospital Complications of Patients with Acute Pancreatitis by Atrial Fibrillation Status

Outcome	No AF (%)	AF (%)	P-value
In-Hospital Mortality	1.96	6.47	<0.001
STEMI	0.04	0.11	<0.001
Type 2 MI	0.48	1.72	<0.001
Pericarditis	0.07	0.21	<0.001
Cardiogenic Shock	0.58	2.13	<0.001
Stroke	0.46	1.20	<0.001
Pulmonary Embolism	0.68	1.18	<0.001
IVC Thrombosis	0.05	0.03	0.064
Shock	4.03	11.04	<0.001
Mechanical Ventilation	3.78	8.79	<0.001
Vasopressors	1.01	2.87	<0.001

Table 4: Length of Stay and Total Charges for Patients with Acute Pancreatitis by Atrial Fibrillation Status

Characteristic	No AF	AF	P-value
Length of Stay (days, mean)	5.46	7.72	<0.001
Total Charges (USD, mean)	69 170.79	102 751.30	<0.001





CONCLUSION

This study confirms a significant association between AF and AP, mediated by shared inflammatory and prothrombotic pathways. Patients with AF exhibited a higher incidence of AP, independent of traditional risk factors such as alcohol use or biliary disease, despite having lower rates of smoking (37.59% vs. 44.22%) and alcohol use (15.71% vs. 29.80%), which are typically linked to pancreatitis risk. Compared to patients without AF, those with AF experienced significantly higher rates of in-hospital complications, including increased mortality (6.47% vs. 1.96%), cardiogenic shock, stroke, pulmonary embolism, shock, mechanical ventilation, and vasopressor use. Notably, patients with AF had higher rates of heart failure (HFrEF: 10.22% vs. 1.71%; HFpEF: 14.69% vs. 2.26%), complicating fluid resuscitation efforts in AP management. Additionally, patients with AF had longer hospital stays (7.72 vs. 5.46 days) and higher total charges ($102,751.30 vs. $69,170.79), reflecting an increased clinical and economic burden. The demographic profile revealed that patients with AF were older (mean age 70.43 vs. 50.79 years) and had a higher prevalence of comorbidities such as coronary artery disease and chronic kidney disease, further exacerbating adverse outcomes. The pathophysiology underlying these associations is multifactorial, involving hemodynamic instability, increased risk of thromboembolic events, and impaired end-organ perfusion during critical illness. Management of AF in this setting requires a multidisciplinary approach, including prompt identification and treatment of triggers, individualized rate or rhythm control, and careful consideration of anticoagulation based on bleeding risk and comorbidities. In summary, the presence of AF in patients with AP is a marker of increased clinical severity and is independently associated with higher mortality, longer hospitalization, and greater cost. These findings underscore the importance of early recognition and aggressive management of AF in this population to mitigate adverse outcomes. Future prospective studies are warranted to further elucidate the mechanistic links between AF and AP and to develop targeted interventions to reduce complications and resource utilization in this vulnerable population.

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