Impact of Atrial Fibrillation on Outcomes in Patients Hospitalized for Acute Cholangitis: A Propensity-Score Matched Analysis

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Introduction & Aim

- Atrial fibrillation (AF) is the most common cardiac arrhythmia worldwide with an estimated 33.5 million individuals with AF globally
- AF is known to be associated with gastrointestinal and liver diseases
- Prior studies have also shown an association between cholestasis and cardiac abnormalities possibly due to the presence of receptors mediating bile acid signaling in cardiovascular tissue
- Aim: To use a population based approach to analyze the impact of AF on in-hospital outcomes and complication rates for patients admitted with acute cholangitis. (AC)

Methods

Data & Cohort
- 2001 – 2014 National Inpatient Sample (NIS)
- Adult inpatients with primary-tertiary AC diagnosis with and without AF (ICD-9 codes)

Baseline Characteristics Observed
- Patient Demographics: Age, Race, Sex, Income, Payer
- Hospital Characteristics: Teaching Status, Size, Region,
- Clinical Features: Charlson Comorbidities, Admission Status, Admission Year
- Assessed with Rao-Scott Chi-Squared and Mann-Whitney tests

Propensity Score Matching
- Cases of AF propensity score matched to non-AF cases
- 1:2 case to control matching ratio, caliper = 0.2
- Nearest neighbor greedy match algorithm
- Matching Covariates: baseline characteristics
- Match Criteria: Standardized Mean Differences (SMD), <0.1
- Doubly robust outcomes regressions

Outcomes Assessment
- Primary Outcomes: Length of stay (LOS), Total In-hospital charges, routine vs non-routine disposition, mortality
- Secondary Outcomes: in-hospital complications and procedures performed
- Assessed with adjusted multivariable Poisson, gamma, and logistic regression

Results

Table 1: Baseline Characteristics Of the Study Cohort Pre and Post Propensity Score Matching

		Raw Cohort				Propensity Matched Cohort		
Variable		No AF N = 403,502	AF N = 44,702	Pvalue	SMD	No AF N = 64,068	AF N = 31,951	SMD
Age[1]		65 (51 - 77)	80 (73 - 86)	<0.001 *	0.86	79 (72 - 86)	79 (72 - 85)	0.00
Sex	Male	50.1%	54.7%	<0.001 *	0.09	54.7%	54.1%	-0.01
	Female	49.9%	45.3%		-0.09	45.3%	45.9%	0.01
Race	White	58.5%	72.3%	<0.001 *	0.34	85.5%	85.4%	0.00
	Hispanic	9.3%	4.4%		-0.20	5.9%	5.7%	0.00
	Asia/Pac Is	4.2%	2.8%		-0.08	3.3%	3.5%	0.01
	Black	7.2%	2.5%		-0.21	3.3%	3.3%	0.00
Charlson Index[1]		1 (0 - 3)	2 (1 - 3)	<0.001 *	0.10	1 (0 - 3)	2 (1 - 3)	0.02
CHA_2DS_2-VASc[1]		3 (2 - 4)	4 (3 - 5)	<0.001*	0.86	4 (3 - 5)	4 (3 - 5)	0.04
Teaching Status	Teaching	55.0%	50.4%	<0.001 *	-0.09	50.2%	50.4%	0.00
	Nonteaching	34.3%	38.4%		0.08	39.7%	39.8%	0.00
	Rural	10.4%	11.0%		0.02	10.1%	9.8%	-0.01
Hospital Region	South	33.1%	29.5%	<0.001 *	-0.07	31.4%	31.2%	0.00
	Northeast	23.3%	27.5%		0.10	31.1%	31.7%	0.01
	Midwest	22.7%	22.9%		0.02	17.5%	17.2%	-0.01
	West	20.9%	20.1%		-0.04	20.0%	19.9%	0.00
Primary Payer	Medicare	50.6%	85.0%	<0.001 *	0.69	84.7%	84.0%	-0.01
	Private Insurance	33.1%	10.8%		-0.48	11.0%	11.6%	0.01
	Medicaid	8.8%	2.3%		-0.24	2.3%	2.5%	0.00
	Self-Pay	4.1%	0.8%		-0.18	1.0%	0.9%	0.00

*1. Median (Interquartile Range) | SMD = Standardized Mean Difference | *Pvalue < 0.05*

Table 2: Primary Outcomes and Complication Rates - Estimates and Adjusted Regression Coefficients

Variable	Outcome	No AF	AF	Coefficient[1,2]	95% Conf Interval	Pvalue
Primary Outcomes	Total Charges	$32,300 ($18,356 - $55,737)	$40,875 ($22,809 - $71,208)	1.25	(1.2 - 1.29)	<0.001 *
	Routine Disposition	57.6%	47.6%	0.64	(0.6 - 0.69)	<0.001 *
	Length Of Stay	5 (3 - 8)	6 (4 - 9)	1.21	(1.18 - 1.25)	<0.001 *
	Mortality	2.7%	4.4%	1.66	(1.4 - 1.97)	<0.001 *
Complications	Acute Kidney Injury	10.5%	12.6%	1.24	(1.13 - 1.36)	<0.001 *
	Acute Posthemorr Anemia	1.8%	2.6%	1.38	(1.12 - 1.7)	0.002 *
	Blood Transfusion	9.1%	16.9%	2.02	(1.84 - 2.22)	<0.001 *
	Enteral/Parenteral Nutrition	2.3%	3.3%	1.46	(1.21 - 1.75)	<0.001 *
	GI Hemorrhage	2.2%	3.0%	1.38	(1.15 - 1.66)	0.001 *
	Intestinal Infection	1.5%	2.2%	1.48	(1.18 - 1.86)	0.001 *
	Mechanical Ventillation	2.9%	5.6%	1.91	(1.64 - 2.22)	<0.001 *
	Pneumonia	4.0%	5.3%	1.34	(1.16 - 1.55)	<0.001 *
	Septicemia	33.0%	38.9%	1.29	(1.21 - 1.38)	<0.001 *
	Thromboembolism	5.4%	6.4%	1.05	(0.9 - 1.23)	0.53

1. Coefficient derived from logistic (odds ratio), Poisson (incident rate ratio), and gamma log-link GLM regresisons | 2. No AF ref group
** Pvalue < 0.05*

Results

- 448,204 admissions for AC - 44,702 had concomitant AF
- AC cases were older (80 vs 65, P<0.001), more frequently male (55% vs 50%, P<0.001), and more likely to be white (72% vs 59%, P<0.001)
- After matching, AC with AF was associated with higher costs (25%, P<0.001), higher inpatient mortality rates (aOR: 1.66, P<0.001), higher LOS (aIRR: 1.21, P<0.001), and lower rates of routine disposition to home (aOR: 0.64, P<0.001)
- AC with AF cases were associated with higher complication rates of gastrointestinal hemorrhage (aOR: 1.38, P=0.001), blood transfusion (aOR: 2.02, P<0.001), intestinal infection (aOR: 1.48, P=0.001), septicemia (1.29, P<0.001), acute kidney injury (aOR: 1.24, P<0.001), enteral and parenteral nutrition (aOR: 1.46, P<0.001), pneumonia (aOR: 1.34, P=0.001), and mechanical ventilation (aOR: 1.91, P<0.001)
- There was no difference in incidence rates of thromboembolism

Conclusions

- Cases with concomitant AC and AF have higher mortality rates, LOS, total charges, and adverse complication rates than AC without AF
- This indicates that AF is a poor prognostic factor in AC and clinicians should exercise heightened vigilance when treating patients with concomitant disease
- Further studies should examine the mechanism of complications and whether rate and rhythm control affect complication rates

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