



Association of Cardiac Arrhythmia in Patient with Inflammatory Bowel Disease and Rates of Severe Gastrointestinal Complication

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Introduction

Inflammatory bowel disease (IBD), including Crohn's disease (CD) and ulcerative colitis (UC), affects millions of Americans annually. Severe complications of IBD include bowel ulceration, fistula, obstruction, peritoneal abscesses and perforation. These complications can be triggered by infection, inflammation, and/or medication use. Cardiac arrhythmias (CA), including atrial fibrillation, atrial flutter, and long qt syndrome, have long been associated with gastrointestinal bleeds (GIB). However, the role of these arrhythmias in IBD is still unclear.

Methods

The National Inpatient Sample 2001-2013 was queried for patients with CD or UC using International Classification of Diseases, Ninth Revision codes. All CA and IBD complications were identified with their respective codes. A binary logistic regression analysis was used to examine the odds ratios of different CA with each complication of IBD, with a significance level of $p < 0.001$.

Results

246,472 patients were identified with IBD. After incorporating demographic variables, patients with atrial fibrillation and atrial flutter were less likely to have bowel obstructions. Patients with long qt, atrial fibrillation, and atrial flutter were more likely to have intestinal perforations. Patients with atrial fibrillation and atrial flutter were also more likely to have peritoneal abscesses. Patients with colonic ulcers and fistulas were not found to have a significant association with CA.

Table 1. Predictors of Bowel Obstruction from cardiac arrhythmias in our study population

Variable	P-Value	Odds Ratio (95% CI)
Age		
19 to 29	Reference	
30 to 50	.000*	1.25 (1.23-1.28)
51 to 60	.000*	1.41 (1.38-1.44)
61 to 79	.000*	1.28 (1.25-1.31)
≥ 80	.000*	0.77 (0.74-0.80)
Race		
Caucasian	Reference	
African American	.000*	0.75 (0.73-0.77)
Hispanic	.000*	0.58 (0.57-0.60)
Asian, Pacific	.000*	0.71 (0.69-0.74)
Islander, Native American		
Gender		
Males	Reference	
Females	.000*	0.81 (0.80-0.82)
Insurance Status		
Private Insurance	Reference	
Medicaid	.000*	0.79 (0.77-0.81)
Medicare	.000*	0.83 (0.82-0.85)
No insurance	.000*	0.71 (0.70-0.73)
Other insurance	.000*	0.71 (0.69-0.74)
status		
Arrhythmia		
No Long QT	Reference	
Long QT	.997	0.00
No Atrial Fibrillation	Reference	
Atrial Fibrillation	.000*	0.76 (0.73-0.79)
No Atrial Flutter	Reference	
Atrial Flutter	.002	0.78 (0.67-0.91)
No Cardiac Arrest	Reference	
Cardiac Arrest	.716	1.04 (0.83-1.31)

*significance level $p < 0.001$

Table 2. Predictors of Intestinal Perforation from cardiac arrhythmias in our study population

Variable	P-Value	Odds Ratio (95% CI)
Age		
19 to 29	Reference	
30 to 50	.000*	0.77 (0.74-0.81)
51 to 60	.000*	0.76 (0.71-0.81)
61 to 79	.065	0.93 (0.87-1.00)
≥ 80	.124	0.91 (0.81-1.03)
Race		
Caucasian	Reference	
African American	.000*	0.83 (0.77-0.88)
Hispanic	.000*	0.65 (0.60-0.72)
Asian, Pacific	.885	0.99 (0.90-1.09)
Islander, Native American		
Gender		
Males	Reference	
Females	.000*	0.66 (0.64-0.69)
Insurance Status		
Private Insurance	Reference	
Medicaid	.000*	0.85 (0.79-0.90)
Medicare	.000*	0.72 (0.68-0.77)
No insurance	.000*	0.77 (0.71-0.83)
Other insurance	.950	1.00 (0.91-1.11)
status		
Arrhythmia		
No Long QT	Reference	
Long QT	.000*	8.04 (3.13-20.67)
No Atrial Fibrillation	Reference	
Atrial Fibrillation	.000*	1.42 (1.28-1.58)
No Atrial Flutter	Reference	
Atrial Flutter	.000*	3.21 (2.56-4.03)
No Cardiac Arrest	Reference	
Cardiac Arrest	.000*	6.22 (4.63-8.36)

*significance level $p < 0.001$

Table 3. Predictors of Intestinal Fistula from cardiac arrhythmias in our study population

Variable	P-Value	Odds Ratio (95% CI)
Age		
19 to 29	Reference	
30 to 50	.000*	0.87 (0.84-0.89)
51 to 60	.000*	0.72 (0.69-0.75)
61 to 79	.000*	0.41 (0.39-0.44)
≥ 80	.000*	0.17 (0.15-0.19)
Race		
Caucasian	Reference	
African American	.718	1.01 (0.97-1.05)
Hispanic	.000*	0.53 (0.50-0.57)
Asian, Pacific	.000*	0.87 (0.82-0.93)
Islander, Native American		
Gender		
Males	Reference	
Females	.000*	0.74 (0.72-0.76)
Insurance Status		
Private Insurance	Reference	
Medicaid	.001	0.94 (0.90-0.98)
Medicare	.000*	0.87 (0.84-0.91)
No insurance	.000*	0.66 (0.63-0.70)
Other insurance	.000*	0.82 (0.77-0.88)
status		
Arrhythmia		
No Long QT	Reference	
Long QT	.997	0.00
No Atrial Fibrillation	Reference	
Atrial Fibrillation	.500	1.04 (0.94-1.14)
No Atrial Flutter	Reference	
Atrial Flutter	.002	1.54 (1.17-2.03)
No Cardiac Arrest	Reference	
Cardiac Arrest	.043	1.54 (1.01-2.33)

*significance level $p < 0.001$

Table 4. Predictors of Gastric Ulcer from cardiac arrhythmias in our study population

Variable	P-Value	Odds Ratio (95% CI)
Age		
19 to 29	Reference	
30 to 50	.275	0.97 (0.93-1.02)
51 to 60	.000*	1.15 (1.08-1.22)
61 to 79	.000*	1.30 (1.21-1.39)
≥ 80	.000*	1.26 (1.13-1.40)
Race		
Caucasian	Reference	
African American	.000*	1.14 (1.08-1.21)
Hispanic	.789	0.99 (0.92-1.07)
Asian, Pacific	.000*	1.20 (1.10-1.31)
Islander, Native American		
Gender		
Males	Reference	
Females	.004	1.06 (1.02-1.10)
Insurance Status		
Private Insurance	Reference	
Medicaid	.014	1.08 (1.02-1.15)
Medicare	.011	0.93 (0.88-0.98)
No insurance	.166	1.05 (0.98-1.13)
Other insurance	.251	1.06 (0.96-1.17)
status		
Arrhythmia		
No Long QT	Reference	
Long QT	.997	0.00
No Atrial Fibrillation	Reference	
Atrial Fibrillation	.812	0.99 (0.88-1.10)
No Atrial Flutter	Reference	
Atrial Flutter	.247	0.77 (0.50-1.12)
No Cardiac Arrest	Reference	
Cardiac Arrest	.973	0.99 (0.52-1.89)

*significance level $p < 0.001$

Discussion

In patients with IBD and CA, there is an increased risk for severe GI morbidity. Specifically, CA was associated with an increased risk of perforation and peritoneal abscess. This may be associated with transient hypoperfusion in CA patients leading to aberrant wound healing. Likewise, IBD may lead to electrolyte imbalances causing destabilization of the cardiac membrane attenuating CA. Further investigation is needed to better understand the causality of this relationship.



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