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Original Article

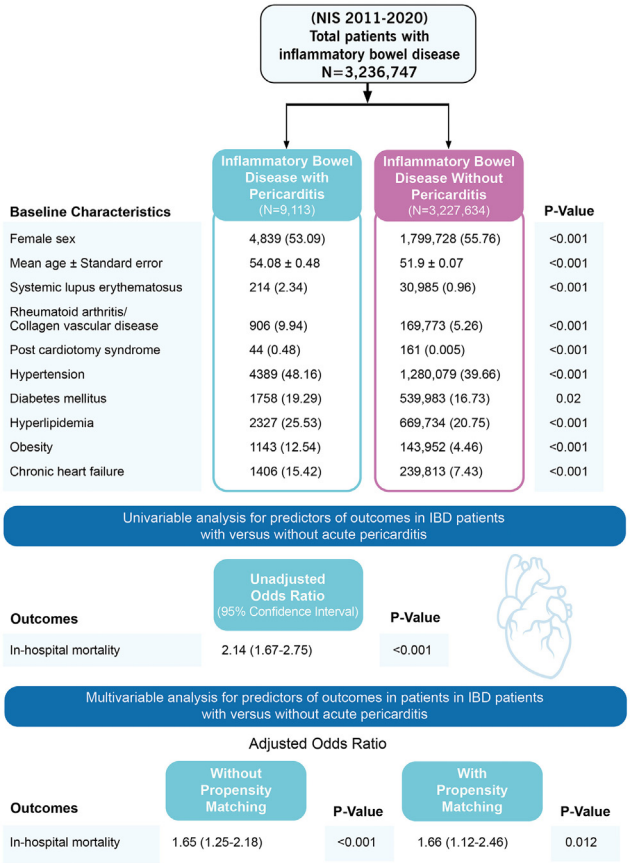
Incidence, Predictors, and Outcomes of Acute Pericarditis in Patients with Inflammatory Bowel Disease: A 10-Year Nationwide Analysis

Ankit Agrawal, MD,[a] Aqieda Bayat, MD,[a] Umesh Bhagat, MD,[a] Heba Wassif, MD,[a] Allan Klein, MD,[a] Michael Garshick, MD,[b,‡] and Brittany Weber, MD, PhD[c,‡]

[a] *Center for the Diagnosis and Treatment of Pericardial Diseases, Department of Cardiovascular Medicine, Heart, Vascular, and Thoracic Institute, Cleveland Clinic, Cleveland, Ohio, USA*

[b] *Center for the Prevention of Cardiovascular Disease and Leon H. Charney Division of Cardiology, Department of Medicine, New York University School of Medicine, New York, New York, USA*

[c] *Division of Cardiovascular Imaging, Department of Cardiovascular Medicine, Heart and Vascular Center, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts, USA*



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ABSTRACT

Background: Inflammatory bowel disease (IBD) is a chronic condition characterized primarily by inflammation of the gastrointestinal tract. Pericarditis is a rare but important extraintestinal manifestation of IBD that is poorly understood yet is associated with significant morbidity. The objectives of this study were to identify the factors associated with pericarditis in IBD and associated complications.

Methods: Hospitalized adult patients (aged $\geq$ 18 years) with a diagnosis of acute pericarditis in the IBD cohort, 2011-2020, were identified from the National Inpatient Sample using codes from the International Classification of Diseases (revision 9 or 10). Multivariable logistic regression was performed to identify clinical factors associated with pericarditis among IBD patients and in-hospital complications.

Results: During the period 2011-2020, among 3,236,747 IBD patients, 9113 (0.28%) had pericarditis, with a mean patient age of 54.08 $\pm$ 0.48 years, and 53.1% females. Patients with IBD and coexisting diagnoses of systemic lupus erythematosus (odds ratio [OR] 1.49, 95% confidence interval [CI] 1.03-2.15, $P = 0.033$), rheumatoid arthritis and/or collagen vascular disorders (OR 1.75, 95% CI [1.41-2.17], $P < 0.001$), or postcardiotomy syndrome (OR 67.13, 95% CI [30.08-149.80], $P < 0.001$), were each associated with a higher risk of pericarditis. Compared to IBD patients without pericarditis, patients with IBD and pericarditis had an increased associated incidence of inpatient mortality (OR 1.65, 95% CI [1.25-2.18], $P < 0.001$).

Conclusions: Pericarditis is an uncommon but important manifestation of IBD. The presence of a concomitant autoimmune condition led to a higher likelihood of developing pericarditis among IBD patients, and IBD patients who develop pericarditis had a higher incidence of inpatient mortality compared to IBD patients without pericarditis. Providers should be aware of the connection between IBD and pericarditis to identify individuals at risk of adverse complications.

RÉSUMÉ

Contexte : Les maladies inflammatoires de l'intestin (MII) sont des affections chroniques caractérisées principalement par une inflammation du tractus gastro-intestinal. La péricardite est une manifestation extra-intestinale rare mais importante des MII, mal comprise et pourtant associée à une morbidité importante. Les objectifs de cette étude étaient d'identifier les facteurs associés à la péricardite dans les MII, ainsi que les complications associées.

Méthodes : Les patients adultes hospitalisés (âgés de $\geq$ 18 ans) avec un diagnostic de péricardite aiguë dans la cohorte MII, 2011-2020, ont été identifiés à partir de l'Échantillon National américain des Patients Hospitalisés (NIS) en utilisant les codes de la Classification Internationale des Maladies (révision 9 ou 10). Une régression logistique multivariée a été réalisée pour identifier les facteurs cliniques associés à la péricardite chez les patients atteints de MII et aux complications hospitalières.

Résultats : Au cours de la période 2011-2020, parmi les 3 236 747 patients atteints de MII, 9 113 (0,28 %) ont eu une péricardite, avec un âge moyen de 54,08 $\pm$ 0,48 ans, 53,1 % étant des femmes. Les patients atteints de MII et présentant des diagnostics concomitants de lupus érythémateux systémique ((rapport de cotes [RC] 1,49, intervalle de confiance [IC] à 95 % 1,03-2,15, $p = 0,033$), de polyarthrite rhumatoïde et/ou de troubles vasculaires du collagène (RC 1,75, IC à 95 % [1,41-2,17], $p < 0,001$), ou de syndrome post-cardiotomie (RC 67,13, IC à 95 % [30,08-149,80], $p < 0,001$), étaient tous associés à un risque plus élevé de péricardite. Par rapport aux patients atteints de MII sans péricardite, les patients atteints de MII et de péricardite présentaient une incidence associée accrue de mortalité chez les patients hospitalisés (RC 1,65, IC à 95 % [1,25-2,18], $p < 0,001$).

Conclusions : La péricardite est une manifestation peu fréquente mais importante des MII. La présence d'une maladie auto-immune concomitante augmente la probabilité de développer une péricardite chez les patients atteints de MII, et les patients atteints de MII qui développent une péricardite ont une incidence plus élevée de mortalité chez les patients hospitalisés, par rapport aux patients atteints de MII qui n'ont pas de péricardite. Les prestataires de soins doivent être conscients du lien entre les MII et la péricardite afin d'identifier les personnes à risque de complications indésirables.

Inflammatory bowel disease (IBD) is a chronic inflammatory condition of the gastrointestinal tract that encompasses both ulcerative colitis (UC) and Crohn's disease (CD).[1] Occurrence of the condition is not infrequent; it is estimated to affect up to 1.5 million North American patients.[2] IBD can be associated with a variety of extraintestinal manifestations that affect multiple organ systems. Meta-analyses suggest that patients with IBD have an increased risk of atherosclerotic cardiovascular disease, yet other cardiovascular manifestations are poorly understood. Pericarditis has been described as one manifestation of IBD, but little is known about the clinical predictors associated with its occurrence. Other notable cardiovascular extraintestinal manifestations include myocarditis, venous and arterial thromboembolism, arrhythmia, heart failure, and endocarditis.[3,4] An association between active disease in IBD and an increased incidence of cardiovascular events has been reported, including in the first year after diagnosis, suggesting that a relationship exists between systemic inflammation and cardiovascular risk.

Prior studies have estimated that the prevalence of pericarditis is roughly 0.19% among CD patients and 0.23% among UC patients.[5] The pathogenesis of pericarditis in the setting of IBD is unclear, although multiple mechanisms are plausible, and these may differ among patients. Possible etiologies include immune-mediated, drug-induced hypersensitivity reactions and cardiotoxicity due to drug treatment from 5-aminosalicylic acid derivatives, such as sulfasalazine and mesalamine.[1] Additionally, drug-induced pericarditis also has been reported in patients with IBD treated with infliximab.[6-8]

Given the lack of evidence regarding comorbid conditions that are associated with IBD, an understanding of acute

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‡Co-senior authors.

Corresponding author: Brittany Weber, Brigham and Women's Hospital, 75 Francis St, Boston, Massachusetts 02115, USA. Tel.: +1-617-732-6290; fax: +1-617-582-6056

E-mail: bweber@bwh.harvard.edu

Twitter: @Bweber04

See page 1384 for disclosure information.

pericarditis among IBD patients and risk factors associated with worse outcomes is important. Early recognition and treatment are necessary to prevent severe morbidity and mortality in patients with acute pericarditis and IBD.[9] This study aims to further elucidate the predictors of acute pericarditis in the inpatient IBD patient population n and the predictors of worse outcomes, including all-cause mortality.

Methods

Study population

The US National Inpatient Sample (NIS) database from 2011 to 2020 was utilized. The NIS is managed by the Healthcare Cost and Utilization Project and run by the Agency for Healthcare Research and Quality.[10] The NIS collects information on more than 7 million hospitalizations yearly, and is funded by contributions from all states affiliated with the Healthcare Cost and Utilization Project. The NIS uses publicly accessible anonymous and deidentified data; thus, this study did not require informed permission from participants or institutional review board approval be obtained. Given that NIS data are compiled annually, the data investigated disease trends over time, from 2011 to 2020. NIS data were queried using claims codes from the International Classification of Diseases (ICD), Ninth and Tenth Revisions (ICD-9, ICD-10), Clinical Modification (ICD-9-CM, ICD-10-CM). All the ICD codes generated are detailed in Supplemental Table S1. Individuals aged < 18 years were excluded from our study.

Study characteristics and outcomes

Acute pericarditis was characterized by specific diagnostic codes—namely, ICD-9 codes 420, 4238, and 4239, and ICD-10 codes I30, I318, I319, and I32. IBD encompassed both CD (ICD-9 code 555; ICD-10 code K50) and UC (ICD-9 code 556; ICD-10 code K51). Baseline demographic characteristics, including age, gender, race, hospital region, and hospital bedsize, were obtained from available NIS variables. Clinical variables, including the incidence of stroke, systemic sclerosis, sarcoidosis, postcardiotomy syndrome, hypertension, diabetes mellitus, hyperlipidemia, obesity, chronic heart failure, coronary artery disease, smoking, renal failure, and metastatic malignancy, were incorporated into the analysis using the corresponding ICD-9 and ICD-10 codes, as detailed in Supplemental Table S1. The primary study outcome was all-cause mortality, and known complications from pericarditis, including cardiac tamponade and constrictive pericarditis, were examined.

Statistical analysis

Means with standard deviations and the number of individuals with the corresponding proportions were calculated for continuous and categorical variables, respectively. The characteristics of acute pericarditis patients with vs without IBD were compared using a Student t test (or the Wilcoxon rank-sum test for non-normal distribution, with normality assessed by the Shapiro–Wilk test) for continuous variables, and a χ^2 test (or Fisher exact test) for categorical variables. Multivariable logistic regression analysis was performed to identify the risk factors for inpatient mortality and for in-hospital complications in the overall cohort of acute pericarditis patients with IBD. All the covariates utilized are risk factors identified as clinically significant in the established literature.[11] Logistic regression analysis was utilized to estimate propensity scores for the likelihood of developing acute pericarditis among patients with IBD. Age, female sex, race, acute kidney injury (AKI), stroke, postcardiotomy syndrome, rheumatoid arthritis (RA), chronic renal failure, systemic lupus erythematosus, systemic sclerosis, diabetes mellitus, hypertension, hyperlipidemia, chronic heart failure, obesity, coronary artery disease, smoking, metastatic cancer, and sarcoidosis were used as covariates in the propensity-score calculation. A 1:3 nearest-neighbor propensity score–matching model was performed. We matched IBD patients with acute pericarditis to IBD patients without acute pericarditis based on the propensity score, and the balance of covariates was ensured between the matched groups by minimizing the differences in the propensity score (Supplemental Fig. S1). A P-value of < 0.05 was considered statistically significant. The analysis was conducted using Stata 17 statistical software (StataCorp, College Station, TX). Stata's every command and appropriate weights were used in all the estimations. Propensity-matching analysis was performed using R software's (version 4.3) MatchIt package (R Foundation for Statistical Computing, Vienna, Austria).

Results

Baseline characteristics

A total of 3,236,747 IBD patients from the period 2011-2020 were identified, among which 9113 patients had a coexisting inpatient hospital diagnosis of acute pericarditis. The prevalence of the condition was 0.28%, with a mean age among patients of 54.08 ± 0.48 years, with 53.09% being female. The demographic and clinical characteristics of IBD patients with vs without acute pericarditis are detailed in Table 1. Compared to IBD patients without pericarditis, those with pericarditis were less likely to be female (53.09% vs 55.76%, $P < 0.001$), were more likely to be in a middle-range or older age group (ages 51-60 years, 18.49% vs 16.11%; ages 61-70 years, 20.64% vs 16.42%; ages 71-80 years, 14.84% vs 13.01%, $P < 0.001$), and had higher rates of additional autoimmune comorbid conditions, including concomitant systemic lupus erythematosus (2.34% vs 0.96%, $P < 0.001$), and RA and/or collagen vascular disorders (9.94% vs 5.26%, $P < 0.001$). The incidence of cardiovascular complications that can result from or are associated with acute pericarditis was higher in IBD patients with pericarditis, including cardiac tamponade (4.83% vs 0.02%, $P < 0.001$), constrictive pericarditis (0.5% vs 0.01%, $P < 0.001$), and postcardiotomy syndrome (0.48% vs 0.005%, $P < 0.001$). Among IBD patients who had pericarditis and postcardiotomy syndrome, 14 (31.81%) had cardiac tamponade, and < 11 had constrictive pericarditis.

Clinical factors associated with acute pericarditis in IBD patients

To understand the clinical features associated with acute pericarditis, we examined the differences between IBD

Table 1. Baseline characteristics of patients who have inflammatory bowel disease (IBD), with vs without acute pericarditis

Variables	IBD with pericarditis (n = 9113)	IBD without pericarditis (n = 3,227,634)	*P*
Female sex	4839 (53.09)	1,799,728 (55.76)	**< 0.001**
Mean age ± standard error, y	54.08 ± 0.48	51.9 ± 0.07	**< 0.001**
Age category, y			**< 0.001**
18−30	1175 (12.89)	469,943 (14.56)	
31−40	1083 (11.88)	459,937 (14.25)	
41−50	1248 (13.69)	449,932 (13.94)	
51−60	1685 (18.49)	519,971 (16.11)	
61−70	1881 (20.64)	529,977 (16.42)	
71−80	1353 (14.84)	419,915 (13.01)	
81−90	684 (7.50)	259,824 (8.05)	
Hospital region			0.10
Northeast	1891 (20.75)	699,751 (21.68)	
Midwest	2405 (26.39)	799,807 (24.78)	
South	3266 (35.83)	1,199,711 (37.17)	
West	1742 (21.47)	539,983 (16.73)	
Race			0.06
White	6851 (75.17)	2,399,745 (74.35)	
African American	994 (10.90)	339,869 (10.53)	
Hispanic	485 (5.32)	189,784 (5.88)	
Asian or Pacific Islander	895 (9.82)	259,824 (8.05)	
size			**< 0.001**
Small	1135 (12.45)	559,994 (17.35)	
Medium	2431 (26.67)	869,847 (26.95)	
Large	5690 (62.43)	1,799,728 (55.76)	
Comorbid conditions			
Stroke	156 (1.71)	41,959 (1.30)	0.16
Systemic sclerosis	30 (0.32)	6132 (0.19)	0.07
Systemic lupus erythematosus	214 (2.34)	30,985 (0.96)	**< 0.001**
Sarcoidosis	35 (0.38)	8714 (0.27)	0.43
Rheumatoid arthritis and/or collagen vascular disease	906 (9.94)	169,773 (5.26)	**< 0.001**
Postcardiotomy syndrome	44 (0.48)	161 (0.005)	**< 0.001**
Cardiac tamponade	441 (4.83)	768 (0.02)	**< 0.001**
Constrictive pericarditis	46 (0.5)	471 (0.01)	**< 0.001**
Colectomy	291 (3.19)	158,089 (4.89)	**< 0.001**
Hypertension	4389 (48.16)	1,280,079 (39.66)	**< 0.001**
Diabetes mellitus	1758 (19.29)	539,983 (16.73)	**0.02**
Hyperlipidemia	2327 (25.53)	669,734 (20.75)	**< 0.001**
Obesity	1143 (12.54)	143,952 (4.46)	**< 0.001**
Chronic heart failure	1406 (15.42)	239,813 (7.43)	**< 0.001**
Coronary artery disease	1744 (19.13)	389,898 (12.08)	**< 0.001**
Smoking	1806 (19.81)	889,858 (27.57)	**< 0.001**
Renal failure	1742 (19.11)	369,886 (11.46)	**< 0.001**
Metastatic cancer	317 (3.47)	63,907 (1.98)	**< 0.001**

Values are n (%), unless otherwise indicated. Boldface indicates statistical significance.

patients with acute pericarditis vs IBD patients without acute pericarditis (Table 2). The IBD cohort had a higher prevalence of female patients among those with pericarditis with IBD, compared to the prevalence in those without IBD; despite this, female gender was associated with a lower risk of developing acute pericarditis (odds ratio [OR] 0.84, 95% confidence interval [CI] 0.76-0.92, $P < 0.001$). The clinical comorbidities that were associated strongly with acute pericarditis include systemic lupus erythematosus (SLE; OR 1.49, 95% CI [1.03-2.15], $P = 0.036$), and RA and/or collagen vascular disease (OR 1.75, 95% CI [1.41-2.17], $P < 0.001$). IBD patients with a known prior history of postcardiotomy syndrome, a clinical entity that often is associated with pericarditis, had a higher likelihood of developing subsequent acute pericarditis requiring hospitalization (OR 67.13, 95% CI [30.08-149.80], $P < 0.001$).

Predictors of in-hospital mortality

We next examined clinical predictors of in-hospital mortality and complications among IBD patients (Table 3). Acute pericarditis (OR 1.65, 95% CI [1.25-2.18], $P < 0.001$), AKI (OR 6.58, 95% CI [6.27-6.90], $P < 0.001$), and systemic sclerosis (OR 2.68, 95% CI [1.83-3.92], $P < 0.001$) were each associated independently with a higher risk of in-hospital all-cause mortality.

To understand whether IBD patients with pericarditis had a higher risk of mortality, compared to IBD patients without pericarditis, when other risk factors were similar, we next performed propensity score−matching analysis using a 1:3 approach, to match 1834 patients and 5502 controls to patients from the IBD cohort, equally distributed between those with vs without acute pericarditis. Compared to matched IBD patients, comparators without pericarditis, individuals with

Table 2. Clinical predictors of acute pericarditis in patients with inflammatory bowel disease

Variables	OR (95% CI)	*P*
Female sex	0.84 (0.76−0.92)	**< 0.001**
Age (per 10 y)	0.97 (0.93−1.00)	0.099
Race		
White	Reference	Reference
African American	1.01 (0.86−1.18)	0.873
Hispanic	0.92 (0.74−1.15)	0.493
Asian or Pacific Islander	1.23 (1.04−1.46)	**0.013**
Systemic lupus erythematosus	1.49 (1.03−2.15)	**0.033**
Rheumatoid arthritis and/or collagen vascular disease	1.75 (1.41−2.17)	**< 0.001**
Acute kidney injury	1.19 (1.05−1.36)	**0.007**
Stroke	1.10 (0.76−1.60)	0.599
Systemic sclerosis	1.62 (0.71−3.66)	0.245
Hypertension	1.04 (0.9`−1.18)	0.515
Diabetes mellitus	0.89 (0.76−1.04)	0.164
Hyperlipidemia	1.06 (0.94−1.20)	0.320
Obesity	1.04 (0.89−1.21)	0.589
Chronic heart failure	1.83 (1.56−2.15)	**< 0.001**
Renal failure	1.38 (1.20−1.59)	**< 0.001**
Coronary artery disease	1.31 (1.13−1.52)	**0.001**
Smoking	0.60 (0.53−0.68)	**< 0.001**
Sarcoidosis	1.01 (0.45−2.26)	0.981
Post cardiotomy syndrome	67.13 (30.08−149.80)	**< 0.001**
Metastatic cancer	1.75 (1.35−2.26)	**< 0.001**

Boldface indicates statistical significance. CI, confidence interval; OR, odds ratio.

Table 3. Multivariable analysis for predictors of mortality in patients with inflammatory bowel disease

	Mortality	
Variables	OR (95% CI)	*P*
Acute pericarditis	1.65 (1.25−2.18)	**< 0.001**
Female sex	0.88 (0.84−0.92)	**< 0.001**
Age (per 10 y)	1.55 (1.53−1.58)	**< 0.001**
Race		
White	Reference	Reference
African American	1.11 (1.04−1.20)	**0.002**
Hispanic	1.30 (1.19−1.43)	**< 0.001**
Asian or Pacific Islander	1.13 (1.05−1.23)	**0.001**
Acute kidney injury	6.58 (6.27−6.90)	**< 0.001**
Stroke	3.42 (3.09−3.79)	**< 0.001**
Systemic sclerosis	2.68 (1.83−3.92)	**< 0.001**
Sarcoidosis	0.96 (0.67−1.39)	0.866
Postcardiotomy syndrome	—	-
Systemic lupus erythematosus	1.12 (0.88−1.43)	0.321
Rheumatoid arthritis and/or collagen vascular disease	0.98 (0.89−1.08)	0.770
Hypertension	0.70 (0.67−0.73)	**< 0.001**
Diabetes mellitus	1.04 (0.99−3.24)	0.130
Hyperlipidemia	0.45 (0.19−1.10)	0.059
Obesity	0.87 (0.81−0.93)	**< 0.001**
Smoking	0.69 (0.65−0.72)	**< 0.001**
Chronic heart failure	1.69 (1.60−1.79)	**< 0.001**
Renal failure	0.81 (0.77−0.85)	**< 0.001**
Coronary artery disease	0.97 (0.92−1.02)	0.352
Metastatic cancer	3.63 (3.36−3.92)	**< 0.001**

Values were adjusted for age, sex, race, systemic lupus erythematosus, rheumatoid arthritis and/or collagen vascular disease, acute kidney injury, stroke, systemic sclerosis, hypertension, diabetes mellitus, hyperlipidemia, obesity, chronic heart failure, chronic renal failure, coronary artery disease, smoking, sarcoidosis, postcardiotomy syndrome, and metastatic cancer. Boldface indicates statistical significance. CI, confidence interval; OR, odds ratio.

IBD and acute pericarditis exhibited an elevated risk of mortality (OR 1.66, 95% CI [1.12-2.46], $P = 0.012$). The covariate balance of propensity-matched outcomes for IBD patients with acute pericarditis is shown in Supplemental Figures S1 and S2.

Discussion

This study evaluates the prevalence of, and those factors associated with, acute pericarditis requiring hospitalization among patients with IBD, over the course of 10 years, 2011-2020. An important finding from these data is that the incidence of acute pericarditis in IBD patients is heightened by the addition of other autoimmune disorders, including SLE and RA. Additionally, the presence of these autoimmune conditions is associated independently with a higher risk of in-hospital mortality. These data highlight the importance of a heightened awareness of pericarditis in patients with coexisting autoimmune conditions.

Predictors of acute pericarditis in IBD patients

More than one-third of patients with IBD are affected by extraintestinal manifestations or extraintestinal complications.[9] Although cardiovascular complications are rare, pericarditis is one manifestation. The data are limited on the exact prevalence of pericarditis in patients with IBD. Therefore, determining the predictors of pericarditis and its relationship to outcomes in this patient population is crucial as a means to understand which IBD patients are at elevated risk so that complications can be prevented. Although the volume of literature on risk factors of acute pericarditis in IBD patients is limited, the condition has been suggested to occur after initiation of common medical therapies in IBD.[1] The 5-aminosalicylic acid derivatives are reported to be primarily responsible for inducing pericarditis. The reported mechanisms include IgE-mediated hypersensitivity reactions, direct cardiotoxicity, cell-mediated hypersensitivity, and humoral antibody reactions.[3,12-16] The autoimmune conditions SLE and RA both are known to be associated with acute pericarditis, and these patients tend to have poor prognoses with more clinical recurrences compared to patients without autoimmunity.[17,18] The exact etiology of acute pericarditis among patients with IBD in this dataset cannot be ascertained, but the concomitant autoimmunity is one important clue, and it highlights the possibility that the presence of concomitant autoimmune conditions may increase the susceptibility to or likelihood of developing acute pericarditis that requires an inpatient admission, among patients with IBD.

In-hospital complications of acute pericarditis in IBD patients

Our results demonstrated that in the patient cohort with postcardiotomy syndrome, 31.81% had cardiac tamponade, and constrictive pericarditis was rare (< 11). Constrictive pericarditis is one of the most severe complications of acute pericarditis and is characterized by fibrous thickening and calcifications of the pericardium. This progressive and debilitating condition leads to impaired diastolic filling, reduced cardiac output, and ultimately heart failure, often requiring surgical pericardiectomy for treatment.[11]

Cardiac tamponade is another severe complication of acute pericarditis that, if not treated, can be life-threatening. In

postcardiotomy syndrome, the immune response triggered by cardiac surgery can lead to pericardial inflammation. The altered immune response in IBD patients potentially could exaggerate this process through excess cytokine activation and/or molecular mimicry, leading to a more aggressive inflammatory state and an increased likelihood of tamponade. IBD patients may experience delay in healing and recovery due to their underlying condition. Potentially, such delay could impact the body's ability to manage the inflammatory response associated with the postcardiotomy syndrome, thereby prolonging the presence of pericardial inflammation and increasing the risk of cardiac tamponade.

In-hospital mortality in IBD patients

The development of acute pericarditis, AKI, and concominant autoimmune conditions (systemic sclerosis, RA, and/or collagen vascular diseases) was associated with higher mortality rates in the IBD cohort. Although earlier research has highlighted that mortality is associated with acute pericarditis,[19,20] the novel aspect of this study is the focus on individuals who have IBD. The treatment landscape for pericarditis is evolving with the use of interleukin-1 inhibitors, and a better understanding of pericarditis in the setting of systemic inflammatory conditions such as IBD is needed.[21,22] The evolution of therapeutic options could be one of the reasons for the decreasing-prevalence trend of pericarditis in IBD patients, attributable to the emergence and utilization of more advanced therapies. The introduction of targeted biologics among patients with IBD might contribute to this downward trend by managing inflammation associated with IBD effectively, thereby potentially reducing the occurrence of pericarditis in these patients.

IBD is a complex disorder, and this study highlights the need for future analysis of IBD as a means to understand the relationship between immune dysregulation and medication interactions that contribute to the development of pericarditis and how to manage pericarditis best once it is diagnosed. Addressing this multifaceted interplay is pivotal in enhancing patient care and minimizing mortality risk in this specific subgroup.

Limitations

Our study has several important limitations. This retrospective, observational study has intrinsic biases, but it represents the largest dataset on IBD patients available in the NIS database that evaluates the factors associated with acute pericarditis. Unmeasured risk factors certainly exist that are not available in the NIS. Another significant constraint lies in the fact that pericarditis frequently is managed on an outpatient basis, potentially resulting in the omission of cases in which patients were not hospitalized. Thus, this study cannot ascertain the true prevalence of acute pericarditis, but rather only the frequency at which patients were hospitalized with this diagnosis. The time course of the development of acute pericarditis in the IBD cohort is unknown, and the condition may have been preexisting. Differentiating between patients who have developed pericarditis as a result of an extraintestinal manifestation of IBD and those who have experienced it as an adverse effect of drug therapy can present a complex diagnostic challenge. The NIS can only be used to evaluate inpatient hospital admission data, and it is limited by the absence of data on patients relating to the period beyond their discharge. Additionally, the NIS dataset does not encompass information pertaining to laboratory biomarkers, such as high-sensitivity C-reactive protein (hs-CRP), advanced cardiovascular imaging obtained during inpatient admission, or the specific treatments administered, thereby limiting the scope of our analyses. Nonetheless, we believe these data provide new and important findings that we hope will lead to future studies of this important condition.

Conclusion

These data highlight an understudied, but clinically relevant cardiovascular manifestation within IBD, and underscores the importance of conducting future studies that address the mechanisms surrounding the pathophysiology of acute pericarditis in IBD patients. Given that additional systemic autoimmune conditions further contribute to a poor prognosis, recognition of this association among patients with IBD is important as a means to prevent irreversible complications and improve the quality of life of these patients.

Ethics Statement

The NIS uses publicly accessible anonymous and deidentified data; thus, this study did not require that institutional review board approval be obtained.

Patient Consent

The authors confirm that patient consent is not applicable to this article. Our study is from the US National Inpatient Sample Database, which is a publicly available deidentified anonymous database; thus, the study did not require any informed patient consent.

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Disclosures

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Supplementary Material

To access the supplementary material accompanying this article, visit the online version of the *Canadian Journal of Cardiology* at www.onlinecjc.ca and at https://doi.org/10.1016/j.cjco.2024.08.004.