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ORIGINAL ARTICLE

Variations in the medical treatment of inflammatory bowel disease among gastroenterologists

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Abstract

Background and aims: With expanding available treatment options and evolving understanding of the risks and benefits of medical therapies for inflammatory bowel disease (IBD), there is the possibility of significant variations in treatment and outcomes. Little is known about the variation in treatment between IBD specialists and other gastroenterology (GI) physicians. Evaluating possible variations is an important first step to help address standardized care and optimize treatment. We studied the differences in use of biologics and immunomodulators in the management of IBD patients at a tertiary care hospital between IBD-trained physicians and other gastroenterologists.
Methods: A total of 325 IBD patients were included in the analysis. Of these, 216 patients received care with an IBD physician and 109 had other GI/non-IBD physicians as their main caregivers.
Results: The unadjusted use of immunomodulators (35.6% *vs* 16.5%, $p = 0.001$), biologics (45.8% *vs* 22.9%, $p = 0.001$) and dual therapy (biologics and immunomodulator) (14.4% *vs* 3.7%, $p = 0.001$) was significantly higher in the IBD-physician group. These differences in therapy between the two groups remained after adjusting for patient and disease characteristics.
Conclusion: There are significant variations in the treatment of patients with IBD by GI physicians. The use of biologics and immunomodulators is higher in GI physicians with dedicated IBD interest and training.

Key words: variation in treatment; inflammatory bowel disease; Crohn's disease, ulcerative colitis; biologics; immunomodulator

Introduction

Inflammatory bowel disease (IBD) is a group of chronic complex immune-mediated disorders of the gastrointestinal tract that affects over a million patients in the USA [1]. IBD spans a spectrum that includes ulcerative colitis (UC) and Crohn's disease (CD) at two ends and indeterminate/undefined disease in between. The goal of treatment is to achieve clinical and endoscopic remission [2,3]. Several immunosuppressive agents have been successfully used for induction and maintenance treatment in IBD. These include steroids, immunomodulators (thiopurines, methotrexate) and biologics such as anti-tumor necrosis factor (anti-TNF) alpha agents, anti-alpha 4 integrins and anti-IL-12/23 agents. While all these might be effective treatments for IBD, there is no single ideal therapy for all patients. This is thought to be partly due to the varied pathways of inflammation in individual patients. With the increase in the treatment options available and evolving understanding of the risk and benefits of medical therapies for the management of

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IBD, there is the possibility of significant variations in treatment and outcomes [4,5].

Previous studies have examined treatment differences between high-volume referral centers [5,6]. Little is known about the variation in treatment between IBD specialists and other gastroenterology (GI) physicians practicing in the same setting. The identification of such variations is an important first step to standardize care and optimize treatment. The objective of our study was to assess the differences in use of biologics and immunomodulators in the management of IBD patients between IBD and non-IBD GI physicians at a tertiary care hospital with a large gastroenterology faculty.

Methods

All patients with a documented diagnosis of IBD as identified from institutional electronic health records (EHR) and seen at the Digestive Diseases Center between January 2013 and March 2015 were included in the study. Exclusion criteria were patients younger than 18 years old, patients lost to follow-up during the study period or pregnant patients. This study was approved by an institutional review board (IRB).

Patients were divided into two groups: care provided by IBD specialists with more than 50% of their practice dedicated to IBD and also practice at the Inflammatory Bowel Disease Center at Allegheny Health Network, and care provided by non-IBD gastroenterologists.

Institutional EHR was queried for documentation of patient characteristics, disease characteristics, and current and past treatment history. The data collected included documentation of IBD type, anatomic location and activity. Disease activity was reported by gastroenterologists based on patient symptoms, clinical parameters and endoscopic evaluation. Treatment history included the use of steroids (within any 4 months in the study excluding new diagnosis), immunomodulators, biologics and dual therapy (biologic plus immunomodulator).

We calculated the unadjusted use of immunomodulators, biologics and dual therapy between the two groups of gastroenterologists. To adjust for the differences in patient and disease characteristics, multivariate logistic regression analysis was performed, adjusting for age, sex, disease characteristics duration, location, activity, severity and extra-intestinal manifestations, steroid use, smoking status, C-reactive protein (CRP) and albumin levels.

Statistical analysis was performed using STATA version 14 (STATA, College Station, TX). Categorical variables were reported as numbers (percentages). Continuous variables are reported as means ± standard deviation. Continuous variables were compared using two sample t-tests and categorical variables compared using Pearson χ^2 tests. Multivariate logistic regression was used to adjust for possible confounding variables mentioned above. A two-sided p-value of 0.05 was used to determine statistical significance.

Results

A total of 325 IBD patients (181 CD, 136 UC and 8 intermediate colitis) were included in the analysis. Mean age was 46.4 ± 16.7 years; 46.5% of patients were male. Of these, 216 patients received care with an IBD physician and 109 had other GI/non-IBD physicians as their main caregiver. Characteristics of the patients and disease in the two groups are compared in Table 1. The mean age of the patients cared for by IBD physicians was significantly younger (43.1 *vs* 52.8 years, $p = 0.001$). The mean

Table 1. Comparison of patient and disease characteristics

Characteristics	Patients cared for by IBD physician (*N*=216)	Patients cared for by non-IBD physician (*N*=109)	*p*-value
Mean age, years	43.1 ± 15.5	52.8 ± 17.0	0.001
Male gender, *n* (%)	97 (44.9)	54 (49.5)	0.43
IBD type, *n* (%)			0.12
Crohn's disease	129 (59.7)	52 (47.7)	
Ulcerative colitis	82 (38.0)	54 (49.5)	
Indeterminate	5 (2.3)	3 (2.8)	
Mean duration of disease, year	11.2 ± 8.6	14.0 ± 12.1	0.02
Previous surgery, *n* (%)			0.001
Colon	39 (18.1)	13 (11.9)	
Small bowel	28 (13.0)	7 (6.4)	
Small bowel + colon	74 (34.3)	27 (24.8)	
Pancolitis	42 (19.4)	21 (19.3)	
Left sided colitis	30 (13.9)	40 (36.7)	
Disease activity, *n* (%)			0.001
Mild	80 (37.0)	82 (75.2)	
Moderate	79 (36.6)	13 (11.9)	
Severe	57 (26.4)	14 (12.8)	
Extra-intestinal manifestations, *n* (%)	26 (12.0)	12 (11.0)	0.78
Tobacco use, *n* (%)	42 (19.4)	14 (12.8)	0.14
Mean albumin, g/dL	4.1 ± 0.5	4.1 ± 0.5	0.97
Anemia, *n* (%)	68 (31.5)	35 (32.1)	0.82
Mean quantitative C-reaction protein	2.6 ± 4.3	4.1 ± 8.0	0.13
Current steroids (excluding new diagnosis in last 112 days)	50 (23.1)	27 (24.8)	0.71
Immunomodulator use	77 (35.6)	18 (16.5)	0.001
Biologics use	99 (45.8)	25 (22.9)	0.001
Dual therapy (biologics and immunomodulator)	31 (14.4)	4 (3.7)	0.001

Table 2. Multivariate analysis while adjusting for patient and disease characteristics

Therapy	Odds ratio	95% confidence interval	*p*-value
Independent use of biologic agents by non-IBD physicians	0.42	0.22–0.79	0.007
Independent use of immunomodulator by non-IBD physicians	0.28	0.15–0.56	0.001
Use of dual therapy (biologics and immunomodulator) by non-IBD physicians	0.31	0.10–0.96	0.04

duration of disease was shorter in patients cared for by IBD physicians (11.2 *vs* 14.0 years, $p = 0.02$). Patients managed by IBD physicians had more previous surgeries and severe disease (both $p = 0.001$). There was no difference in the frequency of extra-intestinal manifestations, tobacco use, albumin, anemia and CRP between the two groups.

The unadjusted use of immunomodulators (35.6% *vs* 16.5%, $p = 0.001$), biologics (45.8% *vs* 22.9%, $p = 0.001$) and dual therapy (biologics and immunomodulator) (14.4% *vs* 3.7%, $p = 0.001$) was significantly higher in the IBD-physician group (Table 1). To adjust for differences in patient characteristics between the two groups, we performed a multivariate analysis adjusting for age, sex, disease duration, location, activity, severity and extra-intestinal manifestations, steroid use, smoking status, CRP and albumin levels. These differences in therapy between the two groups did not appear to be affected by patient and disease characteristics, as shown in Table 2. Non-IBD physicians were 2.5 times less likely to prescribe biologics (OR = 0.42, 95% confidence interval (CI) 0.22–0.79, $p = 0.007$). Similarly, there was 4-fold variation in the use of immunomodulators therapy (OR = 0.28, 95% CI 0.15–0.56, $p = 0.001$). IBD physicians were almost three times more likely to use dual therapy (biologics and immunomodulators) when compared to the non-IBD physicians group (OR = 0.31, 95% CI 0.10–0.96, $p = 0.04$).

Discussion

There is a significant variation in the use of immunosuppressive agents for the treatment of IBD patients between IBD and non-IBD physicians within the same center. Previous studies have identified differences between large referral centers [5,6].

Managing patients with IBD is challenging because of multiple factors. These include a complex disease spectrum, varied clinical presentation and rapidly changing treatment options. Although the overall success rate of treatment has improved, the understanding of the risks and benefits of available treatment options continues to evolve [7]. There are wide variations in treatment patterns and varied adherence to existing recommendations. Recognition of the variations is one of the first steps to help improve care and outcomes [5].

Extensive variations in virtually all aspects of health care delivery, including physicians' practices, are well known [8]. Specific data on the variation in management in IBD patients within the same practice setting are limited. Benchimol *et al.* compared prescription rates among elderly patients with IBD in four countries (USA, UK, Denmark and Canada) and found significant variation in medication prescription rates among these countries [9]. Variation in treatment exists not only among different countries, but also within the USA. Ananthakrishnan *et al.* have reported wide variation in the use of biologics and immunosuppressive agents among high-volume referral centers within a consortium of seven major IBD centers in the USA [5]. Another study evaluating the initial management of newly diagnosed CD in children found widespread variation in medical management across 10 high-volume academic pediatric gastroenterology centers [6].

Our study highlights these variations within a single high-volume center, which persists after adjusting for disease and patient characteristics. There are likely multiple possible explanations for these differences. It is possible that the available guidelines are not widely adhered to, especially by non-IBD gastroenterologists [2,3,10]. There are different treatment pathways suggested for the management of IBD that may contribute to uncertainty. Management is becoming increasingly complex with the development of newer immunosuppressive agents and ongoing debate about the best practices. There might be underutilization of biologics in non-IBD gastroenterologists because of concerns about the risks versus benefits of the therapy.

Our study has several limitations. It is retrospective and from a single center, and the results may not be generalizable. However, we were able to determine the variations that exist among non-IBD gastroenterologists and IBD specialists at the same center. This is an important first step to improve patient outcomes.

Conclusion

There are significant variations in the treatment of patients with IBD by GI physicians. Use of biologics and immunomodulators is higher in GI physicians with dedicated IBD interest and training. There is a need for further studies and discussion of evidence-based guidelines that can be easily incorporated into practice to reduce variation and hopefully improve outcomes including adherence to guidelines and quality of life in IBD patients.

Conflict of interest statement: none declared.

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