

# Medical Versus Interventional Treatment of Intra-Abdominal Abscess in Patients With Crohn Disease

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## ABSTRACT

**BACKGROUND:** Few studies exist to guide the treatment approach to intra-abdominal abscesses in Crohn disease, which can include antimicrobials alone or in conjunction with percutaneous drainage or surgery. The primary aim of this study is to review outcomes from different treatment approaches to intra-abdominal abscess in Crohn disease.

**METHODS:** Medical records were reviewed for patients admitted to the University of Michigan health care system with Crohn disease and intra-abdominal abscess over a 4-year period. Outcomes were compared among medical and interventional approaches. The  $\chi^2$  test was used to test for statistical significance.

**RESULTS:** Of the 33 patients included, 13 were in the medical group and 20 were in the interventional group. Abscess recurrence/nonresolution occurred in 31% of patients in the medical group and 25% of patients in the interventional group ( $P = .7$ ).

**CONCLUSIONS:** In this study, there was no significant difference in outcome between medical and interventional therapy for intra-abdominal abscess in Crohn disease.

**KEYWORDS:** Crohn disease, intra-abdominal abscess, treatment

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## Introduction

Spontaneous intra-abdominal or pelvic abscesses are a frequent complication of Crohn disease occurring in 10% to 28% of patients.<sup>1–3</sup> Traditionally, definitive management with surgical drainage and resection of inflamed bowel was the recommended treatment. However, given that the disease process may lead to recurrent intra-abdominal abscesses and the patients are often young, a more conservative approach (antibiotics with or without percutaneous drainage) is frequently taken to avoid repeated surgeries and short bowel syndrome. In a recent article analyzing the modality of treatment for intra-abdominal abscesses in 3296 hospitalized patients with Crohn disease, 39% were treated with antibiotics alone, 29% with percutaneous drainage, and 32% with surgery; despite an increase in the use of conservative treatment, there is a paucity of data addressing the efficacy of these therapies in comparison with surgical management, especially in regard to medical management alone (without percutaneous or surgical drainage). The primary aim of this study is to review the outcome of medical therapy (antibiotics) and interventional therapy (percutaneous drainage and surgical drainage with antibiotics) in the treatment of intra-abdominal abscess in Crohn disease at the University of Michigan. In addition, we review the duration of antibiotic therapy between the treatment groups, given that prolonged antibiotic use and increases in antibiotic resistance are major public health concerns.

## Materials and Methods

The medical records were reviewed for patients 18 years and older admitted to the University Hospital and C.S. Mott Children's Hospital (both part of the University of Michigan Health System) from January 1, 2010, to September 30, 2014, with the diagnosis of Crohn disease and intra-abdominal abscess. The search was conducted using *International Classification of Diseases, Ninth Revision (ICD-9)* codes 569.5, 555.9, and 567.22. Exclusion criteria included abscess as an acute complication of surgery (within 30 days of an operation) and a follow-up period of less than 6 months.

### Definitions

An abscess was defined as an extra-luminal fluid collection documented on computed tomography or magnetic resonance imaging of the abdomen. Treatment groups were categorized as medical (antibiotics alone without percutaneous aspiration or drain placement) or interventional (antibiotics plus percutaneous drainage with or without drain placement and surgery). Treatment failure was defined as nonresolution or recurrence of abscess within the 6-month follow-up period.

### Data collection

For each patient, the following data were collected: patient age, initial abscess size, treatment modality, culture results from



abscess fluid/tissue (if cultures were obtained), antibiotic duration, abscess resolution on imaging, and modality of secondary treatment if needed. Records were reviewed for a follow-up period of 6 months.

### Statistical analysis

Treatment outcome was compared between the medical and interventional groups using the  $\chi^2$  test. A *P* value <.05 was considered statistically significant. The software package used was Prism, version 6.02 (GraphPad Software, Inc., La Jolla, CA, USA).

This study was submitted to and approved by the University of Michigan Institutional Review Board (HUM00095070).

### Results

A total of 33 patients were admitted with the diagnosis of Crohn disease and intra-abdominal abscess over the study period. Of these, 13 patients (39.4%) were treated with appropriate antibiotics alone and 20 patients (60.6%) were treated with interventional therapy (antibiotics and percutaneous drainage or surgery). Table 1 summarizes the characteristics of the treatment groups (age range, abscess size, and antibiotic duration). The age ranges between the treatment groups were very similar, with a mean age of 33 in the medical group and 31 in the interventional group. Average abscess size was smaller for the medical treatment group (3.2 cm) compared with the interventional treatment group (5.9 cm). The mean antibiotic duration was similar between the groups, with a mean of 58 days in the medical group and 59 days in the interventional group. Given the right skew in the distribution of the antibiotic duration variable, a median value was also calculated which resulted in a smaller number of antibiotic days in the medical treatment group (28 days) compared with the interventional treatment group (42 days).

Table 2 summarizes the treatment outcome between the medical and interventional groups. Treatment failure was similar between the medical and interventional groups at 31% and 25%, respectively. There was no statistically significant difference in outcome between the groups (*P* = .7).

Table 3 and Table 4 summarize follow-up treatment for abscesses which did not resolve or recurred in the follow-up period. For the purposes of this table, the interventional treatment group is divided into percutaneous and surgical therapy. All patients in the medical treatment group with an initial treatment failure subsequently underwent surgery. In the percutaneous drainage group, 2 of the 3 patients with an initial treatment failure underwent surgery, and 1 of the 3 was treated with repeat percutaneous drainage. The 2 patients in the surgical group with initial treatment failure (abscess recurrence greater than 1 month but less than 6 months after surgery) were treated with percutaneous drainage.

Figure 1 summarizes the abscess microbiology. Abscess cultures were obtained for 16 of the patients in the interventional

**Table 1.** Characteristics of medical and interventional treatment groups.

CHARACTERISTIC	MEDICAL	INTERVENTIONAL
No. of patients	13	20
<b>Age, y</b>		
Average	33	31
Range	21-59	19-56
<b>No. of patients treated by</b>		
Percutaneous drainage	—	13
Surgery	—	7
Average abscess size, cm	3.2	5.9 <sup>a</sup>
Percutaneous drainage	—	6.2 <sup>b</sup>
Surgery	—	5.4 <sup>c</sup>
<b>Antibiotic duration, d</b>		
Average	58	59
Median (range)	28 (14-270)	42 (0-264)

<sup>a</sup>In 2 cases, initial abscess size was not recorded; thus, this reflects the average of 18 of the 20 patients in the group.

<sup>b</sup>In 1 case, initial abscess size was not recorded; thus, this reflects the average of 12 of the 13 patients in the group.

<sup>c</sup>In 1 case, initial abscess size was not recorded; thus, this reflects the average of 6 of the 7 patients in the group.

**Table 2.** Outcome of medical vs interventional treatment for intra-abdominal abscess.

VARIABLE	ABSCCESS RECURRENCE OR NONRESOLUTION, NO. (%)	ABSCCESS RESOLUTION, NO. (%)	<i>P</i> VALUE
Medical	4 (31)	9 (69)	.7
Interventional	5 (25)	15 (75)	
Percutaneous	3 (23)	10 (77)	
Surgical	2 (29)	5 (71)	

group. One patient in the medical treatment group had a positive blood culture which was included in the analysis as well. All of the abscesses were polymicrobial. The most frequently cultured organisms were *Escherichia coli*, *Candida* species, *Enterococcus* species, and *Streptococcus* species.

### Discussion

In concordance with prior literature,<sup>4</sup> this study demonstrates a trend toward the use of nonsurgical strategies in the initial treatment of intra-abdominal abscesses in Crohn disease, with the majority of patients in our sample undergoing treatment with antibiotics alone or percutaneous drainage (79%). This study demonstrated no statistically significant difference in the rates of abscess recurrence or nonresolution between the

**Table 3.** Treatment of recurrences between the medical, percutaneous, and surgical groups.

TREATMENT OF RECURRENCES	MEDICAL, NO. (% OF RECURRENCES, % OF ALL PATIENTS IN THE TREATMENT GROUP)	PERCUTANEOUS, NO. (% OF RECURRENCES, % OF ALL PATIENTS IN THE TREATMENT GROUP)	SURGICAL, NO. (% OF RECURRENCES, % OF ALL PATIENTS IN THE TREATMENT GROUP)
Antimicrobials alone	0	0	0
Percutaneous drainage	0	1 (33.3, 8)	2 (100, 29)
Surgery	4 (100, 31)	2 (66.7, 15)	0
TREATMENT OF RECURRENCES	MEDICAL, NO. (%)	PERCUTANEOUS, NO. (%)	SURGICAL, NO. (%)
Antimicrobials alone	0	0	0
Percutaneous drainage	0	1 (33.3)	2 (100)
Surgery	4 (100)	2 (66.7)	0

**Table 4.** Patients treated without surgical drainage for initial treatment and treatment of recurrences.

MEDICAL, NO. (%)	PERCUTANEOUS, NO. (%)	MEDICAL + PERCUTANEOUS, NO. (%)
9 (69)	11 (85)	20 (77)

medical and interventional groups, and surgery was successfully avoided in 77% of patients who underwent initial treatment with antibiotics alone or percutaneous drainage.

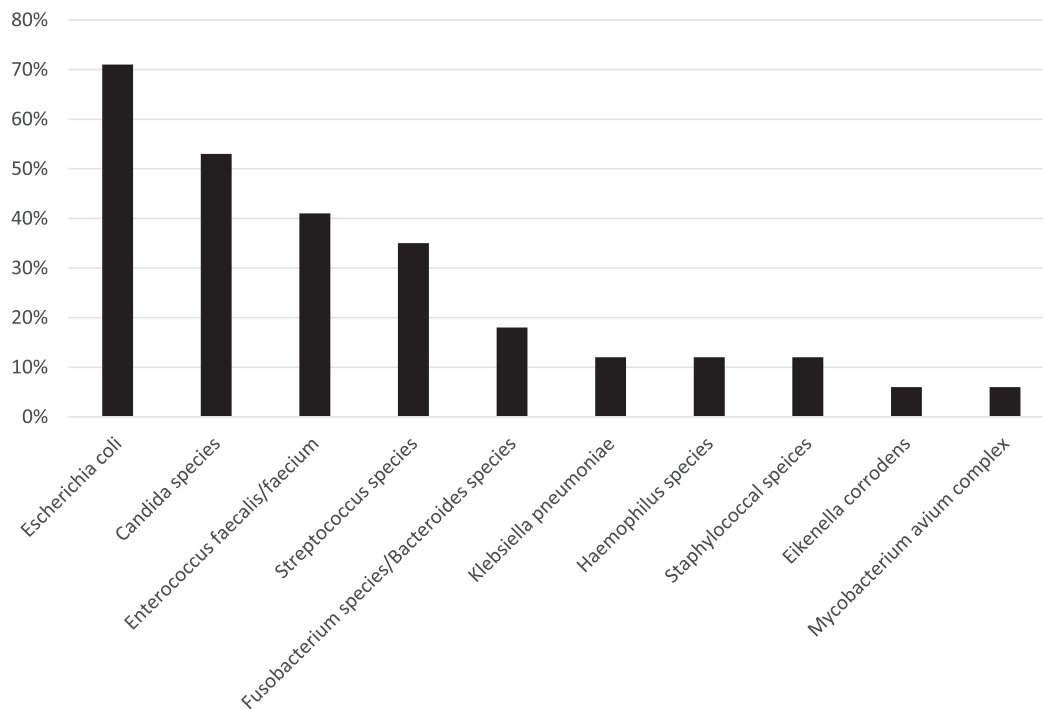
Percutaneous drainage in the treatment of intra-abdominal abscess in Crohn disease has been evaluated in various other studies with eventual surgical therapy required in 20% to 70% of patients.<sup>5-13</sup> In this study, 23% of patients in the percutaneous drainage group required another intervention, and 15% of patients eventually required surgery. In most cases, surgery was successfully avoided.

Treatment of intra-abdominal abscesses with antibiotics alone has been less widely studied in the literature. Garcia et al<sup>5</sup> conducted a retrospective study of 51 patients with intra-abdominal abscesses and Crohn disease, 10 of whom underwent treatment with antibiotics alone. Abscess recurrence in the medical treatment group was 50%, with subsequent surgery required in 80% of recurrences. Bermejo et al<sup>6</sup> reported an abscess recurrence of 37% in the medical treatment group in a study of 128 patients with 54 patients in the medical treatment group, all of whom eventually required surgery. Similarly, Lee et al<sup>7</sup> described an abscess recurrence or nonresolution rate of 37% in the medical treatment group in their study of 19 patients treated with antibiotics alone. In this study, the abscess recurrence or nonresolution in the medical treatment group was lower than in the above-mentioned studies at 31%. The follow-up period of 6 months in this study is shorter than the 12 to 47.5 months of follow-up periods in the above-mentioned studies. Thus, this study may have found a slightly

higher recurrence rate if patients had been followed longer. However, Garcia et al<sup>5</sup> and Lee et al<sup>7</sup> also evaluated time to abscess recurrence and found that all abscesses recurred within 3 to 7 months. In addition, recurrence was closer to 3 months in the nonsurgical (medical and percutaneous drainage) groups, which would suggest that almost all abscess recurrences would be captured within this study's follow-up period.

Despite the apparent success of antibiotics alone in the treatment of intra-abdominal abscess demonstrated in this study, it still remains unclear how to select patients for this therapy. The American College of Radiology guidelines for the treatment of intra-abdominal abscess, which are not specific to Crohn disease, recommend antibiotics alone for abscesses less than 3 cm with follow-up imaging to ensure resolution.<sup>14</sup> A trial of antibiotic therapy alone for abscesses less than 3 cm is also suggested in the review by Feagins et al<sup>1</sup> of the current strategies in the management of intra-abdominal abscess in Crohn disease. In this study, the mean abscess diameter was 3.2 cm in the medical treatment group which may have contributed to this group's success. Studies have also suggested that abscesses in association with an enteric communication are less likely to be successfully treated with medical therapy alone or percutaneous drainage.<sup>1,6-7,11</sup> The presence of an associated fistula was not evaluated in this study. Yamaguchi et al<sup>10</sup> suggested the importance of prior surgical history in evaluating patients for conservative therapy. In their study, 85% of patients successfully treated conservatively had no prior surgical history compared with 25% of patients who eventually required surgery. Prior surgical history was not evaluated in this study.

The recurrence of abscesses after primary surgical drainage was 29% in this study, which is higher than the abscess recurrence rates of 9% to 20% reported in other studies.<sup>5,6,8,9</sup> This may be, in part, due to the small sample size of only 7 patients



**Figure 1.** Abscess microbiology. All abscesses were polymicrobial. The data represent 16 abscess cultures from the interventional group and 1 blood culture from the medical group. The graph represents the percentage of cultures which grew a specific organism or species. *Escherichia coli* was the most frequently cultured organism.

compared with 33 to 44 patients in the surgical group in the comparison studies. In addition, other potentially complicating variables, such as the use of immunosuppressive medications and whether associated diseased bowel was removed in the primary surgery, were not accounted for.

The duration of antibiotic therapy between medical versus interventional groups has not been evaluated in other studies. In this study, the average duration of antibiotic use was similar between medical and interventional groups. Given the wide range of data, the median values were calculated and demonstrated that antibiotic duration was lowest for the medical group. One would expect the opposite. It is likely, however, that the medical therapy group represents the least complicated cases with smaller abscesses, and indeed our study did show that the average size of an abscess in the medical treatment group was smaller than in the interventional groups by about half. The longer duration of antibiotics in the interventional group may be due to variables not accounted for in the study.

This study is limited by its retrospective design and small sample size. The sample size precluded conducting any adjusted analyses, but this would be important to pursue in future studies. Patients were treated at the discretion of the attending physician and not by any standardized protocol.

## Conclusions

In conclusion, this study did not demonstrate a difference in treatment failure between initial conservative therapy with antibiotics alone and interventional therapy for

intra-abdominal abscesses in Crohn disease. Treatment with antibiotics alone or percutaneous drainage successfully avoided surgery in most cases. The duration of antibiotic therapy was not significantly different based on the type of treatment chosen; however, there were likely confounding factors resulting in an increased antibiotic duration in the interventional group.

## Author Contributions

All the authors contributed in writing and editing this article.

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