



## Outcome of medical management of intraabdominal abscesses in children with Crohn disease☆☆☆



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### ABSTRACT

**Introduction:** Crohn disease (CD) is a chronic inflammatory condition of the gastrointestinal tract that is complicated by fistulas, strictures, and intraabdominal abscesses (IAA) in 10%–30% of patients. To avoid surgical resection of the bowel, medical therapy with antibiotics (Ab) with or without percutaneous drainage (PD) is first undertaken. Our objectives are to examine the outcome of IAA in CD patients treated with antibiotics alone vs antibiotics and PD, and to identify risk factors for medical therapy failure.

**Methods:** Charts for patient with CD who were diagnosed between 2004 and 2016 at the Women and Children's Hospital of Buffalo were retrospectively reviewed. We compared the two modalities of medical therapy (Ab + PD vs Ab alone) in terms of abscess resolution and the need for surgical intervention.

**Results:** Twenty-nine patients, ages ranging from 12 to 18 years, mean  $15.5 \pm 2.5$ , 48% Male with IAA were identified. Overall, 69% of abscesses failed medical therapy including 87% of the drained abscesses and 50% of nondrained abscesses,  $p = 0.04$ . The abscesses that failed medical therapy were more likely to have been drained ( $P = 0.03$ ) as they were larger in size ( $P = 0.03$ ), patients were more likely to have a known CD on immunosuppression ( $P = 0.016$ ), and more likely to have an associated upper GI disease ( $P = 0.002$ ), when compared to those that were successful with medical therapy alone.

**Conclusion:** Our results show that the majority of our patients required surgical intervention for abscess treatment and resolution of associated findings despite drainage. Risk factors include big drainable abscesses, developing IAA while on immunosuppression, and a more extensive disease with associated fistulae and strictures. Small undrainable abscesses are likely to resolve with antibiotics alone, therefore early detection and treatment are essential.

**Type of study:** Level 2, retrospective study.

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Crohn disease (CD) is a chronic inflammatory condition of the gastrointestinal tract. It involves the full thickness of the bowel wall and therefore can be complicated by fistulas, strictures, and intraabdominal abscesses (IAA) in 10%–30% of patients [1–3].

The medical treatment regimen for IAA involves antibiotic therapy with or without percutaneous drainage (PD). If an abscess persists,

surgical drainage along with resection of the diseased bowel segment is warranted [4]. PD by interventional radiology (IR) along with intravenous (IV) antibiotics has become the first line therapy in order to prevent surgical intervention or to improve surgical outcomes [5]. However the success rate of PD in abscess resolution varies widely, ranging from 14% to 85%. It is unclear whether it can prevent the need for surgical intervention [6].

The risk of surgical intervention increases with the duration of the disease. The cumulative surgical rate in pediatric patients is 14%–17% at 5 years, and 28% at the 10-year follow up [4]. Bernell et al. [7] reported the cumulative incidence of bowel surgery in CD at 10 years after diagnosis to be 71%. Schaefer et al. [8] reported a 13.8% risk of surgery at 5 years in pediatric patients with CD. That risk increases to 21.5% in patients 13–16 years old. In addition to age at diagnosis, other factors such as greater disease severity, stricturing, and penetrating disease were also found to be associated with an increased risk for bowel surgery in patients [8]. Despite the introduction of infliximab and other biologics

**Abbreviations:** CD, Crohn disease; IAA, Intraabdominal abscesses; PD, Percutaneous drainage; IBD, Inflammatory bowel disease; IR, Interventional radiology.

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over the past 15 years, it is unclear whether biologics have decreased the risk of surgery in patients with CD. In one study there was no demonstrable difference noted in the rates of patients requiring resection surgery within three years of diagnosis.

Studies on the management of IAA in children are very limited. Dotson et al. retrospectively reviewed charts of 30 pediatric patients with Crohn disease and IAA. Most of their patients (>60%) required definitive surgical intervention within 1 year [9]. However, they had no clear predictors of medical management failure.

Our objective in this study is to examine the outcome of IAA in CD patients receiving IV antibiotics alone, compared to PD plus IV antibiotics, in terms of surgical intervention prevention and abscess resolution. The secondary objective is to identify any risk factors associated with medical therapy and PD failure.

## 1. Materials and methods

Charts of patients with Inflammatory Bowel Disease (IBD), who were diagnosed between 2004 and 2016 at the Women and Children's Hospital of Buffalo, were retrospectively reviewed. Patients with CD, either known or newly diagnosed, found to have an IAA were included in the study.

The diagnosis of CD was based on clinical, radiographic, endoscopic, and histological criteria. IAA was diagnosed by a radiologist on magnetic resonance imaging (MRI) or a computed tomography (CT) scan of the abdomen and pelvis, with IV and oral contrast. An abscess was defined as an inflammatory mass with a rim enhancing fluid component.

Parameters examined at presentation included the presence and size of an abscess in ml (calculated by approximation to a revolution ellipsoid with the average formula of  $d1 \times d2 \times d3 \times 0.52$ ), pediatric Crohn disease activity index (PCDAI), Paris classification, demographics, inflammatory markers, imaging, management outcome, and time to abscess resolution [14].

### 1.1. Treatment

All patients who were determined to have IAA were admitted to the hospital and were started on broad-spectrum IV antibiotics. Drainable abscesses were drained by an interventional radiologist. Treatment success was defined as complete resolution of the abscess, without the need for surgical drainage or resection of the diseased part at follow up. If a surgical resection or surgical drainage was required, it was considered a failure of the medical treatment.

## 2. Ethical consideration

The study was approved by the Children and Youth Institutional Review Board (CYIRB), at the University at Buffalo.

## 3. Statistical analysis

Data were entered into an Excel spreadsheet and uploaded onto Statistical Analysis System (SAS).

A t-test was performed to compare continuous outcomes. The Mann-Whitney test was used to compare ordinal outcomes, and the Chi-square or exact test was used to compare categorical outcomes. A multivariate logistic regression was performed to determine variables associated with medical therapy and PD failure. We also performed a stepwise selection logistical model to determine the most significant variable.

## 4. Results

### 4.1. Patient characteristics

From 2004 to 2016, we identified twenty-nine patients who were diagnosed with CD that was complicated by the presence of an

**Table 1**

Demographics of patients who underwent percutaneous drainage vs those who had no drainage.

	Drained (n = 15)	Not drained (n = 14)	P values
Age at abscess onset (mean ± SD)	15.5 ± 3.0	15.5 ± 2.2	0.74
Time from CD diagnosis to abscess onset (yrs) (mean ± SD)	1.2 ± 2.3	1.6 ± 3.2	0.73
Gender M (%)	8 (53)	6 (43)	0.73
BMI z score (mean ± SD)	-0.79 ± 1.5	-1.1 ± 2.0	0.69
PCDAI (mean ± SD)	43.4 ± 9.9	35.9 ± 11.6	0.07
ESR (mean ± SD)	63.6 ± 18.8	39.4 ± 16.4	0.002
CRP (mean ± SD)	145.0 ± 75.4	70.6 ± 38.0	0.003
Hematocrit (mean ± SD)	32.0 ± 6.2	32.8 ± 3.7	0.58
Albumin (mean ± SD)	3.13 ± 0.5	3.2 ± 0.5	0.68
Size of abscess in ml (mean ± SD)	45.8 ± 56.2	8.7 ± 8.7	0.02
Duration of drain in weeks (mean ± SD)	8.5 ± 5.3	N/A	N/A
Needed surgical intervention N (%)	13 (87)	7 (50)	0.04
Paris Classification			
A1b n (%) <sup>a</sup>	9 (60%)	13 (93%)	0.1
A2 n (%) <sup>a</sup>	6 (40%)	2 (14%)	0.1
L1 n (%) <sup>a</sup>	8 (53%)	10 (71%)	0.5
L3 n (%) <sup>a</sup>	8 (53%)	5 (36%)	0.3
L4a n (%) <sup>a</sup>	5 (33%)	5 (36%)	0.9
L4b n (%) <sup>a</sup>	0 (0%)	1 (7%)	0.3
B2 n (%) <sup>a</sup>	7 (47%)	9 (64%)	0.5
B3 n (%) <sup>a</sup>	12 (80%)	14 (100%)	0.3
P n (%)	4 (27%)	2 (14%)	0.4

Note: All patients received antibiotics.

PD = percutaneous drainage, CD = Crohn disease, SD = standard deviation, M = male, PCDAI = pediatric Crohn disease activity index, ESR = erythrocyte sedimentation rate, CRP = C-reactive protein.

No one had A3 (age > 40), L2 (isolated colonic disease), or B1 (nonstricturing nonpenetrating disease).

<sup>a</sup> Used Paris classification. A1b = ages <17, A2 = ages 17 < 40, L1 = Distal ileum and limited cecal disease, L3 = ileocolonic disease other than limited cecal disease, L4a = upper disease proximal to ligament of Treitz, L4b = upper disease distal to ligament of Treitz but proximal to distal 1/3 of ileum, B2 = stricturing disease, B3 = penetrating disease, P = perianal disease.

intraabdominal or pelvic abscess. The age of patients at the time of CD diagnosis ranged from 12 to 18 years (mean 15.5 ± 2.5 years; 48% male). Patient demographics are shown in Table 1, including Crohn disease activity index scores, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), hematocrit and albumin values at the time of presentation with an abscess, the average size of the abscess and Paris classification.

Fourteen patients (48%) were diagnosed with CD at the time they presented with an abscess. They were not under treatment at the time of diagnosis. The rest were on maintenance medications for 1.4 ± 2.8 years prior to developing an abscess (Tables 3 and 4).

All 12 patients that were known to have CD had imaging studies including computed tomography scans and magnetic resonance imaging prior to abscess onset. There was no evidence of abscess, phlegmon,

**Table 2**

Imaging pre and post abscess diagnosis.

	Drained (n = 15)	Not drained (n = 14)	Overall (n = 29)
<b>Pre Abscess Imaging</b>			
CT	6	6	12
MRI	3	2	5
UGI SBFT	2	1	3
None	4	5	9
<b>Post abscess Imaging</b>			
CT	6	5	11
MRI	8	7	15
UGI SBFT	0	1	1
US	1	1	2

CT = computed tomography, MRI = Magnetic resonance imaging, UGI SBFT = upper gastrointestinal series with small bowel follow through, US = ultrasound, CD = Crohn disease.

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