

Review of Intra-Abdominal Abscess in Crohn's Disease

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Abstract

Crohn's disease is an idiopathic chronic transmural inflammatory condition of the intestine. Common complications include intestinal obstruction, internal and external fistulae, and spontaneous abscess formation. Intra-abdominal abscess affects 7-28% of patients with Crohn's disease. This discussion will provide an overview of intra-abdominal abscess in Crohn's disease focusing on risk factors, clinical features, evaluation and management.

Keywords: Crohn's disease; Intra-abdominal abscess; Percutaneous drainage; Surgical resection

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Introduction

Crohn's disease is an idiopathic chronic transmural inflammatory condition of the intestine. The incidence and prevalence of Crohn's disease is 5-10/100,000 people and 50-100/100,000 people respectively [1]. It can affect any portion of the gastrointestinal tract from the mouth to the perianal area. It commonly affects the terminal ileum and cecum (55%) [2]. Crohn's disease is a lifelong condition and can present at any

age. However, more than 80% of patients present before the age of 40 years [3].

Crohn's disease patients have varied presentation with a broad spectrum of clinical manifestations that may be confused for other medical conditions. They can present with abdominal pain, diarrhea with or without bleeding, weight loss, or fatigue. The diagnosis of Crohn's disease is confirmed by using a combination of endoscopic, pathologic, and imaging studies of the bowel in a patient with a compatible clinical history. The disease course is characterized by frequent exacerbations and remissions. Patients are prone to develop pyogenic complications because of the transmural nature of the disease. These include fistulas, frank perforations, and abscess formation.

This review aims to provide an overview and summarize the evaluation and management of spontaneous intra-abdominal abscesses in patients with Crohn's disease.

Overview and Risk Factors for Intra-abdominal Abscess

Intra-abdominal abscess affects 7-28% of patients with Crohn's disease [4, 5]. The majority of abscess are on the right side (66%) and 40% are anterior abdominal wall abscesses [5]. Spontaneous intra-abdominal abscess can form as a result of one of the following mechanisms- direct spread of bacteria through a fistula from the bowel to the adjacent tissue or, less likely, by hematogenous spread.

An intra-abdominal abscess in Crohn's disease is commonly localized in the dependent areas of the peritoneal cavity such as the pelvis, sub diaphragmatic area, paracolic

gutters or between bowel loops (inter-loop abscess). The abscess usually contains a mixture of aerobic (*E.Coli*, *Enterococci*) and anaerobic bacteria (*Bacteroides Fragilis*, *Peptostreptococcus*) [6, 7]. Infections with *Candida Albicans* can be seen in chronic abscess after prolonged antibiotic therapy in immuno suppressed and malnourished patients. The risk factors for the development of intra-abdominal abscess are delineated in Table 1.

Table 1: Risk factors for intra-abdominal abscess in Crohn's disease

Spontaneous Intra-abdominal Abscess [9, 10]	Postoperative Intra-abdominal Abscess [11,13]
Genetic Factors	Thiopurine therapy
Smoking	Preoperative corticosteroid use
Low albumin levels (<3g)	Duration of symptoms leading to surgery
Recurrent clinical episodes of CD	Colo-colonic anastomoses
Articular disease manifestation	Operating time >180 minutes
Corticosteroids	Penetrating type
	Hand sewn anastomosis

Association with genetic markers such as polymorphisms of Immunity- Related Guanosine triphosphatase family M (IRGM), Organic Cation Transporter (OCTN1/2), Disks Large HomoloG 5 (DLG5) and internal penetrating Crohn's disease have been noted [13, 14]. Corticosteroids when used alone increase the risk for both spontaneous and post-operative intra-abdominal abscess by three fold. The risk increases by 15 fold when corticosteroids are used in combination with other immuno suppressants [8]. However, in contrast, the thiopurines and anti-TNF agents have a lower risk of development of intra-abdominal abscess when used alone [16]. The risk of fistula formation and subsequent abscess development is found to be higher in smokers [17]. A

retrospective study of patients who underwent surgery for primary or recurrent Crohn's disease by Kanazawa et al. [15] revealed operating time >180 minutes, penetrating phenotype, and hand sewn anastomosis, to be the main risk factors for postoperative intra-abdominal septic complications.

Evaluation of Intra-abdominal Abscess

A high degree of suspicion for an intra-abdominal abscess in a patient with Crohn's disease should be entertained in patients who present with fever and abdominal pain, with or without an abdominal mass. Either Computerized Tomography (CT) (Figure 1, 2) or Magnetic Resonance Imaging (MRI) (Figure 3, 4) of the abdomen and pelvis is considered an appropriate imaging modality for the diagnosis of an intra-abdominal abscess. They not only detect superficial abscesses but are also useful in detecting retroperitoneal and deep pelvic abscesses. The CT scan has a sensitivity and specificity of 90% and 95% respectively [18]. Following the detection of the abscess, an attempt should be made to evaluate for the presence of a fistula as this can change patient management. Fistula detection by either CT or MR Enterography is high yield with a sensitivity of 100% for MRE [19].

CT enterography is quicker but carries the risk of exposure to ionizing radiation. This is of concern in patients with Crohn's disease who are more likely to undergo repeated radiologic evaluations because of the recurrent nature of the disease and its attendant complications. MR Enterography can be used and involves no exposure to ionizing radiation. However, they are expensive, more time consuming, and variable in both examination quality and availability. A recent study by Lee et al. [20] involving 92 patients with Crohn's disease who underwent CT enterography using a standard dose of radiation compared with 50% reduced dose performed similarly with regards to identification of enteric inflammation of Crohn's disease. Contrast enhanced ultrasound may be useful in differentiating phlegmon and abscess. Colonoscopy should be performed in patients with a spontaneous intra-abdominal abscess following treatment and control of acute infection. This helps in determining the extent, severity, and location of the disease.

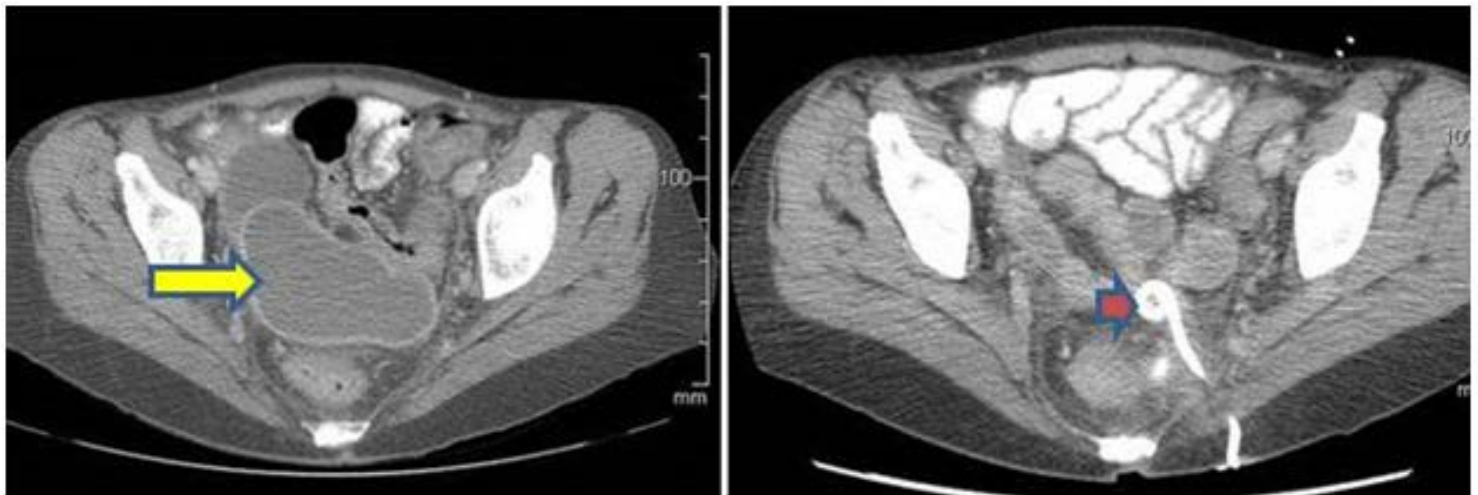
Figure: 1

Figure 1: Axial CT images. The yellow arrow on the first image points to a peripherally enhancing deep pelvic abscess. The second image was acquired several days after percutaneous

drainage, and the red arrow points to the end of a pigtail drainage catheter, with no residual abscess cavity.

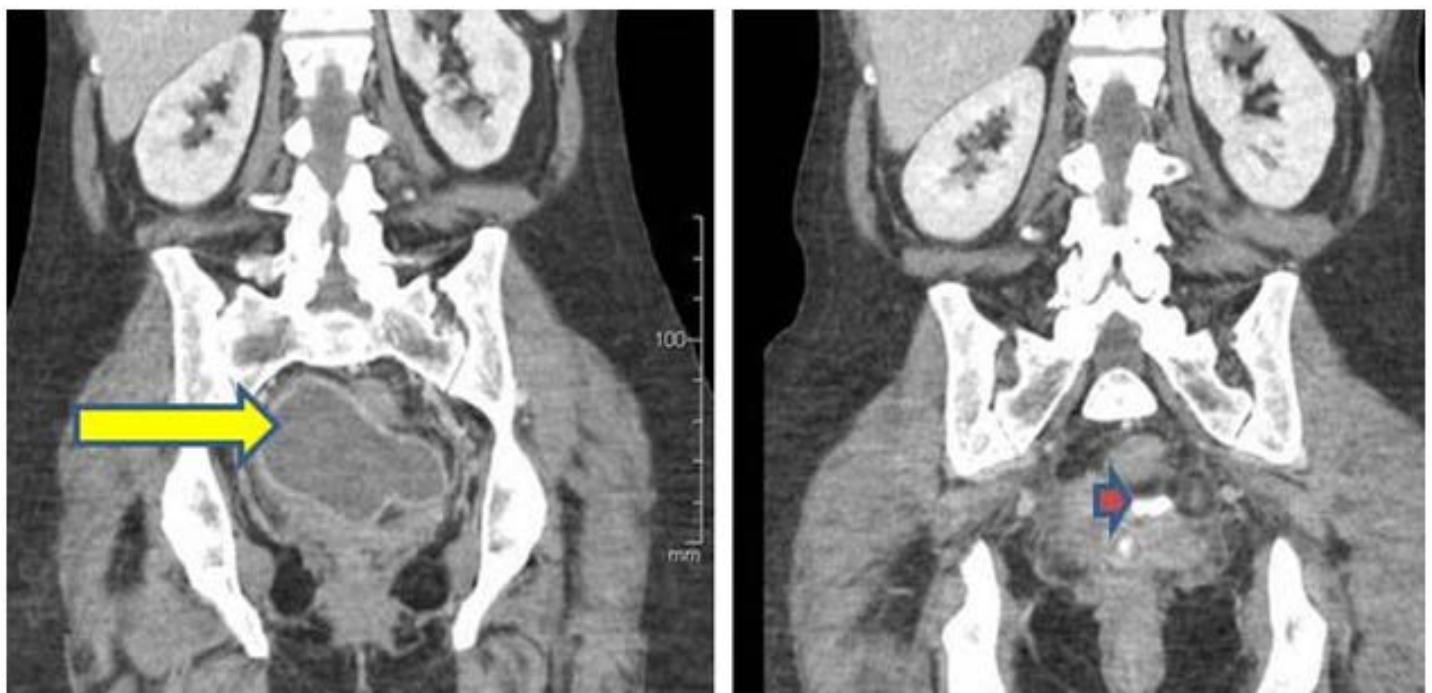
Figure: 2

Figure 2: Coronal CT images: The yellow arrow on the first image points to a peripherally enhancing deep pelvic abscess. The second image was acquired several days after percutaneous

drainage, and the red arrow points to the end of a pigtail drainage catheter, with no residual abscess cavity

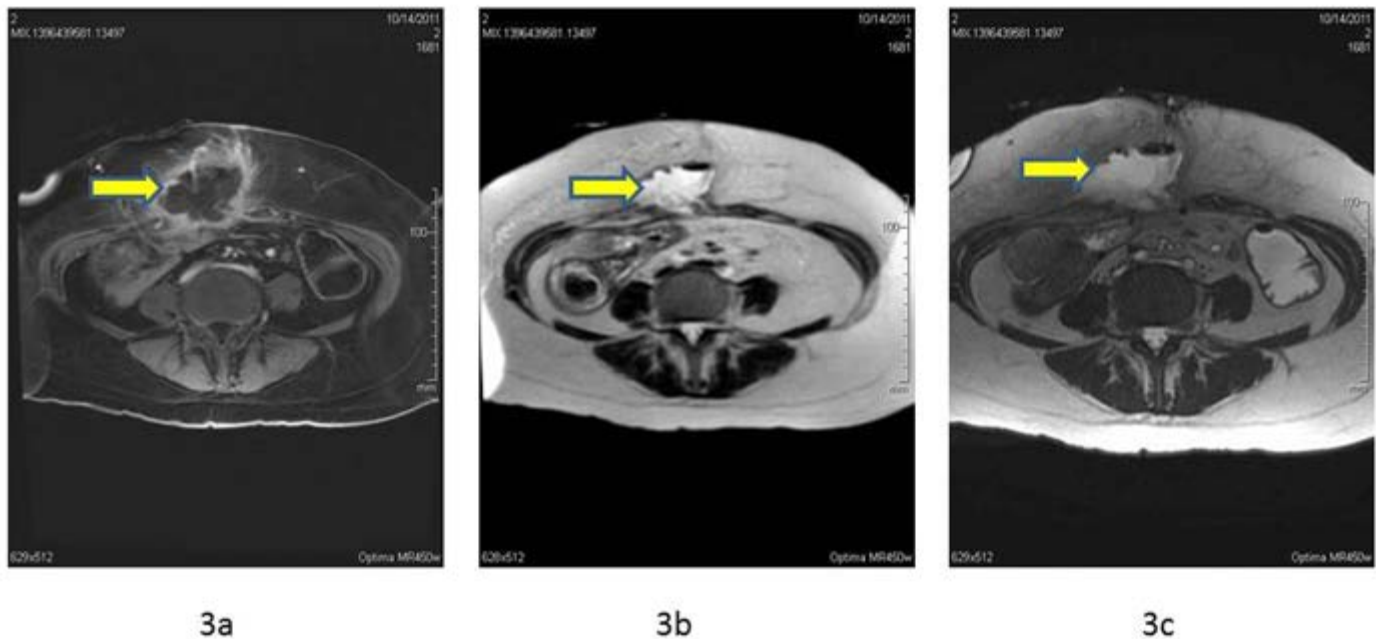
Figure: 3

Figure 3: Axial MRI images showing an abdominal wall abscess (yellow arrow). a) Axial fat-saturated T1 after gadolinium contrast. b) Axial single shot FSE T2. c) Axial FIESTA.

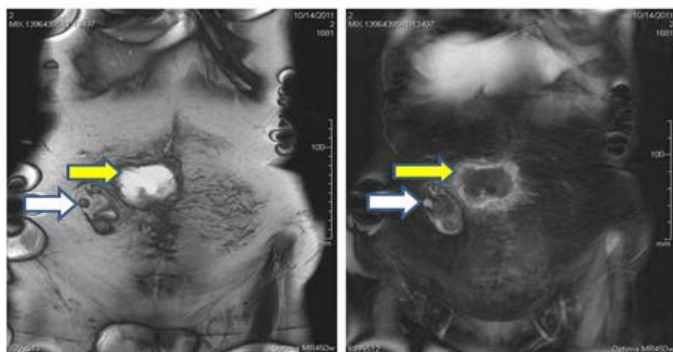
Figure: 4

Figure 4: Left image: MRI: Coronal FIESTA sequence. The yellow arrow points to an abdominal wall abscess. The white arrow points to a stoma in the adjacent abdominal wall.

Right image: MRI: Coronal fat-saturated T1-weighted sequence after gadolinium contrast. The yellow arrow points to an abdominal wall abscess. The white arrow points to a stoma in the adjacent abdominal wall.

Treatment of Intra-Abdominal Abscess

Non-Operative Management

Patients with a documented abscess should be treated in the hospital with bowel rest, adequate hydration, and pain control. Intravenous antibiotic therapy covering aerobic and anaerobic bacteria should be initiated promptly following diagnosis of an intra-abdominal abscess. Piperacillin-Tazobactam is usually the first line antibiotic. If patients are penicillin allergic ciprofloxacin + clindamycin, ertapenem or metronidazole + third generation cephalosporin should be considered. *Candida Albicans* can be treated with fluconazole.

The decision to drain the abscess depends on its size. If the abscess is < 3cm in diameter with no associated fistula, the patient can be managed conservatively with antibiotic therapy and close clinical monitoring in a hospital setting [21, 22]. The clinical progress can be monitored by repeat imaging in 4-5 days to evaluate for worsening or non-improvement of the abscess. If there is no improvement on imaging, percutaneous drainage of the abscess without drain placement should be considered. If there is clinical and radiographic improvement, repeat imaging should be done in 4-6 weeks to confirm resolution of the abscess.

Patients who have an intra-abdominal abscess > 3cm in diameter will less likely resolve without drainage. An ultrasound or CT guided catheter is placed to drain the abscess and success can be achieved in 85-100% of cases [23]. Percutaneous drainage has similar outcomes to a surgical approach for patients with intra-abdominal abscess [24]. The factors that adversely affect successful outcome of the procedure include steroid use, colonic disease phenotype, and multiple or multi locular abscesses [25].

In recent years there has been an increasing trend towards non-surgical management of intra-abdominal abscess. However, practice variations still exist with teaching hospitals more often opting for percutaneous drainage versus surgery [26]. Percutaneous drainage was associated with shorter hospitalizations (6.5 v s 16.5 days), and lower treatment costs [24]. Surgery can be entirely avoided in some patients [27]. Even in patients in whom surgery is being considered, percutaneous drainage is still considered the first line therapy as it significantly reduces the rate of postoperative septic complications such as anastomotic leak, postoperative intra-abdominal abscess, and fistula formation [28]. Hence, the emergence of percutaneous drainage has converted emergency surgery into elective surgery and has increased the possibility of a successful one-stage surgical procedure rather than the more complicated and extensive two-stage procedure.

A fistula should be suspected in patients with large volume catheter drainage (>50ml/day) or if there is persistent drainage from the abscess cavity after one week of catheter placement. Percutaneous drainage is contraindicated in patients with peritoneal signs, hemorrhage, and non-mature abscess/phlegm on [29]. It is a relatively safe procedure but rare complications such as enterocutaneous fistula, bacteremia, and soft tissues infection have been reported, especially in immune-suppressed patients. Imaging, preferably CT scan, should be considered once every 1-2 weeks if the catheter remains in the abscess cavity or if there are any signs of clinical deterioration. Antibiotics should be continued up to one week after complete drainage of the abscess. A longer course may be required in patients if the abscess is incompletely drained.

Operative Management of Intra-abdominal Abscess

Operative management of an intra-abdominal abscess is considered in patients who have failed non-operative management, have fistulizing disease with sepsis, recurrent abscesses, or in those who will need resection for intractable disease. Gutierrez et al. [30] noted that the time to resolution of abdominal and pelvic abscesses was similar with surgical or percutaneous drainage, which increased with longer delay in time to drainage. They further found approximately one-third of patients treated with percutaneous drainage required surgery within one year. The average time from percutaneous drainage to surgery in a study by Rypens et al. was found to be 25 days (range 8-60 days) [31]. With the advent of percutaneous drainage, surgery is usually elective. Before opting for elective surgery, the surgeon should ensure that the patient has adequate nutritional support. However, if ongoing sepsis is an indication for surgery or there is a multi locular abscess not amenable to percutaneous drainage, emergent surgery may be required.

Surgical treatment usually involves exploratory laparotomy, debridement of the abscess cavity, and resection of the involved bowel. Fistulas can be treated by dissection and repair followed by interposition of omentum between two organs if necessary. In the presence of gross perforation, the involved segment of bowel should be resected and primary repair should be avoided as it is associated with higher morbidity and mortality. Reduced rates of stoma creation were noted in patients who undergo elective surgery following a successful percutaneous drainage as compared with failed percutaneous drainage or those requiring emergency surgery [32]. Postoperative septic complications are more common in patients with low albumin (<3g/L), preoperative corticosteroid use, undrained abscess, or fistula at the time of laparotomy [10]. If all four of these factors are present, the risk of intra-abdominal sepsis is 50% vs 5% in the absence of any risk factors.

Immunosuppressant use in patients with intra-abdominal abscess

There are no clear guidelines for the use of immunosuppressants following the diagnosis of an intra-abdominal

abscess. There is variation in the use of immuno suppression in managing spontaneous intra-abdominal abscess. There are no studies that evaluated role of immuno suppressants in patients with Crohn's related intra-abdominal abscess. However, several studies that were done to evaluate the role of specific treatments for intra-abdominal abscess also mentioned continuation of immunosuppressant therapy during management. In a retrospective review by Gervais et al. [27] involving 32 patients who underwent percutaneous drainage of an intra-abdominal abscess, 19 patients were on steroid therapy and 50% had resolution without surgery. However, a recent review by Dulai et al. [33] revealed that the risk of serious infection is higher in patients treated with steroids than those treated with anti-Tumor Necrosis Factor (TNF) agents.

A recent prospective observational study [34] from the Therapy Resource Evaluation Assessment Tool (TREAT) registry compared anti-TNF therapy (infliximab) with conventional non-biological medications used in the treatment of Crohn's disease. There was a risk of serious infection (fungal, mycobacterial) with steroid and anti-TNF therapy. The risk appears to be higher with steroid use. Crohn's disease patients using anti-TNF agents had a lower risk of intra-abdominal abscess when compared to steroid therapy (intestinal abscess 0.04 vs 0.05 /100 patient-years, pelvic abscesses 0.01 vs 0.05 /100 patient-years) [3] (however, there was no *p*-value reported). The current opinion regarding use of immuno suppressants based on the information available is to hold immunosuppressive therapy until complete drainage of the spontaneous intra-abdominal abscess is achieved and infection is controlled. In patients with a spontaneous intra-abdominal abscess, it is preferable to resume immuno suppressants early – about 3 weeks after the abscess drainage [35] as to enable healing of the diseased bowel.

Conclusion

Intra-abdominal abscess formation affects up to one third of patient's with Crohn's disease. A mixture of aerobic and anaerobic organisms can be found in these abscesses. Treatment involves bowel rest, analgesia, antibiotics, percutaneous and/ or

surgical drainage. Immuno suppressants should be held until the abscess is completely drained and infection controlled.

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