Role of Percutaneous Abscess Drainage in Young Patients with Crohn’s Disease

- Intra-abdominal abscesses develop in 10–30% of patients with Crohn’s disease and are typically detected on either MRI or CT imaging
- An abscess is a complication of penetrating Crohn’s disease and is considered a contraindication to immunosuppressive medical therapies
- Treatment options for intra-abdominal abscesses include antibiotics, percutaneous abscess drainage (PAD), and surgery
- Benefits of PAD for Crohn’s related abscesses include:
  - Minimal invasiveness
  - Rapid clearance of infection allowing initiation of anti-inflammatory medications
  - Potential avoidance of surgical abscess drainage and/or surgical bowel resection

The prevalence of Crohn's disease is estimated to be 319 per 100,000 persons in the USA, with an incidence of about 5-10 cases per 100,000 individuals per year. Up to one quarter of the diagnoses are made in children <18 years, who are more likely than adults to present with more extensive bowel involvement and to have rapid clinical progression. During the course of their illness, 10-30% will develop an abdominopelvic abscess. In broad terms, such abscesses can be categorized as either perianal or intra-abdominal. Perianal abscesses are typically treated with a combination of medical therapy and surgical drainage and are beyond the scope of this article. Intra-abdominal abscesses, because of their frequently deeper anatomic location and larger size, often present more of a therapeutic dilemma.

Crohn's disease is characterized by transmural inflammation involving the entire bowel wall thickness. Penetrating Crohn's disease refers to inflammation that has broken through the bowel wall, which can cause complications related to gut bacteria exiting the bowel into the surrounding abdomen and pelvis. Fistulas can develop when inflammatory tracts extend from one bowel loop to another, or from the bowel to another organ or the skin. Abscesses are focal accumulations of this bacteria-rich fluid that typically occur adjacent to inflamed bowel segments within an inflammatory track. Abscesses can also occur at surgical anastomosis sites of prior bowel resections.

Diagnosis and Assessment of Intra-abdominal Abscesses
MR enterography (MRE) has several advantages over other imaging modalities for the diagnosis and assessment of abscesses associated with Crohn's disease. MRE, which uses both intravenous and oral contrast for optimal bowel evaluation (Figure 1), does not expose the patient to ionizing radiation, which is an important consideration for
young patients who may require frequent imaging for monitoring and treatment of their disease. It has excellent contrast resolution for detecting abscesses (T2-hyperintense fluid collections with peripheral enhancement) as well as associated bowel inflammation and fistulous tracks. However, it is less sensitive than CT for detecting free intraperitoneal air that can be an early sign of abscess formation and may not be well-tolerated by children due to relatively long scan times (30-45 minutes). MRE image quality can be significantly affected by patient movement, and young children may require intravenous sedation to tolerate MRE.

CT enterography (CTE) is another commonly used diagnostic method for patients with suspected abscesses due to Crohn’s disease (Figure 2). Similar to MRE, CTE utilizes intravenous and large-volume oral contrast for tailored bowel evaluation. The main advantages of CTE include very fast scan times (<1 second), no need for patient sedation, and overall more consistent image quality in young children compared to MRE. Its main disadvantage is patient exposure to ionizing radiation, although continued innovations in CT technology have dramatically reduced effective radiation dose to patients from abdominal CT scanning in recent years.

Ultrasound is another imaging modality increasingly used for bowel evaluation in children. Like MRE, ultrasound does not expose patients to ionizing radiation. Ultrasound has advantages over MRE including the ability to evaluate the bowel and associated fluid collections in children who are awake without the need for sedation. However, ultrasound (Figure 3) is limited in older children and adults by depth of visualization and associated obscuration of adjacent structures by air within bowel loops. This is a particular problem for assessment of intra-abdominal abscesses, which in general are deep within the abdomen and surrounded by bowel.

**Intra-abdominal Abscess Therapy**

Treatment of Crohn’s-related intra-abdominal abscesses is typically multidisciplinary, involving pediatric gastroenterologists, interventional radiologists, and surgeons. Crohn’s disease patients with an abscess often present with abdominal pain and signs of infection (e.g., fever, leukocytosis) and are at increased risk for disseminated infection and sepsis. The primary goal of therapy is to eradicate the infection. In addition, because an abscess is considered a contraindication to immunosuppressive Crohn’s medical therapies, the secondary goal of therapy is to allow initiation or resumption of Crohn’s directed medications to treat the penetrating inflammatory process underlying abscess formation. Very small (<2cm in diameter) abscesses may resolve with antibiotic therapy alone, but larger
abscesses typically require drainage. Although surgical drainage historically was the primary approach, in recent years image-guided percutaneous abscess drainage (PAD) has become an increasingly common first-line option for the treatment of Crohn’s associated intra-abdominal abscesses because of its minimally invasive nature. In addition to drainage, a specimen of abscess fluid can be sent to the microbiology laboratory for analysis to guide antibiotic treatment. The technical success rate in adult patients is reported to be as high as 96%, and the procedure obviates the need for early surgery in up to 50% of patients.

Pre-drainage CT or MRI is typically performed to determine a suitable percutaneous approach that avoids damage to adjacent structures. PAD is performed under CT or ultrasound guidance, with ultrasound as the preferred modality because it is faster and avoids ionizing radiation. For larger patients and for abscesses that are smaller or deeper within the body, CT is typically used with a low-dose technique to minimize patient radiation exposure.

In most cases, the procedure is performed under moderate sedation. However, general anesthesia may be required for small children and patients who need a transgluteal catheter. The drainage catheter may be placed using the Seldinger or the tandem trochar technique (Figure 4). The size of the catheter, typically in the range of 6-10 Fr, is determined by the location and size of the fluid collection. Aspiration should be performed after catheter placement to drain as much fluid as possible for microbiological analysis. The abscess is then allowed to drain by gravity into a bag. Irrigation with saline is periodically performed post-drainage to help remove any reaccumulated fluid and maintain catheter patency. Once the catheter output ceases, repeat imaging should be employed to confirm correct catheter position, demonstrate resolution of the fluid collection, and assess for a persistent fistula between the abscess cavity and adjacent bowel. If the collection has resolved and the patient’s clinical signs of infection are no longer present, the catheter may be removed.

Contraindications of PAD include coagulopathy and the lack of a safe percutaneous access route. Complications of PAD include damage to adjacent organs and enterocutaneous fistulae, although these are very rare occurrences with the use of real-time imaging.

Scheduling
Image-guided percutaneous abscess drainage is available through the Interventional Radiology Clinic on the main campus of Massachusetts General Hospital. Appointments can be made through ROE (inside Partners network) or ROE Portal (outside Partners network) or by calling 617-726-8396.

Further Information
For further information on image-guided percutaneous abscess drainage in Crohn’s disease, please contact Michael S. Gee, MD, PhD, Pediatric Radiology, Department of Radiology, Massachusetts General Hospital, at 617-724-4207 or Debra A. Gervais, MD, Abdominal Imaging and Intervention, Department of Radiology, Massachusetts General Hospital, at 617-726-8396.

We would like to thank Michael Gee, MD, PhD, Debra Gervais, MD, and Brian Pugmire, MD, Department of Radiology, and Jess Kaplan, MD, Department of Pediatrics, Massachusetts General Hospital, for their assistance and advice on this issue.
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Janet Cochrane Miller, D. Phil., Author
Raul N. Uppot, M.D., Editor