Guidelines for Imaging of Crohn’s Perianal Fistulizing Disease

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Perianal fistulizing disease is very common in patients with Crohn’s disease and has been reported in up to 38% of these patients. Moreover, the presence of complex or multiple fistulas is seen in up to 23% of this group of patients. Perianal fistulizing disease is traditionally diagnosed and assessed with clinical evaluation and EUA. Imaging, however, has been used increasingly in patients with Crohn’s disease and perianal fistulas to confirm the diagnosis and exclude other underlying causes of pelvic sepsis, to classify the fistula for surgical planning, to predict surgical outcome, to assess for recurrent disease, and to monitor medical therapy.

In this article, we discuss the practical indications of imaging in patients with Crohn’s disease and perianal fistulas. We also address the inherent advantages and disadvantages of the vast array of imaging tests currently available and address the role of imaging in monitoring treatment options.

INDICATIONS FOR IMAGING IN PERIANAL FISTULIZING CROHN’S DISEASE

Confirming the Diagnosis

Clinical diagnosis of perianal fistulizing disease is often times made by thorough physical examination and imaging. Imaging is recommended for all patients to assess for septic complications such as an abscess and to accurately identify fistula anatomy. In addition, an accurate assessment of the perianal process is important not only to the medical and surgical treatment decision process but also, as several studies have shown, to patient outcomes especially if an abscess or fistula is missed at the time of EUA. Imaging may also be helpful to demonstrate fistula extension, sphincter complex involvement, and to distinguish this from other causes of perianal infection, such as an obstructed pilonidal sinus. Magnetic resonance imaging (MRI) has shown to be reliable in distinguishing between these 2 entities.

Preoperative Classification of Perianal Fistulizing Disease

Preoperative classification of perianal fistulizing disease allows optimal surgical planning and prediction of outcome of the planned surgery. Traditionally, preoperative assessment has been performed by EUA. However, this may be difficult in the presence of inflammatory swelling or fibrosis or if the cutaneous exit is difficult to identify or probe. Another known disadvantage of EUA alone is determining anatomic landmarks, such as the levator plate.

The most clinically useful classification system is to divide the patient’s perianal fistula into simple or complex as recommended by the American College of Gastroenterology technical review (see Clinical Guidelines for the Management of Perianal Crohn’s Disease). A simple fistula is a superficial, intersphincteric, or low transsphincteric fistula, has only one opening, and is not associated with an abscess and/or does not connect to an adjacent structure, such as the vagina or bladder. In contrast, a complex fistula involves more of the anal sphincters (i.e., high transsphincteric, extraspincteric, or supraspincteric), can have multiple openings, horseshoeing (crossing the midline either anteriorly or posteriorly), is associated with a perianal abscess, and/or connects to an adjacent structure. Imaging can classify fistulas as simple or complex, thereby helping in therapeutic decision-making. This is particularly important for surgical planning as failure to eradicate infections or adequately drain tracts (with seton) may lead to relapse.

Beets-Tan et al demonstrated the beneficial effect of MRI in the presurgical assessment of perianal fistulizing disease. After initial EUA was performed, MRI findings provided important additional information that led to change in surgery in 12 (21%) of 56 patients. The benefit of MRI was most obvious in patients with Crohn’s disease (40%) and in patients with recurrent fistulas (24%). In patients with a primary simple fistula, the benefit was minimal (8%). In their study, those with complex fistulas or Crohn’s disease incurred greater benefit from MRI imaging than those with simple fistulas or non-Crohn’s disease indications. Using a similar study design, Buchanan et al showed that preoperative MRI changed the surgical approach in 10% of patients. Finally, Lindsey et al demonstrated the beneficial effect of MRI in the presurgical assessment of perianal fistulizing disease.

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reported that anal endosonography, when performed preoperatively, influenced operative management in 38% of cases, usually towards a more conservative treatment.

**Predictor of Outcome**

The use of preoperative MRI for the prediction of postsurgical outcome has been evaluated in several studies. Spencer et al⁷ compared the classification of simple versus complex fistulas using MRI and EUA and found that MRI was the better predictor of outcome, with positive and negative predictive values of 73% and 87%, compared with 57% and 64% for EUA, respectively. Similarly, Morris et al⁸ showed that when using the St James’s University Hospital classification, the MRI grading of fistulas was significantly associated with outcome. MRI grades 1 and 2 (fistula confined to the internal sphincter complex) were associated with a favorable outcome after surgical management. MRI grades 3 to 5 (transsphincteric fistulization, grade 3 or 4 and translevator fistula, grade 5) were associated with a less favorable outcome, requiring more complex surgery with threatened continence and potential colonic diversion.

**Assessment of Recurrent Fistula**

Recurrent fistulas are most difficult to evaluate clinically. Buchanan et al⁹ studied the value of preoperative MRI in the evaluation of patients with recurrent fistulas. After an initial EUA, findings of the preoperative MRI were disclosed to the surgeon who at that time could then decide whether to proceed with further surgery. Fistula recurrence was 16% for surgeons who operated based on these MR findings, compared with 57% for surgeons who ignored MRI findings. In the 16 patients who received further surgery as a direct result of the MR findings, MRI correctly predicted the location of disease in all cases.

**Monitoring Medical Treatment**

Infliximab, a chimeric monoclonal antibody to human tumor necrosis factor (TNF) α, is effective in the medical treatment of perianal Crohn’s disease. Imaging plays an important role in therapeutic monitoring of fistula activity. Before treatment, imaging may detect abscess formation in which case infliximab therapy is contraindicated.⁹,¹⁰ After treatment, fistulas may persist despite clinical findings suggesting remission, such as closure of the external opening.⁹,¹⁰ Imaging can demonstrate persistent fistulas in these cases, leading to the decision to escalate medical therapy or undergo surgery.

Van Assche et al⁹ examined clinical and radiological response of Crohn’s fistulizing disease before and after treatment with infliximab in a double-blind placebo-controlled trial. Their study confirmed that MRI was reliable in the assessment of fistula tracts with good interobserver agreement. MRI demonstrated perianal fluid collections in patients’ pretreatment and showed persistent tracts with varying degrees of residual inflammation in 8 of 11 patients that responded clinically (defined as cessation of fistula drainage). Other studies evaluating the role of MRI in the long-term assessment of infliximab therapy also concluded that MRI improvement of the perianal fistulizing disease coincided with clinical and endoscopic response in a large group of patients.¹¹,¹²

Imaging studies with endoscopic ultrasound (EUS) or MRI have demonstrated persistent fistula activity for months after the fistula stops draining. Ng et al¹³ monitored fistula activity with imaging after initiation of therapy. The study showed that MRI detected fistula activity in approximately 50% of patients by week 22; all patients had resolution of fistula activity after escalation of anti-TNF dose. Rasul et al¹⁴ examined the role of transperineal ultrasound in the evaluation of fistula response to infliximab therapy in patients with Crohn’s disease. At week 48, patients treated with infliximab who prematurely discontinued therapy had clinical fistula remission, but incomplete radiological healing showed a propensity for early relapse. Schwartz et al similarly found that the median time to cessation of fistula drainage was 10.6 weeks (4–32 wk) in a cohort of patients treated with combination of immunomodulator, anti-TNF, and antibiotics. EUS activity was still present in all these cases, with median time to EUS inactivity being 21 weeks, again suggesting that fistula healing is slower than clinical healing and prolonged treatment is required for fistula response.¹⁵

**IMAGING MODALITIES**

**Fistulography**

Fistulography involves studying perianal fistulas by contrast fluoroscopic examination. The technique is no longer routinely used in the evaluation of perianal fistulizing disease. The main reasons for the decline in its application include the fact that some fistulas may be missed because of lack of filling with contrast because of debris within or because of contrast reflux from the opening. The procedure can also be painful, and there is
a theoretical risk of septic spread of infected feculent material. Also, fistulograms cannot visualize the pelvic floor musculature and, therefore, cannot demonstrate the relationship of the fistula to the sphincter complex or levator ani muscle. In a retrospective study comparing fistulography to operative findings, Kuipers and Schulpen showed that fistulograms were accurate in only 4 of 25 patients (16%) with a false-positive rate of 12%.

**Computed Tomography**
Computed tomography (CT) is of limited use in the assessment of perianal fistulas because of its inherent lack of contrast resolution. The attenuation of the anal sphincter complex and pelvic floor soft tissue structures is too similar to that of the fistula itself. Schratter-Sehn et al compared CT and EUS to operative findings and/or clinical course for the evaluation of perianal fistulas. Of 25 patients with 17 fistulas, CT could be used to correctly classify only 4 (24%) fistulas, in contrast to the 14 (82%) accurate classifications achieved with endosonography. In addition, CT also exposes patients to harmful ionizing radiation, which is avoided with MRI and EUS.

**Anal Endosonography**
Anal endosonography (AES) or EUS allows good direct visualization of the internal and external sphincter as well as the intersphincteric space. It is excellent at identification of the internal fistula opening (accuracy of 91%) although the tract extending up to the anal mucosal surface may not be seen. Because of the close proximity to the intersphincteric space, intersphincteric fistulas are very well visualized. In general, reports on the accuracy of AES are mixed. Investigators have demonstrated an 82% agreement of findings with surgery, whereas others have found it to be no better than digital rectal examination. This discrepancy may be due to operator dependency of the technique. Other disadvantages of AES include poor visualization beyond the external sphincter and difficulty in imaging in the coronal plane. Supralevatoric extensions are, therefore, difficult to detect. Also, AES cannot be used to reliably distinguish infection from fibrosis, because both have a hypoechoic appearance. This causes particular difficulties in patients with recurrent disease because infected tracts and fibrotic scars are frequently combined.

**Transperineal and Transvaginal Sonography**
Maconi et al compared the detection of perianal and rectovaginal fistulas in patients with Crohn’s disease using transperineal ultrasound with endoanal ultrasound as the reference standard. In their study, they reported that transperineal ultrasound had a sensitivity of 84.9% and provided a simple, painless, and real-time alternative method to detect and classify perianal and rectovaginal fistulas and/or abscesses in Crohn’s disease.

Stewart et al used transperineal sonography in men and both transperineal and transvaginal sonography in women for evaluation of perianal inflammatory disease. In their study, they reported that preoperative sonographic findings were confirmed in 22 (85%) of 26 patients.

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**FIGURE 2.** Coronal T2-weighted (A), axial fat-suppressed T2-weighted (B), and axial contrast-enhanced fat-suppressed T1-weighted images (C) show a 2 cm intersphincteric abscess that appears hyperintense on the T2-weighted images and shows rim enhancement post contrast administration.
The use and value of MRI in the assessment of perianal fistulas in patients with Crohn’s disease has been well established. MRI can separate soft tissue and pelvic septic complications (i.e., abscesses) from fistula anatomy with high accuracy. Furthermore, images can be viewed in both coronal and sagittal planes to better delineate landmarks, and nonionizing radiation avoids exposure to radiation.

The technical and interobserver variability can impact the outcomes of MRI of perianal fistulizing disease. First, MRI protocols may differ between centers. Two types of coils have been used: the endoanal and the external phased array coils. Use of endoanal coils improves MRI evaluation of perianal fistulas, but these coils are poorly tolerated in symptomatic patients. MRI with phased array surface coils requires no patient preparation and is well tolerated.

Technological advances such as higher field strength and greater signal-to-noise ratio have reduced scan time and improved image resolution. Intravenous gadolinium also enhances the detection of fistula activity. Contrast-enhanced MRI can detect fistula disease activity through increases in signal intensity compared with surrounding fat after contrast administration, and positivity correlates with clinical disease assessment using perianal disease activity index and fistula drainage activity. Recent studies using dynamic contrast-enhanced MRI have also shown promise in enhanced identification of fistula activity. Using this modality, images are acquired during (rather than after) contrast administration, thereby capturing the dynamic response of inflamed tissue to blood flow. Ziech et al has suggested that dynamic contrast-enhanced MRI is useful in monitoring treatment-related outcomes given the association between perianal

**FIGURE 3.** Simple intersphincteric fistula identified by MRI. Fat-suppressed T2-weighted image demonstrates a hyperintense simple linear left-sided intersphincteric fistula.

**FIGURE 4.** Transphincteric fistula. Axial T1-weighted image (A) demonstrates high signal intensity (due to protein in pus) tract in the puborectal muscle. Coronal T2-weighted image (B) in the same patient illustrates the horse-shoe configuration of the fistula complex. Axial contrast-enhanced fat-suppressed T1-weighted image (C) demonstrates the vivid enhancement of this actively inflamed fistula and a left sided transphincteric tract (arrow).
Endoscopic Ultrasound

Rectal EUS is a novel and effective modality to classify fistula tracts, identify abscess cavities, and assess the degree of active inflammation surrounding a fistula tract, thereby guiding medical and surgical therapy.15,33 Prospective studies comparing MRI, EUS, and EUA, have demonstrated a high accuracy in patients with suspected perianal Crohn’s fistulas (EUS 91%; MRI 87%; and EUA 91%). An accuracy of 100% was achieved when MRI or EUS was combined with EUA.34

EUS has been used as an imaging modality in several small therapeutic monitoring studies with excellent outcomes. Schwartz et al15 found that EUS inactivity after initiation of medical therapy was associated with good long-term outcomes and lack avoidance of abscess formation in a cohort of patients treated with maximal medical therapy and seton.

CONCLUSIONS

Imaging plays an important role in the multidisciplinary medical and surgical evaluation of Crohn’s perianal fistulas. High-resolution MRI and EUS are currently the preferred techniques for the assessment of fistula anatomy, degree of fistula activity, and relationship between the fistula tract and pelvic floor structures, as well as identification of septic complications such as abscesses.

Imaging has become an increasingly important guide for gastroenterologists and surgeons who care for patients with Crohn’s disease. It guides decision-making before and after initiation of medical therapy and surgical interventions.

REFERENCES


