INTRODUCTION

Crohn’s disease (CD) is a chronic inflammatory condition of the gastrointestinal tract characterized by segmental, transmural inflammation, and granulomatous changes. CD has a variable clinical course with both intestinal and extra-intestinal symptoms. Perianal-rectal fistulae and abscesses frequently complicate CD and may have devastating consequences. Patients with perianal fistulae and perirectal abscesses may suffer from pain, discharge, bleeding, and incontinence because of the destructive nature of the disease. This leads to substantial morbidity and impaired quality of life.

The evaluation of a patient with suspected perianal fistula or abscess includes further diagnostic imaging. Traditionally, options have included fistulography, computed tomography (CT), magnetic resonance imaging (MRI), and examination under anesthesia (EUA). Endoscopic ultrasound (EUS) is emerging as an accurate diagnostic modality for periano-rectal disease in patients with CD. Furthermore, EUS may help guide medical decision making following surgical or medical therapy of perianal CD.
EUS AS AN IMAGING MODALITY

Rectal endosonography can be performed by using either a rigid ultrasound probe that is inserted blindly into the rectum (transrectal ultrasound, TRUS) or by using a dedicated echoendoscope that is essentially a flexible endoscope with an ultrasound transducer at its tip (EUS). Flexible EUS is superior to TRUS because of greater depth of penetration of sound waves that allows for deeper scanning and also maintaining optimum quality higher up in the rectum. The two major kinds of EUS include radial EUS where sound waves are transmitted perpendicular to the long axis of the shaft of the endoscope allowing for 360° scanning and linear EUS where sound waves are transmitted parallel to the long axis of the shaft of the endoscope.

EUS provides detailed, accurate images of the external and internal anal sphincters (Figure 1). The circular smooth muscle of the rectum thickens to form the internal anal sphincter that appears as a hypoechoic (dark) band around the anal canal. The internal anal sphincter is typically three cm in length. Lateral to the internal anal sphincter, the external anal sphincter is viewed as a hyperechoic (bright) ring. The external anal sphincter is usually four cm in length. An experienced endosonographer can accurately identify defects in the internal and external anal sphincters, thus denoting a pathologic perianal process.

Fistulae appear as hypoechoic or anechoic (black) tracts with hyperechoic content that usually denotes air within the fistulous tract (Figure 2). Air may create reverberation echoes in motion. Fistulae may be viewed with both the radial echoendoscope and the linear echoendoscope in order to increase the depth of imaging and fully delineate the anatomy of the fistulous tract. EUS can define the precise location and length of fistulae as well as possible communication from the rectum to nearby organs, such as the vagina or bladder.

Perianal abscesses appear as anechoic or hypoechoic areas with irregular borders. If the abscess contains necrotic material, scattered echogenic foci may be seen within the abscess (Figure 3).

In a non-blinded series, Tio, et al used TRUS and EUS to evaluate perianal fistulae and/or abscesses in CD (1). Thirty-six patients with suspected or known periano-rectal disease were studied. In patients with surgically confirmed fistulae, EUS accurately identified fistulas in 82.4%. In a subset of patients that had fistulography performed, EUS was superior to fistulography in defining the anatomy of the fistulous tract. Surgical specimens were used as controls. The authors concluded that EUS was a safe and effective method to diagnose perianal fistulae and/or abscesses in patients with Crohn’s disease.

Indications for EUS examination in CD include; suspected fistula or abscess, fever and anal symptoms.
EUS COMPARED WITH OTHER DIAGNOSTIC MODALITIES

A number of studies have compared the diagnostic yield and accuracy of EUS versus digital rectal exam (DRE), fistulography, CT, MRI and EUA.

In a prospective study, DRE by an experienced consultant was found to have an accuracy of 82% compared to an accuracy of 75% with rigid TRUS. Findings at surgery were considered the gold standard (2). This difference in accuracy between DRE and TRUS was not statistically significant. Also, the rigid nature and short focal length of the ultrasound probe used in this study resulted in inadequate evaluation of higher fistulous tracts and prevented evaluation of lesions deeper than the external anal sphincter.

A prospective comparison of EUS and CT was performed in twenty-five patients with CD and anorectal symptoms (4). CT was performed with intravenous and rectal contrast and EUS was performed with a five MHz probe using a 270° transverse array echoendoscope. Seventeen patients were clinically confirmed to have fistulae; eight patients by surgery and nine patients by fistulography. EUS diagnosed fistulae in 14 patients and CT in only four patients. The sensitivity of EUS versus CT to detect fistulae was 82% versus 24%. There was no significant difference between EUS and CT in the detection of perirectal abscesses. As mentioned earlier, EUS avoids the use of ionizing radiation when compared to CT.

Orsoni, et al prospectively compared the results of anal endosonography (AES), MRI and surgical exploration in twenty-two CD patients with anorectal disease (5). AES was performed with a rigid linear probe and MRI was performed using a body coil. AES and MRI detected 14 and nine abscesses respectively while surgery confirmed 11 abscesses in 10 patients. The sensitivity of AES versus MRI for diagnosing anorectal abscesses was 100% versus 55%. AES and MRI detected 26 and 14 fistulae respectively whereas 27 fistulas were confirmed in surgical exploration in 16 patients. Eleven patients had complex fistulas and five patients had a single fistula. The sensitivity of AES versus MRI for diagnosing perianal fistulae was 89% versus 48%. Furthermore, AES was found to be superior to MRI in diagnosing complex fistulas.

A recent prospective, triple-blind study enrolled thirty-four patients with suspected CD perianal fistulae and compared rectal EUS, MRI and EUA (6). Acceptable accuracy was defined as agreement with the consensus gold standard for 85% of patients. A total of thirty-two patients were analyzed as one patient did not undergo EUS or EUA and consensus could not be reached for another patient. EUS was performed using a radial echoendoscope and a 7.5 MHz biplane probe. Pelvic MRI was performed using a 1.5 T superconducting magnet and coupled with a torso phased-array coil. Thirty-nine fistulas and 13 abscesses were discovered in 32 patients. Each modality had an accuracy of 85%; EUS 91%, MRI 87%, and EUA 91%. With the combination of any two modalities, the accuracy rose to 100% and the authors concluded that the optimal approach may be combining any two of the three methods.

ROLE OF EUS IN GUIDING THERAPY

Treatment options for periano-rectal disease in CD include surgical modalities involving incision and drainage of abscesses, fistulotomy for superficial uncomplicated fistulas, and placement of setons in patients with high fistulas or active rectal disease. Pre-
cise delineation of anatomy by EUS helps guide optimal surgical therapy by providing a “road map” prior to surgical intervention and may help avoid post-operative fecal incontinence. Medical therapy with infliximab can heal perianal fistulae associated with CD (7). There is concern that despite closure of superficial fistulous opening with medical or surgical treatment the deeper fistulous tract may persist thereby resulting in reopening of fistulae. It is therefore reasonable to evaluate the deep fistula tract with EUS to guide medical and surgical therapy with the aim of maintaining fistula healing.

In a study of thirty consecutive patients with draining perianal and/or rectovaginal fistulae, AES was performed at study entry and at 10 weeks (8). Patients were treated with intravenous infliximab. Clinical assessment and perianal examination was performed at weeks 0, 2, 6, 10, and then every six months. Two patients dropped out and final analysis was performed on twenty-eight patients. Though 53.6% of patients had clinical evidence of fistula closure at week 10, only 17.8% patients had complete disappearance of fistulous tract on AES. Perianal fistula closure rates were significantly higher than those of rectovaginal fistula closure; both clinically and at AES. Patients with closed perianal fistula at week 10 and disappearance of fistulae tract on AES had a lower relapse rate than those in which AES revealed persistence of the fistulous tract.

Schwartz, et al conducted a retrospective analysis of twenty-one patients with symptomatic CD perianal fistula (9). Patients underwent a baseline EUS followed by serial EUS examinations. Medical treatment included immunomodulators (azathioprine or 6-mercaptopurine), Ciprofloxacin, and induction followed by maintenance infliximab infusions. Surgical treatment including incision and drainage and seton placement was performed when indicated. EUS findings were used to guide management with removal of setons or cessation of infliximab and Ciprofloxacin once EUS showed fistula tract healing. Patients were followed for a median of 68 weeks and no abscesses developed in any patient during this period. Eleven out of twenty-one (52%) of patients showed no persistent fistula activity and 64% of these patients maintained fistula healing off infliximab and Cipro. The remaining 36% (4/11) of patients with no persistent fistula activity on EUS continued to receive infliximab for maintenance of remission of luminal disease. The authors concluded that EUS may identify a subset of patients that can discontinue therapy without recurrence of fistula drainage.

CONCLUSION

EUS evaluation of periano-rectal fistulae and abscesses in CD has proven to be superior to fistulography and CT, and equivalent or superior to MRI. EUS, MRI and EUA, may be complementary to one another with the most optimal approach being a combination of these modalities. A competent endosonographer can accurately delineate the relationship between anal sphincters and the track of a fistula. The accuracy of anatomic detail gained from EUS along with the lack of radiation exposure makes it an emerging diagnostic tool. Furthermore, serial EUS examinations in patients with periano-rectal CD may help guide long term surgical and medical management.

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References