

CT Evaluation of Crohn's Disease: Effect on Patient Management

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CT scans from 80 consecutive patients with clinically symptomatic Crohn's disease were reviewed retrospectively to determine the effect of CT diagnosis on patient management. The initial clinical impression and any subsequent change in patient management because of the CT findings were noted. In 22 (28%) of the 80 patients, significant previously unsuspected findings led to a change in medical or surgical management. These included 12 patients with fistulae, four with abscess, two with avascular necrosis of the femoral head, two with sacral osteomyelitis, and single cases of pelvic inflammatory disease and femoral vein thrombosis.

Although CT has been shown to be of limited value in the patient with generalized abdominal pain [1], it has proven to be extremely useful when disease is found clinically to be localized to a specific quadrant of the abdomen [2-5]. The CT findings in Crohn's disease have been reported. Previous studies have stressed that, although CT may not be the ideal initial study when Crohn's disease is suspected, it can play an important role in the detection and evaluation of potential complications [6-9]. However, no previous study has evaluated the role of routine CT scanning in determining management in patients with Crohn's disease. With this goal in mind, the records of 100 consecutive patients with Crohn's disease were reviewed retrospectively, and any change in management brought about by the CT findings was noted.

Materials and Methods

One hundred consecutive patients referred for CT scans with a history of Crohn's disease were reviewed; patients in the immediate postoperative period were not included. Of the 100 patients reviewed, clinical follow-up was insufficient in 20 because of inadequate follow-up or unavailability of medical records; these 20 patients were excluded from the study.

All CT scans were reviewed by a radiologist with knowledge of the clinical problems as given on the requisition. The patients' charts were reviewed to determine what the diagnoses and projected treatment plans were prior to CT, as well as to determine what the subsequent management of the patient was. Direct consultation with the patient's personal physician was done when the medical records or charts were incomplete or inconclusive. To be considered to have a significant impact on patient management, the results of the CT studies must have led to a change in medical therapy, a change from medical treatment to surgery, or a reversal of a decision to operate.

Scanning was performed on either a Siemens DR-3 or Pfizer/AS&E 0500 scanner, usually the former. Scanning techniques were 5 sec, 450 mAs, 125 kVp, and 4-mm collimation or 10 sec, 230 mAs, 125 kVp, and 5- or 10-mm collimation, respectively. Scans were obtained at 1.5-cm sequential intervals from the diaphragm to the lower perineum with additional scans obtained as necessary. All patients were given 1000 ml of oral contrast material over a 2-3 hr period before the examination, with another 250 ml of oral contrast medium immediately before the study. Rectal contrast material consisting of 150 ml of 2% Hypaque was routinely administered through a 24-French catheter. IV contrast material consisting of a 100-ml drip infusion of Hypaque-60 was used routinely.

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The most common reason for performing the CT study (35/80) was to rule out abscess. Other reasons for performing CT were: (1) to evaluate suspected fistula (12 patients), increasing abdominal pain (eight patients), or suspected abdominal mass (seven patients); (2) to define the extent of Crohn's disease (seven patients); and (3) to evaluate the cause of suspected small-bowel obstruction, to exclude neoplasm, or to define an abnormality seen on another radiographic examination (11 patients).

Results

In 22 patients (28%), significant unsuspected findings were detected that led to a change in medical or surgical management. These consisted of 12 patients with fistulae, four with an abscess, two each with avascular necrosis of the femoral head and sacral osteomyelitis, and single cases each of pelvic inflammatory disease and femoral vein thrombosis. In another 13 patients, CT demonstrated unsuspected findings that did not alter the clinical management and were therefore not considered in this context to be significant. These included gallstones (four patients), fatty infiltration of the liver (four patients), and ovarian cyst (five patients).

Abscesses

Of the 35 patients evaluated to rule out abscess, abscess was confirmed in eight (23%). Other radiologic studies had suggested or identified an abscess in only three of these eight patients. Location was perirectal (three), left lower quadrant (two), right lower quadrant (one), cul de sac (one), and anterior (one) and superior (one) to the bladder.

In the other 45 patients, CT detected an unsuspected abscess in four (9%); all of these were subsequently confirmed by surgery. They were located in the pelvis involving the bladder wall, above the dome of the bladder, in the left psoas muscle, and in the left lower quadrant near the junction of the sigmoid and descending colon (Figs. 1 and 2). In five

(6%) of the 80 patients in whom other radiologic studies had suggested abscess, CT excluded this diagnosis. On the basis of CT results, these patients were treated with an increased steroid regimen and improved clinically (Fig. 3).

Fistula

In 12 patients evaluated to determine the presence or extent of a suspected fistula, a fistula was confirmed in 10, with more than one fistula in five. Fistulae were enterovesical (five), enterocutaneous (three), perirectal/perianal (four), rectovaginal (one), to levator muscle (one), and to sacrum (one) (Fig. 4). The fistulae were seen as defined tracts usually opacified with contrast material extending between adjacent bowel loops, from bowel to the subcutaneous tissues, or to adjacent muscle or skeletal structures.

In another 12 patients, CT demonstrated a fistula previously unsuspected on physical examination or from other radiographic studies. These fistulae included perirectal (four); enteroenteric (three); and a single case each of enterovesical, ischiorectal, enterocutaneous, rectovaginal, and bowel to sacrum (Figs. 5 and 6).

Skeletal Findings

In four patients, unsuspected skeletal abnormalities were found that proved to be the basis for the presenting symptoms. Two patients had avascular necrosis of the femoral heads and two, osteomyelitis of the sacrum that required surgical intervention. In one of the patients, a barium enema had demonstrated widening of the presacral space suggesting a presacral abscess. CT excluded an abscess by demonstrating that the widening was caused by extensive presacral fat and also demonstrated previously unsuspected bilateral avascular necrosis.

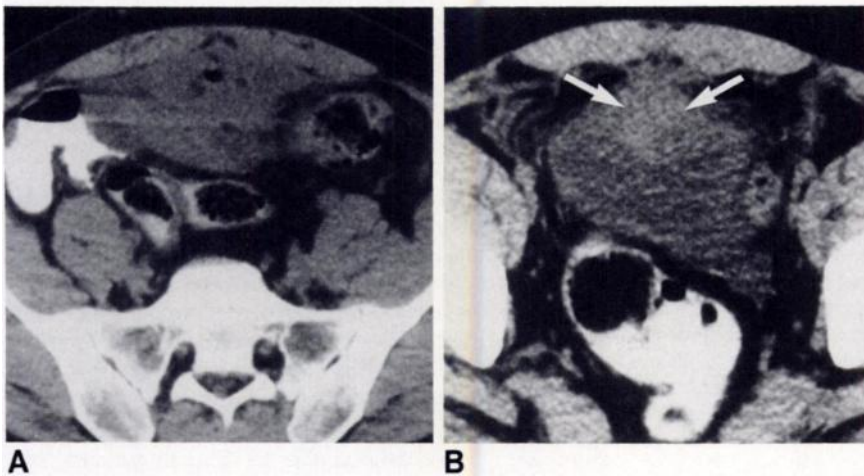


Fig. 1.—38-year-old man presenting with dysuria. Cystoscopy was negative. Small-bowel series showed thickening of small bowel without a fistula. CT shows abscess beneath anterior abdominal wall (arrows) extending to dome of bladder. At surgery a fistula was found into bladder wall but not into bladder. About 0.5 m of small bowel was resected but bladder was not.

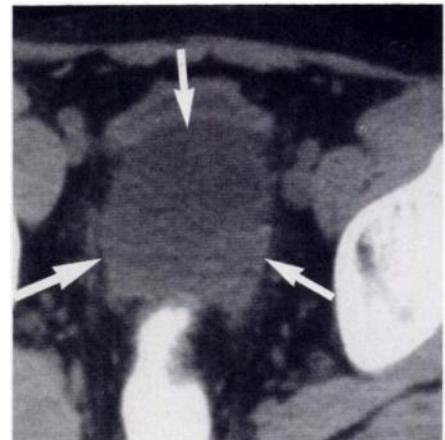


Fig. 2.—22-year-old man with increasing abdominal pain and fever. Barium enema and upper gastrointestinal series demonstrated abnormal bowel but no evidence of abscess. CT shows abscess above prostate and bladder (arrows). Treatment was conservative with antibiotics; subsequent CT scans showed resolution of abscess.

Fig. 3.—History of Crohn's disease with ileocecal anastomosis and increasing right groin pain. Barium enema showed thickened sigmoid colon and possible presacral abscess. CT shows increase in presacral space because of excessive fat deposition. Bilateral avascular necrosis is seen as cause of pelvic pain. A right total hip replacement was performed later. Retrospective review of plain radiographs documented early avascular necrosis of femoral heads.

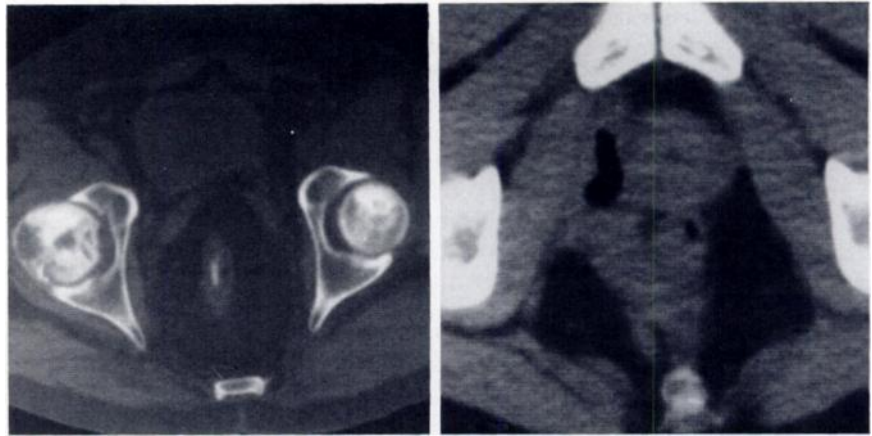


Fig. 4.—28-year-old man with pelvic pain. Clinical impression was of possible pelvic abscess. CT shows periprostatic abscess with perirectal fistula on right side. Medical therapy was stopped and surgery was performed with drainage of periprostatic abscess.

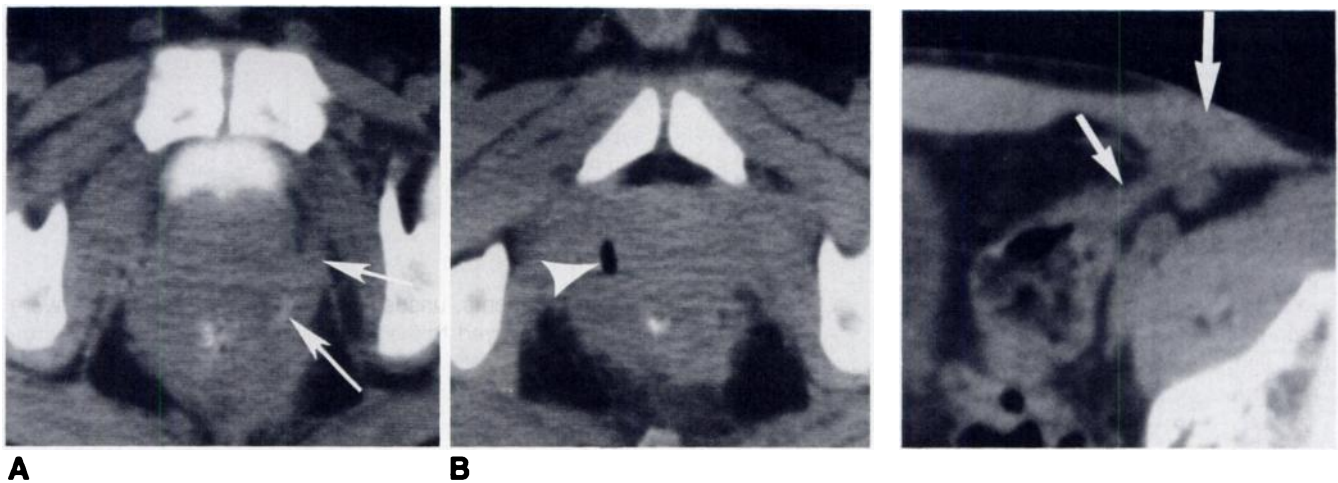


Fig. 5.—24-year-old man with history of Crohn's disease suspected to have abscess. CT shows evidence of marked inflammation of rectum with perirectal fistulae (arrows). Fistula extends into prostate bed (arrowhead).

Fig. 6.—25-year-old man with abdominal pain and palpable area of fullness in left lower quadrant. Clinical impression was possible enterocutaneous fistula. Barium enema and upper gastrointestinal small-bowel follow-through did not show fistula. CT shows fistula from sigmoid colon into anterior abdominal wall with inflammatory mass present (arrows).

Pelvic Inflammatory Disease

In one patient, unsuspected pelvic inflammatory disease was found with inflammation and enlargement of both ovaries. Previous sonograms suggested a pelvic abscess, which was not confirmed on CT.

Femoral Vein Thrombosis

Unsuspected femoral vein thrombosis was detected in one patient who presented with vague abdominal pain and no localizing signs. Anticoagulants were given with resolution of clinical symptoms.

Discussion

Clinical management of the patient with Crohn's disease can be extremely problematic. These patients are prone to develop complications from the primary disease as well as

from the medical or surgical therapy. In addition, there may be psychological overtones such that the physical complaints may be considered psychosomatic. Also, when a definite complication is found the decision must be made whether to maintain or modify medical therapy or to opt for surgical intervention.

Double-contrast barium studies of the upper and lower gastrointestinal tract have long been the standard diagnostic procedures for evaluation of inflammatory bowel disease [10–12]. A carefully performed double-contrast examination undoubtedly detects subtle disease, particularly mucosal involvement including aphthous ulcers [13]. Fistulae can also be seen. Extraluminal abscess usually cannot be defined fully, but rather only inferred by secondary signs such as spiculation of the bowel wall, separation of bowel loops, and mass effect [14]. The full extent of disease, however, may be underestimated by contrast studies since involvement of the mesentery, ischioanal fossa, and solid viscera cannot be evaluated

well. Contrast studies may show separation of bowel loops and the question remains: Are the bowel loops separated merely because of wall thickening or is there a complication such as fistulous tracts or an interloop abscess [15]?

CT scans have several distinct advantages over routine contrast studies in the evaluation of the extraluminal components of disease. CT not only clearly defines the full extent of bowel-wall thickening, the cause of separation of bowel loops, and the mesenteric component of the disease process [6], but directly shows the extraluminal process.

CT can be particularly helpful in the evaluation of mesenteric disease in the patient with inflammatory bowel disease. In Crohn's disease, several mesenteric abnormalities may be seen, including mesenteric thickening with an increase in mesenteric density, mesenteric inflammation with edema of the mesentery, or mesenteric adenopathy [6].

An abscess requiring surgical intervention can be shown directly with CT. CT has proven to be superior to sonography in the evaluation of abscesses, as abscesses can be interloop, in the mesentery, or in the perirectal zones, which are areas less accessible to the sonographic probe. In many cases CT can be used for direction of drainage of these abscesses, thereby circumventing the need for surgical intervention [16].

Barium studies often adequately determine the presence of fistulae. The full extent of the fistulous tract may, however, be more clearly defined by CT, especially when the fistulae are in the perirectal area. Perirectal fistulae can be difficult to evaluate on clinical examination and routine contrast studies. Physical examination may be painful or even impossible because of extreme rectal tenderness. Barium enema may fail because of inability to insert the rectal catheter or incontinence. Small fistulas may go undetected on contrast studies because of nonfilling or spasm. CT is able to detect a fistula in the perirectal area and ischioanal fossa in the range of 2–5 mm. The high detection rate is because the ischioanal fossa normally consists of fat. The most subtle changes in fat density from even small tracts extending into the ischioanal zones can be detected with a high degree of accuracy and specificity. In addition, perirectal fistulas can be evaluated for possible extension into adjacent organs, including prostate and vagina. CT allows definition of the full extent of the fistulous tract and its involvement of adjacent organs, particularly the musculoskeletal structures. For example, in our group of patients, two had unsuspected sacral osteomyelitis not evident on plain films or contrast studies, but clearly defined by CT as a fistulous tract with an associated mass involving the anterior sacral segments. CT not only made the diagnosis but also aided in subsequent surgical planning. Two others had avascular necrosis of the femoral head, a process for which CT is clearly superior to plain films [17].

An enterovesical fistula can be detected accurately with CT scanning [18, 19], whereas other imaging techniques, including cystoscopy, contrast studies, and excretory urograms, have a detection rate of much less than 50%. We previously reported our experience showing that CT can detect over 90% of surgically proven enterovesical fistulae. In that series of 26 patients with enterovesical fistula, the fistula was defined only by CT in six [19].

While we would not suggest that CT can approach the diagnostic accuracy of an air-contrast examination for mucosal disease, CT can be extremely helpful in the evaluation of the patient with Crohn's disease, allowing further evaluation of the extent of bowel disease and also an assessment of mesenteric disease; and it may provide additional information about fistulous tracts. In a single examination, the full extent of disease can be determined in a rapid, noninvasive fashion. Subsequent management decisions can be made quickly on the basis of CT data. In addition, CT is not an organ-specific study, simply evaluating the bowel or the extracolonic component of disease. Rather, on a single examination, the entire abdomen and pelvis are evaluated, allowing detection of serendipitous findings that are often of high clinical significance. For instance, skeletal manifestations producing clinical symptoms thought to be from intrinsic bowel disease were seen in four patients in our present study.

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