MR Enterography of the Ileoanal Pouch: Descriptive Radiologic Analysis With Endoscopic and Pathologic Correlation

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OBJECTIVE. The purpose of this study was to describe the MR enterography (MRE) appearance of inflammation of the ileoanal pouch after ileal pouch–anal anastomosis (IPAA) surgery and to correlate it with pouch endoscopic and histopathologic findings.

MATERIALS AND METHODS. All MRE studies performed between October 1, 2007, and September 30, 2013, for patients who had previously undergone IPAA (n = 54) were retrieved. After review of medical records, the patients who underwent MRE, pouch endoscopy, and biopsy within 90 days (14 men, 14 women; mean age, 42.2 years; range, 24–67 years) were selected for inclusion in the study. Two blinded MRI radiologists in consensus retrospectively evaluated MRE studies for multiple MRI features. Two MRI scores were then calculated: an active and a composite inflammation score. A gastroenterologist retrospectively reviewed the pouch endoscopic images, and a pathologist reviewed the slides; both of these investigators were blinded. Both MRI scores were correlated with the pouch endoscopic and histopathologic findings.

RESULTS. The composite MRI score had strong positive correlation with the endoscopic score (r = 0.61; p = 0.0005) but weak positive correlation with the histopathologic score (r = 0.31; p = 0.10, not statistically significant). The active inflammation MRI score had moderate positive correlation with the endoscopic score (r = 0.57; p = 0.0017) and weak positive correlation with the histopathologic score (r = 0.20; p = 0.31, not statistically significant). An MRI score ≥ 4 indicated the best results, with sensitivity of 86%, specificity of 79%, positive predictive value of 80%, negative predictive value of 85%, and accuracy of 82% for pouch inflammation. A positive likelihood ratio of 4.00 and negative likelihood ratio of 0.18 were obtained.

CONCLUSION. In patients who have undergone IPAA surgery, the MRE findings strongly correlate with the pouch endoscopic findings with high sensitivity and positive predictive value for pouch inflammation. Therefore, MRE is a useful noninvasive test performed without ionizing radiation that can be used to evaluate patients with clinical symptoms and possibly alleviate the need for endoscopy in a select patient population.

Keywords: biopsy, ileal pouch–anal anastomosis, ileoanal pouch, MR enterography, pouch endoscopy, ulcerative colitis

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Restorative proctocolectomy with ileal pouch–anal anastomosis (IPAA) is the treatment of choice for patients with severe ulcerative colitis or familial adenomatous polyposis. Since the introduction of the procedure by Parks et al. [1] and Utsunomiya et al. [2] in 1978, indeterminate colitis has been added to the indications for IPAA [3–8]. Although the IPAA procedure is technically challenging to perform, restoration of gastrointestinal continuity and maintenance of fecal continence with preservation of the anal sphincters eliminates the need for a permanent stoma, generally improving quality of life in this patient population [5]. The surgical procedure involves total colectomy, rectal mucosectomy, and creation of a blind-ending J- or S-shaped ileal reservoir via folding of a portion of terminal ileum on itself with side-to-side anastomosis [9].

The IPAA procedure is associated with low mortality, but both early and late complications are frequently encountered [10–13]. Early complications can include postprocedural sepsis, anastomotic leaks with abscess formation, small-bowel obstruction. and portal vein thrombosis. Late complications include pouchitis, pouch strictures, fistulas, and malignancy [9, 14–16].

Pouchitis is the most common late complication after IPAA, having a described prevalence of 27% [17–19]. Pouchitis is postulated to be a result of dysbiosis within the pouch [9, 19]. Pouchitis is often suspected

because of the presence of subjective symptoms alone, but similar symptoms can have other causes, including anal sphincter dysfunction, anastomotic stricture, occult leak, pouch inlet obstruction, cuffitis, and irritable pouch syndrome [20]. Ofer Ben-Bassat et al. [21] found weak correlation between clinical symptoms of pouchitis and endoscopic or histologic findings.

Imaging techniques used in the evaluation of inflammatory bowel disease (IBD) and its complications include fluoroscopic enema, CT with IV contrast administration, MDCT enterography, scintigraphy, and MRI [22–25]. MDCT enterographic findings have been found to positively correlate with findings of pouch inflammation at pouch endoscopy and histopathologic examination [26]. MR enterography (MRE), with its lack of ionizing radiation and superior soft-tissue contrast resolution, may be an alternative to MDCT enterography for the follow-up of IPAA patients. Tang et al. [27] compared the diagnostic utility of CT enterography, diatrizoate meglumine and diatrizoate sodium enema, pelvic MRI, and pouch endoscopy in assessing ileal pouch disorders. To our knowledge, however, the role of MRE in assessing complications of IPAA and correlation with endoscopic and histopathologic findings has not been studied. The goal of this retrospective study was to delineate the MRE features of the ileoanal pouch after IPAA surgery and correlate them with pouch endoscopic and histopathologic findings.

Materials and Methods

Subjects

This retrospective study was compliant with HIPAA. Our institutional review board granted approval for the study with a waiver of the requirement for informed consent of the subjects. Radiology information system review of records from October 1, 2007, through September 30, 2013, yielded 3494 MRE examinations performed at our institution. Of these, 54 studies were completed for patients who had undergone IPAA. The inclusion criteria for the study were IPAA and MRE within 90 days of pouch endoscopy and biopsy.

Among the 54 MRE examinations retrieved, 28 examinations were eligible for this study. The other 26 patients were excluded because 18 did not undergo endoscopy or biopsy within 90 days before or after MRE; one patient with asymptomatic Gardner syndrome did not undergo biopsy; one patient had an ileorectal anastomosis rather than an ileoanal pouch; two patients had J pouches resected before the MRE examination; three patients had biopsy specimens obtained from the ileostomy, ileoanal anastomosis, or a terminal ileum pseudopolyp rather than the J pouch; and one patient did not receive IV contrast material for MRE (Fig. 1). For patients who underwent multiple MRE studies, the study completed within the shortest time from pouch endoscopy and biopsy was reviewed, and the other examinations ($n = 15$) were excluded.

The final study group comprised 28 patients (14 men, 14 women; mean age, 42.2 years; range, 24–67 years). The preoperative diagnoses included ulcerative colitis ($n = 25$ [89.3%]), Crohn disease ($n = 2$ [7.1%]), and familial adenomatous polyposis syndrome with rectal cancer after neoadjuvant therapy ($n = 1$ [3.6%]). The mean time interval from the date of IPAA surgery to MRE study was 7.7 years (range, 15 days–27.6 years). The mean time interval between MRE and pouch endoscopy with biopsy was 22 days (range, 0–70 days). Thirteen patients underwent MRE after pouch endoscopy or biopsy, and 15 underwent MRE before pouch endoscopy or biopsy.

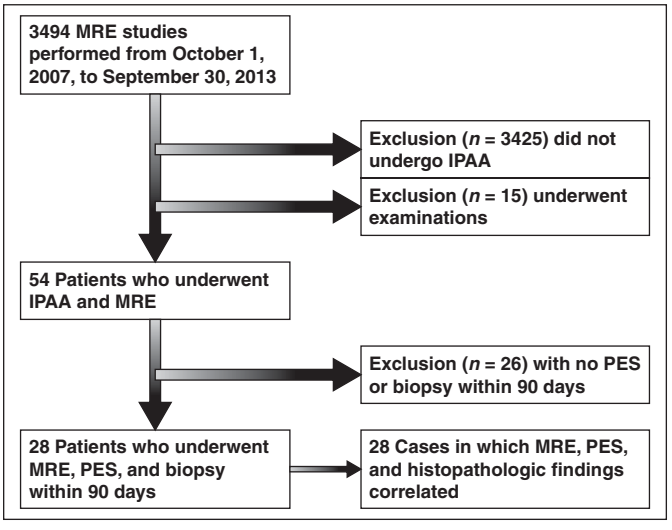


Fig. 1—Flow diagram shows patient selection. MRE = MR enterography, IPAA = ileal pouch–anal anastomosis, PES = pouch endoscopy.

Imaging Technique

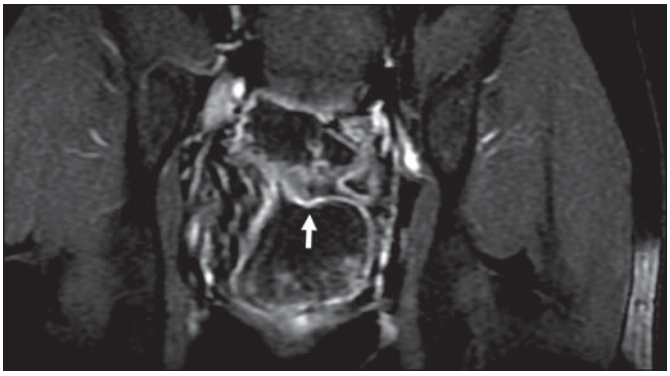
The patients received 900 mL of a neutral enteric contrast agent orally (0.1% weight/volume barium sulfate suspension (VoLumen, Bracco Diagnostics) and 450 mL of water over a 45-minute period before the study.

Abdominopelvic MRE was performed with 1.5-T MRI units (Signa HDxt/16, GE Healthcare) and body array coils. Three-plane localizer images and coronal dynamic thick slab single-shot fast spin-echo (SSFSE, GE Healthcare) or HASTE (Siemens Healthcare) images were obtained initially. Coronal FIESTA (GE Healthcare) or fast imaging with steady-state precession (true FISP, Siemens Healthcare) with 4.5-mm slice thickness, coronal adiabatic spectral inversion recovery (ASPIR, GE Healthcare) or HASTE fat-saturated sequences (Siemens Healthcare) with 4.0-mm slice thickness, axial FIESTA (GE Healthcare) or true FISP (Siemens Healthcare) with 4.5-mm slice thickness, and coronal 3D volumetric interpolated breath-hold examination (VIBE, GE Healthcare) or liver acquisition with volume acquisition (LAVA XV unenhanced, Siemens Healthcare) sequences with 3.6-mm slice thickness were subsequently performed. Coronal contrast-enhanced (0.1 mmol/kg gadobutrol, Gadovist, Bayer HealthCare) 3D VIBE or LAVA XV images were acquired in two phases (enteric and portal venous) and followed by axial 3D VIBE or LAVA XV contrast-enhanced sequences with coverage of the abdomen and pelvis. The optimal timing for the enteric phase was calculated with the following departmental formula: arrival time + one-half injection time – one-half acquisition time + 6 seconds. To reduce bowel peristalsis, 1 mg of intramuscular glucagon or 0.25 mg of sublingual hyoscyamine sulfate (Levsin, Alaven) was administered after acquisition of coronal dynamic thick slab SSFSE or HASTE images.

Image Analysis

Images from each MRE examination were assessed in consensus by two abdominal radiologists (16 and 6 years of body MRI experience after residency training). Both radiologists were blinded to the clinical history, endoscopic findings, and histopathologic results. Each MRE image was evaluated at a PACS workstation (Centricity, GE Healthcare), and measurements were made with an electronic ruler.

The multiple MRE variables described by Liszewski et al. [26] were evaluated to assess for pouch inflammation. A composite MRI and active inflammation score was derived as adapted from scoring



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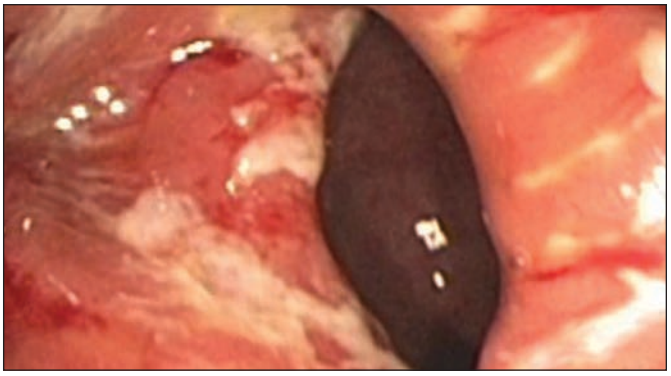

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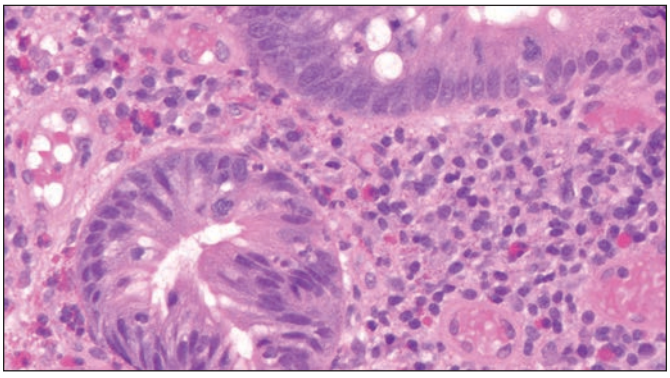

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Fig. 2—29-year-old man with history of ulcerative colitis treated with ileal pouch–anal anastomosis.
A, Coronal contrast-enhanced MR enterographic image shows mucosal hyperenhancement (*arrow*), mural stratification, and moderate (7 mm) wall thickening of ileal pouch.
B, Image from endoscopy performed 28 days before MR enterography shows ulcerated narrowing, erythema, friability, and mucosal exudate in ileal pouch.
C, Histopathologic image (H and E, ×400) shows mild pouchitis (cryptitis, score 1). Colonic crypt epithelium shows focal infiltration by neutrophils.

indexes postulated by Liszewski et al. [26], who studied findings of pouch inflammation at CT enterography. Pouch wall thickening was graded as follows: normal (< 3 mm, score 0), mild (3–6 mm, score 1), moderate (6–9 mm, score 2), and severe (> 9 mm, score 3). Attempts were made to measure the wall thickness of the J pouch in a well-distended nondependent portion of the pouch to avoid falsely elevated measurements from factors such as dependent fecal material and inadequate distention.

Additional MRI variables evaluated included pouch mural stratification; submucosal fat; mucosal hyperenhancement; peripouch stranding; peripouch hyperemia; presacral widening; peripouch fatty proliferation; peripouch abscess, fistula, or sinus track; inlet inflammation (i.e., mural thickening > 3 mm, mucosal hyperemia, stranding); and inlet stricture with small-bowel obstruction. These entities were assessed as absent (score 0) or present (score 1). Mural stratification was deemed present if hyperenhancement of both the inner mucosa and outer muscularis propria of the J pouch was evident. Peripouch hyperemia was deemed present if hypervascularity of mesenteric vessels adjacent to the pouch was seen, including vascular prominence, tortuosity, and wide spacing of the vasa recta (comb sign) [28]. Peripouch hyperemia was considered a distinct feature from mucosal hyperenhancement. Presacral space was defined as the distance from the anterior cortex of the sacrum to the posterior wall of the ileal pouch, and widening as greater than 15 mm [26]. Peripouch lymph nodes were graded by size: no lymph nodes (score 0), largest lymph node with a short-axis diameter less than or equal to 5 mm (score 1), and largest lymph node with a short-axis diameter greater than 5 mm (score 2).

We calculated a composite MRI score (0–15 points) by summing all individual scores, thereby including signs of both active and chronic inflammation. We also calculated an active inflammation MRI score (0–9 points) by adding the individual scores for mucosal hyperenhancement; pouch wall thickening; mural stratification; peripouch stranding; peripouch hyperemia; and peripouch abscess, fistula, or sinus track, thereby obtaining a more focused score for signs of active inflammation.

Pouch Endoscopy

All 28 subjects underwent pouch endoscopy. The findings were scored by a single gastroenterologist with 10 years of endoscopy experience after residency who was blinded to the MRE and histopathologic findings. The modified pouchitis disease activity index scoring system for endoscopic assessment of pouch disease activity was used [29]. Endoscopic findings of edema, granularity, friability, loss of vascular pattern, mucosal exudates, and ulceration were graded as absent (score 0) or present (score 1). A composite endoscopic score (0–6 points) was established by summing all of the individual scores.

Histopathologic Analysis

Biopsy specimens were fixed in formalin and processed for paraffin sections. Slides stained with H and E were reviewed by a single pathologist with 2 years of experience after residency, who was blinded to clinical history, endoscopic findings, and MRE results. Specimens were graded as normal or inactive pouchitis (score 0), mild pouchitis (cryptitis, score 1), moderate pouchitis (crypt abscesses, score 2), and severe pouchitis (ulceration, score 3).

Statistical Analysis

The composite MRI score, active inflammation MRI score, composite endoscopic score, and histopathologic score were compiled for each patient. Both composite MRI score and active inflammation MRI score were correlated with composite endoscopic and histopathologic scores by use of Spearman correlation (r). Correlation coefficients of 0.8–1.0, 0.60–0.79, 0.40–0.59, 0.20–0.39, and 0.00–0.19 were interpreted as indicators of very strong, strong, moderate, weak, and very weak correlation, respectively; $p \leq 0.05$ was considered statistically significant.

In this study, endoscopy was considered the reference standard criterion for pouchitis because the primary goal of MRE is to assess for pouchitis without the need for invasive intervention, including pouch endoscopy with or without biopsy. A composite endoscopy score ≥ 2 was considered positive for pouchitis according to the modified disease activity index endoscopic subscore [29]. The diagnostic accuracy of the composite MRI score was evaluated in comparison with a composite endoscopy score ≥ 2 by use of MRI scores ≥ 1, ≥ 2, ≥ 3, ≥ 4 and ≥ 5. Sensitivity, specificity, positive predictive value, negative predictive value, accuracy, positive likelihood ratio, and negative likelihood ratio were calculated with endoscopy as the criterion standard. A histopathologic score ≥ 1 was considered positive for pouchitis according to the scoring criteria. Data were analyzed with statistical software (SPSS version 10.0, IBM-SPSS).

Results

Pouch Endoscopy

Fourteen patients (50%) met the criteria for pouchitis on the basis of the reference standard criterion of an endoscopy score ≥ 2, as in the modified pouchitis disease activity index scoring system. The composite endoscopic score ranged from 0 to 6, with a mean of 2.4 (SD, 2.2). Twenty-three patients (82.1%) had at least one endoscopic sign of pouchitis. Pouch edema was identified in 11 patients (39.3%) (Figs. 2B and 3D), pouch granularity in 13 patients (46.4%) (Fig. 3D), and pouch friability in 12 patients (42.9%) (Figs. 2B and 3D). Loss of vascular pattern was noted in 14 patients (50.0%). Mucosal exudate was identified in 10 patients (35.7%) (Fig. 2B) and pouch ulceration in 12 (42.9%) (Fig. 2B).

Histopathologic Results

Nineteen patients (67.9%) had at least one histopathologic sign of inflammation at biopsy. Cryptitis, indicative of mild pouchitis, was noted in 15 patients (53.6%) (Fig. 2C). Crypt abscesses, indicating moderate pouchitis, were identified in two patients (7.1%). Ulceration, indicative of severe pouchitis, also was noted in two patients (7.1%) (Fig. 4).

MR Enterography

The composite MRI scores ranged from 0 to 10, with a mean of 4.1 (SD, 3.1). The active inflammation MRI scores ranged from 0 to 7 with a mean of 2.0 (SD, 2.4). Of 28 patients, 24 (85.7%) had at least one MRE finding of active or chronic pouch inflammation, which corresponded to a composite MRI score of at least 1. However, only 16 patients (57.1%) had at least one MRE finding of active pouch inflammation, which corresponded to an active inflammation MRI score of at least 1. Thirteen patients (46.4%) had normal pouch wall thickness, six patients (21.4%) had mild pouch wall thickening, nine patients (32.1%) had moderate pouch wall thickening (Fig. 2A), and no patient had severe pouch wall thickening (Table 1).

TABLE 1: Results of MR Enterographic Evaluation

Characteristic	Present	Absent
Pouch thickness		
Normal	13 (46.4)	
Mild	6 (21.4)	
Moderate	9 (32.1)	
Severe	0 (0)	
Mucosal hyperenhancement	11 (39.3)	17 (60.7)
Mural stratification	7 (25.0)	21 (75.0)
Submucosal fat deposition	0 (0)	28 (100)
Peripouch stranding	6 (21.4)	22 (78.6)
Peripouch hyperemia	6 (21.4)	22 (78.6)
Presacral widening (> 15 mm)	2 (7.1)	26 (92.9)
Peripouch fatty proliferation	2 (7.1)	26 (92.9)
Peripouch abscess, fistula, or sinus track	2 (7.1)	26 (92.9)
Signs of inlet inflammation	10 (35.7)	18 (64.3)
Inlet stricture	6 (21.4)	22 (78.6)
Peripouch lymph nodes	Nodes < 5 mm, 1 (3.6)	Nodes > 5 mm, 20 (68.6)
Composite MRI score	Range, 0–10	Mean, 4.1 (SD, 3.1)
Active inflammation MRI score	Range, 0–7	Mean, 2.0 (SD, 2.4)

Note—Values are numbers of patients with percentages in parentheses unless otherwise indicated.

Correlation Between MR Enterographic, Pouch Endoscopic, and Histopathologic Results

Among patients who underwent MRE, pouch endoscopy, and biopsy, the composite MRI score had strong positive correlation with the composite endoscopic score ($r = 0.61$; $p = 0.0005$). The active inflammation MRI score had moderate positive correlation with the composite endoscopic score ($r = 0.57$; $p = 0.0017$). The composite MRI score had weak positive correlation with the histopathologic score ($r = 0.31$; $p = 0.10$, not statistically significant). The active inflammation MRI score had weak positive correlation with the histopathologic score, which also did not reach statistical significance ($r = 0.20$; $p = 0.31$).

Performance Measures

We calculated the diagnostic accuracy of the composite MRI score compared with an endoscopic score ≥ 2 using composite MRI scores ≥ 1, ≥ 2, ≥ 3, ≥ 4, and ≥ 5. We then evaluated the diagnostic performance measures for a composite MRI score ≥ 4 in the detection of pouchitis and found sensitivity of 86% (95% CI, 57–98%), specificity of 79% (CI, 49–95%), positive predictive value of 80% (CI, 52–96%), negative predictive value of 85% (CI, 55–98%), overall accuracy of 82% (CI, 63–94%), positive likelihood ratio of 4.00, and negative likelihood ratio of 0.18.

Discussion

Reports [30, 31] have described the utility of MRE in diagnosis, evaluation of disease activity and severity, and assessment of complications and therapeutic response in patients with IBD. The noninvasive nature, superior soft-tissue contrast resolution, and absence of ionizing radiation, particularly compared with MDCT enterography, make MRE the diagnostic test of choice for patients with IBD, who typically are young and need repeat imaging studies.

Pouchitis is a common long-term complication in patients with ulcerative colitis who have undergone IPAA [9, 19]. Most episodes of mild pouchitis can be managed medically; however, refractory or severe cases may require more aggressive treatment, including

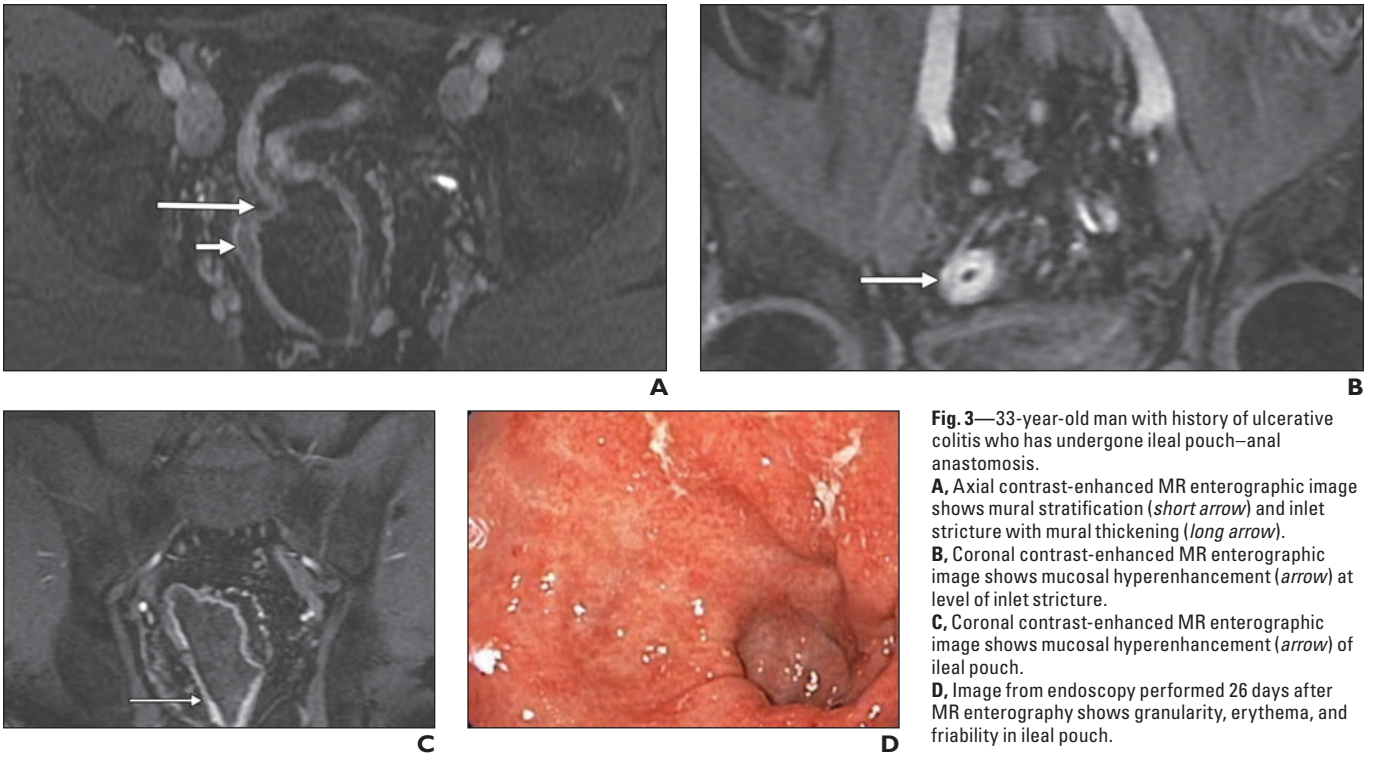

Fig. 3—33-year-old man with history of ulcerative colitis who has undergone ileal pouch–anal anastomosis.
A, Axial contrast-enhanced MR enterographic image shows mural stratification (*short arrow*) and inlet stricture with mural thickening (*long arrow*).
B, Coronal contrast-enhanced MR enterographic image shows mucosal hyperenhancement (*arrow*) at level of inlet stricture.
C, Coronal contrast-enhanced MR enterographic image shows mucosal hyperenhancement (*arrow*) of ileal pouch.
D, Image from endoscopy performed 26 days after MR enterography shows granularity, erythema, and friability in ileal pouch.

surgical intervention and closer surveillance, primarily with imaging.

In a retrospective study with consensus opinion as the criterion standard, Tang et al. [27] compared the accuracy of MDCT enterography, diatrizoate meglumine and diatrizoate sodium enema, pelvic MRI, and pouch endoscopy in detecting strictures, fistulas, sinus tracks, and leaks in IPAA patients. None of the tests alone was found to be more accurate than the others. Nadgir et al. [19] performed a retrospective study to assess the performance of pelvic MRI for identifying the presence of inflammation in patients with IPAA with suspected pouchitis. Those investigators evaluated MRI features of inflammation similar to those in our study, including pouch wall thickening, mucosal hyperenhancement, peripouch stranding, peripouch fluid collection, sinus or fistula track formation, stricture, lymphadenopathy, and peripouch fatty proliferation. They included only nine MRI studies, and MRI showed evidence of pouchitis in five patients who had abnormal mucosa at endoscopic and histopathologic examinations.

More recently, Liszweski et al. [26] introduced a systematic scoring system that used MDCT enterographic findings in determining the degree of pouch inflammation. They used signs of active and chronic inflammation to assess the MDCT enterographic signs of pouch inflammation by creating two separate CT scoring indexes. We used these imaging scoring indexes in our study. Each radiographic finding evaluated in the scoring indexes has been described for IBD and pouch inflammation. The imaging markers of active inflammation described include pouch wall thickening [23, 32–36], mucosal hyperenhancement [34], mural stratification [7, 37], peripouch stranding [9, 23, 25, 38], peripouch hyperemia [28], peripouch abscess, fistula, and sinus track [9, 22, 23, 25, 27]. We incorporated other imaging markers more often seen in patients with subacute and chronic inflammation into the composite MRI score, including peripouch fatty proliferation, widening of the presacral space, enlarged lymph nodes, and submucosal fat deposition. We also integrated inflammatory complications of the ileal pouch, including inlet stricture and hyperenhancement.

Our study showed strong correlation between the composite MRI score and the endoscopic findings. However, we found only moderate correlation between active inflam-

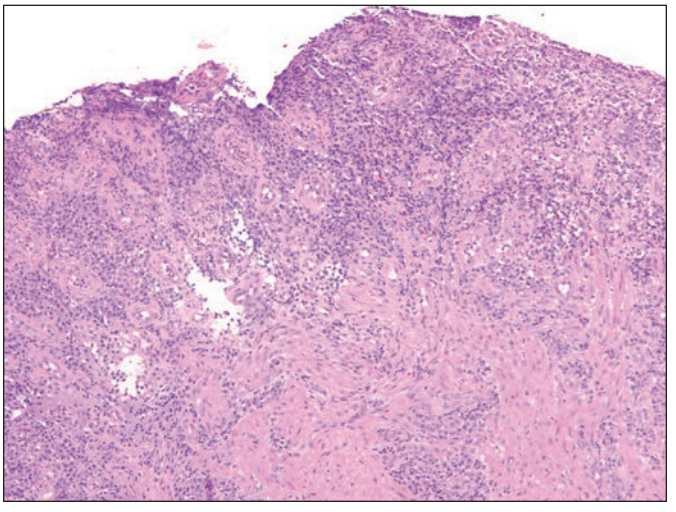

Fig. 4—40-year-old man with history of ulcerative colitis who has severe pouchitis (ulceration, score 3) after ileal pouch–anal anastomosis procedure. Histopathologic image (H and E, ×100) of colonic mucosa shows expansion of lamina propria by inflammatory cells, granulation tissue formation, and ulceration.

mation MRI scores and endoscopic findings. Both composite MRI score and active inflammation MRI score had weak correlation with histopathologic findings. The difference in degree of correlation between the composite and active inflammation MRI scores and the endoscopic findings indicates the additional value of surrogate markers of inflammation, including inlet stricture and inflammation. The results of our study also indicate that the more inclusive composite MRI score, indicative of inflammation, accurately correlates with endoscopic findings and is a potential initial noninvasive test that can be used to evaluate for pouchitis, precluding immediate endoscopy.

The presence of four or more imaging markers of inflammation on MRE images had the best correlation with endoscopy, with high sensitivity of 86%, specificity of 79%, positive predictive value of 80%, negative predictive value of 85%, accuracy of 82%, positive likelihood ratio of 4.0, and negative likelihood ratio of 0.18. The diagnostic accuracy of the composite MRI score obtained with composite multiple MRI scores ≥ 1, ≥ 2, ≥ 3, ≥ 4, and ≥ 5 helped determine an accurate cutoff for a composite MRI score ≥ 4. Lower composite MRI score thresholds had poor specificity, whereas an MRI score ≥ 5 had diminished sensitivity. The results suggest the potential of MRE findings for obviating pouch endoscopy in clinically suspected cases of pouchitis through the presence of four or more imaging markers of inflammation on MRE images.

In comparison with routine pelvic MRI examinations, MRE entails the administration of oral enteric contrast medium for evaluation of the small bowel. Enteric contrast agents help to displace intraluminal bowel gas, which can cause susceptibility artifacts that limit assessment of the bowel. Enteric contrast agents may also improve luminal distention [39]. In patients with IPAA, inlet inflammation, which was identified in nearly 36% of our study patients, can be missed on pelvic MR images obtained without enteric contrast administration owing to limited evaluation of the pouch inlet. This highlights the importance of proper MRI techniques for the detection of active inlet disease.

The major limitation of our study was its retrospective design, which is prone to the limitations inherent to all studies of this design. Despite the large number of MRE examinations performed at our institution, the sample size for this study was small because endoscopy or biopsy was not necessarily performed for a number of patients before or after MRE. Multiple studies were also performed on the same patients, further limiting the sample size. The small sample size makes it difficult to identify statistically significant trends and correlations. Thirteen of 28 patients (46.4%) in our study underwent MRE after pouch endoscopy and biopsy and may have undergone therapy after pouch endoscopy but before MRE, which could result in an underestimate of the imaging findings. The observed stronger correlation between composite MRI score and endoscopic score compared with histopathologic score may also have been affected by treatment response in the short time interval between MRE and pouch endoscopy with biopsy. It can be postulated that after initiation of therapy, resolution of gross morphologic findings visualized at MRE and pouch endoscopy may lag behind the microscopic findings seen at histopathologic examination. Correlation with clinical information from medical record review was incomplete and inaccurate; therefore, these data were not included in the analysis. Biopsy sampling error may be another pitfall of our study. Further studies with prospective design and correlation of imaging findings with standardized clinical data would be helpful for confirming the diagnostic utility of MRE in the subset of IBD patients with IPAA with clinical suspicion of pouchitis.

Conclusion

Multiple MRE parameters correlate with endoscopic findings of pouch inflammation; however, correlation with histopathologic findings is weaker. MRE has high sensitivity, specificity, positive predictive value, negative predictive value, accuracy, and positive likelihood ratio for pouchitis when four or more imaging markers of inflammation are present. When MRE is available, the noninvasive nature, superior soft-tissue contrast resolution, and lack of ionizing radiation make it the ideal diagnostic test for IBD patients who have undergone IPAA. The findings help to guide clinical decisions, including the need for further diagnostic tests, such as pouch endoscopy and biopsy, and the type of therapy.

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