INFLAMMATORY BOWEL DISEASE - THINKING BEYOND THE BOWEL!

Yasmeen K Tandon MD, Namita S Gandhi MD
Tabassum Khowaja MD, David M Einstein MD,
Mark E Baker, MD
Section of Abdominal Imaging, Imaging Institute
Cleveland Clinic, Cleveland
OBJECTIVES

• Review the extra intestinal manifestations (EIMs) of Inflammatory Bowel Disease (IBD -Crohn’s Disease and Ulcerative Colitis)

• Pictorial Review of EIMs in IBD in different organ systems:
  • Musculoskeletal
  • Gastrointestinal
  • Vascular
  • Renal
  • Pulmonary
  • Dermatological

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BACKGROUND

• EIMs are seen in approximately 25–40% of IBD patients and 25% of IBD patients have more than one EIM

• EIMs can involve almost any organ system including musculoskeletal, hepatobiliary, vascular, renal, pulmonary, dermatologic, and ocular systems.

• The diagnosis and treatment of IBD should involve a multidisciplinary team and it is important for radiologists to be cognizant of these manifestations so that the appropriate management decisions can be made
MUSCULOSKELETAL MANIFESTATIONS OF IBD

- Sacroiliitis
- Peripheral arthritis
- Ankylosing spondylitis
- Osteopenia
- Aseptic necrosis

Arthropathy is the most common EIM seen in IBD, with reported overall prevalence of 17–39%.
MUSCULOSKELETAL : SACROILIITIS

- MRI suggests prevalence of 30-40% in UC and 40-50% in CD
- Usually bilateral and symmetric, based upon plain films
- On CT, we have noted that it may not always be symmetric

34 y M with UC. Coronal CTE shows active inflammatory disease in the sigmoid colon (white arrows). Coronal and axial images show bilateral SI joint irregularity, erosions and sclerosis compatible with sacroilitis (black arrows).
54 F with CD. Coronal CTE shows short strictures of the ascending colon without active inflammation (white arrows) with upstream bowel dilation. Sclerosis and irregularity of bilateral sacroiliac joints consistent with sacroilitis (black arrows).
MUSCULOSKELETAL: ANKYLosing SPONDYLITIS

- Ankylosing spondylitis occurs in 5% to 10% of patients with IBD
- Nearly all IBD patients who are +HLA-B27 will develop ankylosing spondylitis
- Major findings to look for:
  - squaring of vertebral bodies
  - vertebral body ankylosis ("bamboo spine")
  - bone proliferation
  - ankylosis of the SI joints.
66 year M with CD. CTE shows a stricture with imaging findings of active inflammation at terminal ileum (red arrows). Coronal and Sagittal CT in the same patient demonstrates the typical ankylosis and “bamboo spine appearance” (white arrows).
Aseptic necrosis may occur due to prolonged steroid use. The hip is the most common site likely due to combination of precarious blood supply and high loading when standing. This infarcted necrotic bone can fracture or become compacted which leads to collapse of articular surfaces, recognized as a “crescent sign” on radiographs. Either long term therapy or short term high dose treatment increases the risk of osteonecrosis.
56 y M with CD with no imaging findings of active inflammation. Axial and Coronal CT shows crescentic subchondral sclerosis of the left femoral head (black arrow) consistent with aseptic necrosis. Early aseptic necrosis is also seen in the right femoral head (red arrow).

44 y F with active inflammatory small bowel CD with luminal narrowing (red arrows). Axial and coronal CT shows geographic areas of sclerosis within bilateral femoral heads consistent with aseptic necrosis (white arrows).
HEPATO-BILIARY MANIFESTATIONS OF IBD

• Primary sclerosing cholangitis
• Autoimmune chronic active hepatitis
• Portal fibrosis
• Cirrhosis
• Granulomatous disease
• Hepatic steatosis
• Cholelithiasis
HEPATOBILIARY: PRIMARY SCLEROSING CHOLANGITIS (PSC)

- PSC is strongly associated with IBD (in 70% cases), especially in UC.
- Seen in approximately 2.5-7.5% of all IBD cases.
- Causes inflammation and fibrosis of the biliary system leading to strictures of the bile ducts.
- Clinically presents with chills, fever, abnormal LFT, jaundice, dark urine, RUQ abdominal pain, and pruritus.
- Slowly progressive, leading to cirrhosis, portal hypertension, and eventual need for liver transplantation.
- May lead to cholangiocarcinoma (5-15% of PSC).
- Typical findings include multi-focal strictures and irregularity of both intra- and extra-hepatic bile ducts, leading to the classic “bead on a string” appearance.
HEPATOBILIARY: PRIMARY SCLEROSING CHOLANGITIS (PSC)

65 y F with a history of PSC and UC. Post contrast MRI images demonstrate multisegmental peripheral intrahepatic biliary ductal dilation with a few scattered areas of focal ductal narrowing (white arrows).

43 y F with long standing Crohn's colitis and ileitis. MRCP shows “beading” of the common bile duct suggestive of PSC.
HEPATOBILIARY: CHOLANGIOCARCINOMA

• PSC is the greatest risk factor for developing cholangiocarcinoma
• Occurs in approximately 12–15% of patients undergoing liver transplantation for PSC.
• Cholangiocarcinoma is 20-30 times more likely in UC patients
• Diagnosis of cholangiocarcinoma can be difficult because of the similar appearance of cholangiocarcinoma and PSC
• Important to scrutinize the biliary system carefully to exclude any mass and dominant strictures causing moderate or marked upstream dilation (typical PSC does not cause moderate or marked upstream dilation)
76 y M with RUQ pain and jaundice with well controlled longstanding history of UC. Axial and coronal T2 shows lobulated mass centered at the right hepatic duct with associated obstruction and moderate dilation of the right anterior and posterior ducts. Left hepatic duct shows wall thickening and abuts the mass but is not obstructed. ERCP brushing of mass confirmed cholangiocarcinoma.
HEPATOMOBILIARY: CIRRHOSIS

- Cirrhosis is more prevalent in IBD patient’s than the general population
- Important to scrutinize for radiographic appearance of cirrhosis and its sequale.

65 y F with a history of PSC and UC. Post contrast MRI images show multiple sequela of cirrhosis and portal hypertension including splenorenal shunt (red arrow), dilated portal vein and esophageal varix (blue arrow)
HEPATOBILIARY: HEPATIC STEATOSIS

- Hepatic steatosis has been associated with IBD and it is important to assess for it on all modalities.

55 M with active CD. CTE shows short segment strictures with imaging findings of active inflammation (white arrow). There is diffuse decreased attenuation of the liver parenchyma in comparison to the splenic parenchyma consistent with hepatic steatosis.
HEPATOBILIARY: CHOLELITHIASIS

- 17-34% of patients with CD have gallstones compared to the general population
- No apparent increased risk in UC
- Decreased bile salt resorption in the terminal ileum, leads to cholesterol supersaturation and nucleation with gallstone formation

53 y F with CD. Coronal CTE shows active inflammatory disease in the descending colon (red arrow). Multiple gallstones are present (white arrows).
VASCULAR MANIFESTATIONS OF IBD

• Thromboembolic events
  • UC and Crohn’s disease are both prothrombotic
  • Venous thromboembolism is more common than arterial thromboembolism
• Associated factors are related to active bowel inflammation including
  ▪ Thrombocytosis
  ▪ Antithrombin III deficiency
  ▪ Increased levels of fibrinogen, fibrinopeptide A, factor V and factor VIII
  ▪ Free protein S deficiency
  ▪ Chronic dehydration due to diarrhea
• Vasculitis
29 y F with active inflammatory small bowel Crohn's disease with luminal narrowing (white arrows) with narrowing of the proximal (toward bowel) SMV as it approaches the affected ileal loops (green arrows) consistent with chronic venous occlusion
**VASCULAR : PORTAL AND HEPATIC VEIN THROMBOSIS**

19 y F with CD. Axial CT shows active inflammatory small bowel CD with luminal narrowing involving the distal ileum (white arrow). Coronal CT images show right portal venous branch thrombosis (black arrows).

34 y M with history of CD. Axial CT shows thrombus present in the left hepatic vein, a branch of the right hepatic vein and an accessory right hepatic vein located posteriorly (black arrows).
UROLOGIC MANIFESTATIONS OF IBD

- Nephrolithiasis
- Obstructive uropathy
- Fistulae to the genitourinary tract, especially to the urinary bladder
- Nephritis
- Secondary amyloidosis
  - A rare systemic complication of the kidneys
UROLOGIC: NEPHROLITHIASIS

• Urinary tract calculi are present in up to 1-5% of IBD patients.
• More often in CD than UC
• Calcium oxalate stones; most common (80%) in small bowel CD
  • Fat malabsorption leads to luminal binding of fatty acids by calcium
  • Decreased calcium available to bind and clear oxalate
  • Leads to increased oxalate absorption and stone formation
  • Since the absorption of sodium bound oxalate occurs in the colon, the increased risk of stones is present only with an intact colon
• Uric acid stones are most common in patient’s with an ileostomy without a colon
  • Due to volume depletion (diarrhea/ileostomy output) and hypermetabolic state output
  • Kidneys respond to fluid loss by forming concentrated acidic urine which favors uric acid crystal precipitation
57 y F with CD presenting with abdominal pain concerning for Crohn’s flair. Axial and Coronal CT shows multiple large renal calculi in the right kidney including large stag horn calculus (white arrows) leading to chronic severe hydronephrosis (green arrow).
PULMONARY MANIFESTATIONS OF IBD

• Airway Disease
  • Airway inflammation is the most common form of respiratory involvement in IBD
  • Bronchiectasis is seen in 2/3 or the cases of the airway involvement
  • Small airway involvement is less common

• Parenchymal Lung disease
  ▪ IBD-related parenchymal disease (usually Cryptogenic Organizing Pneumonia) is rare.
  ▪ Other forms of parenchymal disease that may be related to IBD or drug toxicity are eosinophilic pneumonia and nonspecific interstitial pneumonitis (NSIP).
44 y W with cough and active UC. CT scan at level of main bronchi shows diffuse bronchiectasis of intermediate airways (white arrows).

37 y M with active UC. CT chest shows peripheral lenticular-shaped areas of consolidation (Red arrows). Biopsy showed COP.

66 y F with UC with cough, fever, and dyspnea. CT chest shows scattered ground-glass opacities (red arrows) and interlobular septal thickening (blue arrows) with little traction bronchiectasis. Biopsy showed NSIP.

Images from Betancourt S, Palacio D, Jimenez C. Thoracic Manifestations of Inflammatory Bowel Disease. AJR; 197:452-456.
DERMATOLOGIC MANIFESTATIONS OF IBD

• Fistulas and fissures
  • Commonest skin manifestation

• Additional major dermatologic manifestations have been reported in 2–34% of IBD patients
  ▪ Erythema Nodosum
    ▪ More Common in CD than in UC
  ▪ Pyoderma Gangrenosum
    ▪ More common in UC
  ▪ Sweet’s Syndrome
  ▪ Vasculitis
  ▪ Amyloidosis
64 y F with UC presented with abdominal pain and fever. Her abdominal exam demonstrated area of erythema and induration under the umbilicus. Axial CT shows complex enterocutaneous fistula in the anterior abdominal wall (white arrows).
SUMMARY AND CLINICAL IMPLICATIONS

• Extra intestinal manifestations of IBD are common.
• Radiologists play a key role in the management of these patients as they may be the first to identify these manifestations.

Email for correspondence: gandhin@ccf.org
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