Characterization of small bowel pathology on CT and MR Enterography: Case-based review

Darya Kurowecki, BSc, MA
University of Ottawa

Rebecca Hibbert, MD, FRCPC
Department of Medical Imaging
The Ottawa Hospital
University of Ottawa
Disclosures

• Nothing to disclose
Learning Objectives

1. Review common and uncommon small bowel pathology on CT and MR enterography
2. Illustrate a pattern-based approach to diagnosis of small bowel disease on CT and MR enterography
3. Review the role of CT and MR enterography in the evaluation of small bowel disease
Case 1: “Irritable bowel syndrome, increasing diarrhea”

Most likely diagnosis:
A. Normal
B. Peutz-Jeghers
C. Adenocarcinoma
D. Carcinoid

Avidly enhancing nodule in ileum
Carcinoid

• Neuroendocrine neoplasm
• Produces serotonin and other vasoactive substances
• 60-70% occur in GI tract (most within 60 cm of IC valve)
• Sporadic but associated with:
  – MEN type 1
  – Zollinger Ellison syndrome
  – Neurofibromatosis type I
• Characteristically slow-growing
• Metastatic findings can include:
  – Spiculated calcified mesenteric nodal mass
  – Hypervascular liver metastases
Case 2: 24 M “abdominal discomfort and history of atopy”

Most likely diagnosis:
A. Crohn disease
B. Eosinophilic gastroenteritis
C. GVHD
D. Small bowel vasculitis

-Mural thickening involving stomach antrum and jejunum
-Multiple small mesenteric lymph nodes
Eosinophilic Enteritis

- Male predominance, 3-5\textsuperscript{th} decade
- Non-neoplastic infiltration of bowel wall by eosinophils
- Should be suspected with peripheral eosinophilia (75%) or atopy (50%)
- Virtually always involves gastric antrum and proximal small intestine
- Findings can range from mucosal disease (ulcers and fold thickening) to intramural (thickening, obstruction) or serosal disease (ascites, adenopathy)
Case 3: “abdominal pain, diarrhea”

Most likely diagnosis:
A. Mastocytosis
B. Scleroderma
C. Celiac disease
D. Whipple disease

- Reversal of fold pattern
- Dilated, fluid filled small bowel
- Prominent mesenteric vessels
- Prominent upper abdominal mesenteric lymph nodes
- Multiple intussusceptions
Celiac Disease

• Chronic autoimmune process
• Attacks small bowel mucosal cells in genetically susceptible individuals exposed to dietary gluten
• Progressive villous inflammation and destruction with hypertrophy of crypts
• Starts in duodenum ➔ ileum
• Now estimated at 1 in 200
• Abdominal pain, iron deficiency anemia, guaiac-positive stools, diarrhea (<20%), constipation (up to 15%)
Celiac Disease Findings

**Malabsorption Pattern (small bowel):**
- Fluid-filled, dilated small bowel (laminar flow, flocculation, dilution)
- Reversal of fold pattern
- Intussusceptions (due to flaccidity of dilated bowel)
- Wall thickening (lymphocytic phase)
- Intramural fat in duodenum, jejunum

**Malabsorption Pattern (large bowel):**
- Increased colonic gas
- Puddles of fluid in right colon
- Geodes of adherent stool in colon (may calcify)
- Fat-attenuation of fluid and stool in colon
- Wall thickening (lymphocytic phase)
- Intramural fat in right colon

**Extra-intestinal:**
- Mesenteric lymph node enlargement
- Low-attenuation or cavitating lymph nodes
- Engorged mesenteric vessels
- Splenic atrophy
Case 4

Most likely diagnosis is:
A. Mastocytosis
B. Peutz-Jeghers
C. Celiac disease
D. Small bowel metastasis

Multiple polypoid lesions in stomach and small bowel, some acting as lead points for intussusceptions

Prior bilateral mastectomy for breast Ca
Peutz-Jeghers

- Autosomal dominant polyposis syndrome
- Polyps are non-neoplastic hamartomas
- Involve small bowel, but also stomach and colon
- Increased risk of:
  - Intussusceptions
  - GI tract and other malignancies (breast, pancreas, ovary)
- Mucocutaneous melanin pigmentation involving fingers, nose, mouth
Case 5: 22 F, years apart

Most likely diagnosis:
A. Mastocytosis
B. Lymphoma
C. Celiac disease
D. Lupus enteritis

- Mural stratification
- Thickened irregular folds
- Mucosal ulcerations
- Patchy bowel enhancement
- Mesenteric vascular engorgement
- Ascites
Lupus Enteritis

- Autoimmune disorder of unknown cause
- Predominantly affects women of child-bearing age
- Vasculitis +/- ischemia
- Responds well to high-dose steroid therapy
- Complications: intramural hemorrhage, bowel infarction, perforation
True or False?

The following are examples of predominantly \textbf{ACTIVE} Crohn’s inflammation. \textbf{TRUE}

\begin{itemize}
  \item T1FS Post
  \item T1FS Post with subtraction
  \item T2W
  \item T1FS Post
\end{itemize}

\textbf{Validated MRI markers:}
- Mural thickness
- Mural T2 signal intensity
- Perimural T2 signal intensity
- T1 enhancement
- Enhancement pattern

\textbf{Others:}
- Restricted diffusion (*if unable to receive IV contrast or tolerate oral preparation)
- Motility
- Comb sign
- Lymph nodes
True or False?

The following case is an example of predominantly **ACTIVE** Crohn’s inflammation.  **FALSE**
Case 6

Most likely diagnosis:
A. Fibrostenosing Crohn disease
B. Radiation enteritis
C. Penetrating Crohn disease
D. Metastatic disease

Patient 1

Patient 2

Large left iliac enterocutaneous fistula

Multiple enteroenteric fistulas in RLQ
Case 7

Most likely diagnosis:

A. Fibrostenosing Crohn disease
B. Radiation enteritis
C. Penetrating Crohn disease
D. NSAID related strictures

- Retained endoscopy capsule
- Multifocal strictures with upstream dilatation
- Viscus perforation (patient 2) from obstruction
Crohn Disease: Important Concepts

• Best conceptualized as spectrum:
  – From active inflammation to fibrosis
  – From ulceration to penetrating disease

• Multiple stages frequently coexisting
  – In the same patient
  – Or in the same segment

• Dominant feature, in conjunction with clinical presentation, determines management
MR enterography

- Increasingly used to objectively assess Crohn disease activity and to guide management
- Assessment of CD activity should be based on integrating several imaging findings
- Many scoring systems:
  - CD MRI index (CDMI)
    - high correlation with histopathology score
  - MR index of activity (MaRIA)
    - high correlation to CD endoscopic index of activity
CT or MR enterography?

**MR enterography**
- Young patient with known or suspected IBD
- When perianal disease is suspected
- When clinical question is active versus chronic disease in a patient with known IBD

**CT enterography**
- Patients >50 or with any indication other than known or suspected IBD
THANK YOU