Crohns Disease: Radiologic Findings

Elissa Altin, Harvard Medical School Year III
Gillian Lieberman, MD

May 2005
Our Patient

● 21 year-old man with 7-year history of Crohn’s and medical non-compliance presents with obstructive symptoms
  ● History: bilious vomiting of undigested food, abdominal pain, loose stools
  ● Physical Exam: orthostatic, Tmax to 101.7, abdomen was soft, non-distended with mild discomfort in the epigastric region without peritoneal signs.
  ● Laboratory: WBC 11.3, Hct 39.1. PT and PTT were 11.2 and 26.3. Electrolytes within normal limits.
Crohns Disease in Overview

- **DEFINITION:** disorder of transmural discontinuous inflammation of any segment of the GI tract from pharynx to perianal area
- **ETIOLOGY:** largely unknown but believed to be caused by destruction of immunologic homeostasis of the GI tract secondary to over-expression of pro-inflammatory cytokines, under-expression of regulatory cytokines, or both
Crohns Disease in Overview

- **GENETICS:** polygenic, but 10 times increased risk of having Crohn's if a first degree relative suffers from it\(^1\)

- **EPIDEMIOLOGY:** bimodal distribution with peak at 2\(^{nd}\)-4\(^{th}\) decade of life and again after 6\(^{th}\) decade; affects whites more, especially Ashkenazi Jews living in Europe and North America
Clinical Features of Crohn’s

- **Inflammatory Symptoms**
  - RLQ pain, fever, diarrhea +/- blood, weight loss, palpable abdominal mass on physical exam

- **Obstructive Symptoms**
  - Post-prandial abdominal pain, distension, nausea, vomiting

- **Fistulous Disease**
  - Enterovaginal, enterocutaneous, enteroentero, enterovesicular fistulae can form as a result of transmural inflammation with elaboration of sinus tracts that penetrate the mucosa
Clinical Features of Crohn’s

- **Perianal Disease**
  - Anal fissures, perianal abscess formation, anorectal fistula, pain and drainage from skin tags

- **Extraintestinal Manifestations**
  - Seronegative arthritis (asymmetric, usually large joints), sacroiliitis, ankylosing spondylitis, *E. nodosum/Pyoderma gangrenosum*, ocular manifestations (episcleritis, uveitis), hepatic complications (elevation of serum transaminases, primary sclerosing cholangitis)
Normal Anatomy

Image from Horton et al.
Diagnosis of Crohn's

- Clinical Presentation
- Endoscopic features
  - Apthous ulcers, edema, erythema, exudate, friable mucosa with intercalated normal mucosa called “skip lesions”, linear ulcers with segments of uninvolved mucosa called “cobblestoning”
- Histologic Features
- Radiologic Features: let’s see...
Radiographic options for diagnosing Crohn’s

- **Conventional X-ray**
  - Without barium: good for obstruction to show dilated loops of bowel and strictures
  - With barium: not in the setting of obstruction, can show details of the mucosa, including filling defects, ulcerations, and strictures

- **CT Scan**
  - Can show cross-sections details of the bowel wall, including edema, engorged ileal vasa recta, fistulous tract formation, abscess, stricture, dilation, mural stratification, and mucosal and mural hyperenhancement
Our Patient: A Natural History of Crohn's on Radiographs

- **Barium swallow to rule out obstructing lesion**
  - No evidence of obstructing lesions, but narrowed and diseased distal ileal loop (“string sign”) in pelvis separate from other loops consistent with wall thickening without evidence of proximal dilation to suggest obstruction

- **Aphthous ulceration**: barium collects in superficial ulceration, surrounded by edematous mucosa, herald future, larger ulceration

![Image of radiograph with string sign and aphthous ulceration]

Courtesy of Kevin Knoblock
More findings from our patient: cobblestoning and ulceration

• Characteristic cobblestoning pattern formed by dispersal of barium between inflamed, edematous mucosa (thick arrow)

• Ulceration: barium collects in ulceration surrounded by thickened mucosa (thin arrow)
More findings from our patient: nodular filling defects

- Nodular filling defects in folds of ileal mucosa are characteristic of Crohn's

Courtesy of Kevin Knoblock
Differential Diagnosis of Crohn's Colitis

- Lactose intolerance
- IBS
- Radiation colitis
- *C. diff* pseudomembranous colitis
- Ischemic colitis
- Appendicitis, diverticulitis, perforating or obstructing carcinoma
- Infection: *Shigella*, *Salmonella*, *Campylobacter*, *E. coli*, *Yersinia* (causes nearly identical small bowel colitis to Crohns)
- Ulcerative Colitis
Crohns versus ulcerative colitis

- Characteristics of Crohns not usually found in UC
  - Small bowel involvement
  - Rectal sparing
  - Absence of gross bleeding
  - Perianal disease
  - Discontinuous areas of disease
Crohns versus ulcerative colitis

- Why do we care to differentiate?
  - Colectomy with ileoanal anastomosis is essentially curative in UC, but in Crohns disease can recur in small bowel
  - Crohns is treated with segmental resection, but in UC, disease can recur in non-resected colon
Our patient: A few years later...

- Presents with fevers to 103, abdominal pain – barium study
  - Distal jejunum shows at least 5 segments of narrowing with interspersed dilation
  - More distally, there is sacculation of the terminal ileum in between areas of luminal narrowing
  - Segmental areas of disease with intervening normal bowel

Courtesy of Kevin Knoblock
Our patient: After surgery

- Status post segmental resection of jejunum, stricturoplasty of ileum, and ileoascending colostomy
- No evidence of obstruction or recurrence
Our patient: Obstructed Again...

- Partial obstruction seen two ways, with distended small bowel loops on KUB and dilated loops of fluid filled small bowel on CT
Other radiologic signs in a comparison patient: fistulae and abscess

- Fistulous tract connecting bowel wall to surrounding abscess
- Seen above without contrast and below with contrast showing enhancing abscess wall
- Presence of contrast in abscess confirms communication between abscess and bowel wall via fistula
Medical Management of Crohn's

- From our patient, we have seen the progression of disease from small scale ulceration to painful climax resulting in surgical resection.
- How do we treat patients medically to hopefully avoid or postpone surgery, keeping in mind that up to 80% of patients will require surgery eventually?
Immunomodulatory Treatment

- Active Ileitis
  - 5-ASA (Pentasa, Asacol), ABX (ciprofloxacin, clarithromycin), steroids

- Maintenance
  - 5-ASA

- Refractory Disease
  - Azathioprine and 6-mercaptopurine
    - Both purine mimic antimetabolites
    - Can help to induce remission in steroid resistant patients as well as for remission maintenance

- Methotrexate
  - Structural analog of folate and competitive inhibitor of dihydrofolate binding
Review of Radiologic Findings
References

- Uptodate.com
- PACS, BIDMC
Acknowledgements

- **Kevin Knoblock**
- **Pamela Lepkowski**
- **Larry Barbaras**
- **Gillian Lieberman, MD**