Inflammatory Bowel Disease: Diagnosis & Treatment

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Learning Objectives

• Distinguish between the types of Inflammatory Bowel Disease
• Assess the significance of diagnostic tests in Inflammatory Bowel Disease
• Discuss the principles and evolving treatments in Inflammatory Bowel Disease
• Optimize preventive measures and management in Inflammatory Bowel Disease
Overview

• Background
• Ulcerative Colitis (UC) v. Crohn’s Disease (CD)
• Diagnostic strategies
• Therapeutics & changes in medical management
• Vaccination & preventive measures
• Case Study
• Summary and Conclusions
BACKGROUND
Definitions

• Inflammatory Bowels Disease
  • Idiopathic inflammation of the GI tract
    • Ulcerative Colitis
      • Limited to mucosal layer of colon and rectum
    • Crohn’s Disease
      • Full thickness inflammation involving any part of the GI tract (mouth to anus)
Epidemiology: United States

• Incidence: 70K new cases IBD diagnosed in U.S. each year
  • Peak onset
    • UC: 30-40 years
    • CD: 20-30 years
  • Pediatric cases: 7-20% (~80K cases in the U.S.)
  • Incidence INCREASING
• Prevalence: ~ 200 cases per 100,000
  • > 1.6 million Americans currently have IBD

www.crohnscolitisfoundation.org/assets/pdfs/updatedibdfactbook.pdf
Epidemiology: United States

- Gender
  - UC: M > F
  - CD: F > M
- Highest incidence
  - Whites of North America
  - Ashkenazi Jews
- Incidence increasing around the world
Etiologic Interplay

Nature
Genes
Microbiome

IBD

Nurture
Environment
ULCERATIVE COLITIS

v.

CROHN’S DISEASE
Ulcerative Colitis

• Begins at rectum and spreads continuously
• Superficial mucosal inflammation of rectum & colon only
• 30% proctitis, 40% left-sided colitis, 30% pancolitis
Ulcerative Colitis

Presentation

• Symptoms depend on extent and severity of inflammation
  • Bloody diarrhea
  • Abdominal cramping
  • Tenesmus/fecal urgency
  • Systemic symptoms, fever, decreased stamina, weight loss
  • Extra-intestinal manifestations (1/3 patients)
Ulcerative Colitis
Distribution at Presentation

Disease Distribution at Presentation:
UC

- 46%
- 37%
- 17%

n = 1116

Furner WC, Colley KB, Ransing GK. Dig Dis Sci 1993;38(9):1137-1146
Ulcerative Colitis
Endoscopic Appearance

NORMAL MUCOSA

ULCERATIVE COLITIS
Crohn’s Disease

- Transmural inflammation of any part of GI tract
  - “Skip” lesions
  - Noncaseating granulomas
  - Inflammation extending from the mucosa to at least the muscularis
- Involves any part of the GI tract (Rectum often spared)
- 30% small bowel (usually terminal ileum), 40% ileum/colon, 25% colon, 5% stomach/duodenum/esophagus
- Fistulas: perirectal/perineum, enterocutaneous, enterocolic, to other internal organs
Crohn’s Disease

Presentation

• Symptoms:
  • Non-bloody diarrhea
  • Weight loss
  • Fever
  • RLQ pain and/or mass
  • Perianal/perirectal disease with abscess, fistulas, structuring
  • Extraintestinal manifestations
Crohn’s Disease
Distribution at Presentation

Crohn’s Disease: Anatomic Distribution

- Small bowel alone (33%)
- Ileocolic (45%)
- Colon alone (20%)

Freq of Involvement
Most
Least
Crohn’s Disease
Endoscopic Appearance

NORMAL MUCOSA

CROHN’S COLITIS

CROHN’S COLITIS
# Ulcerative Colitis v. Crohn’s Disease

<table>
<thead>
<tr>
<th>Ulcerative Colitis</th>
<th>Crohn’s Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous/superficial</td>
<td>“Skip lesions”/deep (transmural)</td>
</tr>
<tr>
<td>Rectum to colon only</td>
<td>Mouth to anus +/- rectum</td>
</tr>
<tr>
<td>++ Rectal bleeding</td>
<td>+/- Rectal bleeding</td>
</tr>
<tr>
<td>Rare strictures</td>
<td>++ Fistulas/strictures</td>
</tr>
<tr>
<td>Surgery curative</td>
<td>Surgery palliative (high rate of recurrence: &gt;50%)</td>
</tr>
<tr>
<td>Extra-intestinal</td>
<td>Extra-intestinal</td>
</tr>
<tr>
<td>Bloody diarrhea/urgency</td>
<td>Abdominal pain/weight loss</td>
</tr>
</tbody>
</table>
Ulcerative Colitis v. Crohn’s Disease

Difficult to distinguish UC from CD in 10-20% of IBD patients
Inflammatory Bowel Disease
Extra-intestinal Manifestations

Extra-intestinal Manifestations of IBD

- Skin
- Eye
- Bones and Joints
- Kidney
- Hepatobiliary
Inflammatory Bowel Disease
Extra-intestinal Manifestations

Dermatologic

pyoderma gangrenosum

erythema nodosum
Inflammatory Bowel Disease
Extra-intestinal Manifestations

• Ocular: episcleritis, anterior uveitis

• Musculoskeletal: arthritis, ankylosing spondylitis, sacroiliitis

• Hepatobiliary: steatosis, cholelithiasis, primary sclerosing cholangitis (PSC)
Inflammatory Bowel Disease
Toxic Megacolon

• Occurs in 1-3% patients with IBD
• Colonic dilatation > 6 cm & signs of toxicity
  • Fever, hypotension, tachycardia, leukocytosis
• High risk of perforation
DIAGNOSTIC STUDIES
Laboratory Studies

- CBC
  - Anemia (iron deficiency, B 12)
- CRP (C reactive protein), ESR
  - Elevated
- CMP (Comprehensive Metabolic Profile)
  - Low albumin from protein loss, inflammation, malabsorption
- Stool studies
  - WBC, culture, C. Diff, O&P
Laboratory Studies

• IBD Antibody Panels
  • pANCA & ASCA
  • perinuclear Antineutrophil cytoplasmic antibodies (pANCA)
    • 65% UC cases
    • 10% CD cases
  • Antibodies to Saccharomyces cerevisiae (ASCA)
    • 60-70% CD
    • 10-15% UC
  • - pANCA/+ASCA  50% sensitivity & 97% specificity for CD
  • +pANCA/-ASCA  57% sensitivity & 97% specificity for UC
• Fecal calprotectin  colonic inflammation
Endoscopy & Radiologic Studies

- Colonoscopy
- Esophagogastroduodenoscopy (EGD/upper endoscopy)
- Video Capsule Endoscopy (VCE Study)
- CT A&P
- CT Enterography
- MR Enterography
- Other modalities
  - Double Balloon Endoscopy
  - Spiral Endoscopy
THERAPEUTIC APPROACH & MANAGEMENT
Inflammatory Bowel Disease

Goals of Therapy

• Induce remission of active disease
• Maintenance of remission
• Maintain/Restore nutrition
• Avoid surgery
• Avoid complications
  • Disease related
  • Therapy related
• Quality of life
Inflammatory Bowel Disease
Evolving Principles of Therapy

• Incorporate elements of prognosis into diagnosis & medical decision making
• Move to “one size fits all” to “smart therapy for the right patient”
• Precision medicine-optimization of treatments instead of “guesswork”
• Monitoring disease activity to achieve deeper remission & to anticipate flares → proactive approach
Inflammatory Bowel Disease
Drug Classes 2017

- Aminosalicylates
  - Oral
  - Rectal
- Corticosteroids
  - Systemic
  - Non-systemic
  - Rectal
  - Oral
- Immunomodulators
  - Thiopurines
    - Azathioprine & 6-Mercaptopurine
    - Methotrexate
- Antibiotics
- Biologics
  - Anti-cytokines
    - Anti-TNF
    - Anti-IL12/23/6
    - Anti-integrin (adhesion molecule inhibitors)
- Investigational molecules
  - Janus kinase inhibitors
    - Tofacitinib
    - Filgotinib
    - Upadacitinib (ABT-494)
  - Anti-SMAD7 antisense oligonucleotide
    - Mongersen
  - Sphingosine-1-phosphate receptor modulator
    - Ozanimod
Inflammatory Bowel Disease

Aminosalicylates

• 5-ASA reduces inflammation
• Sulfasalazine (Azulfidine) → oldest & cheapest
• Newer agents comprised of Mesalamine bound to carrier molecules to prevent degradation in proximal small bowel
  • Asacol, Pentasa, Lialda, Apriso, Colazal, Delzicol, Dipentum, Glazo, Canasa (suppository), Rowasa (enema)
• Oral, enema, and suppository routes
Inflammatory Bowel Disease
Corticosteroids

- Topical
- Systemic
- Used for acute flares NOT remission
- Significant side effects: osteoporosis, hypertension, growth retardation, hyperglycemia, cataracts
  - Hydrocortisone (IV, foam, enemas)
  - Prednisone or Methylprednisolone (IV, oral)
  - Budesonide
    - Fewer systemic side effects & less adrenal suppression
Inflammatory Bowel Disease
Immunomodulators

AZATHIPRINE
5-MERCAPTOPURINE
6-THIOGUANINE
Inflammatory Bowel Disease

Immunomodulators

• 6-Mercaptopurine (6-MP), Azathioprine, Methotrexate (MTX)
• 3-6 month full onset of action
• Side effects: bone marrow suppression, hepatic toxicity, pancreatitis, lymphoma, skin cancers (basal & squamous cell)
• Thiopurine Methyltransferase (TPMT) enzyme activity
• Measure thiopurine methyltransferase (TPMT) enzyme activity prior to starting immunomodulatory agents
  • Genetically determined metabolism
• Lab tests available to monitor metabolite levels
Inflammatory Bowel Disease

Antibiotics

• Mostly used for treating Crohn’s disease
• Issues:
  • Small intestinal bacterial overgrowth 2° enteral fistulas
  • Modulate an abnormal microbiome in theory
• Broad spectrum bactericidal activity + some immunosuppressive properties
• Commonly used antibiotics
  • Metronidazole (Flagyl)
  • Ciprofloxacin (Cipro)
  • Rifaximin (Xifaxan)

Inflammatory Bowel Disease
Microbiome Modulators

- Antibiotics → supra
- Fecal Microbiota Transplant (FMT)
  - Intestinal dysbiosis important in underlying pathobiology of IBD
  - Administration: oral v. enema v. colonoscopic
- Enteral nutrition
  - Elemental, semi-elemental, & polymeric diets
- Probiotics & Prebiotics
  - Possibly reduce relapses in patients with UC
  - VSL #3
  - Bifidobacterium, Lactobacillus, E. coli
- Omega-3 Fatty Acids
  - May reduce relapses in patients in remission with Crohn’s disease

Inflammatory Bowel Disease
Calcineurin Inhibitors (Cyclosporine)

• Severe ulcerative colitis refractory to steroids
• Often used as bridge to surgery or onset of action of immunomodulatory drugs
  • Associated with high 1 year colectomy rate among initial responders
• Significant side effects: nephrotoxicity, hepatotoxicity, hypertension, paresthesias, seizures, anaphylaxis
• Biologics have largely supplanted use due to ease of use & lower toxicity profile

Inflammatory Bowel Disease
Traditional Therapy Summary

<table>
<thead>
<tr>
<th>Class</th>
<th>Medication</th>
<th>Route</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-ASA (mesalamine)</td>
<td>Azulfidine, Asacol, Apriso,</td>
<td>PO, rectal</td>
<td>Nausea, diarrhea, nephritis, rash</td>
</tr>
<tr>
<td></td>
<td>Colazal, Delzicol, Dipentum, Glazo, Lialda,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pentasa, Canasa (suppository), Rowasa (enema)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antibiotics</td>
<td>Flagyl, Cipro, Rifaximin</td>
<td>PO</td>
<td>Nausea, PMC, neuropathy</td>
</tr>
<tr>
<td>Steroids</td>
<td>Prednisone, Budesonide, Solumedrol, Hydrocortisone</td>
<td>PO, IV</td>
<td>DM, cataracts, psychosis, weight gain, skin changes, osteoporosis/necrosis, hypertension</td>
</tr>
<tr>
<td>Immunomodulators</td>
<td>Azathioprine, 6-MP, Methotrexate</td>
<td>PO</td>
<td>Leukopenia, hepatitis, pancreatitis, lymphoma, infection, skin cancers</td>
</tr>
</tbody>
</table>
Inflammatory Bowel Disease
Biologics: The New Era
Inflammatory Bowel Disease
When to Introduce Biologic Therapy?

• Steroid-refractory UC/CD
• Steroid-dependent UC/CD
• Immunomodulator-refractory UC/CD
• Immunomodulator-intolerant UC/CD
• Clinical predictors of a poor outcome at diagnosis
• Fistulizing CD
• Prevention of Postoperative CD
• Maybe sooner than later
Inflammatory Bowel Disease

Biologics

• Biologics dramatically changed treatment of IBD
  • Initial studies showed closure of fistulas
• Mode of action
  • Specifically target mediators of inflammation
    • Tumor Necrosis Factor Alpha = Cachexin = Cachectin
    • Anti-Tumor Necrosis Factor → Antibodies
• Changed natural history of disease → avoid surgery & complications
• Mucosal healing → Better outcomes
• Faster healing

Inflammatory Bowel Disease

Anti-TNF Agents

Certolizumab pegol

TNF receptor

CD

Adalimumab

CD

UC

Golimumab

UC

Infliximab

$(\text{Fab}^{'})_2$

Fc region

Inflammatory Bowel Disease

Anti-TNF Agents

• Anti-TNF agents were initial biologics to block inflammatory cascade
• 4 Anti-TNF agents currently available
  • Infliximab
    • IV infusion
  • Adalimumab
    • Subcutaneous
  • Certolizumab pegol
    • Subcutaneous
  • Golimumab
    • Subcutaneous

Inflammatory Bowel Disease
Anti-TNF Agents

• Need to check for TB, HBV, & HCV prior to treatment
• Loading and maintenance dosing required
• Important to monitor therapeutic drug levels
• Assess stability between doses
• Combination therapy mostly accepted as superior
• Higher response rates in patients with shorter disease duration

Inflammatory Bowel Disease

**Biosimilars**

- Copy versions of original biologic agents
  - Similar but not identical
  - Safety data and efficacy data are extrapolated
  - Evidence suggests that unidirectional switches are safe
- Inflectra → biosimilar to infliximab
  - Approved by FDA in April 2016 (approved September 2013 by European Medicines Agency)
- Amjectiva → biosimilar to adalimumab
  - Approved by FDA September 2016
  - Greater than 20 other biosimilars in pipeline to infliximab & adalimumab

Inflammatory Bowel Disease
Anti-Integrin Antibodies

• α4 Integrins
  • Mediate leukocyte recruitment and adhesion
• Monoclonal Abs with different mechanism of action than anti-TNF agents in intestinal immune response
  • Blocks an integrin (α4β7) on lymphocyte surfaces that facilitates trafficking of lymphocytes to gut & binding of those lymphocytes to specific ligands
• Gut specificity is important
  • β-subunit (β7) of α4β7 makes this integrin specific to the gut
  • Limiting lymphocyte trafficking to gut limits systemic & CNS toxicity

Inflammatory Bowel Disease

Anti-Integrin Antibodies

• 2 Agents
  • **Natalizumab**
    • Humanized monoclonal Ab directed against α-4 integrin
    • Blocks leukocyte migration to sites of inflammation → **NOT GUT SPECIFIC**
      • Blocks both α4β1 & α4β7
    • Limited use → PML (Progressive Multifocal Leukoencephalopathy)
  • **Vedolizumab**
    • Humanized monoclonal Ab directed against α4β7
    • Blocks lymphocytes selectively trafficking to the gut → **GUT SPECIFIC**
• Still need to check for TB, HBV, & HCV prior to starting treatment
• Insurance company requirement

Inflammatory Bowel Disease
Anti-Integrin Antibodies

Natalizumab
Vedolizumab

300mg IV q4W
300mg IV at weeks 0, 2, and 6
then 300 mg IV q8W

CD
CD
UC

Inflammatory Bowel Disease
Anti-Integrin Antibodies

- **Etrolizumab (rhuMAb Beta7)**
  - Monoclonal Ab developed with specificity for just β7 subunit
    - Exclusively binds to lymphocytes with their gut specific receptor mucosal addressin cell adhesion molecule
  - Administered SC
  - As of 2016 in Phase III trials for induction & maintenance therapy for Ulcerative Colitis & Crohn’s Disease

**Inflammatory Bowel Disease**

**Anti-IL 12/23**

- Interleukin (IL)-12/23 activate certain T cells
- **Ustekinumab**
  - Human IgG1k monoclonal Ab → interferes with triggering the body's inflammatory response through suppression of certain cytokines
  - Blocks biologic activity of IL-12 & IL 23 by inhibiting receptors for these cytokines on T cells, natural killer cells, & Ag presenting cells
- Approved by FDA September 26, 2016
  - Moderate to severe Crohn's Disease

Inflammatory Bowel Disease

JAK Inhibitors

- Janus kinase (JAK) family
  - Comprises 4 intracellular tyrosine kinases
  - JAK1, JAK2, JAK3, & nonreceptor tyrosine-protein kinase 2 (TYK2)
  - Activate signal transducers & activators of transcription (STATs) through auto phosphorylation
  - JAK-STAT pathways regulate signaling for multiple immune-relevant mediators: Type I interferon, interferon-γ, & interleukins 2, 4, 6, 7, 9, 12, 15, 21, 23, 27

Inflammatory Bowel Disease

JAK-STAT Pathway

Inflammatory Bowel Disease

JAK Inhibitors

- **Tofacitinib**
  - Inhibits JAK 1 & JAK 3 → interferes with several cytokine receptors
  - Oral agent
  - Effective after renal transplant & approved for RA
  - Phase 3 trial recently shown to be more effective in patients with moderately to severely active ulcerative colitis as induction and maintenance therapy than placebo
  - Associated with increases in certain lipid levels
  - Few nonmelanoma skin cancers & cardiovascular events noted in trial

Inflammatory Bowel Disease
Novel Treatments

- JAK-1 Inhibitors
  - Tofacitinib
  - Filgotinib
    - Crohn’s Disease
    - Upadacitinib (ABT.494)
- Mesenchymal Stem Cell (Cx601)
  - Injected around fistulas in perianal Crohn’s
- Oligonucleotide (STNM01)
  - Left sided UC
  - Double stranded RNA

- Hyperbaric Oxygen (HBOT)
  - Ulcerative Colitis
- Anti-SMAD7 antisense oligonucleotide
  - Mongersen
- Sphingosine-1-phosphate receptor modulator
  - Ozanimod
Inflammatory Bowel Disease
Summary of Drug Therapy 2017

• Goals of management are evolving: prognosis, target deep remission
• For 5-ASAs understand delivery and possible dose-reduction in maintenance
• You do not need to use steroids as much as you think
• Lymphoma is from thiopurines → risk goes away when drugs stopped
• Nonmelanoma CA skin is from thiopurines → risk does not go away when drugs stopped
Inflammatory Bowel Disease
Summary of Drug Therapy 2017

• Pro-active anti-TNF drug monitoring is coming here
• Biosimilars are coming → interchangeability is uncertain
• Anti-integrin therapies are safe and probably should be used earlier (at least in UC)
• Anti-IL12/23 is shown to be effective in induction and maintenance of moderate-to-severe CD as maintenance therapy
• JAK inhibitor data is evolving
Inflammatory Bowel Disease

Surgery: Ulcerative Colitis

• **Surgery** for Ulcerative Colitis
  • Total proctocolectomy curative
    • Eliminates risk of CA colon
  • Necessary in ~ 25% patients
  • Indications:
    • Severe hemorrhage
    • Perforation
    • Fulminant colitis
    • Toxic megacolon
    • Medical failure
Inflammatory Bowel Disease
Surgery: Crohn’s Disease

• Surgery Crohn’s Disease
  • > 50% patients will need at least one surgery
  • Palliative
    • > 50% recurrence at surgical site within one year
    • Post-op immunomodulators or biologics may reduce recurrence
  • Indications
    • Strictures causing obstructive symptoms
    • Fistulas or perianal disease refractory to medical therapy
    • Intra-abdominal abscess
    • CA colon
Ulcerative Colitis
Therapeutic Pyramid

Severe

Surgery
Biologics

Moderate

Systemic Corticosteroids
Topical Steroids

Mild

Aminosalicylates

Immunomodulators
Crohn’s Disease
Therapeutic Pyramid

- Surgery
- Biologics
- Immunomodulators
  - Corticosteroids (Prednisone)
  - Budesonide
- Aminosalicylates/Antibiotics

Severe
Moderate
Mild
Crohn’s Disease
Step-Up versus Step-Down Therapy

Step-Up Therapy
- Anti-TNF
- AZA v. 6-MP/MTX
- Steroids
- 5-ASA

Step-Down Therapy
- Anti-TNF
- AZA v. 6-MP/MTX
- Combination
- Steroids
VACCINATIONS & PREVENTIVE MEASURES
Biologic Agent
Pre-Treatment Assessment

- TB
- HAV
- HBV
- HCV
- HIV (?)
- Other viruses (?)
  - Varicella, Zoster, MMR, Diphtheria & pertussis
  - Influenza
Checklist for IBD Patients

Vaccinations

• NO LIVE VACCINES IN PATIENTS ON BIOLOGICS
  • Varicella (chicken pox) → live vaccine
  • Zoster (shingles) → live vaccine
  • MMR → live vaccine
  • Diphtheria & Pertussis
  • Influenza
  • HPV
  • Hepatitis B vaccine
  • Hepatitis A vaccine
  • Meningococcal Meningitis
  • Pneumococcal Pneumonia

Non-live vaccine
Checklist for IBD Patients

Bone Health

• Check Vitamin D 25-OH level
  • Baseline
  • Follow as necessary

• Bone density assessment → DEXA Scan

• Prescription for Calcium + Vitamin D3
  • All patients with each course of oral steroids
  • Vitamin deficient patients
Checklist for IBD Patients

Therapy Related Testing

• Mesalamines
  • Annual renal function monitoring

• Corticosteroids
  • Bone Health as outlined supra, document plan & use of steroid sparing therapy, Ophthalmology exam

• Thiopurines
  • TPMT level, CBC, LFTs prior to therapy, then routine CBC & LFT monitoring

• Anti-TNFα
  • TB screening prior to therapy (QuantiFeron-TB Gold assay +/- CXR, then yearly, Hepatitis B vaccination, CBC, LFTs, & renal function monitoring
Checklist for IBD Patients

Therapy Related Testing

• Natalizumab
  • Enroll in TOUCH Program
  • Check JCV Ab prior to initiating therapy → treat if negative
  • Retest JCV Ab every 4-6 months
  • CBC & LFTs at baseline & then monitor

• Vedolizumab
  • CBC, LFTs, & renal function at baseline & then monitor

• Proactive Monitoring
  • Check blood levels of biologics, monitor CRP & stool calprotectin
CASE STUDY
CASE STUDY
History

• 28 yo female dancer c/o change in bowel habit, stool urgency, bloody stool
  • Symptoms present for ~ 3 months & getting more frequent
  • Admits to LLQ, crampy pain → relieved with BM
  • 3-5 stools per day → may wake up at night with “diarrhea”
  • No risk factors for complaints:
    • travel/antibiotics/medical exposure/food/pets/medications/herbals/et cetera
  • Negative ROS (no constitutional or systemic symptoms)
  • PMH, PSH, Family history, social history → negative/non-contributory
CASE STUDY

Exam

- AA & O x 3, NAD, WN/WD
- Afebrile, normotensive
- Mild LLQ tenderness → no peritoneal signs
- Normal perineum & peri-anal area
- Rectal exam → brown stool flash stool guaiac +
- Exam otherwise WNL
CASE STUDY
Lab Data

- Hgb 10.2 gm%
- CRP 11.3
- Albumin 3.2 g/dl
- WBC, Platelets, CMP, TSH → WNL
- Stool WBC: many
- Stool culture, C. diff, O&P → negative
CASE STUDY
Colonoscopy

• Colonoscopy to Cecum + Biopsies
  • Inflammation starting at the pectinate (aka: dentate) line extending to the proximal sigmoid colon
  • Inflammation is confluent and continuous
  • Remaining colon looks normal
CASE STUDY
Colonoscopy + Biopsies

RECTUM

SIGMOID COLON

DESCENDING COLON
CASE STUDY
Pathology

• Microscopic Appearance
  • PMNs infiltrating crypts of Lieberkuhn at mucosal base forming crypt abscesses
  • Superficial desquamation of overlying epithelium leading to ulcer formation
  • Cryptitis undermining adjacent mucosa with edematous change
  • Findings suggestive of ulcerative colitis
Ulcerative Colitis
Therapeutic Pyramid

- Surgery
- Biologics
- Systemic Corticosteroids
- Topical Steroids
- Aminosalicylates

Moderate
Mild

Immunomodulators
CASE STUDY
Outcome
SUMMARY & CONCLUSIONS
NO GOOD DEED GOES UNPUNISHED!!!
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Thank You

EXPLORE HEALTHCARE SUMMIT 2017
August 10-11, 2017
Norman, Oklahoma