

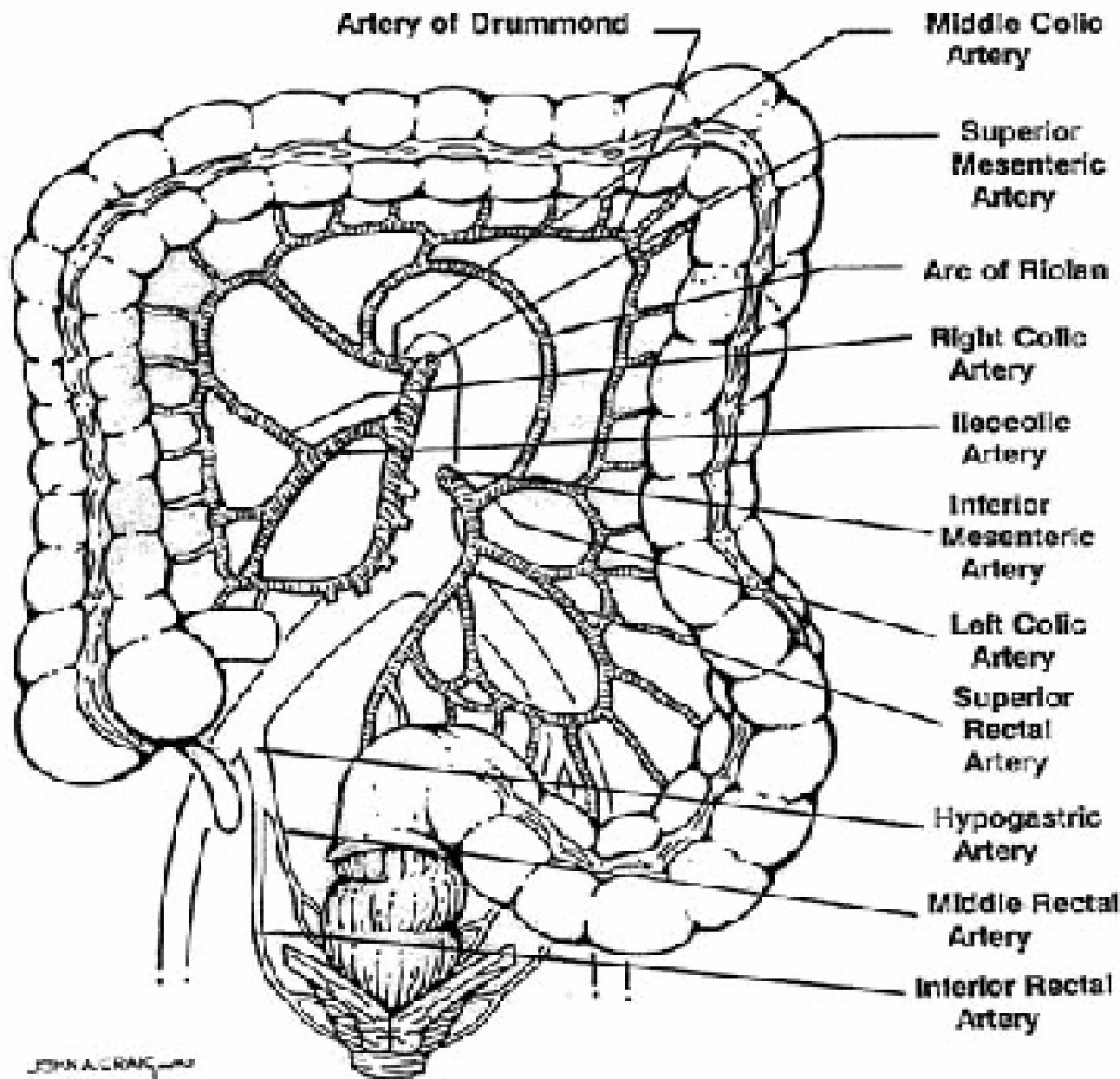
COLON & RECTUM

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Topics

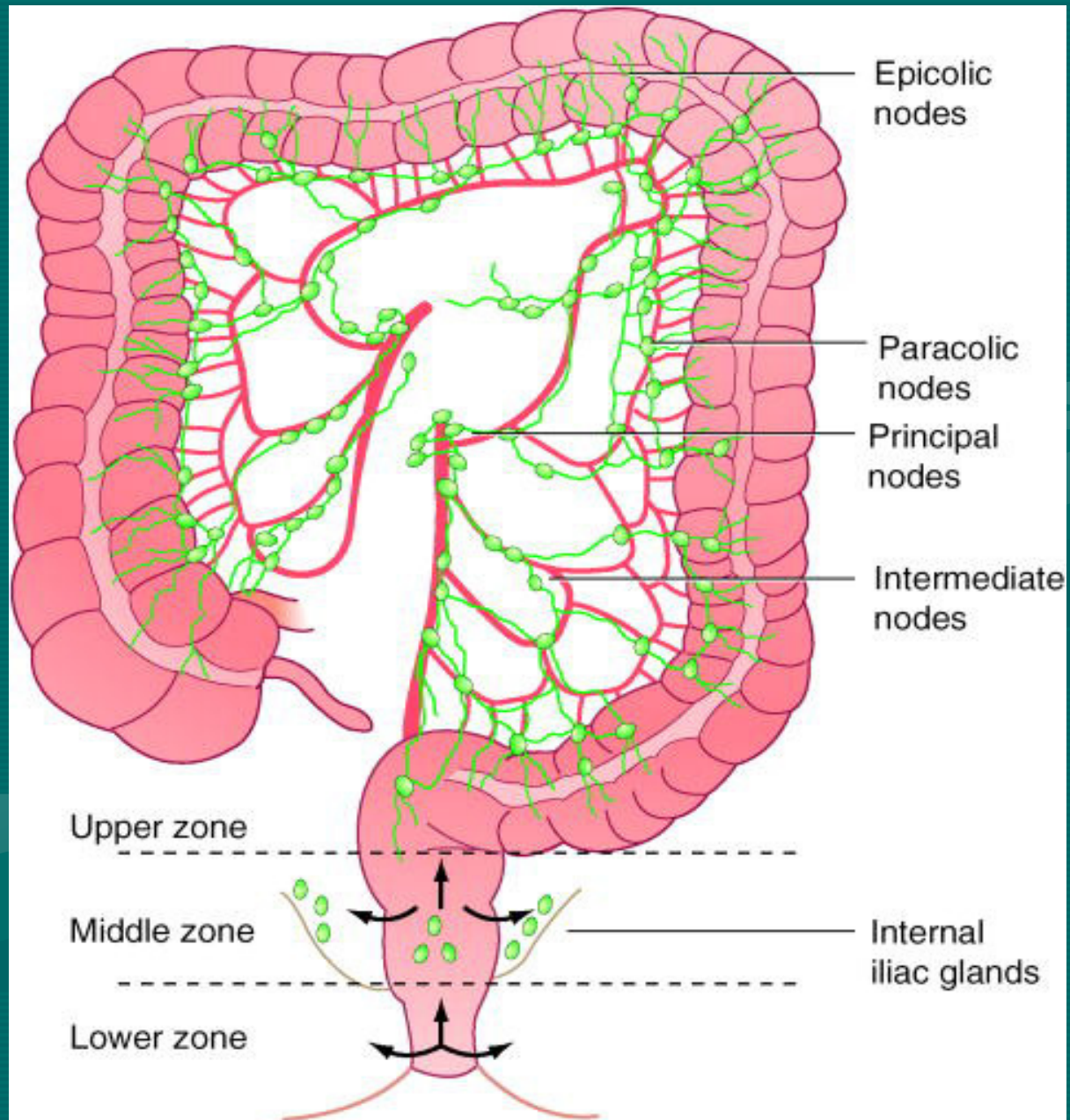
- Basic Anatomy
- Lower GI bleeding
- Diverticular disease
- Colon & Rectal Carcinoma
- Anal Cancer
- Large Bowel Obstruction
- Inflammatory Bowel Disease – CD, UC

ARTERIAL SUPPLY OF COLON & RECTUM

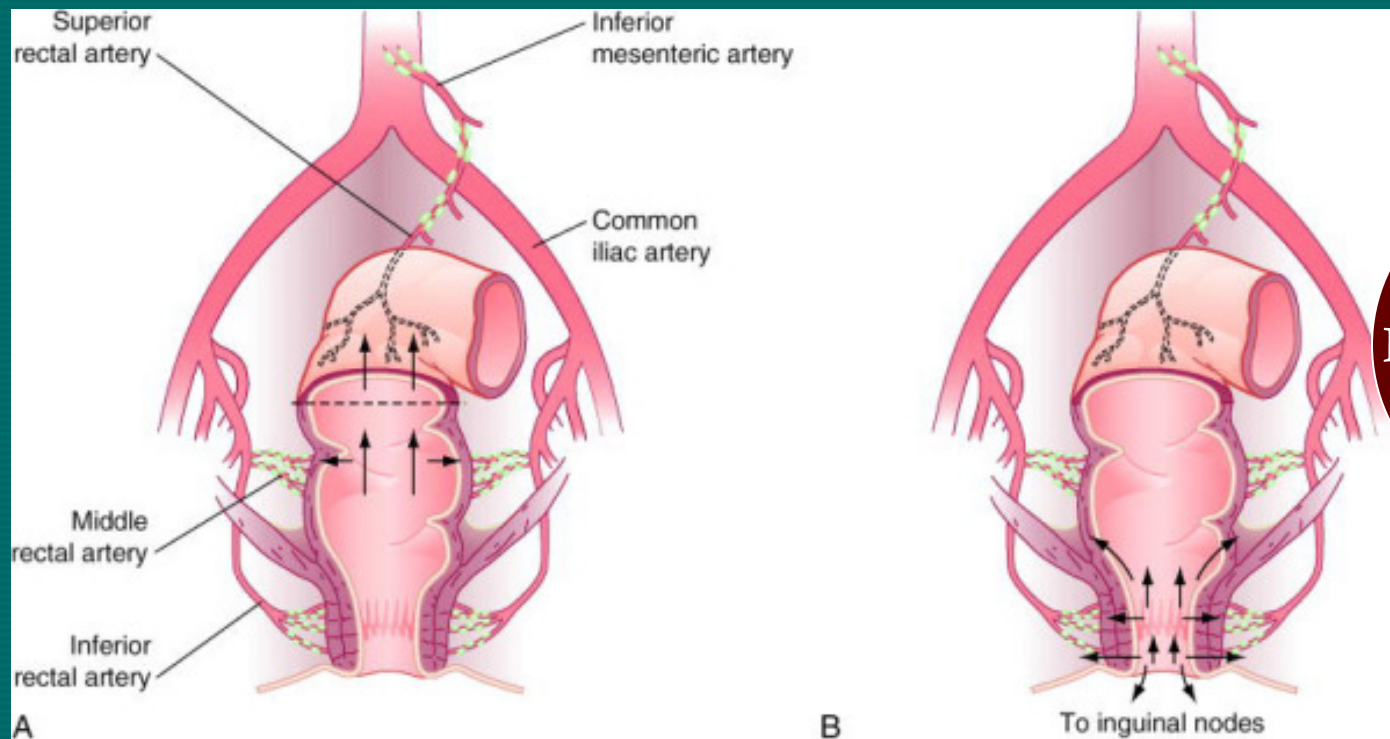


- The marginal artery of Drummond brings blood to the left colon if inferior mesenteric artery is ligated
- Arc of Riolan (meandering artery) is another anastomosis between the middle colic & the left colic arteries (not present always)

LYMPHATIC DRAINAGE OF COLON & RECTUM



LYMPHATIC DRAINAGE OF RECTUM & ANAL CANAL



This is
IMPORTANT
STUFF

Upper two-third of rectum : Sup Rectal nodes → Inferior mesenteric nodes

Lower one-third of rectum : Sup Rectal nodes → Inferior mesenteric nodes

AND Internal iliac nodes (along middle rectal vessels)

Anal canal above dentate line : Sup rectal nodes → Inferior mesenteric nodes

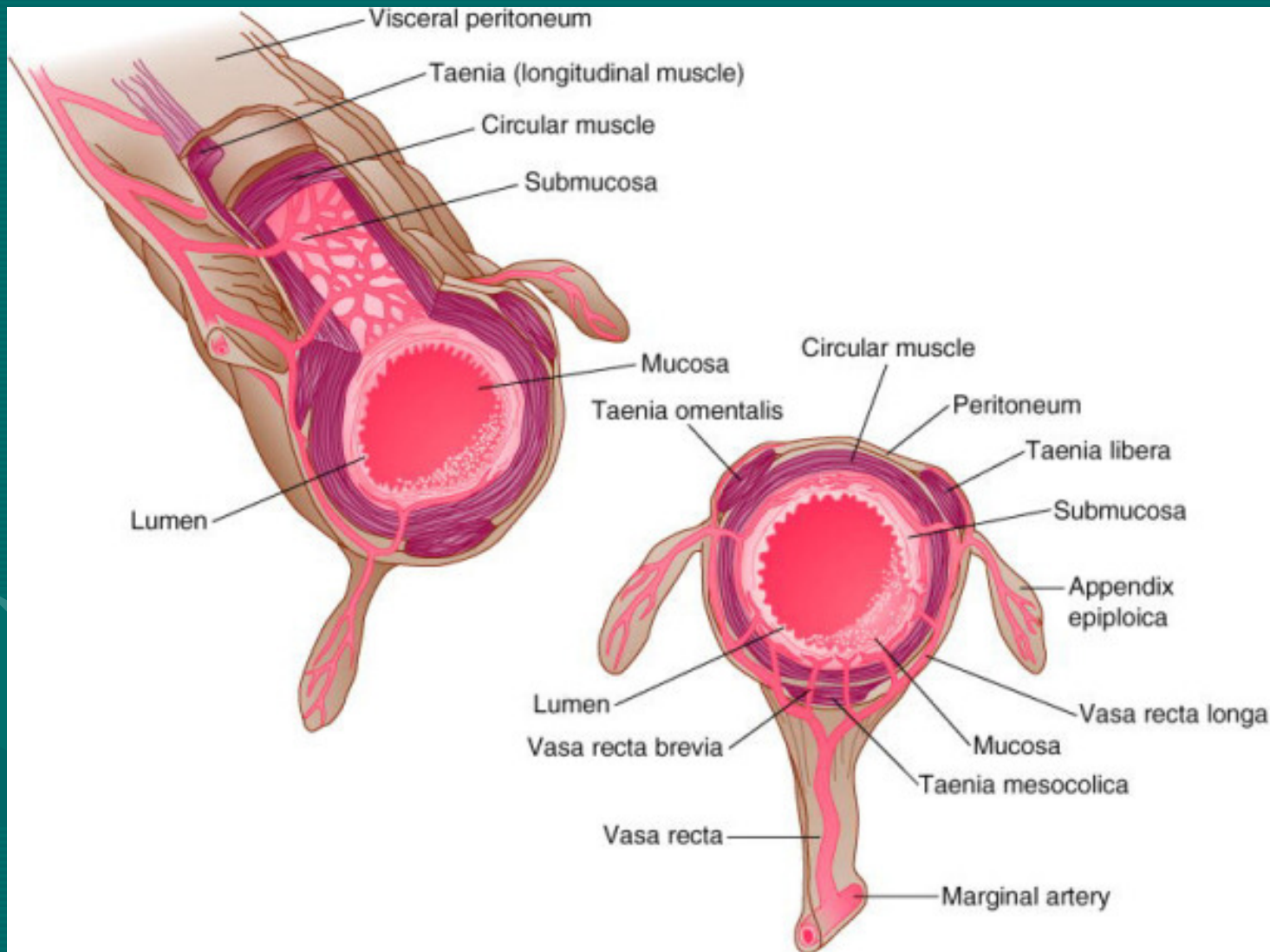
AND Internal iliac nodes laterally

Anal canal below dentate line : Inguinal nodes *primarily*

(can go to internal iliac or superior rectal nodes)

ARTERIAL SUPPLY OF COLON

Cross sectional anatomy

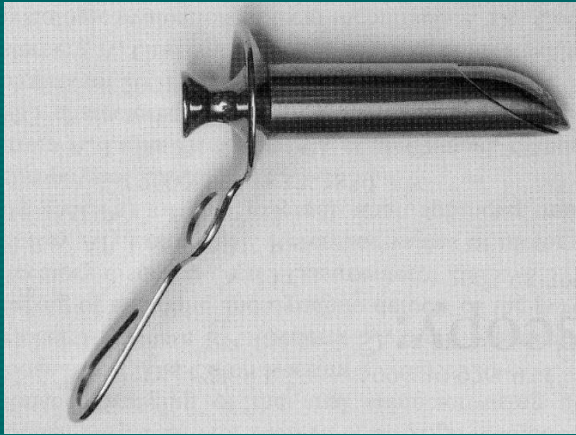


Note:

The vasa recta brevia run subserosally in the wall and penetrate the circular muscle and run in the submucosa

Look at the vasa rectae penetrating the muscle

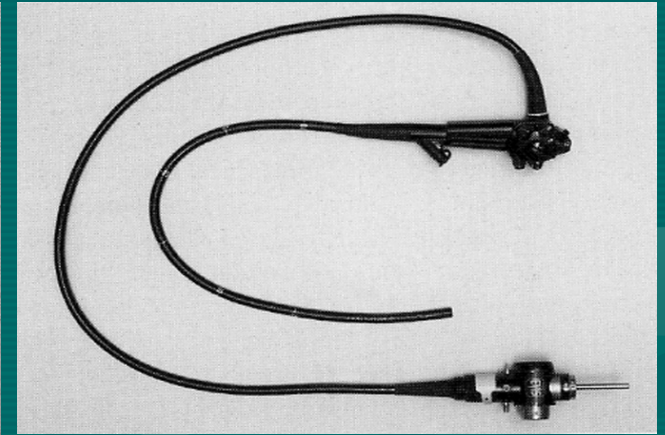
OUR TOOLS



Anoscope



Rigid Proctoscope



Flexible Sigmoidoscope

Anoscope : view the anal canal, about 6-8 cm long

Proctoscope : view the rectum and distal sigmoid colon, about 20-22 cm long

Flexible Sigmoidoscope : can visualize the left colon, may be upto the splenic flexure

Colonoscope : view the entire colon and may be the distal terminal ileum



LOWER GI BLEEDING

LOWER GI BLEEDING (LGIB)

- LGIB ranges from trivial to massive, life-threatening blood loss
- Accounts for an estimated 20% of all major GI bleeds
- Annual incidence of LGIB requiring hospitalization is ~ 21 cases per 100,000 adults in the U.S
- Predominantly a disease of the elderly, with a > 200-fold increase from the 2nd to the 8th decade of life
- Mean age: 63 to 77 years
- Majority have a self-limited illness and an uncomplicated course
- About half present with both hemodynamic instability and a low hemoglobin and hematocrit
- Mortality rate: 2% to 4%

LOWER GI BLEEDING

- LGIB is defined as bleeding emanating from a source distal to the ligament of Treitz
- LGIB can be
 - Acute
 - recent duration (arbitrarily defined as less than 3 days duration)
 - instability of vital signs
 - anemia
 - need for blood transfusion
 - Chronic
 - passage of blood per rectum over a period of several days or longer
 - implies intermittent or slow loss of blood
 - occult fecal blood (present with symptoms of anemia)
 - occasional episodes of melena or maroon stools
 - small quantities of visible blood per rectum

LOWER GI BLEED

ETIOLOGY

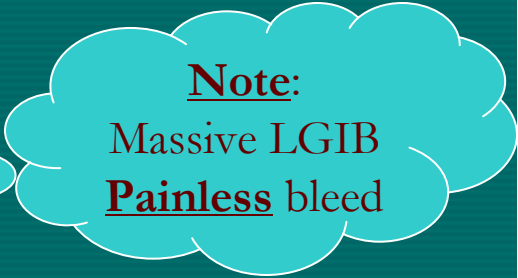
- Diverticulosis
- Vascular ectasia
- Anal pathology
 - e.g. hemorrhoids, fissure
- Neoplasia
- Upper GI hemorrhage
- Ischemic colitis
- Trauma
- Mesenteric ischemia
- Inflammatory bowel disease
- Infectious colitis
- Radiation colitis
- Dieulafoy's lesions
- Colonic ulcerations
- Rectal varices
- Aorto-enteric fistula
- Small bowel sources
 - e.g. Meckel's diverticulum
- Post-polypectomy

LOWER GI BLEED

ETIOLOGY

- Colonic diverticulosis

- most common source of massive LGIB (40% to 55%)
- painless bleeding
- ceases spontaneously in up to 90% of patients
- bleeding tends to be more common from right colon diverticulosis (left colon has more diverticula)



Note:
Massive LGIB
Painless bleed

- Rebleeding risk after an initial episode

- 10% of patients in the first year
- increases to 25% at 4 years

- Given the prevalence of colonic diverticulosis, and the fact that most episodes of hemorrhage tend to cease spontaneously, many episodes of lower GI bleed are attributed to colonic diverticulosis as a presumptive rather than a definitive diagnosis.

LOWER GI BLEED

ETIOLOGY

- Angiodysplasias (arteriovenous malformations)
 - responsible for 3% to 20% of cases of massive LGIB
 - are small ectatic blood vessels in the submucosa of the gastrointestinal tract with thin overlying mucosa with superficial erosion
 - increase in frequency with the age of the patient.
 - may occur throughout the GI tract
 - painless bleeding
 - most common cause of bleeding from the small bowel in patients older than 50 years of age
 - >50% of angiodysplasias are localized to the right colon, and bleeding from angiodysplasia correlates with this distribution
 - may be associated with many medical conditions, including end-stage renal disease, aortic stenosis, von Willebrand's disease, and others



Note:

Massive LGIB
Painless bleed

LOWER GI BLEED

ETIOLOGY

- Angiodysplasias (arteriovenous malformations)
 - Colonoscopy is the most sensitive method to identify angiodysplasias
 - red, flat lesions about 2 to 10 mm in diameter
 - stellate or oval in shape
 - sharp or indistinct borders
 - can control bleeding with local injection of epinephrine or cautery
 - On angiography
 - appear as a tuft of ectatic vessels
 - brisk, early venous filling (AV malformation)
 - slowly emptying veins
 - can control bleeding with angioembolization

LOWER GI BLEED

ETIOLOGY

- Colonic neoplasms

- includes adenomatous polyps, juvenile polyps, and carcinomas
- bleeding from these lesions are slow, characterized by occult bleeding and secondary anemia
- can bleed briskly, but not common
- Juvenile polyps are the second most common cause of hemorrhage in patients younger than the age of 20 years.

NEVER think of neoplasm as one of the top etiologies for massive GI bleed, but neoplasm can erode into a blood vessel and cause massive bleed

LOWER GI BLEED

ETIOLOGY

- Colitis

- Hemorrhage is rarely the presenting sign; rather, it develops in the course of the disease
- the cause is suspected based on the patient's history
- Up to 20% of cases of acute LGIB
- Most episodes of bleeding cease spontaneously or with specific therapy directed at the cause
- Causes
 - inflammatory bowel diseases (CD, UC)
 - infectious colitis (causes include Escherichia coli, typhoid, cytomegalovirus, and Clostridium difficile)
 - radiation colitis

LOWER GI BLEED

ETIOLOGY

Vascular causes

- Vasculitides
 - polyarteritis nodosa, Wegener's granulomatosis, rheumatoid arthritis
 - associated with punctate ulceration of the colon and small bowel
- Colonic ischemia – causes ischemic colitis
 - mucosal ulceration and friability may result in acute hemorrhage
 - often in the setting of acute abdominal pain and sepsis
- Acute mesenteric ischemia
 - severe abdominal pain, hematochezia
 - patient appears very sick, may be in shock, acidotic
 - preexisting vascular disease, arterial embolism risk, hypercoagulability
- Control of hemorrhage rarely is the major focus of therapy. Rather, restoration of visceral perfusion is the primary therapeutic objective

ISCHEMIC COLITIS

- Is due to non-occlusive form of intestinal ischemia, rarely due to occlusion of a major vessel



Related to low blood flow, (hence non-occlusive ischemia), this is a disease of the microscopic vasculature of the bowel.

- Eg: CHF, shock, sepsis, dehydration, vasoactive meds, vasopressors, mesenteric vein thrombosis, etc,...
- Can also be due to occlusion of a major mesenteric vessel or iatrogenic ligation (after aortic aneurysm repair), but rare



Most common area affected is the splenic flexure (and then the left colon), as it is at the periphery of both SMA & IMA blood supply

- Most common in the elderly, especially who have atherosclerosis, diabetes, etc... but occasionally in the young

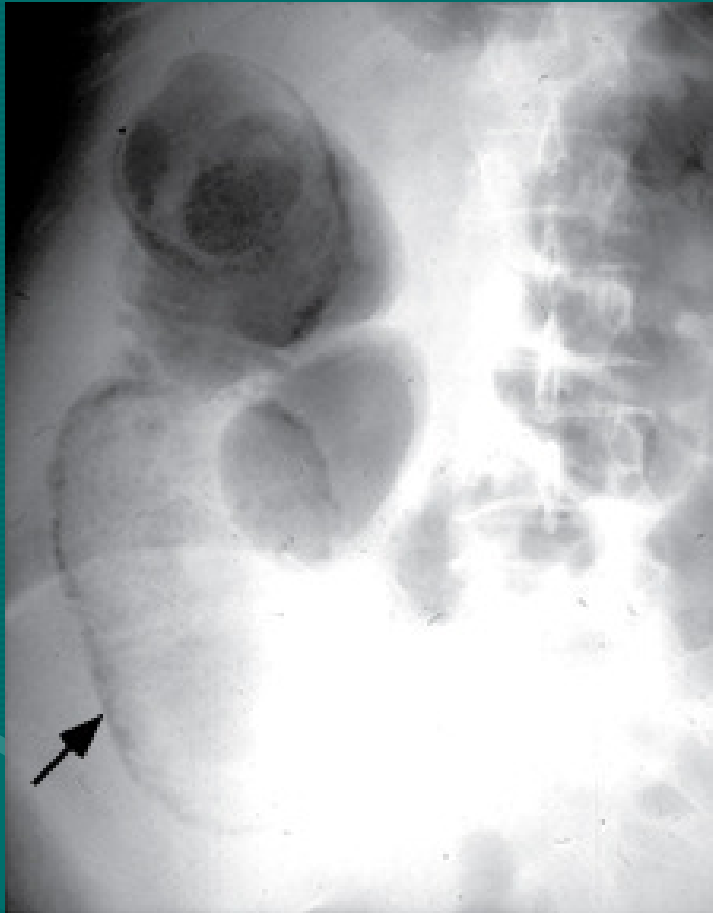
Any patient on hemodialysis **OR** s/p aorto-iliac surgery with abdominal pain, **THINK** of ischemic colitis

Any patient after cardiopulmonary bypass **OR** after MI with abdominal pain, **THINK** of acute mesenteric infarction or ischemic colitis

ISCHEMIC COLITIS

- History – mild lower abdominal pain, bright red blood per rectum, diarrhea, mild fever.
- Physical exam – varies from mild abdominal tenderness to peritonitis and septic shock
- Non-gangrenous type: (mild and moderate types)
 - majority of patients - 85%
 - usually transient and resolves without sequelae.
 - ~10% of these patients, (i.e. moderate type) develop long-term complications, persistent segmental colitis and/or the development of a stricture.
 - the serosal surface of the colon appears normal
- Gangrenous type: (severe type)
 - approximately 15%
 - transmural ischemia causes gangrene of the bowel
- Diagnosis depends on a high index of suspicion

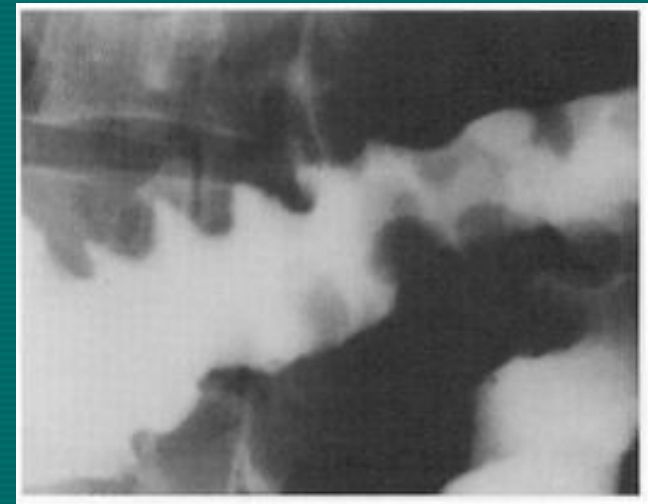
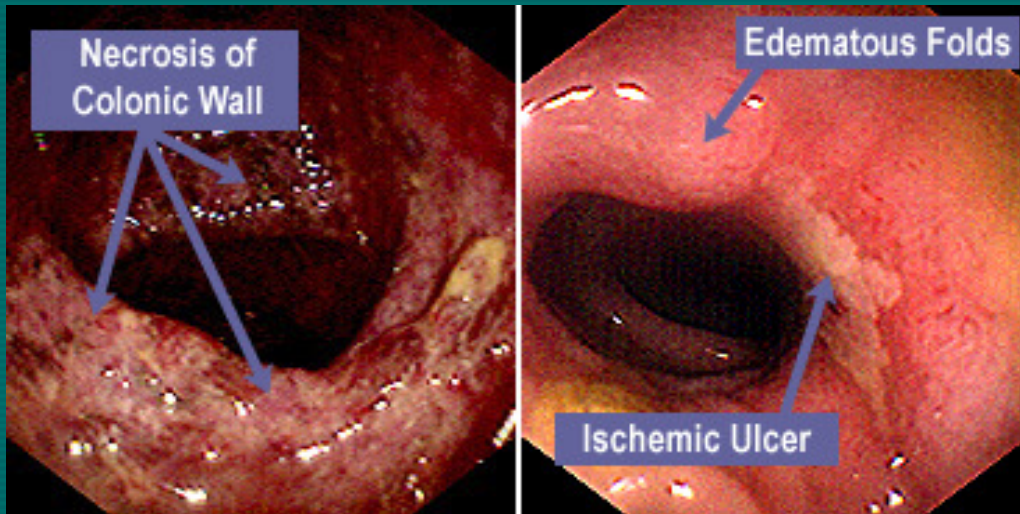
ISCHEMIC COLITIS



Plain film of the abdomen demonstrates air within the wall of the ascending colon (arrow)
– pneumatosis intestinalis

- Colonoscopy :
 - edematous mucosa with or without patchy ulceration
 - dark hemorrhagic mucosa with or without patchy ulceration
- Plain X-ray :
 - dilated bowel
 - “thumbprinting” of the involved colonic segment
 - look for free air, portal air, pneumatosis intestinalis.
- CT scan :
 - thickening of the involved segment of colon
- Arteriography :
 - non-contributory as this
 - is a disease of the microscopic vasculature

ISCHEMIC COLITIS



Endoscopy of ischemic colitis:

- continuous necrosis and mucosal friability (resembles ulcerative colitis) (*left panel*)
- discrete ulcers with surrounding edema may also be seen (*right panel - is a mild case*)

Thumbprinting in acute ischemic colitis at the splenic flexure.


This may be seen in plain abdominal X-ray too.

CAUTION :

Insufflation of the colon or barium enema is dangerous when there is any inflammation or ischemia – high risk of perforation

ISCHEMIC COLITIS

- Mild and moderate types – conservative supportive therapy
- Assess for hemodynamic instability, sepsis, peritoneal signs, co-morbid conditions
- Optimally hydrate, optimize hemodynamics, avoid vasopressors, address the predisposing factors
- NPO, IVF, antibiotics if indicated, serial abdominal exams
- **Needs emergent laparotomy**
 - Transmural ischemia
 - Peritonitis
 - Sepsis/septic shock
 - Worsening condition of the patient
- Elective colon resection
 - Chronic disease
 - Stricture



Do resection of the diseased colon with proximal end colostomy

Distinguishing Features

Colonic vs small bowel ischemia

<u>Acute colonic ischemia</u>	<u>Acute mesenteric ischemia involving SB</u>
90 percent of patients over age 60	Age varies with etiology of ischemia
Acute precipitating cause is rare	Acute precipitating cause is typical
Patients do not appear gravely ill	Patients appear gravely ill
Mild abdominal pain, tenderness present	Pain is usually severe, tenderness is not prominent early
Rectal bleeding, bloody diarrhea typical	Bleeding uncommon until very late
Colonoscopy is procedure of choice	Angiography indicated
Involves the IMA distribution (usually)	Involves the SMA distribution

LOWER GI BLEED

ETIOLOGY

Anorectal pathology

- Hemorrhoids are usually noted on physical examination in more than half of patients with LGIB
- In only $< 2\%$ can the massive LGIB be attributed to these lesions
- **Unless unequivocal signs of bleeding are evident on anoscopy, always investigate for another source of LGI bleed**
- Patients with portal hypertension may develop massive hemorrhage from rectal varices
- Patients with HIV-associated thrombocytopenia can bleed from hemorrhoids

VERY IMPORTANT

LOWER GI BLEED

ETIOLOGY

Massive UGI Bleed

- 10% to 15% of massive UGI bleeding present as lower GI bleeding
- ALWAYS differentiate an UGI Bleed from a LGI Bleed
- Simple diagnostic test to differentiate
 - Place an NG tube
 - A clear NG-tube aspirate DOES NOT rule out an upper GI source
 - Presence of bile makes an upper source of bleed unlikely
- EGD is indicated if there is any doubt

Important

LOWER GI BLEED

INITIAL ASSESSMENT

- Is the patient hemodynamically stable ?
- If not, start resuscitation immediately
- Assess the severity of bleeding
 - Amount of blood lost
 - Syncope (10%)
 - Orthostatic changes (30%)
 - Frequency of bleed

LOWER GI BLEED

INITIAL ASSESSMENT - *History*

- Assess the severity of bleeding
- Abdominal pain or recent diarrhea and fever may point to colitis, either infectious or ischemic
- Initial history should exclude less common causes
- Medications
 - Anticoagulants : warfarin, low-molecular-weight heparins
 - Platelet aggregation inhibitors : NSAID, Plavix
 - Others : digitalis (associated with mesenteric ischemia)
- Past medical history (CHF, HIV, CLD, etc...)
- Prior surgery
 - aortic surgery (possibility of ischemic colitis, aorto-enteric fistula)
- Patient age is relevant
- Prior bleeding episodes ?

Lot of patients (especially the elderly) are on multiple meds, hence do not forget to ask

Causes of Lower GI Bleeding by age

Infants and children	Adolescents and young adults	Adults upto 60 years	Adults over 60 years
Meckel's diverticulum	Meckel's diverticulum	Diverticulosis	Diverticulosis
Polyps	Inflammatory bowel disease	Inflammatory bowel disease	Vascular ectasia (angiodysplasia)
Ulcerative colitis	Polyps	Polyps	Malignancy
Duplications		Malignancy	Ischemic colitis
		Congenital AV malformations	Polyps

Less frequent causes not specific for any groups:

Infectious diarrheas (amebiasis, shigellosis), drug induced ulcers, vascular lesions, vascular tumors, varices, coagulopathies

LOWER GI BLEED

INITIAL ASSESSMENT - *Physical examination*

- Check vital signs - shock (20%)
- Check orthostatic vital signs if without overt shock
- Examine for
 - scars from previous abdominal incisions
 - presence of abdominal masses
 - skin and oral lesions suggestive of polyposis syndromes
 - stigmata of cirrhosis (bleeding from esophageal varices)
- Rectal examination to identify
 - any anorectal pathology (tumors, ulcers, polyps, fissure, etc...)
 - color of the rectal contents
 - presence of formed stool or blood clot
- Anoscopic/proctoscopic examination
 - any anorectal pathology (tumors, ulcers, polyps, etc...)
 - hemorrhage from local pathology (eg: hemorrhoids) or proximal pathology

LOWER GI BLEED

INITIAL ASSESSMENT - *Laboratory Evaluation*

- CBC (with platelet count)
- PT/PTT/INR
- Creatinine & BUN
 - assess baseline renal function
 - for purposes of resuscitation
 - in the event that a mesenteric angiogram is required
- Bleeding time if the patient has been on antiplatelet medication
- Blood typing and crossmatching for PRBC
- Check availability of fresh-frozen plasma and platelets
 - may be required if the patient has been on anticoagulants or platelet aggregation inhibitors

EVALUATION OF LOWER GI BLEEDING

- Lower GI bleed can be
 - Occult
 - Melena
 - Intermittent scant hematochezia
 - Massive lower GI bleed

Whenever you see a LGI bleed, ask yourself, into which of the above 4 broad categories it belongs to and then think of the differential diagnosis and plan on the tests/procedures to be performed

EVALUATION OF LOWER GI BLEEDING

- OCCULT FECAL BLEED

- Chronic LGIB that presents with occult fecal blood should undergo colonoscopy
- Do upper endoscopy
 - if a source is not identified on colonoscopy
 - if there are upper-GI symptoms
 - if there is anemia

- MELENA

- Upper endoscopy first, as an upper-tract source is more likely
- Do colonoscopy
 - if an upper-GI source is not identified
 - if there are lower-GI symptoms
 - if screening colonoscopy is indicated

Darker blood denotes a more proximal source of bleeding, but **remember:** occasionally some cases of massive UGI bleeding can present with bright red blood per rectum. Patient is usually in shock.

EVALUATION OF LOWER GI BLEEDING

• INTERMITTENT SCANT HEMATOCHYZIA

- Chronic intermittent passage of small amounts of visible red blood is the most common pattern of LGIB
- Usually from an anorectal or a distal colonic source
- Hence, the initial evaluation should be digital rectal examination, anoscopy and sigmoidoscopy
- Patients
 - over 50 years of age
 - with anemia
 - with significant risk factors for colorectal neoplasia
 - with worrisome symptoms, such as weight loss or change in bowel habits
- Young, otherwise healthy patients with a convincing, benign source of bleeding on proctosigmoidoscopy, such as hemorrhoids or anal fissures, generally do not need to undergo colonoscopy for further evaluation

REMEMBER
THIS

NEEDS
COLONOSCOPY

EVALUATION OF LOWER GI BLEEDING

- MASSIVE ACUTE BLEEDING
 - Quick clinical evaluation and prompt RESUSCITATION
 - NG tube placement is done
 - A clear NG-tube aspirate DOES NOT rule out an upper GI source
 - Presence of bile makes an upper GI source of bleed unlikely
 - Upper endoscopy should be performed after colonoscopy where a colonic source is not identified

Procedures used for localization of LGI bleed

(localization is important in any bleed, but this pertains to massive bleed)

Technique	Advantages	Disadvantages
Radionuclide imaging (Tagged RBC scan)	<ul style="list-style-type: none"> - Noninvasive & safe - High sensitivity 	<ul style="list-style-type: none"> - <u>Does not localize</u> site of bleeding - May need <u>to be done during active bleeding</u>
Mesenteric Angiography	<ul style="list-style-type: none"> - <u>Accurate anatomic localization</u> - Does not require bowel prep - Can use catheter for vasopressin infusion or embolization 	<ul style="list-style-type: none"> - Variable sensitivity - Complications of angiography - Has to be <u>performed during active bleeding</u>
Colonoscopy	<ul style="list-style-type: none"> - Precise localization - Potential therapeutic intervention <ul style="list-style-type: none"> - electrocoagulation - inject epinephrine solution - thermal heater probe - sclerotherapy 	<ul style="list-style-type: none"> - Variable sensitivity - <u>Poor visualization</u> due to <ul style="list-style-type: none"> - too much blood - unprepared colon - <u>Risks of sedation</u> in acutely bleeding patient

MANAGEMENT OF LOWER GI BLEED

Colonoscopy

- Colonoscopy is most appropriate as the initial diagnostic procedure
 - in patients presenting with acute hemorrhage that has ceased
 - in patients with a more moderate degree of bleeding
- Perform colonoscopy ASAP in the course of evaluation
 - most episodes of hemorrhage cease spontaneously

Tagged RBC scan (99mTc-red blood cell scan)

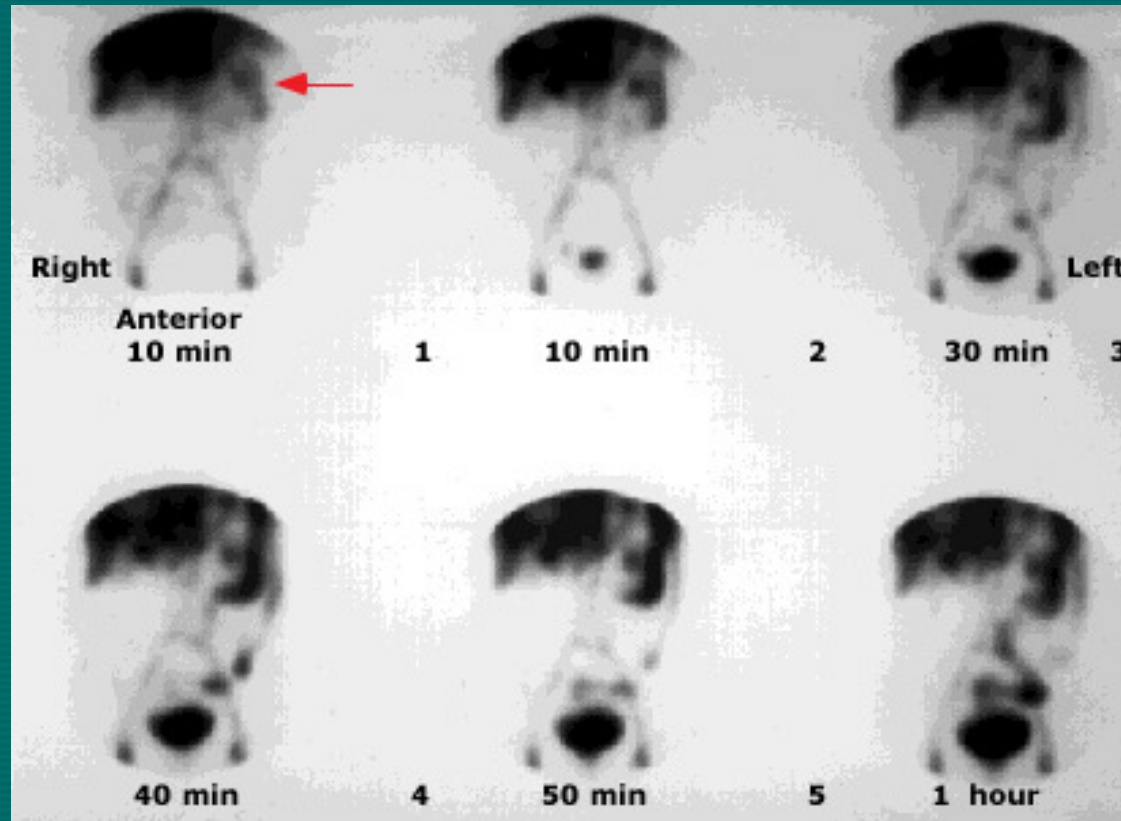
- Rates of bleeding as low as 0.1-0.5 ml/min can be detected
- Accurately identify a source of bleeding in up to 85%, if actively bleeding at the time of injection and initial imaging
- **Always confirm** with mesenteric angiography or colonoscopy
- **Never plan surgery based solely on tagged RBC scan**



Mesenteric arteriography

- Selective injection of radiographic contrast into the SMA &/or IMA
- Rate of bleeding at a rate of 0.5-1.0 ml/min or greater
- Accurately identify arterial hemorrhage in 45% to 75%, if actively bleeding at the time of injection of the contrast

Tagged RBC Scan



Bleeding is noted in the LUQ

- As the radiotracer is going inferiorly (towards the rectum) we infer that the bleeding is at the splenic flexure.
- If the path of the radiotracer was from left to right side of the abdomen, then the bleeding is probably from the small bowel.

MANAGEMENT OF LOWER GI BLEED

- Depends on the diagnosis
- Majority have a self-limited illness and an uncomplicated source
- Do not forget the co-morbidities
- Treatment
 - Inpatient vs. Outpatient management
 - Medical management
 - Office (clinic) based management
 - Surgical management

MANAGEMENT OF LOWER GI BLEED

Surgery

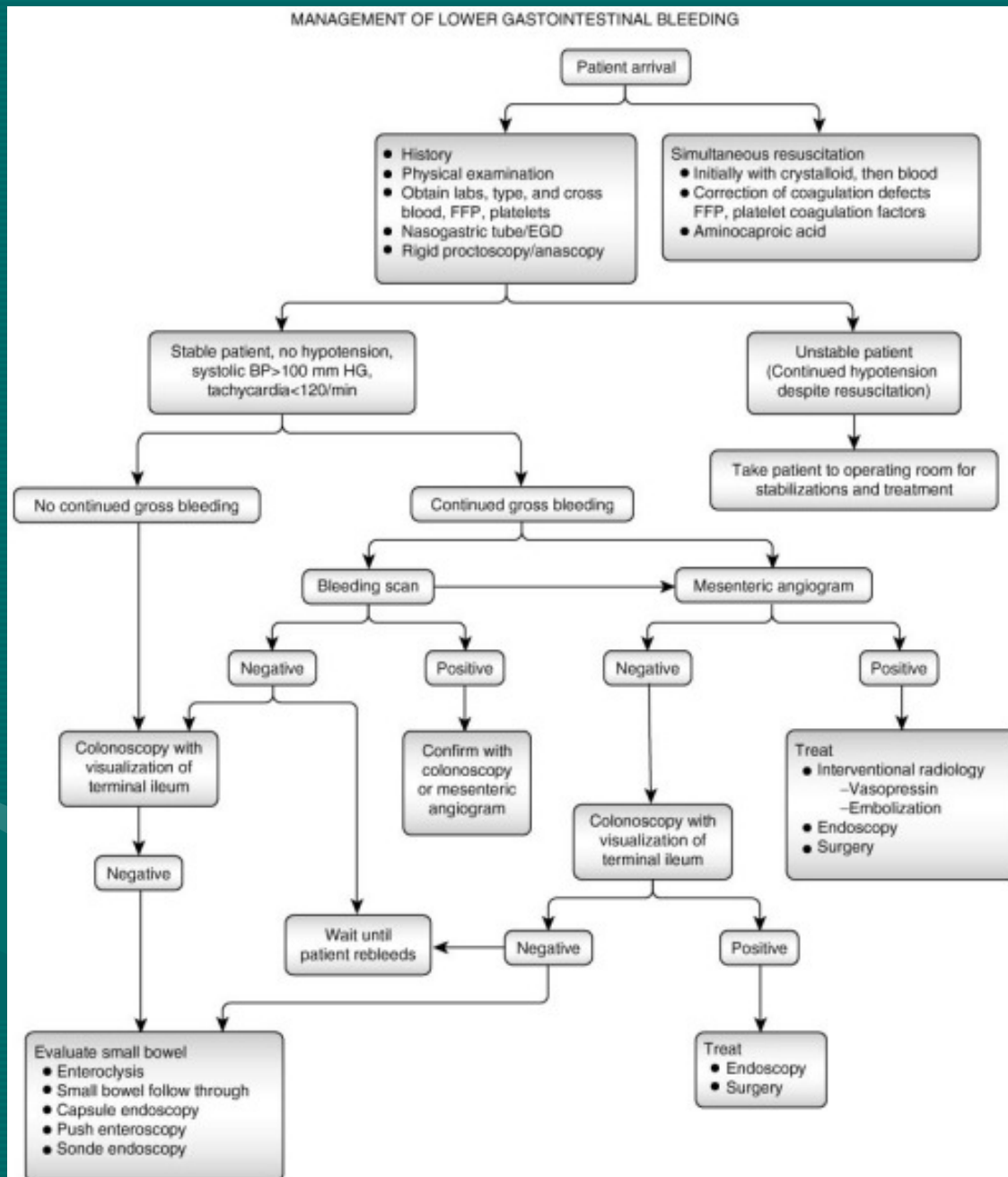
- Indications
 - ongoing hemorrhage
 - transfusion of >6 units of PRBC, ongoing transfusion requirement
 - persistent hemodynamic instability
 - recurrent lower gastrointestinal hemorrhage
- Always attempt to localize the bleeding site pre-operatively
- Surgical Options in acute LGI bleed
 - Segmental colectomy if bleeding site is known pre-op
 - Subtotal colectomy if bleeding site is unknown, but not from the small bowel
 - Ileostomy or colostomy if indicated with the above procedures
 - Never do blind segmental colectomy, rebleeding rates are 50-75%
- Mortality after colectomy for acute LGIB overall is 5%.



Important Diagnostic Hints for LGIB

<i>Symptoms</i>	<i>Possible Diagnosis</i>
Abdominal pain & bleeding	Ischemic bowel disease Inflammatory bowel disease Ruptured abdominal aortic aneurysm
Painless bleeding	Diverticular disease Angiodysplasias Hemorrhoids Benign & Malignant neoplasms Proctitis
Bloody diarrhea	Infectious colitis Inflammatory bowel disease Ischemic bowel disease
Constipation & bleeding	Colorectal malignancy Hemorrhoids Diverticular disease
Rectal pain & bleeding	Anal fissures Hemorrhoids

ALGORITHM - MANAGEMENT OF MASSIVE LGI BLEED



This is too big. Let us make the algorithm simpler

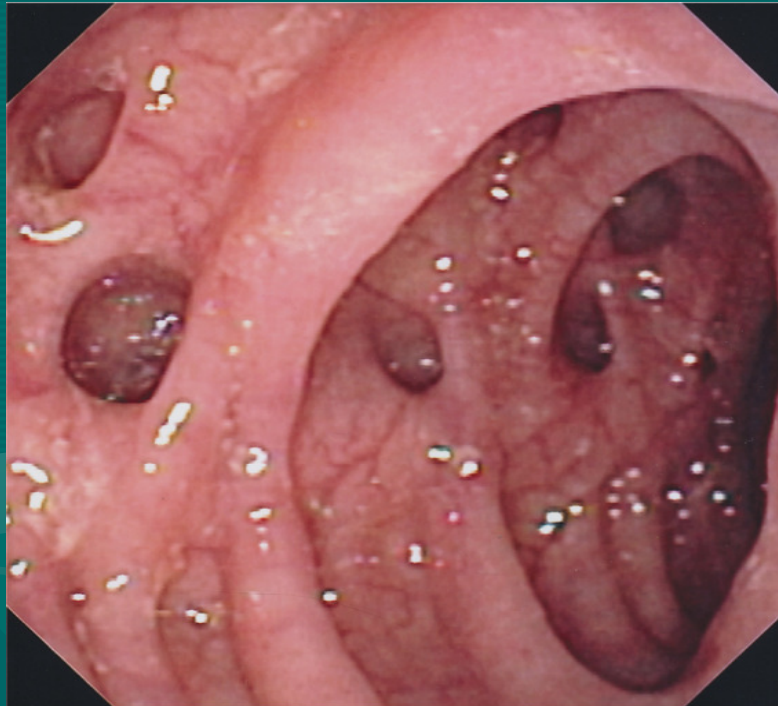
LOWER GI BLEED - SUMMARY

- LGIB is defined as bleeding from a source distal to the ligament of Treitz.
- An upper endoscopy to look for an UGI source of bleeding should be done if a source is not identified on colonoscopy, especially if there is a history of UGI symptoms or anemia.
- Colonoscopy is recommended in the early evaluation of severe acute LGIB.
- Colonoscopy is effective in the diagnosis and treatment of LGIB.

LOWER GI BLEED - SUMMARY

- Thermal coagulation and/or epinephrine injection can be used in the treatment of bleeding diverticula, vascular ectasia or postpolypectomy bleeding.
- Angiography and/or tagged-RBC scan can be used in the setting of active, persistent bleeding or if endoscopy is nondiagnostic.
- Preoperative localization of bleeding should be attempted in all patients before surgical intervention
- Aspirin and NSAIDs should be avoided in patients with a history of lower-GI bleeding if possible

DIVERTICULAR DISEASE



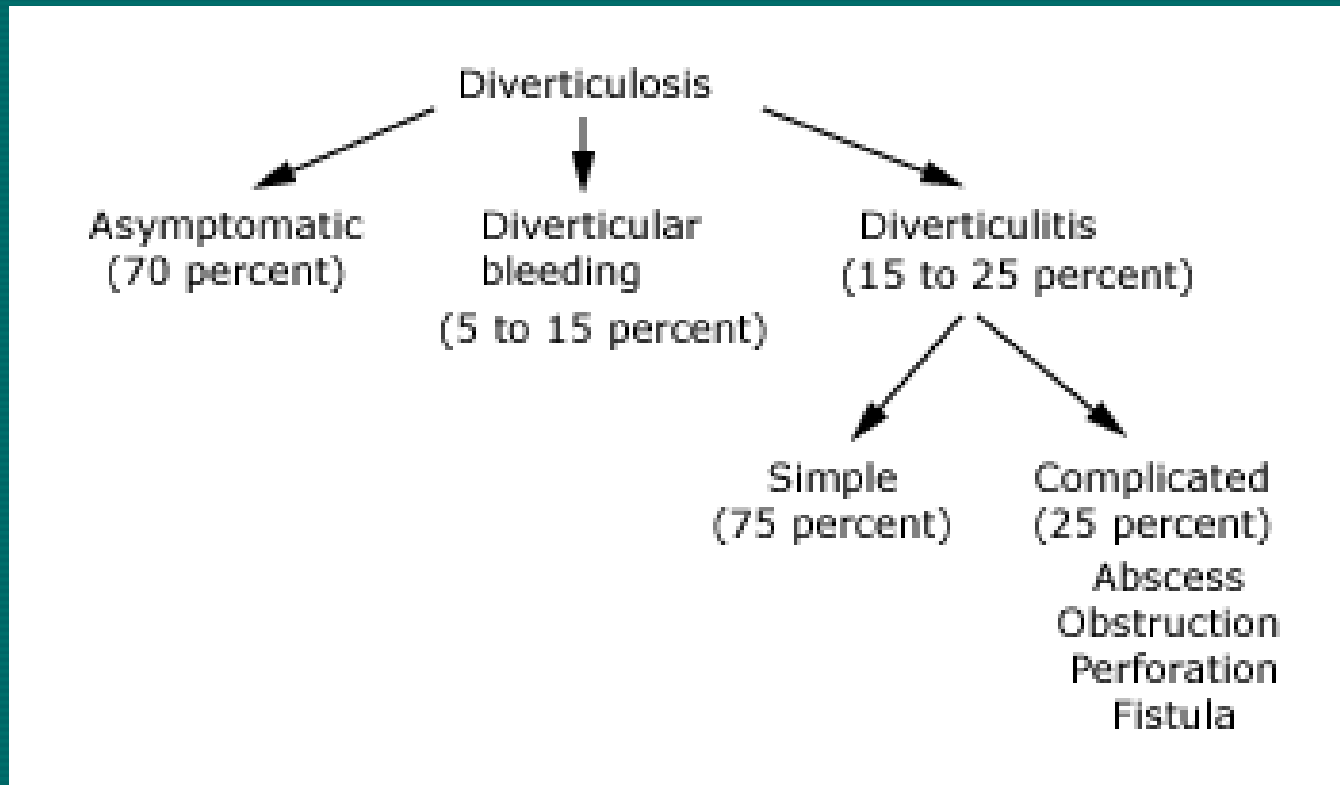
DIVERTICULAR DISEASE

DEFENITIONS

- Diverticulum is a sac-like protrusion of the colonic wall.
- Diverticulosis merely describes the presence of diverticula.
- Diverticulitis refers to inflammation of diverticula.
- Diverticular disease is a term encompassing diverticulosis and diverticulitis.

DIVERTICULAR DISEASE

NATURAL HISTORY



- Symptomatic diverticular disease includes
 - hemorrhage
 - diverticulitis
 - complications of diverticulitis - abscess, fistula, obstruction, free perforation

DIVERTICULAR DISEASE

EPIDEMIOLOGY

- Prevalence of diverticular disease is age-dependent
 - 5% at age 40, to 30% by age 60, to 65% by age 85.
- Geographic variations exist both in the prevalence and pattern of diverticulosis.
 - "Westernized" nations
 - have prevalence rates of 5 to 45%
 - is predominantly left-sided (95% of have sigmoid diverticula, while 35% also have more proximal disease)
 - In Africa and Asia
 - prevalence is less than 0.2%
 - is usually right-sided

DIVERTICULAR DISEASE

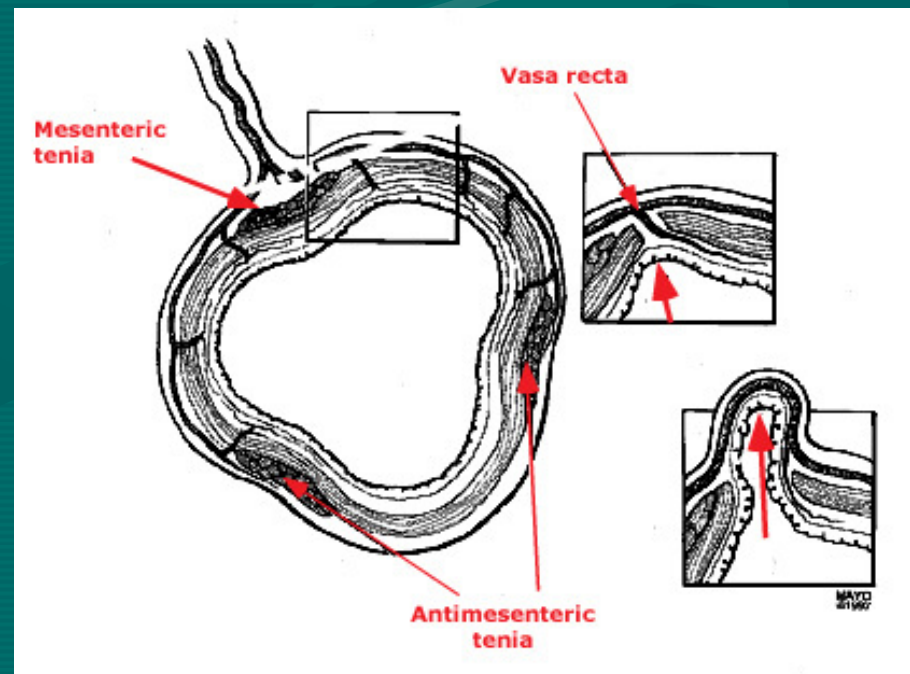
ETIOLOGY

- Environmental and lifestyle factors play an important role in the pathogenesis
 - low dietary fiber predisposes to the development of diverticular disease
 - dietary fiber, by producing a large bulky stool, results in a wider-bore colon that is less likely to permit segmental muscular contractions and therefore less likely to develop diverticula
 - lack of vigorous exercise may be a risk factor for diverticular disease
 - the risk of developing symptomatic diverticular disease was inversely related to overall physical activity

DIVERTICULAR DISEASE

PATHOPHYSIOLOGY OF DIVERTICULA FORMATION

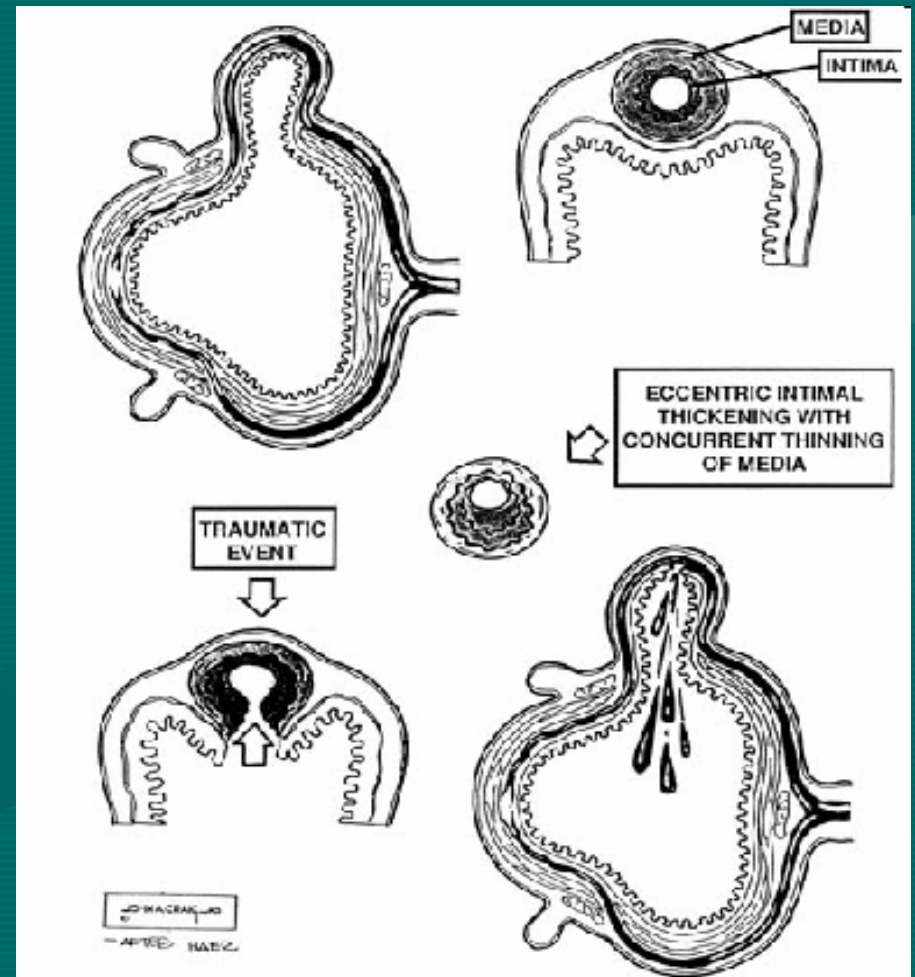
- A typical colonic diverticulum is a "false" or pulsion diverticulum, i.e.
 - it does not contain all layers of the wall as a true (congenital) diverticulum does
 - instead, mucosa and submucosa herniate through the muscle layer, covered only by serosa.
- Diverticula develop at the sites where the vasa recta penetrate the circular muscle layer
- Mucosa protrudes through this area of weakness



DIVERTICULAR DISEASE

PATHOGENESIS OF DIVERTICULAR HEMORRHAGE

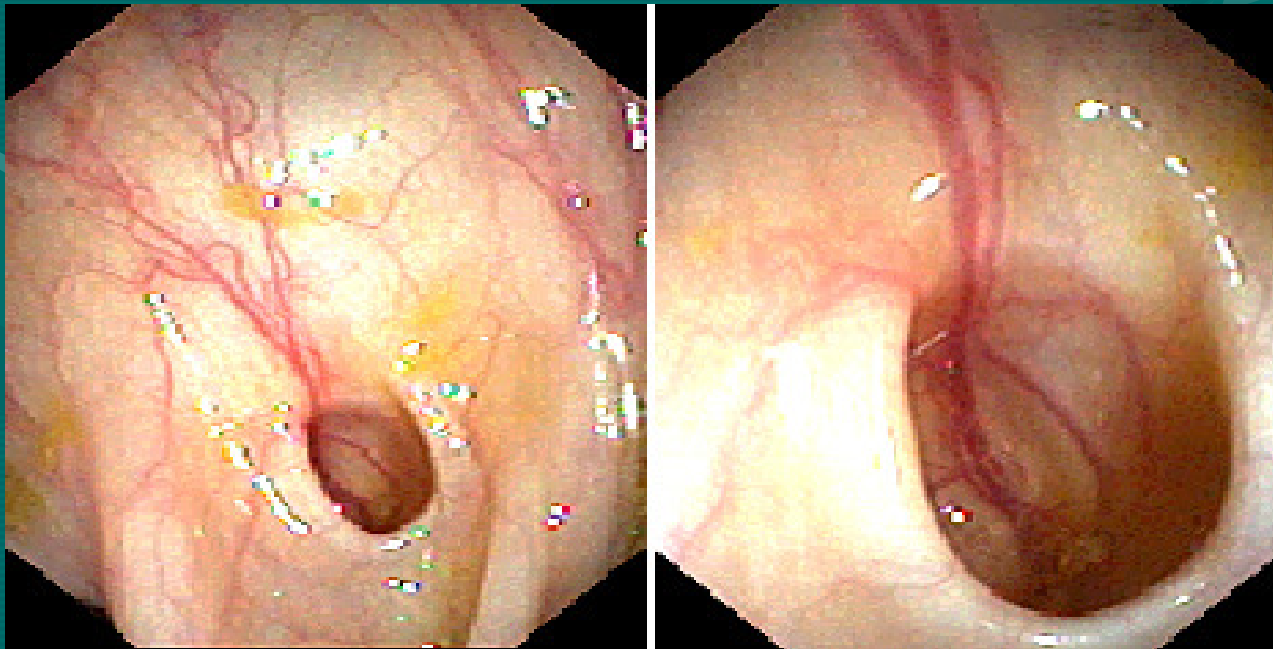
- As a diverticulum herniates,
 - the penetrating vessel becomes stretched over the dome of the diverticulum
 - separated from the bowel lumen only by mucosa
- Over time, this vasa recta is exposed to injury along its luminal aspect
 - eccentric intimal thickening and thinning of the media occurs
 - segmental weakness of the artery results
 - predisposing to rupture into the lumen



DIVERTICULAR DISEASE

PATHOGENESIS OF DIVERTICULAR HEMORRHAGE

- Diverticular bleeding typically occurs in the absence of diverticulitis
- Right-sided diverticula
 - have wider necks and domes
 - expose the vasa recta to injury over a greater length
 - higher incidence of right-sided hemorrhage

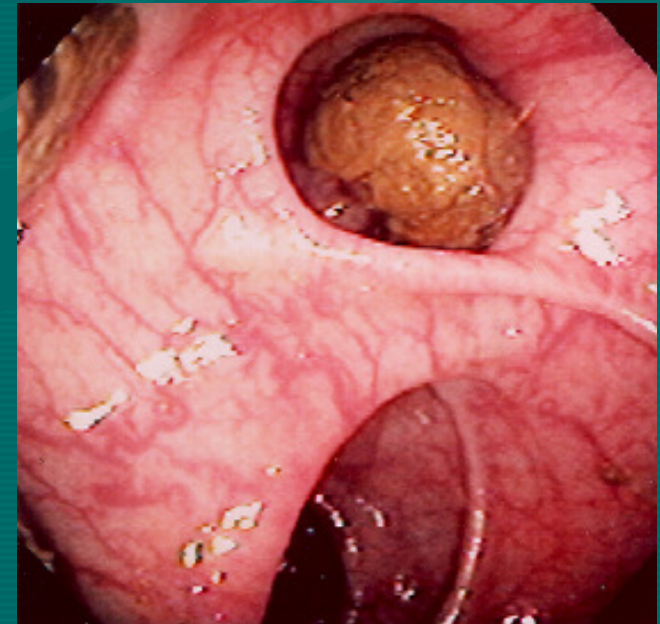


Endoscopy showing a blood vessel within a diverticulum. The blood vessel is separated from the bowel lumen only by mucosa.

DIVERTICULAR DISEASE

PATHOPHYSIOLOGY OF DIVERTICULITIS

- Diverticulitis, ie, inflammation of diverticula
 - produces variable clinical manifestations, ranging from subclinical inflammation to generalized peritonitis.
- The underlying cause is micro- or macroscopic perforation of a diverticulum.
- Pathophysiology: one of two mechanisms
 - obstruction of diverticula (eg: by fecoliths), increases diverticular pressure and leads to perforation
 - erosion of the diverticular wall by increased intraluminal pressure or inspissated food particles leads to inflammation and focal necrosis, resulting in perforation.



DIVERTICULAR DISEASE

PATHOPHYSIOLOGY OF DIVERTICULITIS

- The inflammation is frequently mild, and a small perforation is walled off by pericolic fat and mesentery
- If inflammatory process is localized, it results in
 - phlegmon
 - localized abscess
 - fistula
 - obstruction
- Poor containment of this inflammatory process results in free perforation and generalized peritonitis

DIVERTICULAR DISEASE

ASYMPTOMATIC DIVERTICULOSIS:


- Most are asymptomatic (70%)
- Diagnosed by colonoscopy or CT or Barium studies
- May also see marked thickening of the colon wall
- Treatment is high-fiber diet (35 g/day)
- Routine screening of colon should always be employed



Pancolonic diverticulosis: There is marked redundancy and overlapping of the sigmoid colon, which obscures the definition of intraluminal lesion.

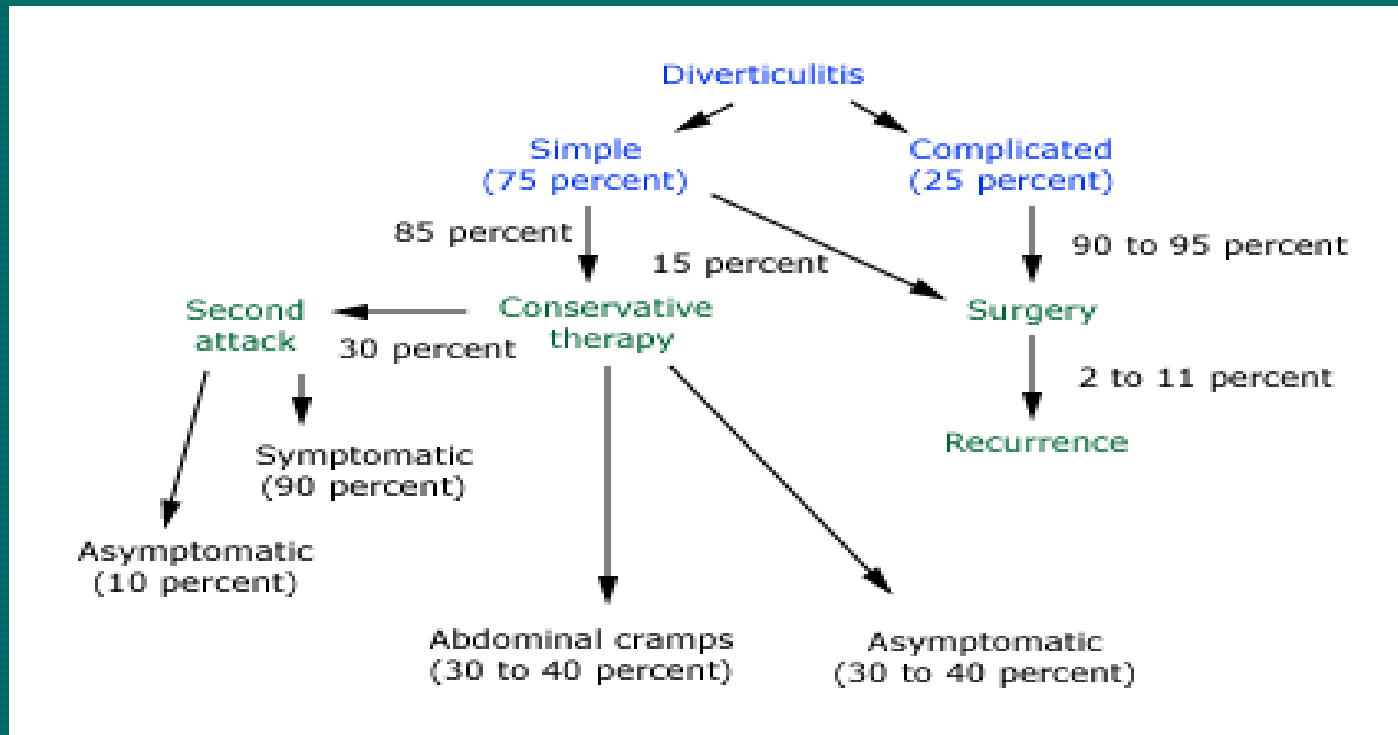
DIVERTICULAR DISEASE

DIVERTICULITIS

- Diverticulitis are of two types:
 - uncomplicated
 - complicated
- Of the patients with diverticulosis, 10-25% will develop an episode of acute diverticulitis in their lifetime
- Longer the duration of diverticulosis, higher the chance of an attack of diverticulitis
-  60-80% of patients treated for an episode of acute diverticulitis will respond to medical therapy

DIVERTICULAR DISEASE

DIVERTICULITIS – Natural History



- With recurrent episode of diverticulitis response is lower
- Risk of complications increases with recurrent disease
- Complete recovery decreases with recurrent disease
- Natural history is same for younger (<50) patients as an older patient, hence management is same

DIVERTICULAR DISEASE

DIVERTICULITIS - *Clinical Diagnosis*

- Uncomplicated diverticulitis refers to the
 - local inflammation of the colon
 - no evidence of pericolonic abscess, fistula, obstruction or free perforation
- “**classical triad**” of presentation
 - left lower quadrant pain
 - fever
 - leukocytosis
- Minor symptoms – nausea, diarrhea, frequency of urination, constipation
- Sigmoid diverticulitis can present with RLQ pain as sigmoid colon is redundant, especially in the elderly.
- Classic clinical symptoms are enough to establish the diagnosis and to begin antibiotic therapy.

Diverticulitis is most common
in the sigmoid colon



DIVERTICULAR DISEASE

DIVERTICULITIS

- Differential diagnosis consists largely of
 - inflammatory bowel disease
 - ischemic colitis
 - tumors (sometimes closely mimics diverticulitis)
 - urologic disorders
 - gynecologic disorders
 - irritable bowel syndrome (can be difficult to differentiate from mild diverticulitis, but IBS do not have fever and leukocytosis)

HENCE ALWAYS RULE OUT MALIGNANCY

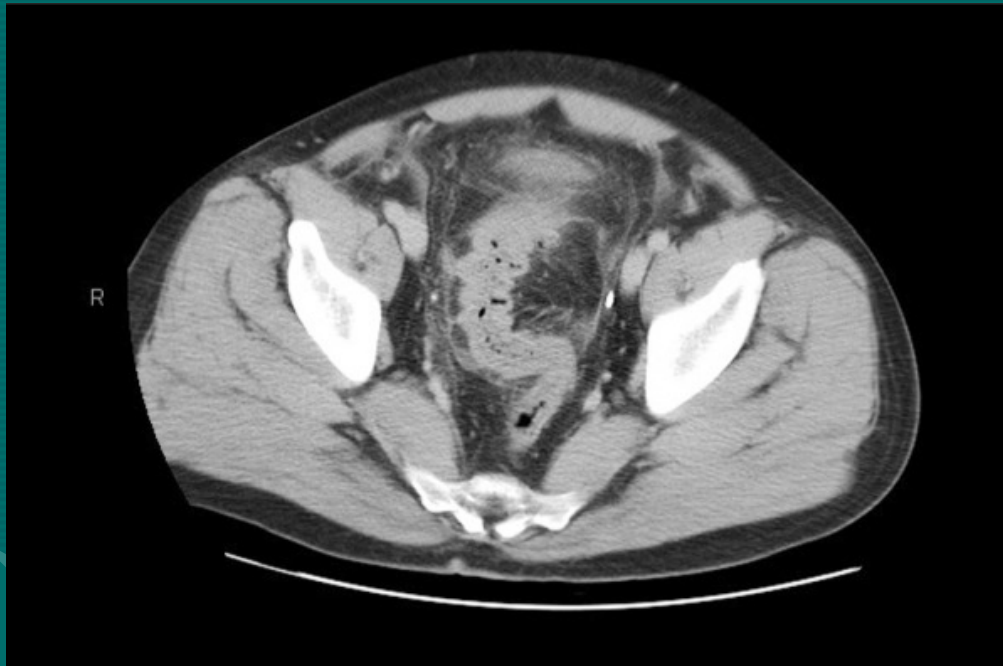
DIVERTICULAR DISEASE

DIVERTICULITIS - *Evaluation*

- **DONOT** do barium enema in acute diverticulitis
 - can perforate and cause barium peritonitis
- **DONOT** do endoscopy in acute diverticulitis
 - can perforate, spread infection
- Plain X-ray of abdomen :- see bowel loops, r/o free air
- **CT scan is the test of choice**
 - more sensitive for the diagnosis of diverticulitis
 - evaluates for complications of diverticulitis
 - useful for CT guided procedures
 - useful for follow up, if patient worsens
 - evaluates for other pathology

DIVERTICULAR DISEASE

DIVERTICULITIS - *acute phase*



CT scan of a patient with acute diverticulitis

- colon wall thickening
- surrounding inflammation (fat stranding)

- CT scan of abdomen and pelvis with IV & PO contrast
 - inflammatory thickening of the involved colon
 - pericolic fat stranding due to edema
 - diverticulosis of the adjacent colon
 - evaluate for abscess, fistula, perforation, obstruction

This is the typical uncomplicated diverticulitis

DIVERTICULAR DISEASE

COMPLICATED DIVERTICULITIS

IMPORTANT SLIDE

- Complicated diverticulitis describes the development of
 - perforation, obstruction, abscess, or fistula
 - arise in about 25% during or after their first presentation.
- Patients with complicated disease will require an operation, either acutely or on an elective basis.
- Emergent or urgent indications for surgery during the acute phase
 - free perforation with generalized peritonitis
 - abscess not amenable to percutaneous drainage
 - obstruction
 - clinical deterioration or failure to improve with conservative management

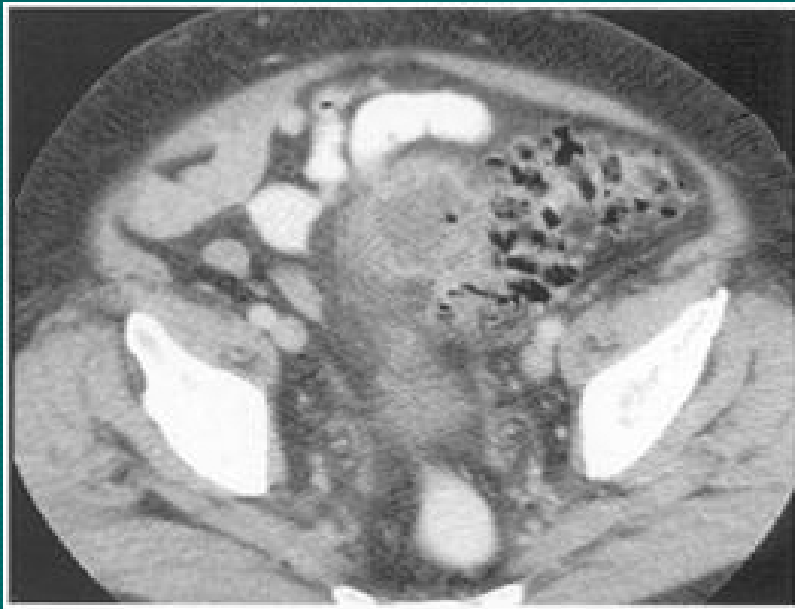
DIVERTICULAR DISEASE

COMPLICATED DIVERTICULITIS

- Diverticulitis with abscess
 - Unresolving pain localized to LLQ
 - Tender abdominal mass (not always)
 - Tender rectal exam with pelvic abscess (not always)
 - Persistently elevated WBC count
- Diverticulitis with generalized peritonitis
 - Patient is sicker (altered mental status, shock, etc...)
 - Severe abdominal pain
 - Abdominal tenderness with guarding
 - Abdominal distention
 - High WBC count
 - CxR or AxR may show free air

DIVERTICULAR DISEASE

DIVERTICULITIS – *Pericolic abscess*



CT of pericolic abscess

Typical changes are present with

- gas outlining the diverticula.
- there is a large pericolic abscess with one small pocket of gas
- the adjacent fat shows inflammatory changes



CT scan of peridiverticular abscess

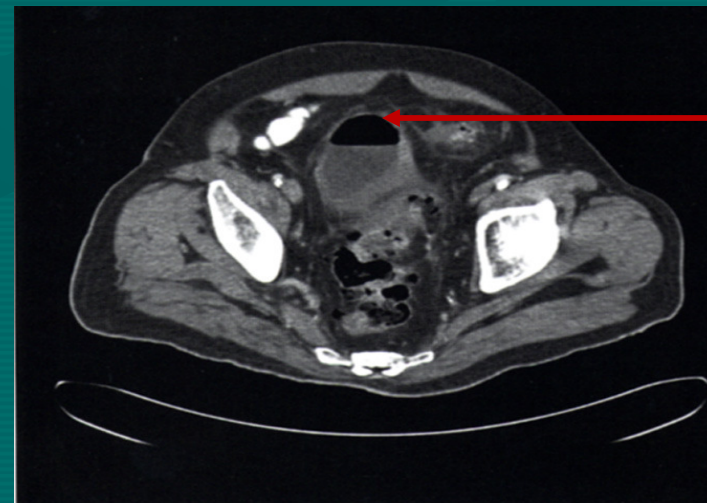
showing

- a small interloop fluid collection (*long arrow*)
- an adjacent thickened sigmoid colon with small diverticula (*short arrow*)

DIVERTICULAR DISEASE

COMPLICATED DIVERTICULITIS



- Diverticulitis with fistula
 - formed when abscess drains into an organ
 - colo-vesical fistula is the commonest (65% of fistulas due to diverticulitis)
 - fistula to vagina, small intestine, skin are possible
 - presence of fistula due to diverticulitis is not a surgical emergency
 - fistula formation may improve patient's condition as the abscess is drained
 - percutaneous drain placement can result in colo-cutaneous fistula
- Colo-vesical fistula leads to
 - recurrent UTI
 - pnuematuria
 - fecaluria
 - CT scan shows air in the bladder



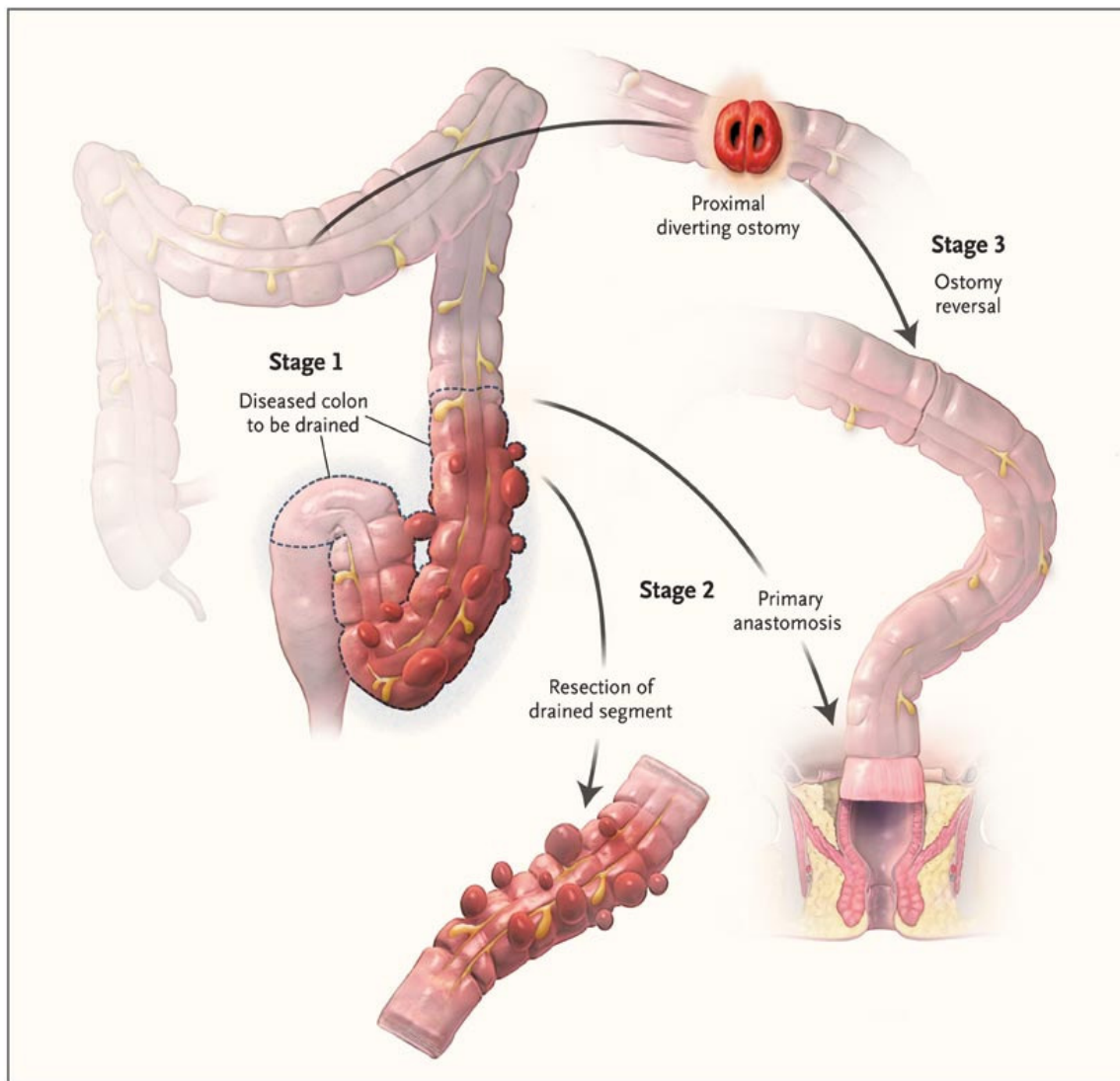
Air in
the
bladder

DIVERTICULAR DISEASE

DIVERTICULITIS - Treatment

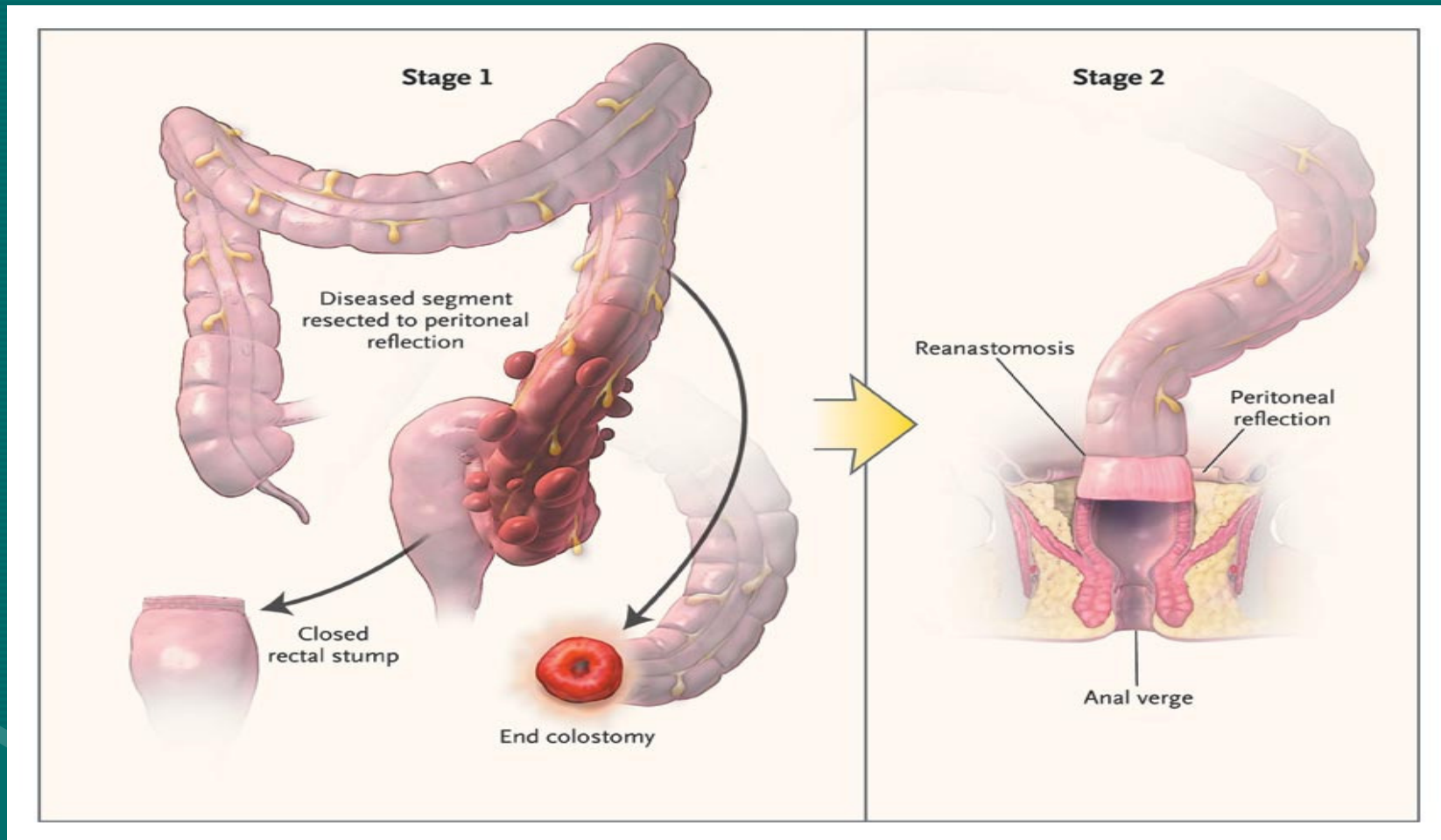
-  Uncomplicated diverticulitis → conservative medical therapy
- Depending on severity
 - Mild disease - outpatient management with oral antibiotics
 - Moderate disease - inpatient management with IV antibiotics, bowel rest, IVF
-  Antibiotics should cover gram-negative rods and anaerobes, as these are the most frequent bacteria involved.
 - ciprofloxacin and metronidazole are antibiotics frequently chosen
- **OR**
 - any broad-spectrum antibiotic covering anaerobes (eg: piperillin/tazobactam)
- If not responding – admit and reCT scan to r/o a complication
- Encourage high fiber diet

3 - STAGE OPERATIVE APPROACH TO DIVERTICULITIS



- 1st operation – the diseased colonic segment is drained, and a diverting ostomy (usually a transverse colostomy) is created proximally. This first stage allows for fecal diversion and drainage of infection.
- 2nd operation – the diseased colon is resected, and a primary colorectal anastomosis is performed.
- 3rd operation – the ostomy is reversed to reestablish bowel continuity.
- The three-stage procedure is rarely performed and is considered only in critical situations in which resection cannot be performed safely

2 - STAGE OPERATIVE APPROACH TO DIVERTICULITIS



- 1st operation – the diseased segment of bowel is resected, an end colostomy is performed, and the distal rectal stump is oversewn (Hartmann's procedure).
- 2nd operation – colonic continuity is reestablished. The margin of resection should include the entire sigmoid colon to reduce the risk of recurrence

DIVERTICULAR DISEASE

COMPLICATED DIVERTICULITIS



- Treatment of diverticular abscess
 - Percutaneous drainage (CT or US guided)
 - If not feasible (or not adequately drainable)
 - do urgent laparotomy & Hartmann's operation (sigmoid resection with end colostomy)
 - do colonoscopy after 6-8 weeks
 - do take-down of colostomy and a colorectal anastomosis after 12 weeks
 - If successful,
 - remove drain after abscess is drained
 - do colonoscopy 6 weeks later
 - do sigmoid resection with primary anastomosis

DIVERTICULAR DISEASE

COMPLICATED DIVERTICULITIS



- Treatment of generalized peritonitis

- do urgent laparotomy & Hartmann's operation (sigmoid resection with end colostomy)
- do colonoscopy after 6-8 weeks
- do take-down of colostomy and a colorectal anastomosis after 12 weeks

- Treatment of diverticulitis with fistula

- Excision of the diseased segment of the colon and closure of the hole in the bladder/other organ
- Do colonoscopy prior to surgery to r/o malignancy

DIVERTICULAR DISEASE

COMPLICATED DIVERTICULITIS

- Stricture due to diverticulitis can cause large bowel obstruction
 - Always rule out malignancy
 - Resection of the offending segment is needed
- Small bowel obstruction is a possibility
 - SB may get adherent to the inflamed colon
 - Lysis of adhesions & resection of the offending segment of colon may be needed

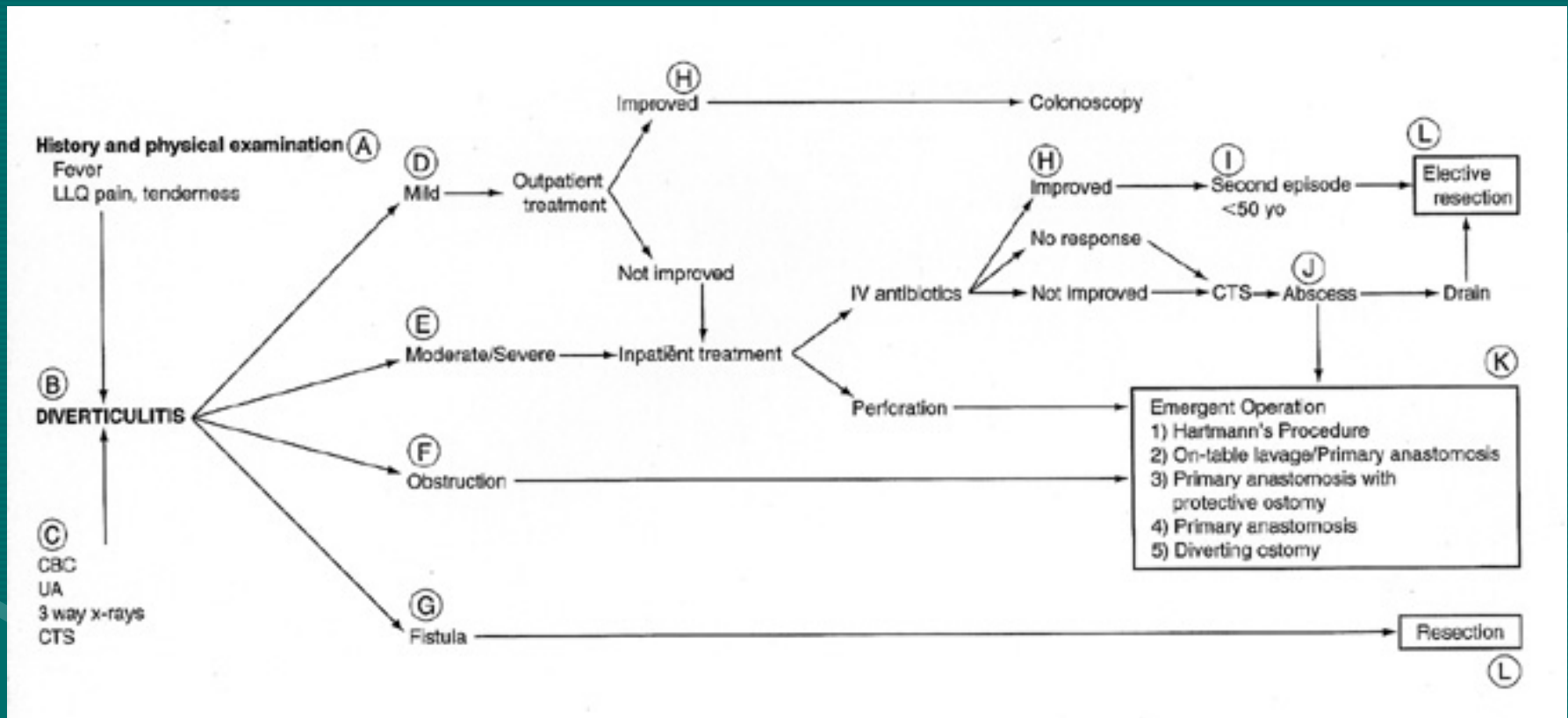
DIVERTICULITIS

Some Key Points

- LLQ pain, fever – suspect acute diverticulitis, get CT scan of abdomen/pelvis
- On CT scan – answer these 2 questions
 - Is it diverticulitis?
 - If so, is it complicated or uncomplicated?
- Patients with complicated disease will require an operation, either acutely or on an elective basis.
- Emergent or urgent indications for surgery during the acute phase
 - free perforation with generalized peritonitis
 - abscess not amenable to percutaneous drainage
 - obstruction
 - clinical deterioration or failure to improve with conservative management
- Elective surgery for diverticulitis
 - Complicated diverticulitis managed conservatively during the acute phase
 - Recurrent diverticulitis (after 2-3 attacks)
 - Patients who have a fistula or stricture/obstruction due to diverticulitis
 - Inability to rule out malignancy
 - Immunosuppressed patients even after one attack of diverticulitis

DIVERTICULAR DISEASE

Management algorithm for diverticulitis



Addendum to the algorithm

- Most physicians would get a CT scan at the time of presentation
- The emergency operation done is the Hartmann's procedure. The other choices are done only in selected patients.





COLON AND RECTAL CANCER

Cancer Statistics - 2008



Estimated New Cases*

3rd among new cancer cases

			Males	Females		
Prostate	186,320	25%			Breast	182,460 26%
Lung & bronchus	114,690	15%			Lung & bronchus	100,330 14%
Colon & rectum	77,250	10%			Colon & rectum	71,560 10%
Urinary bladder	51,230	7%			Uterine corpus	40,100 6%
Non-Hodgkin lymphoma	35,450	5%			Non-Hodgkin lymphoma	30,670 4%
Melanoma of the skin	34,950	5%			Thyroid	28,410 4%
Kidney & renal pelvis	33,130	4%			Melanoma of the skin	27,530 4%
Oral cavity & pharynx	25,310	3%			Ovary	21,650 3%
Leukemia	25,180	3%			Kidney & renal pelvis	21,260 3%
Pancreas	18,770	3%			Leukemia	19,090 3%
All Sites	745,180	100%	All Sites	692,000	100%	

3rd among cancer deaths

Estimated Deaths

			Males	Females		
Lung & bronchus	90,810	31%			Lung & bronchus	71,030 26%
Prostate	28,660	10%			Breast	40,480 15%
Colon & rectum	24,260	8%			Colon & rectum	25,700 9%
Pancreas	17,500	6%			Pancreas	16,790 6%
Liver & intrahepatic bile duct	12,570	4%			Ovary	15,520 6%
Leukemia	12,460	4%			Non-Hodgkin lymphoma	9,370 3%
Esophagus	11,000	3%			Melanoma of the skin	9,250 3%
Urinary bladder	7,470	3%			Uterine corpus	7,470 3%
Kidney & renal pelvis	8,100	3%			Liver & intrahepatic bile duct	5,840 2%
All Sites	294,120	100%			All Sites	271,530

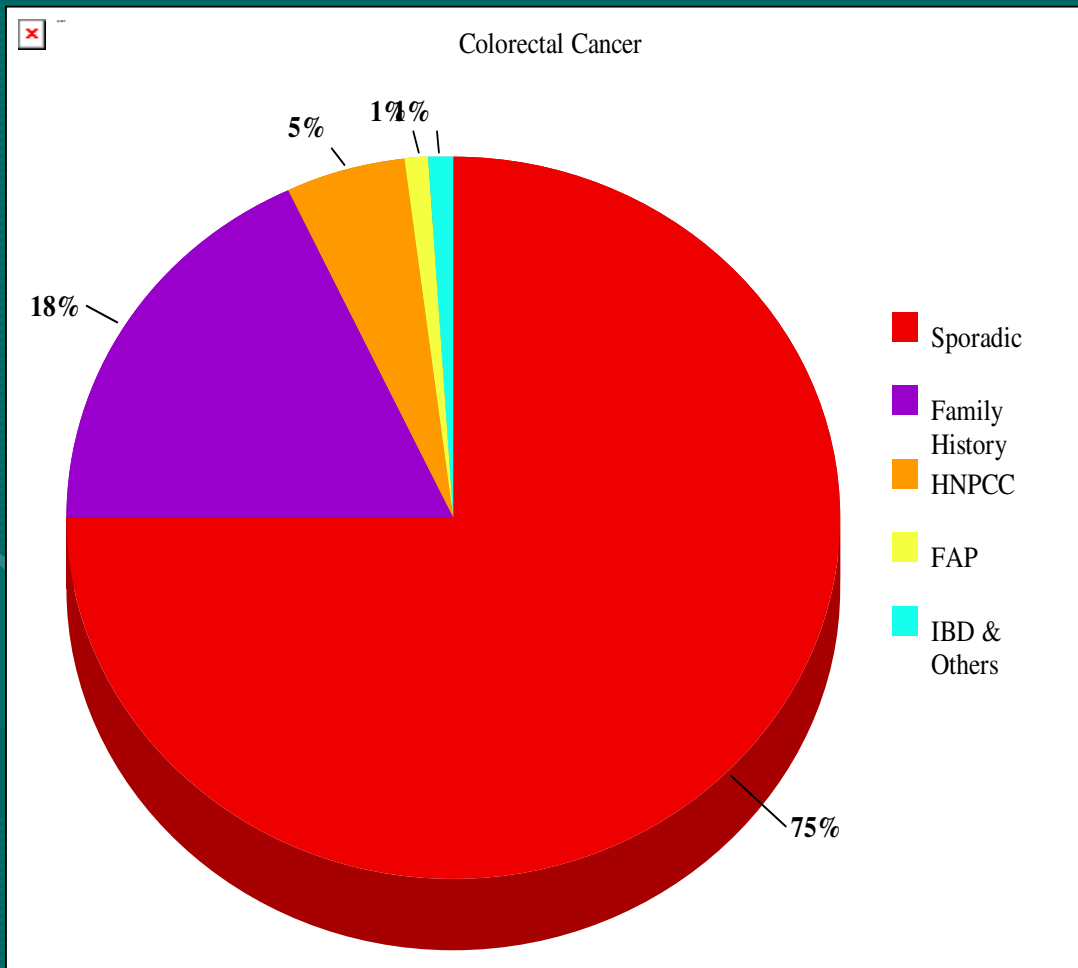
2nd among cancer deaths, both men & women together

COLORECTAL CANCER

- Is a common cancer
- Countries of the Western world have a higher incidence
- Lifetime probability for colorectal cancer
 - men : 1 in 17
 - women : 1 in 19
- African Americans
 - higher incidence than Caucasians
 - ratio of 1.2 (men)
 - ratio of 1.3 (women)
 - higher mortality than Caucasians - ratio of 1.4 for both sex
- Incidence and mortality rate of CRC is decreasing

All statistics from Cancer Facts & Figures 2007, American Cancer Society

COLORECTAL CANCER



Sporadic : 70-80%

Family h/o CRC : 15-20%

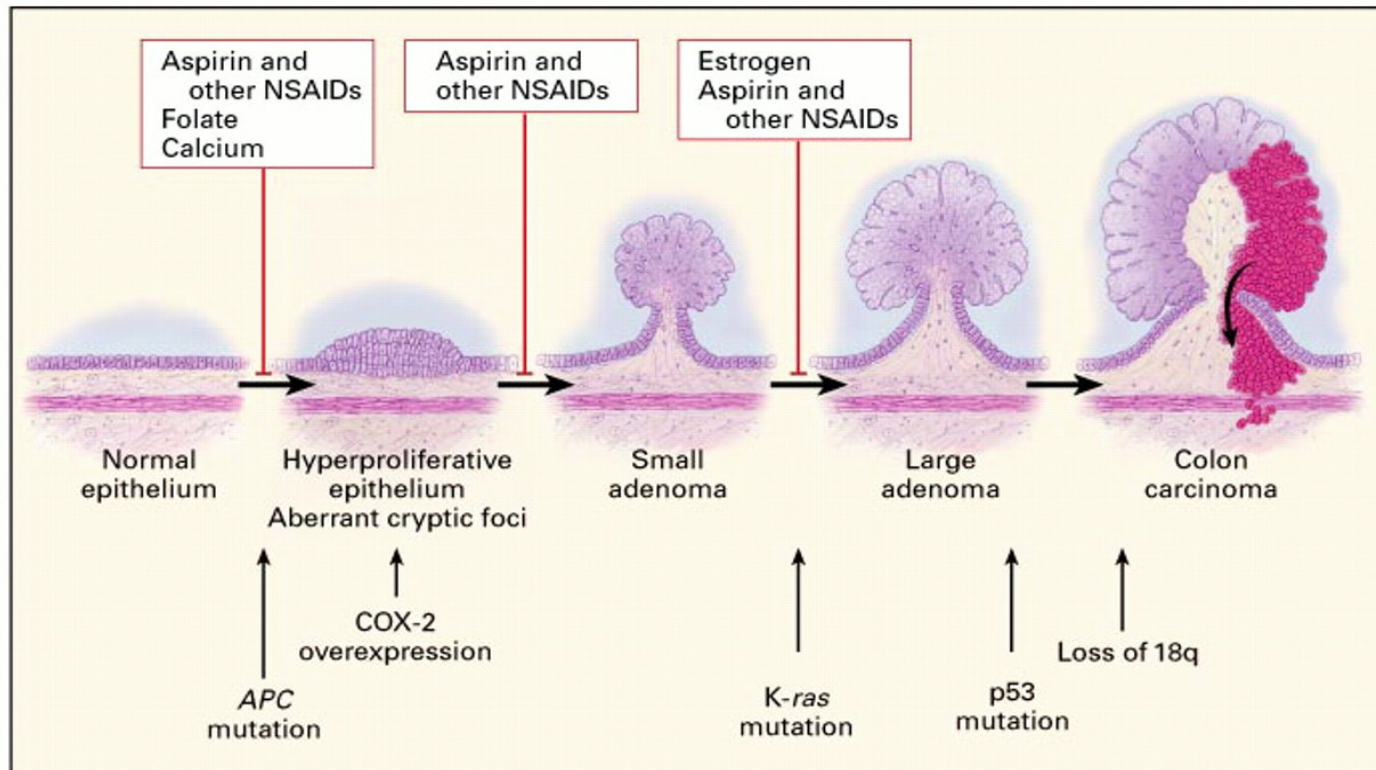
HNPCC : 4-7%

FAP : 1%

IBD & others : 1%

COLORECTAL TUMORIGENESIS

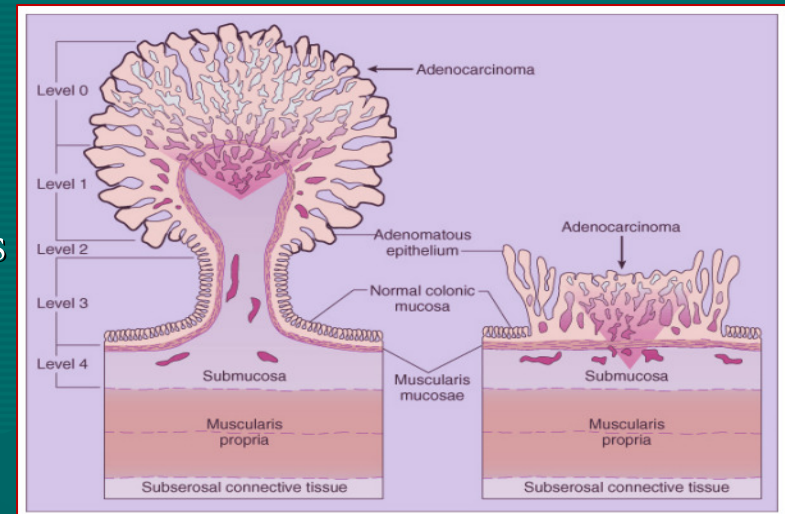
- Molecular and genetic pathways are involved in the genesis of colorectal cancer
- Tumor suppressor genes, DNA mismatch repair genes, and proto-oncogene all contribute to colorectal neoplasia, both in the sporadic and inherited forms
- Adenoma-carcinoma sequence, i.e. adenomatous polyp progresses to cancer



Colon Carcinogenesis and the effects of chemopreventive agents

COLORECTAL POLYPS

- Colorectal polyps can be
 - sporadic or hereditary
 - neoplastic or non-neoplastic
- Hyperplastic polyp is the most common of all colorectal polyps
- Tubular adenoma : 65-80%
 - most common neoplastic polyp
 - are most often pedunculated
 - generally less atypia in tubular adenomas
- Tubulovillous : 10-25%
- Villous adenomas : 5-10%
 - are more commonly sessile
 - severe atypia or dysplasia (precancerous cellular change) is found more often in villous adenomas
- Bigger the polyp, higher the incidence of invasive carcinoma
- More the villous component, higher the incidence of carcinoma



COLORECTAL CANCER

RISK FACTORS

- Age
 - incidence increase significantly between the ages of 40 and 50
 - 90% of cases occur after age 50
- Inflammatory bowel disease - UC > CD
- Personal history of colorectal cancers or adenomatous polyps
 - metachronous CRC incidence is 0.33% per year
- Hereditary Colon Cancer Syndromes
 - Familial adenomatous polyposis (FAP) syndrome
 - Hereditary nonpolyposis colon cancer (HNPCC)
 - Family history of sporadic cancers or adenomatous polyps

COLORECTAL CANCER

RISK FACTORS

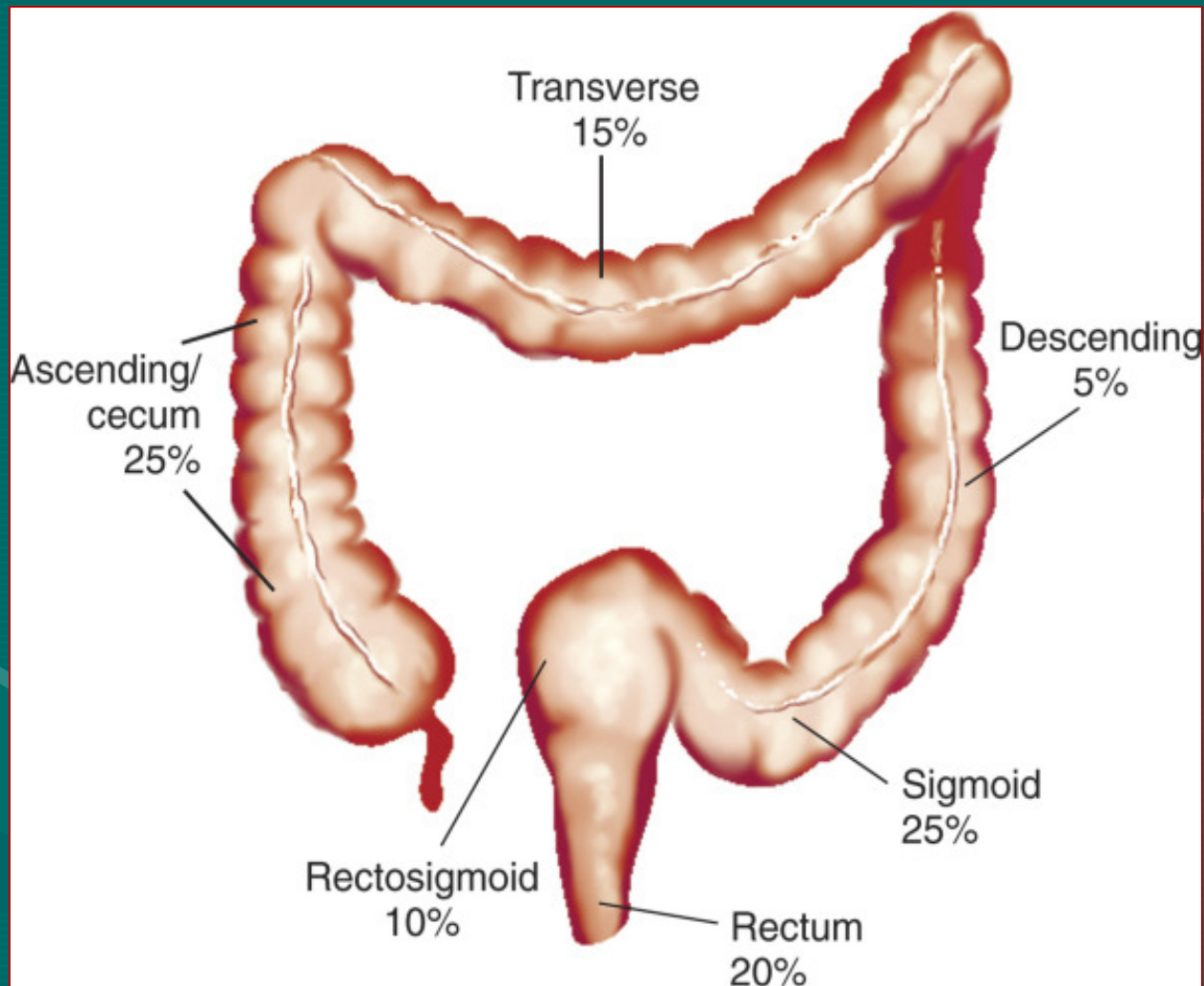
- Probably related

- Long-term consumption of red meat or processed meats
- High-fat and low-fiber consumption
- Cigarette smoking
- Prior pelvic irradiation
- Obesity

- Probably protective

- Intake of a diet high in fruits and vegetables
- Regular physical activity
- Postmenopausal hormone use
- Anti-oxidants, vitamins, Calcium, Magnesium
- Medications : NSAID/aspirin, statins

COLORECTAL CANCER



NOTE:

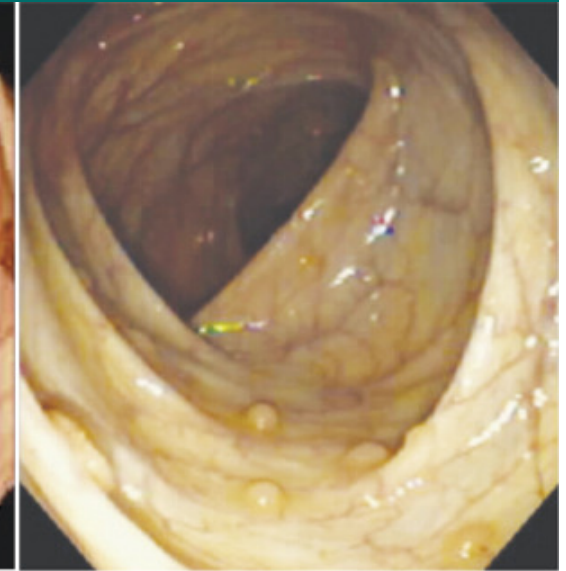
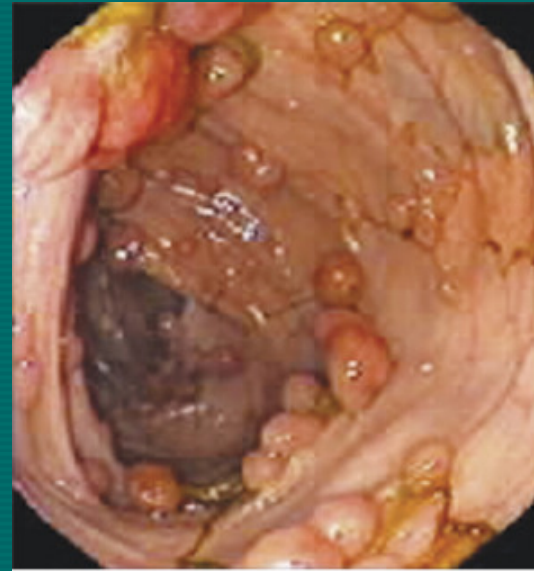
Only about one half of cancers are within the reach of the flexible sigmoidoscope. Hence full colonoscopy is important.

Distribution of colorectal cancers within the colon

HEREDITARY COLON CANCER SYNDROMES

- Family history of sporadic cancers
 - RR of 2.25 if 1st degree relative has CRC
 - Higher incidence if relative had CRC at a younger age
 - Higher incidence if more relatives are involved
- Hereditary nonpolyposis colon cancer (HNPCC)
 - autosomal dominant
 - two subgroups - Lynch syndrome I & Lynch syndrome II
 - 70%-80% lifetime risk of colorectal cancer
 - nearly 70% of cancers arise in the right colon
 - Lynch II has colonic & extracolonic cancers
- Familial adenomatous polyposis (FAP) syndrome

FAMILIAL ADENOMATOUS POLYPOSIS



- autosomal dominant
- numerous colonic adenomas typically appear during childhood
- symptoms appear at an average age of approximately 16 years
- colon cancer develop in 100% of untreated individuals by age 45
- variants are Gardner's syndrome, Turcot's syndrome, and attenuated adenomatous polyposis coli

COLON & RECTAL CANCER

SPREAD

- Lymphatic



- most common mechanism for metastatic disease
- pericolic nodes, then to the nodes at the root of the main vessel

- Hematogenous

- Liver (most common), lung, brain, bone, etc...

- Transperitoneal/Implantation

- tumors with serosal involvement shed viable tumor cells
- spreads within the peritoneal cavity and implant on other organs
- examples are ovaries, omentum, peritoneal surface, nodules in the rectovesical pouch or pouch of Douglas
- widespread peritoneal involvement is called carcinomatosis

- Direct extension

- to any nearby structures by direct infiltration
- this is T4 disease

CLINICAL MANIFESTATIONS OF CRC

- Abdominal pain
 - initially vague, dull, poorly localized
 - partial obstruction
 - peritoneal dissemination
 - intestinal perforation leading to generalized peritonitis
 - locally advanced
- Change in bowel habits
 - narrowed bowel lumen leads to thin caliber of stool, constipation and/or diarrhea
- Bleeding (hematochezia or melena)
 - Proximal cancers - melena
 - Distal cancers - hematochezia
- Asymptomatic

**This is a very
worrisome symptom**

CLINICAL MANIFESTATIONS OF CRC

- Weakness - 20 percent
- Anemia without other gastrointestinal symptoms - 11%
 - Usually right sided cancers
 - May be stool guiac positive
- Weight loss - 6 percent
- Intestinal Obstruction
- Unusual presentation
 - fistulas (internal/external)
 - abscess
 - fever & pain (mimics diverticulitis)
- Metastatic disease – liver metastasis, ascites, peritoneal nodules, Sister Joseph’s nodule, etc...



Any patient over 50 with anemia (man or woman) – **RULE OUT** colorectal cancer

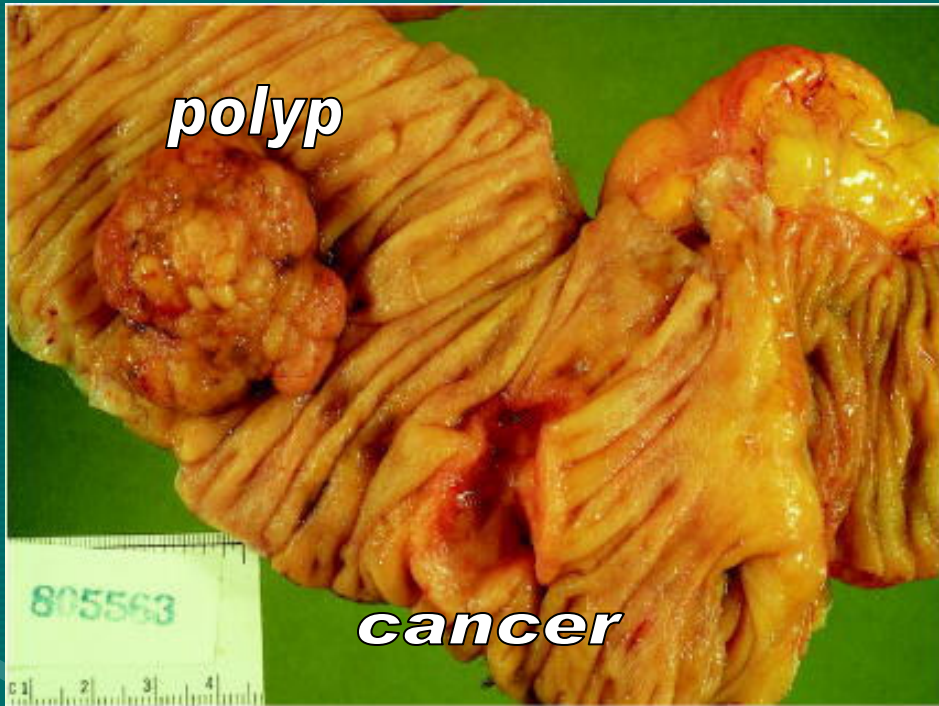
CLINICAL MANIFESTATIONS OF CRC

- May have synchronous cancers
 - two or more distinct primary tumors separated by normal bowel and not due to direct extension or metastasis
 - occur in 3-5% of patients with colon/rectal cancer

HENCE DO A COMPLETE COLONOSCOPY BEFORE STARTING TREATMENT, unless obstructing or nearly obstructing

ALWAYS

CLINICAL MANIFESTATIONS OF CRC



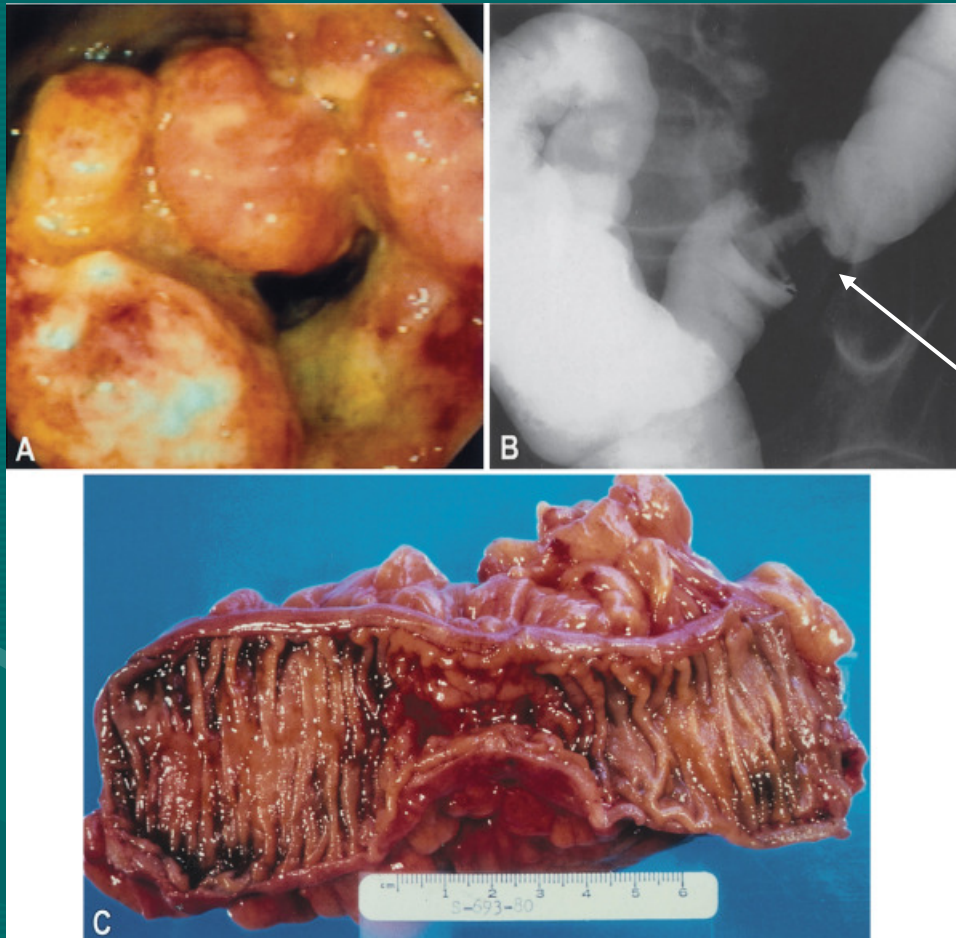
Resected right colon with large benign sessile polyp adjacent to an ulcerated carcinoma

Note: This is unlikely to obstruct

- Right-sided cancers
 - tend to be polypoid or fungating or ulcerating
 - unlikely to obstruct
 - tends to present with weakness & anemia
 - may have melena or guaiac positive stool
 - advanced lesions can cause change in bowel habits and bowel obstruction

Know the differences between RIGHT & LEFT colon cancers

CLINICAL MANIFESTATIONS OF CRC



- Left-sided cancers

- tend to be annular or constricting lesions
- likely to obstruct
- produce an "apple-core" or "napkin-ring" appearance on Ba enema
- tends to present with change in bowel habits & gross bleeding

Colonoscopic view, Ba enema, Resected specimen

CLINICAL MANIFESTATIONS OF CRC

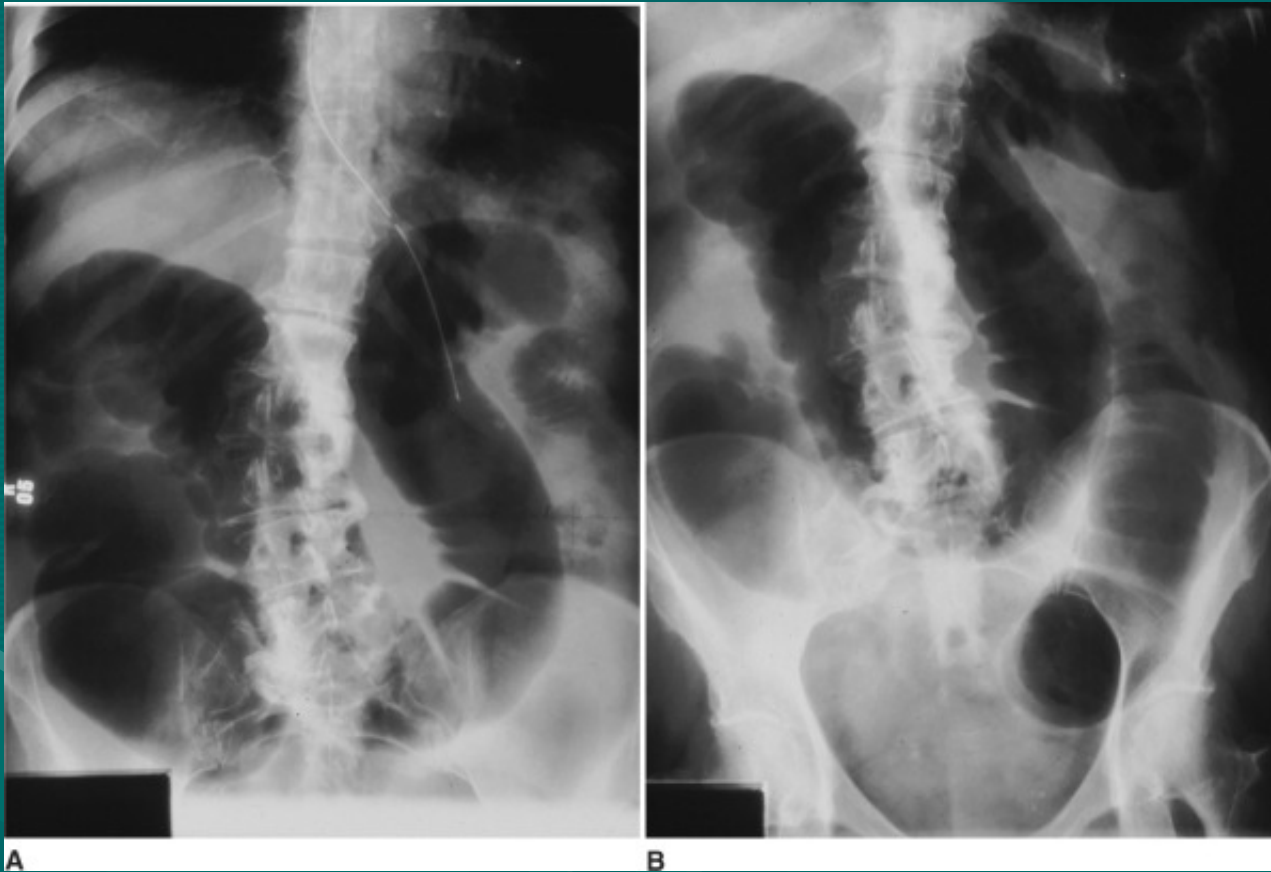


Annular carcinoma in the mid-transverse colon with a small, sessile polyp proximally (arrow) and diverticular disease in the descending colon



Carcinoma of right colon can also give rise to apple-core lesion

CLINICAL MANIFESTATIONS OF CRC



Dilated colon upto the sigmoid colon with no air in the rectum indicates an obstruction

Large bowel obstruction at sigmoid colon caused by carcinoma.

A, Erect. B, Supine.

CLINICAL MANIFESTATIONS OF RECTAL CANCER

- Most common symptom of rectal cancer is hematochezia
- Unfortunately, this is often attributed to hemorrhoids (by patient & physician), hence correct diagnosis is consequently delayed until the cancer has reached an advanced stage.
- Other symptoms include
 - mucus discharge
 - tenesmus
 - change in bowel habit
 - pain (usually with locally advanced rectal cancer)

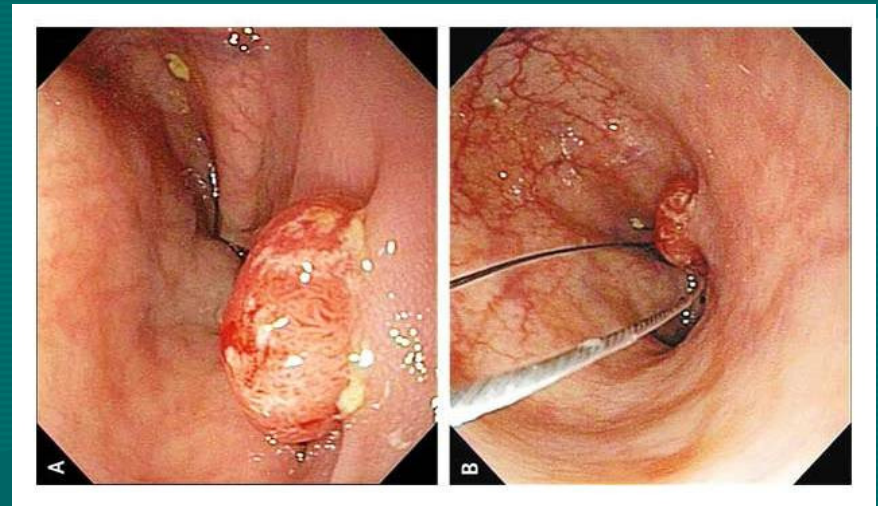


Colorectal cancer can co-exist with hemorrhoids.
Hence, always look for a proximal source of bleed



DIAGNOSIS OF COLORECTAL CANCER

- Colonoscopy
 - single best diagnostic test in symptomatic individuals
 - can localize lesions throughout the large bowel
 - biopsy mass lesions
 - detect synchronous neoplasms
 - remove polyps



- Double contrast barium enema
 - cannot biopsy the lesion
 - done if unable to reach the tumor with colonoscope for technical reasons

STAGING OF COLORECTAL CANCER

- Assess the local and distant extent of disease
- Thorough History & Physical examination
- Lab tests - LFT, CEA
- CT scan of abdomen & pelvis
 - regional tumor extension
 - regional lymphatic disease
 - distant metastases
 - tumor-related complications (e.g., obstruction, perforation, fistula formation)
- Chest X-ray (or CT chest) to rule out lung metastasis
- Endorectal ultrasound for rectal tumors
- PET scans
 - do not add significant information to CT for preoperative staging of CRC

PREOP ASSESSMENT OF RECTAL CANCER

Similar to colon cancer patients, but with two significant differences:

- (1) distance from the anal sphincters:
 - needs precise location of the cancer with respect to the anal sphincters
- (2) extent of local disease: as determined by
 - depth of penetration into the bowel wall and spread to adjacent LN

Location of the tumor is

- best determined with a rigid proctosigmoidoscope
- accurately measure the exact distance from the tumor to the anal sphincter

Depth of penetration can be evaluated by

- Digital rectal examination
 - superficially invasive tumors are mobile and deeper ones are tethered
- Endorectal ultrasound (EUS) or MRI (with endorectal coil)

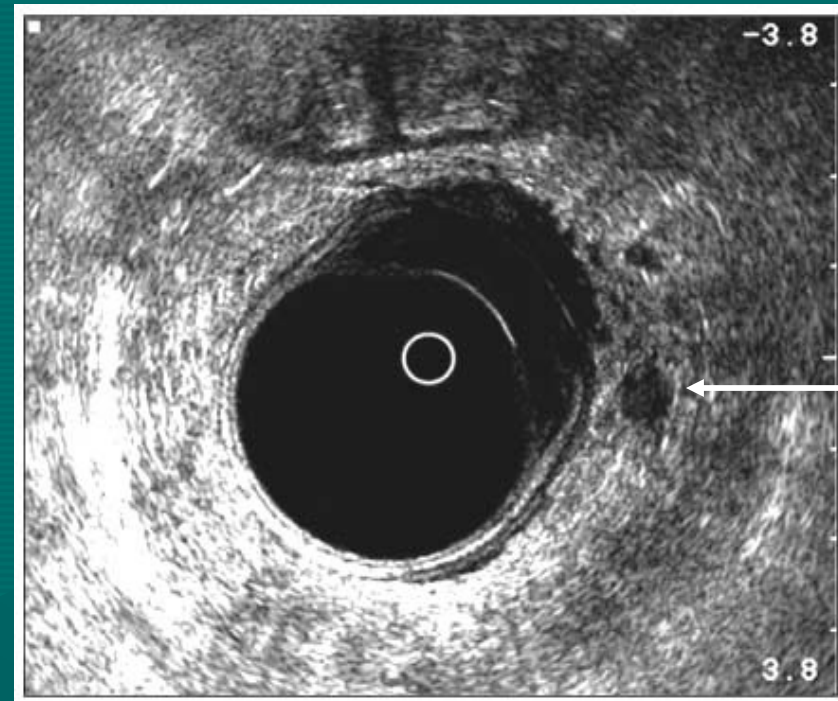
Local lymph node involvement is determined by

- Endorectal ultrasound (EUS) or MRI with endorectal coil

PREOP ASSESSMENT OF RECTAL CANCER

ENDORECTAL ULTRASOUND

Endorectal ultrasound of T₃N₁ rectal cancer



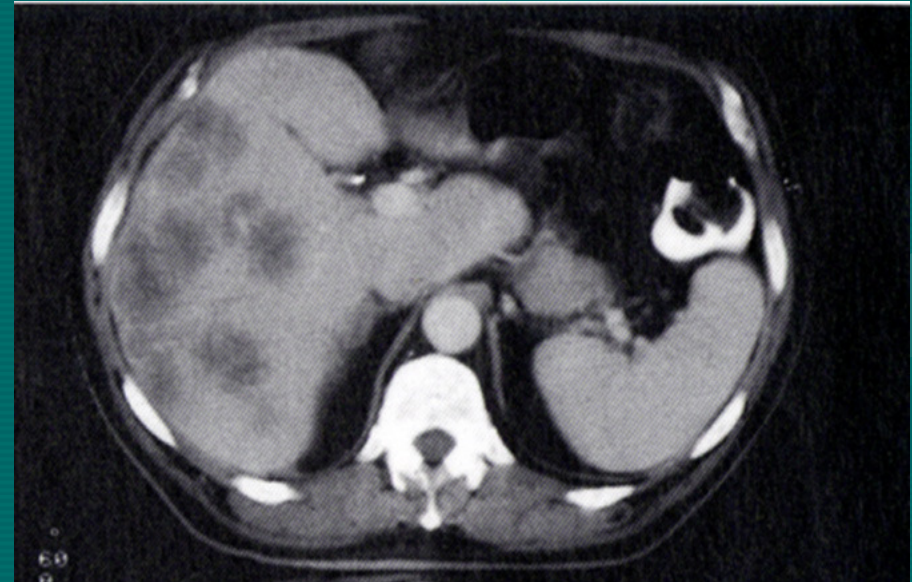
The cancer penetrates through all layers of the rectal wall, and an enlarged lymph node (*arrow*) is visible

STAGING OF COLORECTAL CANCER



CT scan of a sigmoid cancer

- an irregular narrowed lumen
- spiculated outer border
- sharp demarcation from normal bowel



CT scan of abdomen showing multiple liver metastasis

STAGING OF COLORECTAL CANCER



Multiple hepatic metastases from a primary colon adenocarcinoma

STAGING OF COLORECTAL CANCER

TNM Staging

Primary Tumor (T)

T1 : invades submucosa

T2 : invades muscularis propria

T3 : invades subserosa or perirectal tissue

T4 : invades other organs

Regional lymph nodes (N)

N1 : metastasis to 1-3 nodes

N2 : metastasis to > 3 nodes

Distant metastasis (M)

M0 : no distant metastasis

M1 : Distant metastasis

Tis : carcinoma in situ

Dukes Staging

A : confined to bowel wall

B : penetrates bowel wall into serosa or perirectal fat

C : lymph node metastasis

D : Distant metastasis

Stage	Dukes Stage	T	N	M	Survival rate
0	-	Tis	N0	M0	100%
I	A	T1/T2	N0	M0	90%
II A/B	B	T3/T4	N0	M0	80%
III	C	Any T	N1/N2	M0	60%
IV	D	Any T	Any N	M1	5-25%

TREATMENT OF CRC

You have to
REMEMBER
this

- Treatment modalities available
 - Radical surgery
 - Chemotherapy
 - Radiotherapy
 - Immunotherapy
- Colon cancer
 - Stage I, II : Surgery
 - Stage IIB*, III : Surgery followed by chemotherapy
 - Stage IV : Any modality as indicated
- Rectal Cancer
 - Stage I : Surgery
 - Stage II, III : Pre-op chemoradiation followed by surgery
 - Stage IV : Any modality as indicated

* Stage IIB colon cancer with poor prognostic factors need post-op chemotherapy
Radiation has no role in curative colon cancer, but has a role in curative rectal cancer
If pre-op Stage I rectal cancer is diagnosed to be Stage II post-op, then give post-op chemoradiation

Poor prognostic factors – lymphovascular invasion, perineural invasion, poorly differentiated

TREATMENT OF CRC

- The objective of surgery for colorectal adenocarcinoma is
 - removal of the primary cancer with adequate margins
 - regional lymphadenectomy
 - restoration of the continuity of the gastrointestinal tract by anastomosis, if indicated
- The extent of resection is determined by
 - the location of the cancer
 - its blood supply and draining lymphatic system
 - presence or absence of direct extension into adjacent organs.

SURGERY FOR COLON CANCER

- Ca of cecum/ascending colon:
 - Right hemicolectomy
- Ca of hepatic flexure/proximal transverse colon:
 - Extended right hemicolectomy
- Ca of distal transverse colon:
 - Extended right hemicolectomy including splenic flexure **OR** left hemicolectomy
- Ca of left colon:
 - Left hemicolectomy
- Ca of sigmoid colon:
 - Sigmoidectomy **OR** left hemicolectomy

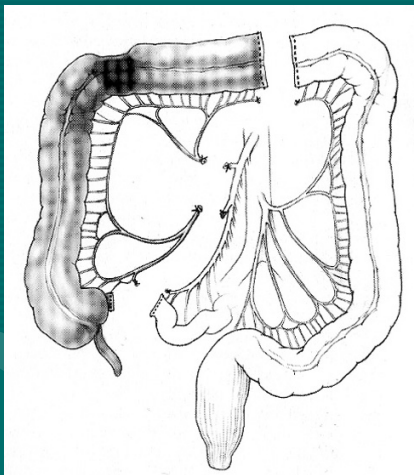
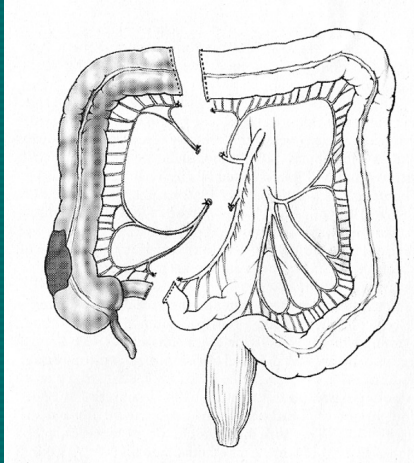
REMEMBER: The extent of resection is determined by the location of the cancer, its blood supply, draining lymphatic system & involvement of adjacent structures



**THE ENTIRE LYMPHATIC BASIN OF THE TUMOR
HAS TO BE RESECTED**

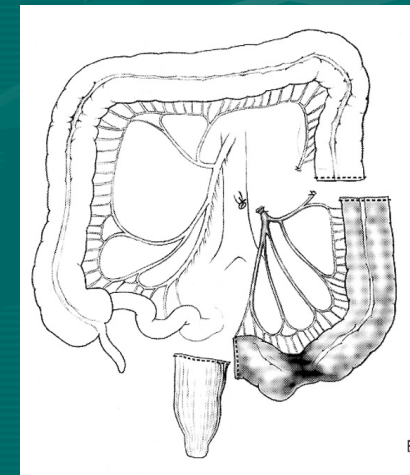
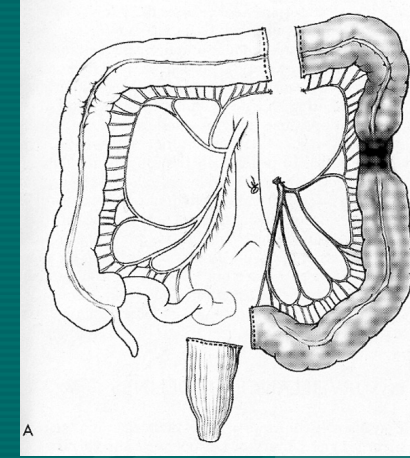
TREATMENT OF CRC

Right hemicolectomy

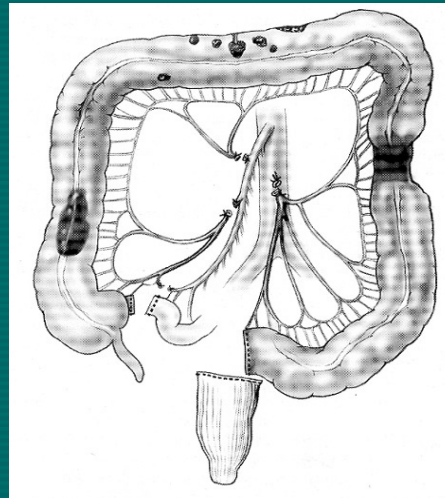


Extended right hemicolectomy

Left hemicolectomy



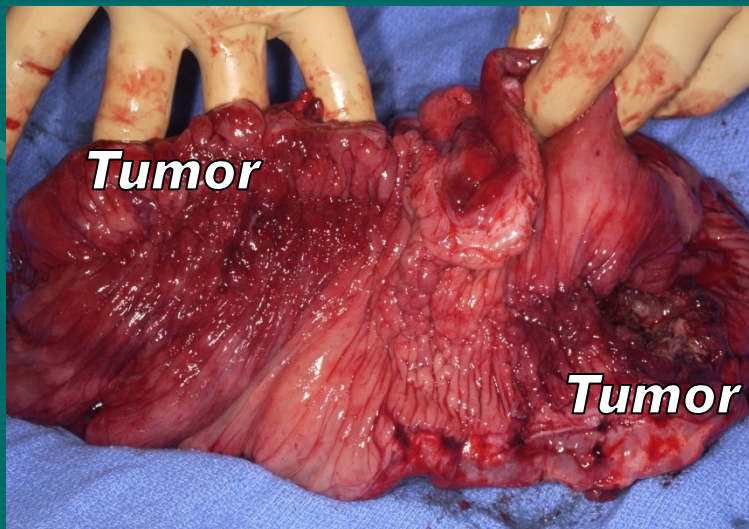
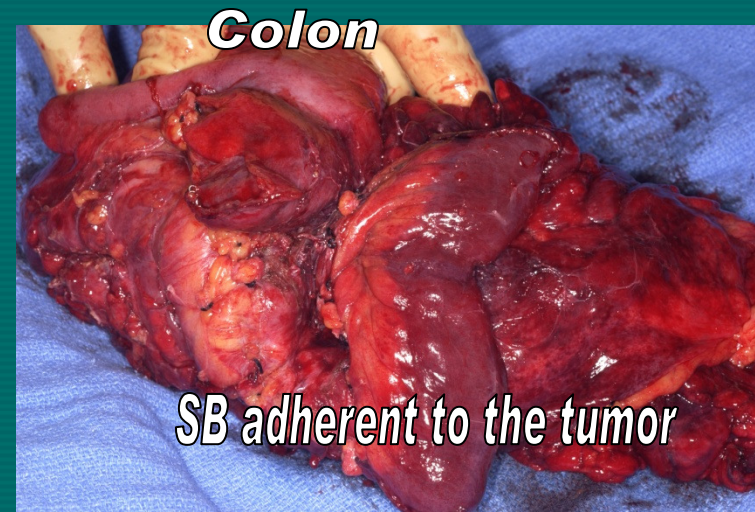
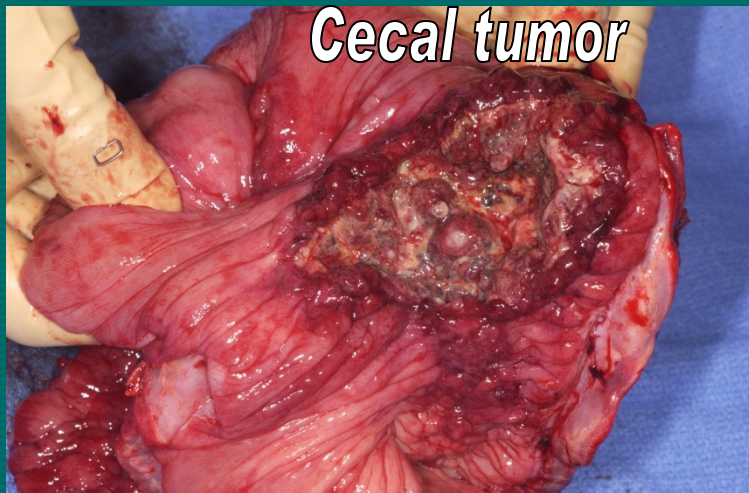
Colectomy for sigmoid Ca



Total colectomy

NOTE: *If colon has synchronous cancers, a total colectomy is required.
Needs lifelong surveillance for the rectum.*

TREATMENT OF CRC



If tumor is infiltrating into nearby structures, that structure has to be removed en bloc with the tumor

DO NOT dissect the structures as tumor spillage is possible

OBSTRUCTING COLON CANCER

SURGICAL OPTIONS

1. Resect the colon cancer and do primary anastomosis (1 surgery)
2. Two stage procedure
 - Resect the colon cancer, staple off the distal end and bring the proximal end as an end colostomy (Hartmann's procedure) (1st surgery).
 - After 6-8 weeks, take down the colostomy and do anastomosis (2nd surgery)
3. Three stage procedure
 - Do proximal loop colostomy (1st surgery)
 - Prep the bowel and do colon resection and do anastomosis (2nd surgery)
 - After 6-8 weeks, take down the colostomy (3rd surgery)
4. Resect the cancer and the entire proximal colon and do anastomosis of ileum to the distal end (1 surgery)
5. Resect the colon cancer, do an on-table colon wash-out and do primary anastomosis (1 surgery)

OBSTRUCTING COLON CANCER

SURGICAL APPROACH

- Obstructing right colon or transverse colon can be managed with right hemicolectomy or extended right hemicolectomy
- Staged procedure :
 - Is done for obstructing cancer in stages
 - Currently, most surgeons do a 2-stage procedure or a 1-stage procedure.
- Colonic stenting across the tumor can be done
 - as a palliative measure
 - allows transient relief of obstruction and do bowel prep prior to definitive surgery
- Do metastatic work up when the condition permits
- Rule out synchronous cancers when appropriate

PERFORATED COLON CANCER

SURGICAL APPROACH

- Present with peritonitis
- Goal of treatment
 - remove the diseased segment of colon
 - prevent ongoing peritoneal contamination
- Surgical procedure is
 - resect the colon cancer, staple off the distal end and bring the proximal end as an end colostomy (Hartmann's procedure)
 - thorough peritoneal lavage
- Associated with high rate of local recurrence and overall low survival

**PERFORATED
COLON
CANCER = BAD
PROGNOSIS**

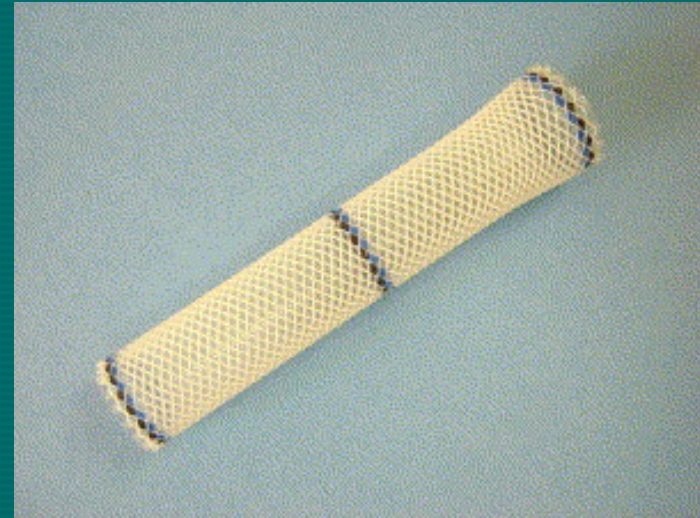
SURGERY FOR RECTAL CANCER

	<u>LAR</u>	<u>LAR with CAA</u>	<u>APR</u>	<u>TAE</u>
Indication	<ul style="list-style-type: none"> • Upper & middle rectal cancer • Some low rectal cancers 	<ul style="list-style-type: none"> • Low rectal cancer with no sphincter involvement 	<ul style="list-style-type: none"> • Low rectal Ca too close to sphincter • Anal sphincter involved • Poor pre-op sphincter control 	<ul style="list-style-type: none"> • Small mobile cancer with no high risk features upto 8cm from anus and not involving muscularis & LN
Approach	Abdomen	Abdomen (perineum, only for anastomosis)	Abdomen and perineum	Transanal
Specimen	Sigmoid colon & rectum	Sigmoid colon & entire rectum	Sigmoid colon, rectum & anus	Only the tumor
Anastomosis	Descending colon to rectum	Descending colon to anal canal	None	None
Anal Sphincters	Preserved	Preserved, may need temporary stoma	Excised, hence <u>needs permanent stoma</u>	Preserved

LAR: low anterior resection CAA: coloanal anastomosis TAE: transanal excision
 APR: abdomino-perineal resection

SURGERY FOR COLON & RECTAL CANCER

- Palliative intervention
 - Intraluminal stenting
 - Balloon dilatation
 - Endoscopic laser ablation
- May be used in obstruction and thus avoid an emergent surgery
- Permits colon prep prior to elective surgery



COLON & RECTAL CANCER

POST-OP FOLLOW UP

- History and Physical
 - every 3-6 months x 2 years, then
 - every 6 months for a total of 5 years
- CEA
 - every 3-6 months x 2 years, then
 - every 6 months for a total of 5 years
 - only for T2 or greater lesions
- Colonoscopy
 - in 1 year
 - repeat in 1 year if abnormal
 - every 2-3 years if normal
 - if none was done due to an obstructing lesion, do in 3-6 months post-op
- CT of Chest/Abdomen/Pelvis annually for patients with high risk features
 - lymphovascular invasion
 - perineural invasion
 - poorly differentiated

60-75% of recurrences occur within 2 years of surgery, hence follow up is rigorous during that period

OSTOMY

- Is the surgical construction of an opening connecting an internal organ to the surface of the body
- Usually done for the purpose of
 - removing waste materials from the body (colostomy, ileostomy, nephrostomy, etc...)
 - for tube feeding (gastrostomy, jejunostomy, etc...)
- Different techniques to create an ostomy, depends on many factors
- For removing waste from the GI tract, a portion of the colon or ileum is brought to the skin surface and turned back on itself like a cuff, thus creating an opening on the abdomen called a stoma.
- Stoma has no nerve endings, but has blood vessels
- Creation of stoma brings about changes
 - loss of bowel control
 - changed density and content of body waste
 - and many more changes

OSTOMY

- Stoma differ by location
 - Colostomy: stoma made in the colon
 - Ileostomy: stoma made in the ileum
- Stomas differ by construction:
 - End stoma: the bowel is completely transected with one end brought to the surface, hence there is complete diversion of stool
 - Loop stoma: the entire loop of bowel is brought to the skin surface and opened
 - there are two openings – one from the proximal bowel and other from the distal
 - ‘spill-over’ into the distal bowel is possible – hence questionable complete diversion (but never an issue in most situations)
 - Double-barrel stoma: bringing both ends of the bowel to the skin surface as two separate stomas
- Stomas are also classified as
 - Temporary:
 - to decompress an obstructed distal colon, usually done on an emergency basis
 - to permit healing of a fistulous tract or acute inflammatory process or an anastomosis distal to the ostomy. This helps to divert the fecal stream.
 - Permanent:
 - with loss of sphincter function (either surgically or otherwise)
 - with certain disease conditions

OSTOMY

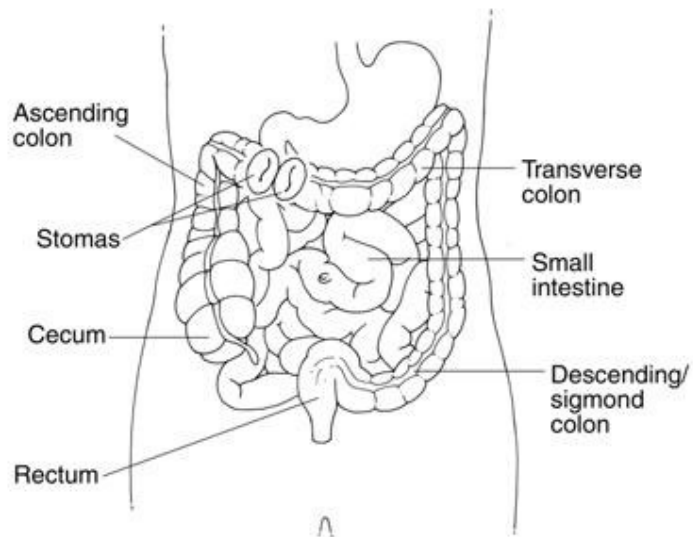
- When an end stoma is created, the contents of the distal segment of the bowel (usually mucous or any retained stool) needs to be evacuated through the anus.
- When the distal end of the transected bowel is brought to the skin surface, it is called a mucous fistula, as it provides a vent for the mucous secreted into the bowel lumen
- If there is any obstructive lesion in the distal segment which is not resected, then
 - a loop ostomy should be created and not an end stoma
 - or
 - a mucous fistula should be created to vent the distal segment

OSTOMY

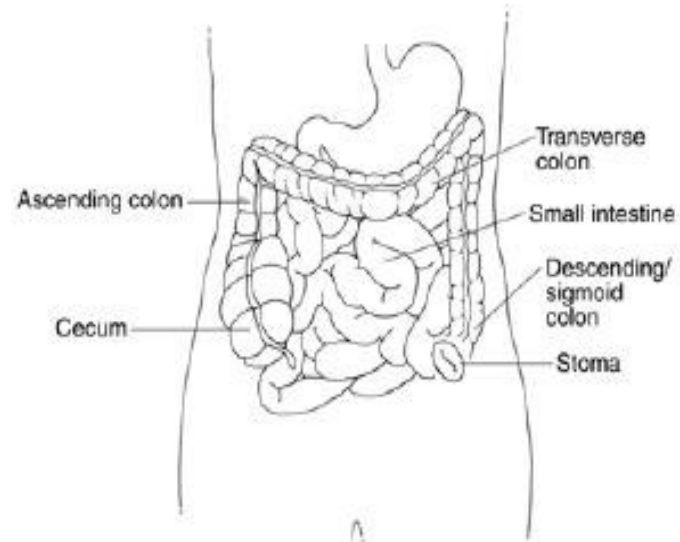
- Colostomy
 - Ascending or Transverse or Descending or Sigmoid
 - End or Loop
 - Temporary or Permanent
- Cecostomy
 - Generally not very effective in decompressing the large bowel
 - Has much morbidity, hence not very popular
 - 'Blow-hole' cecostomy – the cecum is brought to the skin surface and a stoma is created
 - Tube cecostomy – a tube is introduced into the cecum and brought out through the skin
 - Done for colonic pseudo-obstruction (Ogilvie's syndrome)
 - When no longer needed, the tube can be pulled and the wound heals

OSTOMY

**Transverse (Double-barrel)
Colostomy**

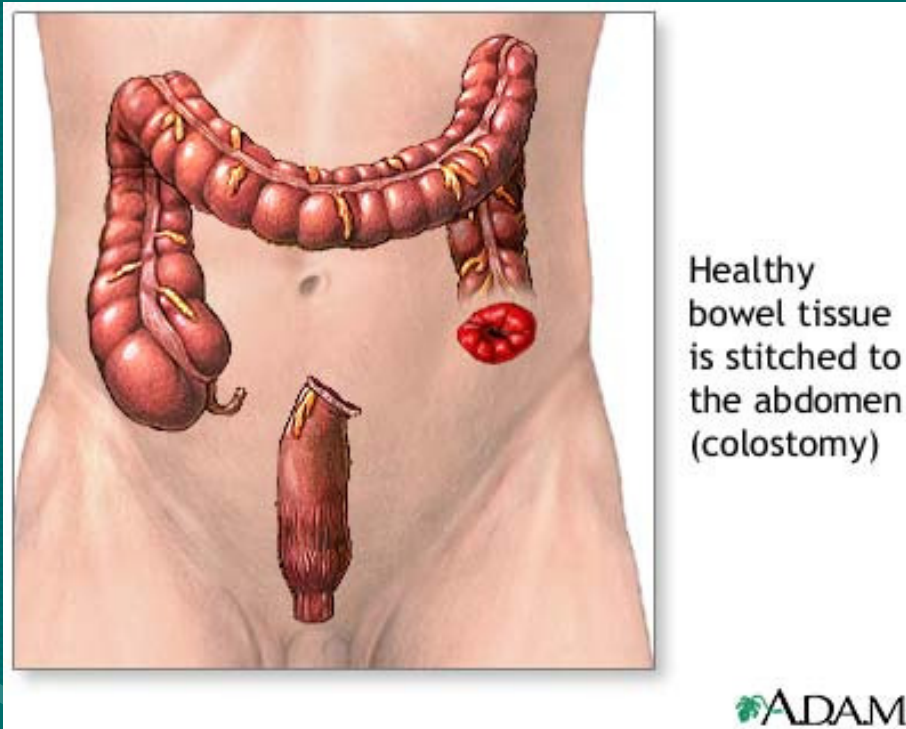


**Descending/Sigmoid
Colostomy**

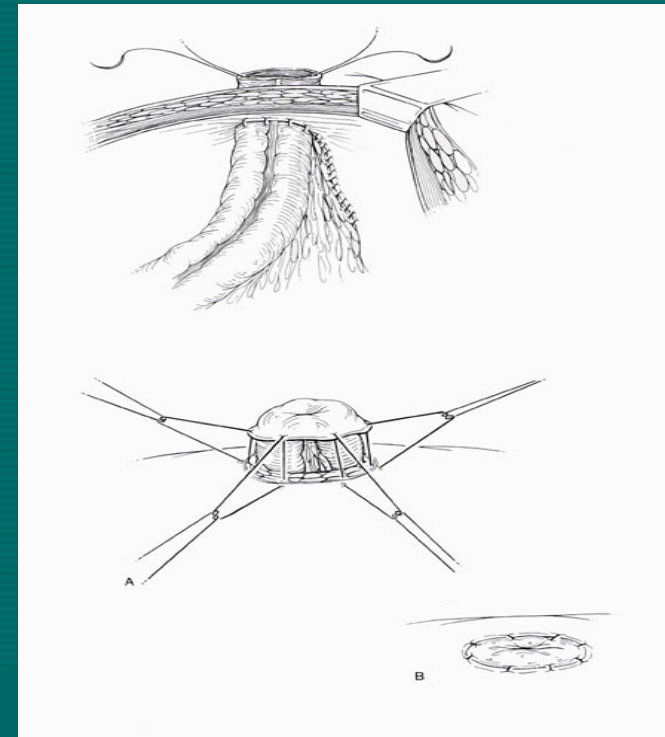


The transverse colostomy is a loop colostomy, while the descending/sigmoid colostomy is an end colostomy

OSTOMY



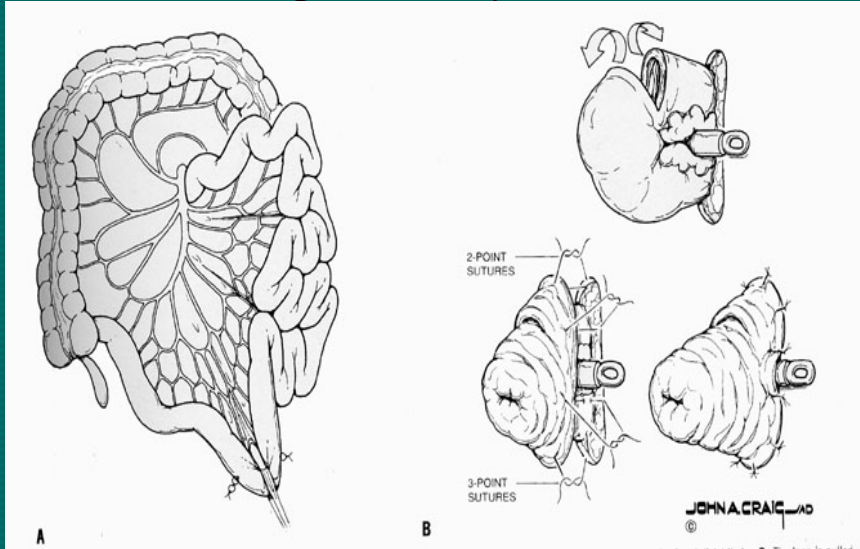
This is the typical Hartmann's procedure – part of the colon is resected, the distal end is closed and the proximal end is fashioned as an end colostomy. Colonic continuity can be re-established once the disease process is adequately treated.



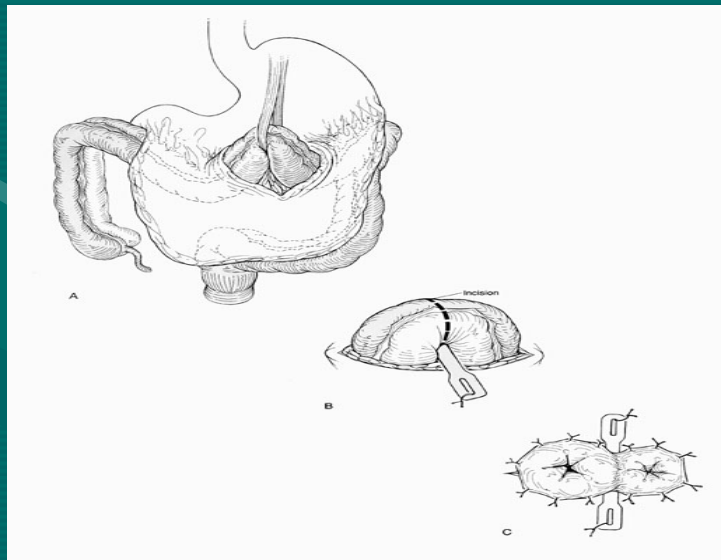
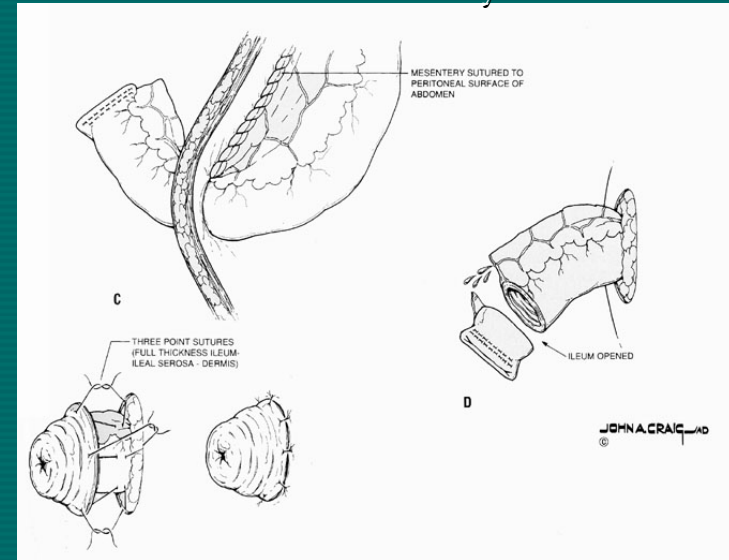
Construction of an end colostomy

OSTOMY

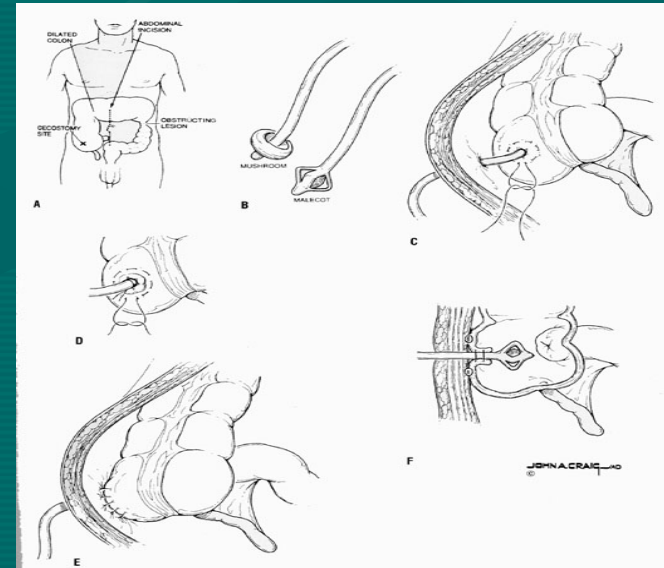
Loop ileostomy



End ileostomy



Transverse loop colostomy



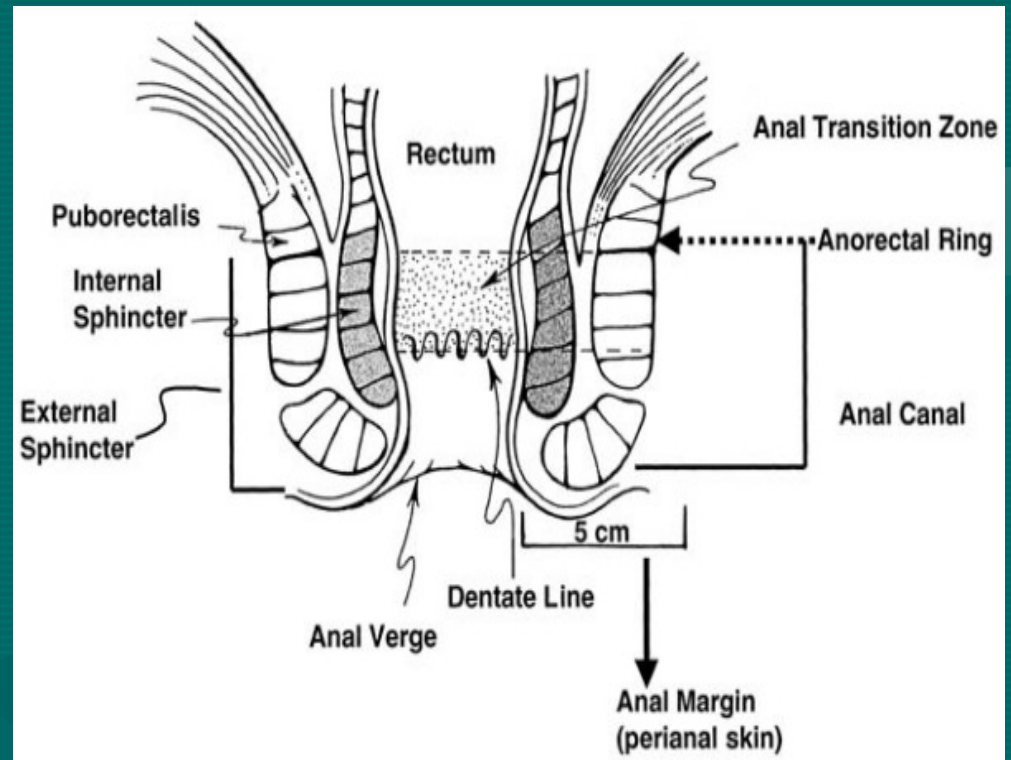
Tube cecostomy

ANAL CANCER



ANORECTAL ANATOMY

- Anal canal extends from the upper level of the puborectalis/levator muscles to the anal verge.
- Anal verge is at the intersphincteric groove - the groove between the lower end of the internal sphincter and the external sphincter
- Anal margin extends laterally from the anal verge for a distance of 5 cm.

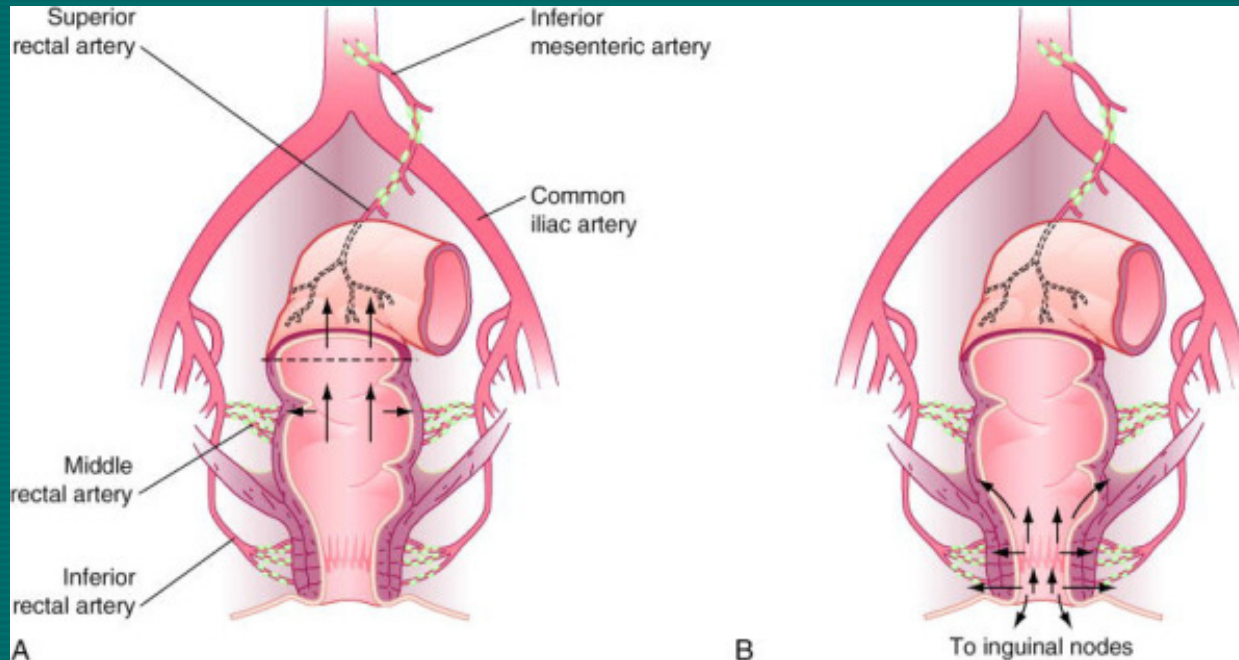


ANAL CANCER

- Anal cancer is uncommon.
 - 1.6% of all digestive system malignancies in the US.
- Increased incidence
 - female gender
 - infection with human papillomavirus (HPV)
 - higher number of sexual partners during their lifetime
 - genital warts
 - cigarette smoking
 - receptive anal intercourse
 - infection with human immunodeficiency virus (HIV)
- Thus, from an etiologic standpoint, anal cancer is more similar to genital malignancies than it is to GI tract cancers.

ANAL CANCER

Lymphatic Drainage



- Lesions in the low rectum and anal transition zone generally spread to superior rectal nodes (then to inferior mesenteric nodes) and laterally to internal iliac nodes.
- Lesions above the dentate line drain to internal pudendal, obturator, or internal iliac nodes (i.e. laterally) or to the superior rectal nodes (i.e. superiorly).
- Lesions from the dentate line to the anal verge drain to the inguinal lymph nodes primarily, but can drain laterally or superiorly as well.
- **Perianal tumors drain into the inguinal region.**

ANAL CANCER

Classification

- Malignant tumors of anal canal

- Epidermoid carcinoma : 80%
- Adenocarcinoma : 15%
- Melanoma : 2-4%
- Other : 2-3%

Note:

- Epidermoid Carcinoma includes
 - Squamous cell Ca - most common
 - Basaloid Ca
 - Cloacogenic Ca
 - Basosquamous Ca
 - Transitional cell Ca

- Malignant tumors of anal margin

- Squamous cell carcinoma (most common)
- Melanoma
- Basal cell carcinoma
- Verrucous carcinoma
- Kaposi's sarcoma

- Potentially Malignant Lesions of anal margin

- Bowen's disease
- Paget's disease
- Leukoplakia
- Condylomata acuminata

Whenever you hear about anal cancer, think of Squamous cell carcinoma, as it the most common type

ANAL CANAL CANCER

CLINICAL FEATURES

- Rectal bleeding – 50%
 - most common initial symptom of squamous cell carcinoma (SCC) of anus
- Pain or the sensation of a rectal mass – 30%
- No tumor related symptoms – 20%
- May be falsely attributed to hemorrhoids, and may delay the diagnosis
- Tumors of the anal margin, may present with
 - anal pruritus
 - bleeding erythematous eczematoid plaque
 - typical examples are Bowen's disease and Paget's disease

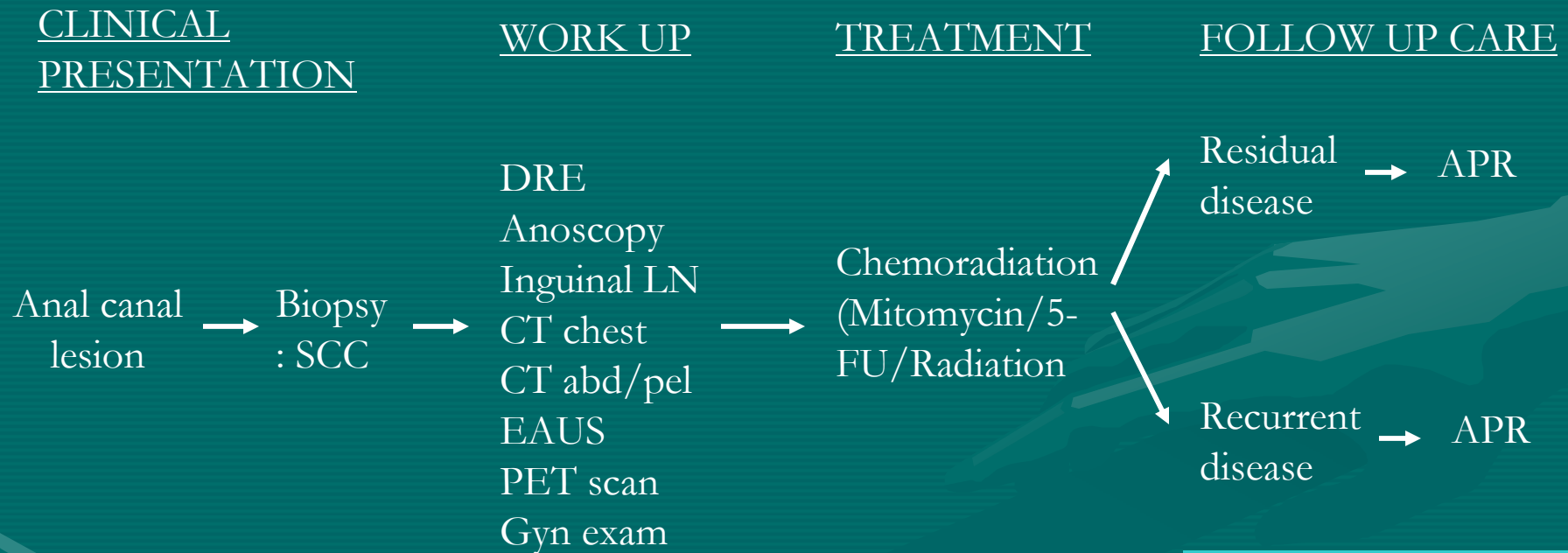
ANAL CANAL CANCER

MANAGEMENT

- Delay in diagnosis is due to
 - Similar complaints for both benign and malignant lesions
 - Patient (and physician too) attributes to hemorrhoids
- Clinician must maintain a high index of suspicion
- Do EUA and biopsy if indicated
- Malignant lesions of the anal margin
 - Are less invasive than those of the anal canal
 - Anal margin cancer behaves like skin cancer

ANAL CANAL CANCER

MANAGEMENT



DRE: Digital Rectal Exam
EAUS: Endoanal Ultrasound

REMEMBER:

 Treatment of choice for SCC of anal canal is chemoradiation (**Nigro protocol**)

Treatment of adenocarcinoma of anal canal is APR vs chemoradiation.

Include bilateral inguinal nodes for radiation for lesions >5cm or if nodes are positive.

Recurrent/residual disease in the groin requires groin dissection.

Inguinal node positivity is determined by FNA or biopsy

ANAL MARGIN CANCER

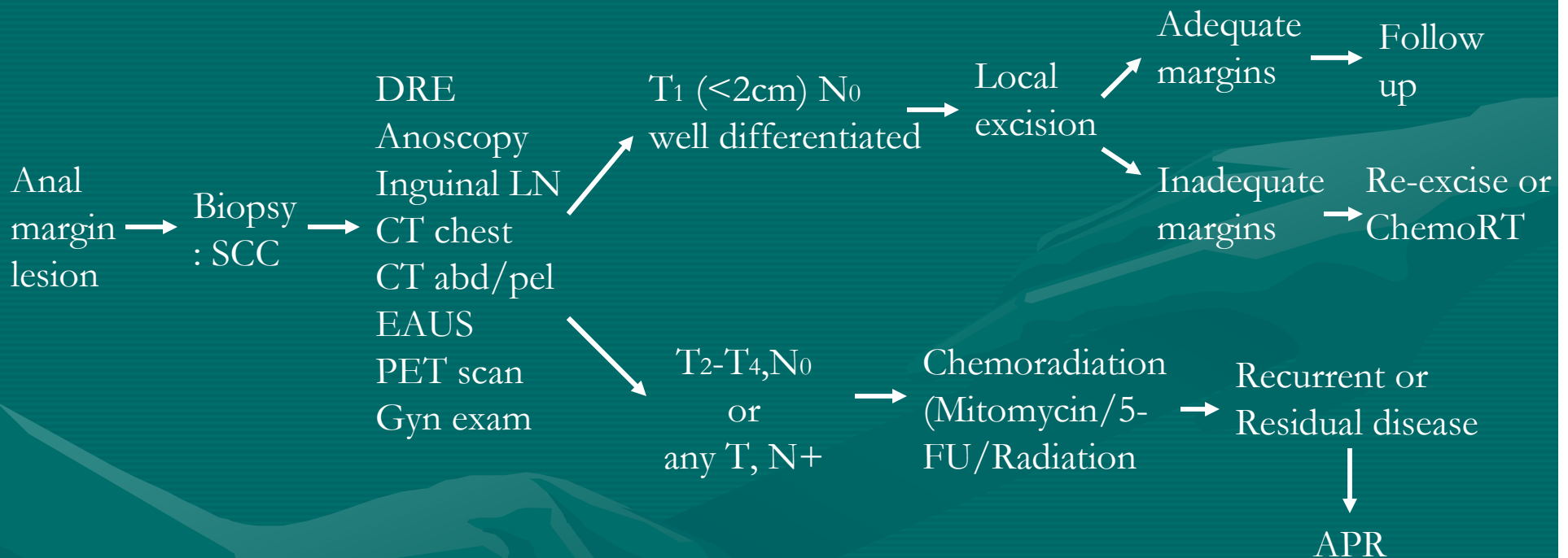
MANAGEMENT

CLINICAL PRESENTATION

WORK UP

TREATMENT

FOLLOW UP



REMEMBER:

Treatment for anal margin cancer is like skin cancer (wide excision vs chemoRT)

Local excision is with 1 cm margin

Include bilateral inguinal nodes for radiation.

Recurrent/residual disease in the groin requires groin dissection.

LARGE BOWEL OBSTRUCTION



LARGE BOWEL OBSTRUCTION

Differential Diagnosis

- Colon/rectal cancer – Most common cause in the U.S (85%)
- Volvulus – sigmoid volvulus, cecal volvulus
- Diverticulitis – may be the 2nd common cause in the U.S
- Hernia
- Fecal impaction

- Stricture (ischemic etiology or anastomotic stricture after colon resection)
- Ischemic bowel
- Intussusception
- Colonic pseudo-obstruction (Ogilvie's disease)
- Inflammatory bowel disease (UC, CD)
- Metastatic or extracolonic malignancy (extrinsic obstruction)
- Foreign body

Important

Note: It is extremely unlikely that colon obstruction would be due to adhesions

LARGE BOWEL OBSTRUCTION

Clinical Features

- The typical presenting complaints of LBO are
 - abdominal pain
 - abdominal distention
 - obstipation
 - vomiting - usually late and may be feculent
- Symptoms depend on the cause, onset, degree of obstruction, comorbidities
 - obstruction associated with a volvulus can develop rapidly
 - obstruction from cancer tends to be gradual, with altered bowel habits and weight loss

LARGE BOWEL OBSTRUCTION

Clinical Features

- Physical Exam

- Dehydration especially in advanced cases
- Abdominal distention, tenderness, altered bowel sounds
- **Significant fever or tachycardia - THINK of the possibility of gangrene and perforation**
- **Peritonitis - THINK of perforation/gangrene**
- Palpable abdominal mass may represent a tumor, an abscess, or distended bowel
- Look for abdominal scars and hernias
- Rectal exam to look for
 - an obstructing rectal mass
 - large volume of hard stool in the rectal vault consistent with fecal impaction



LARGE BOWEL OBSTRUCTION

Diagnostic Strategies

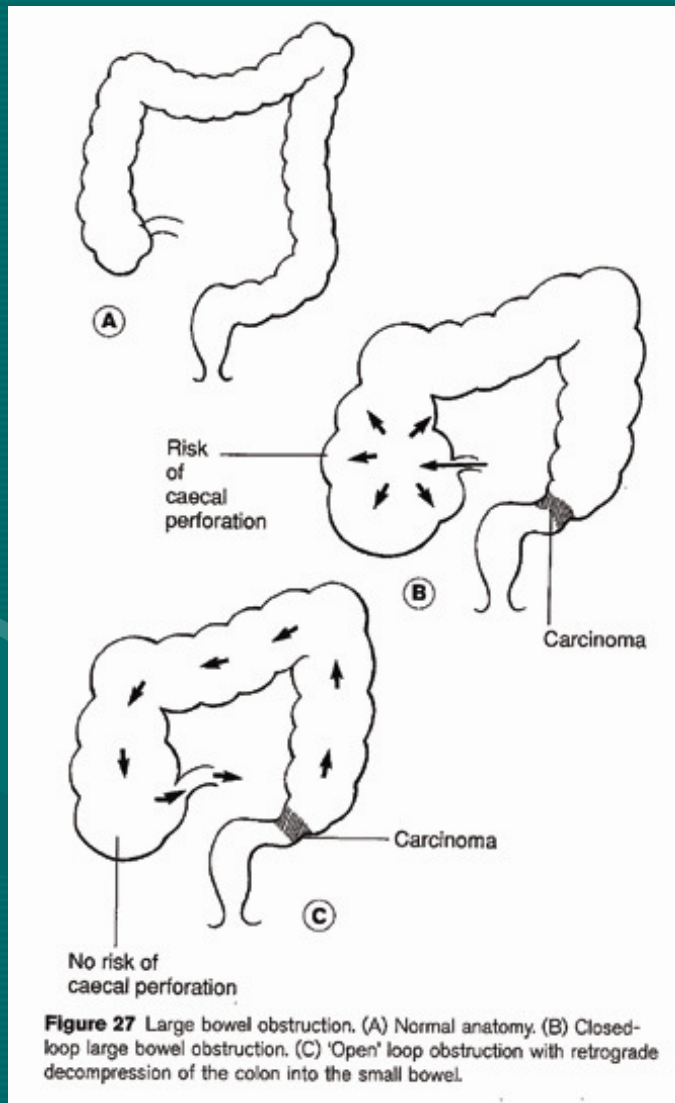
- A distended colon is the hallmark of LBO
- Small bowel may be distended as well if the ileocecal valve is incompetent
- Cecal diameters exceeding 12 cm are of concern because this finding is associated with a higher risk of perforation.
- The actual location and cause of the LBO is not usually evident on plain films.
- CT is good in determining the cause of the obstruction such as diverticular abscess or intussusception.
- CT is typically less helpful in pseudo-obstruction

Note the dilated colon with no air in the rectum, suggesting LBO



LARGE BOWEL OBSTRUCTION

Always look at the cecal diameter



- Obstructed colon progressively distends while small bowel continues to pour its contents through the IC valve
- If IC valve is incompetent
 - Retrograde decompression of colon occurs
- If IC valve is competent
 - Closed-loop obstruction occurs
 - Massive & rapid colonic distention occurs
 - Cecum, which is thin walled is likely to perforate

This is BAD

Laplace's Law:

$$Tension = \frac{Pressure \times Radius}{Thickness}$$

REMEMBER: Wherever the obstruction is in the large bowel, the cecum bears the maximal tension and is the area likely to perforate

LARGE BOWEL OBSTRUCTION

Management

- Fluid resuscitation and electrolyte replacement
- NPO, NG tube, Foley catheter
- Antibiotics if gangrene or perforation is suspected
- Do labs, radiology studies, EKG, etc...
- Proctoscopy or flexible sigmoidoscopy or colonoscopy as indicated
- **DONOT FORGET** other comorbid conditions

THE QUESTIONS AT THIS POINT ARE:

1. **WHAT IS THE ETIOLOGY OF THE LARGE BOWEL OBSTRUCTION ?**
2. **DOES HE/SHE NEED AN EMERGENT SURGERY ?**

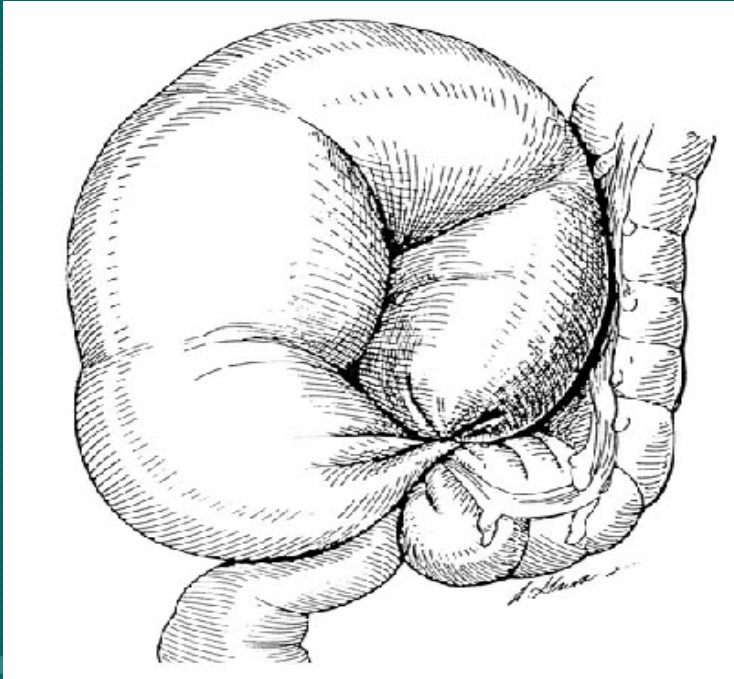
LARGE BOWEL OBSTRUCTION

Management

- Emergent surgery is indicated
 - in complete obstruction
- OR
 - if there is peritonitis, or ischemia or perforation
- Always get consent for a possible stoma
- Surgical options depend on
 - the cause and location of the obstruction
 - peritoneal contamination
 - condition of the proximal colon
 - concomitant disease
 - patient's status
 - surgeon's operative skills
- If emergent surgery is not indicated, admit and plan further line of action

LARGE BOWEL OBSTRUCTION

SIGMOID VOLVULUS



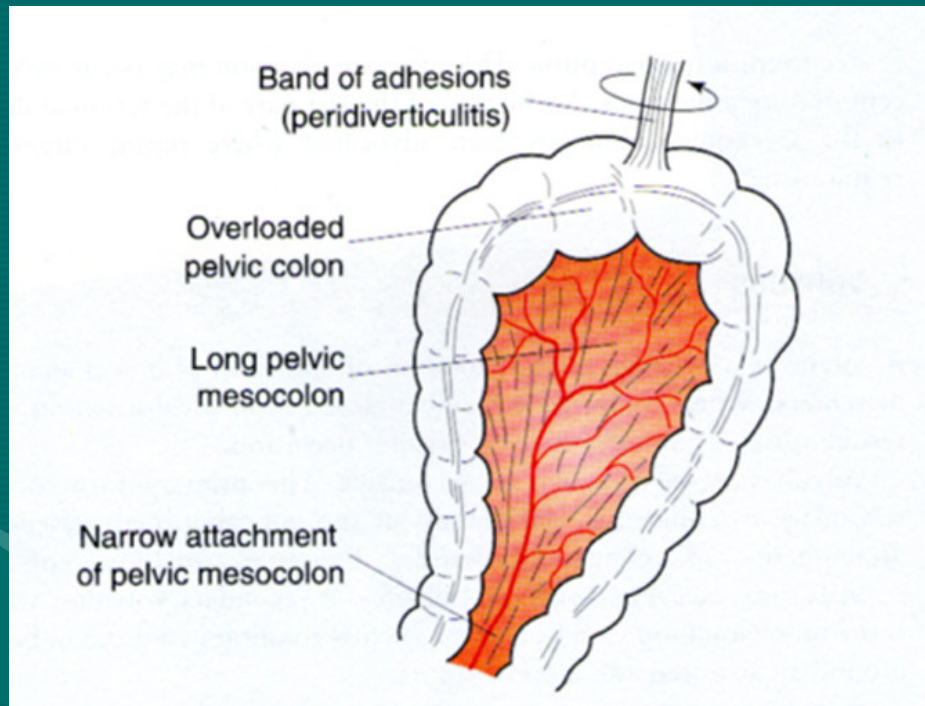
Sigmoid volvulus accounts for 65-75% of all cases of colonic volvulus

- The torsion occurs around the mesosigmoid
- The torsion leads to a partial or complete closed loop obstruction
- Increased incidence noted in
 - institutionalized patients
 - neuropsychiatric conditions
 - treated with psychotropic drugs
- possibly as a result of alterations in colonic motility
- Increased incidence in 3rd world
 - attributed to a high fiber diet

LARGE BOWEL OBSTRUCTION

SIGMOID VOLVULUS

Predisposing Factors



- Exact precipitator of an acute episode of volvulus is not clear.
- Chronic constipation has been associated with volvulus
- No association with prior surgery
- can be associated with ischemia caused by either
 - mural ischemia associated with increased tension of the distended bowel wall
 - arterial occlusion caused by torsion of the mesenteric arterial supply

LARGE BOWEL OBSTRUCTION

SIGMOID VOLVULUS

- may present as acute or subacute intestinal obstruction
- signs and symptoms indistinguishable from those caused by cancer of the distal colon
- usually a sudden onset of severe abdominal pain, vomiting, and obstipation
- abdomen is usually markedly distended and tympanitic
- NEEDS URGENT LAPAROTOMY

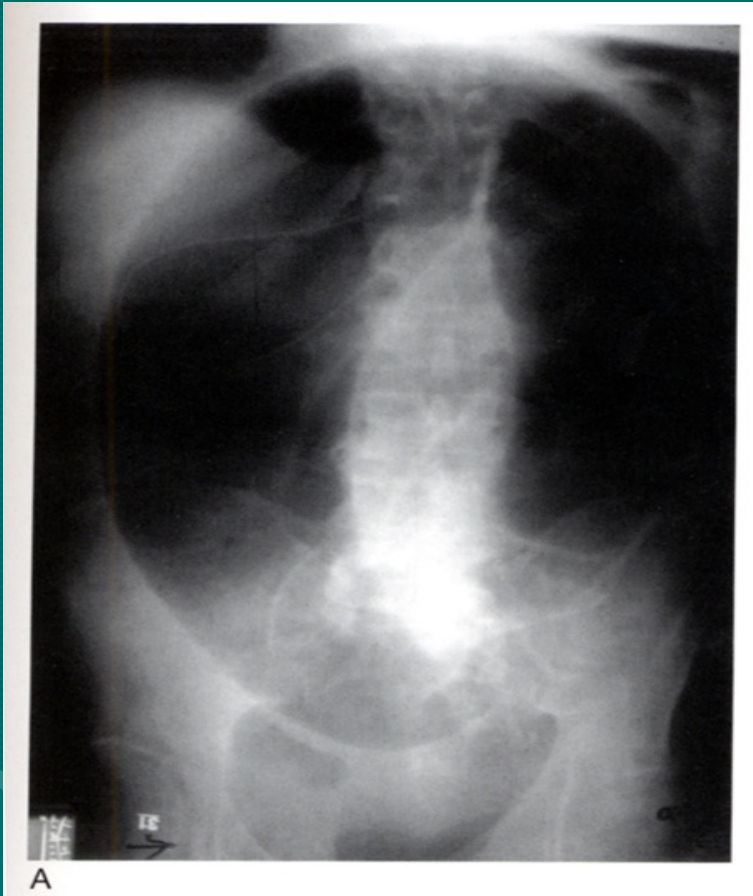


- Fever
- tachycardia
- peritonitis
- leukocytosis
- metabolic acidosis



suggest ischemia or perforation

SIGMOID VOLVULUS

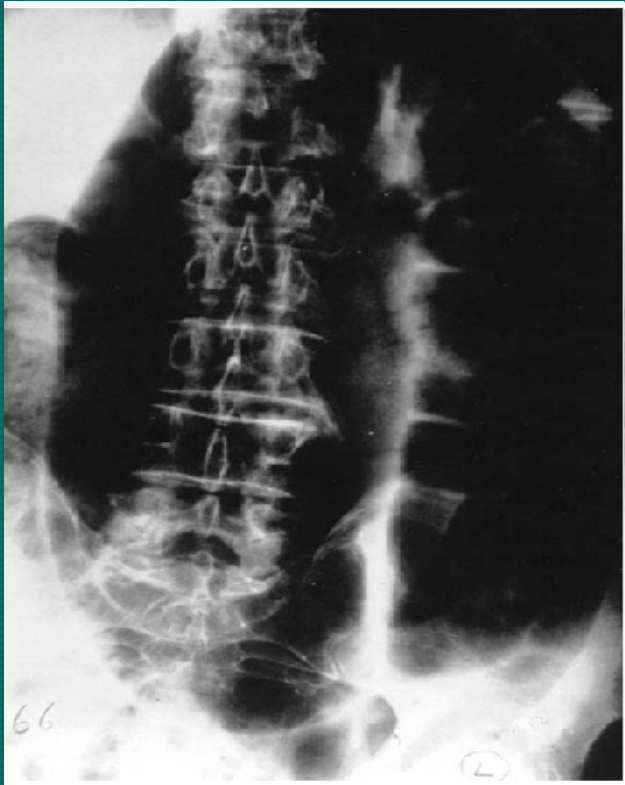


Abdominal radiographs usually reveal a markedly dilated colon lacking in haustral markings. On plain radiograph, a sigmoid volvulus may look like a "bent inner tube" or an "omega" or an "inverted U-shaped loop" with the convexity pointing to the right upper quadrant



Water soluble contrast enema showing 'bird beak' deformity at the point of obstruction

SIGMOID VOLVULUS



“Bent inner tube” or “Omega” or “Inverted U-shaped loop” on plain abdominal X-ray, THINK of SIGMOID VOLVULUS

Dilated colon with the convexity pointing to the right upper quadrant → SIGMOID VOLVULUS

“Bird beak” deformity on contrast enema → SIGMOID VOLVULUS

“Bird beak” deformity on Ba swallow → ACHALASIA CARDIA

LARGE BOWEL OBSTRUCTION

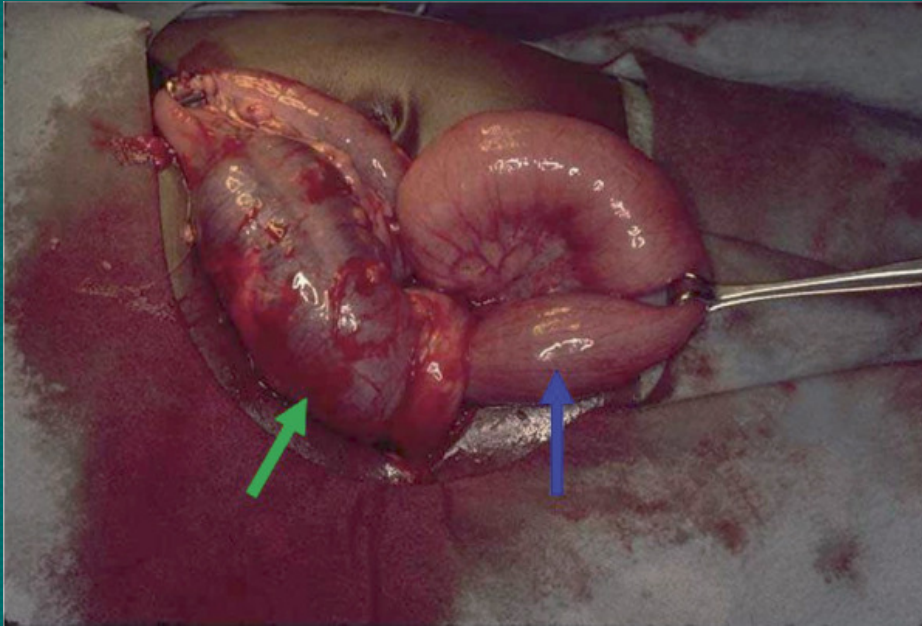
SIGMOID VOLVULUS

- Appropriate resuscitation
- If signs of ischemia are present
 - needs emergent laparotomy
- If no signs of ischemia,
 - attempt decompression with a proctoscope or flexible sigmoidoscope
- If decompression is unsuccessful
 - needs emergent laparotomy
- If decompression is successful,
 - place a rectal tube for 2-3 days
 - optimize the patient's clinical status
 - prep the bowel
 - do sigmoid resection on the same admission
- Recurrence rates after endoscopic decompression, but without surgery is as high as 90%



LARGE BOWEL OBSTRUCTION

INTUSSUSCEPTION



Intraoperative photograph of a patient with an ileocolic intussusception. The ileum (intussusceptum, *blue arrow*) is seen entering the ascending colon (intussuscipiens, *green arrow*).

- Intussusception is the telescoping of one portion of the intestine into the other and is the most common cause of intestinal obstruction in early childhood
- A lesion (“lead point”) changes the motility of the intestine and allows a proximal segment to invaginate into a more distal segment
- Blood supply can be compromised.
- Edema due to the intussusception leads to mechanical obstruction of the bowel

LARGE BOWEL OBSTRUCTION

INTUSSUSCEPTION

- Intussusception in adults is rare.
- 90% of adults with intussusception, has a pathologic lesion, serving as the 'lead point'.
- In the colon most of the lesions are malignancies.
- Intussusception in adults is often unsuspected
- Abdominal pain, vomiting, bleeding, and constipation.
- Abdomen may be distended, bowel sounds are often decreased.
- A mass is seldom palpated

LARGE BOWEL OBSTRUCTION

INTUSSUSCEPTION



Treatment is **ALWAYS surgical resection in adults** because there is a pathological lesion almost all the time.



Note the "bowel-within-bowel" appearance (arrow)

- Plain X-ray – intestinal obstruction
- CT/US may aid in diagnosis
 - appears as a “donut” or a “target”
- Ba enema
 - ‘claw sign’ *or* ‘meniscus sign’
 - only diagnostic, not therapeutic

COLONIC PSEUDO-OBSTRUCTION

- Pseudo-obstruction, also called *Ogilvie's syndrome*, is defined as LBO in which no obstructing lesion can be identified.
- Painless colonic dilation and abdominal distention
- With abdominal tenderness, think of ischemia/perforation
- Usually found in elderly patients with significant acute comorbid conditions (CHF, CVA, CAD, CLD, DM, etc...)
- Typically patients have a history of significant trauma, spine or retroperitoneal surgery, severe electrolyte disturbances, hypoxia, uremia, or narcotic exposure.
- Exact mechanism is unknown, thought to be due to sympathetic overactivity or interruption of parasympathetic activity

COLONIC PSEUDO-OBSTRUCTION

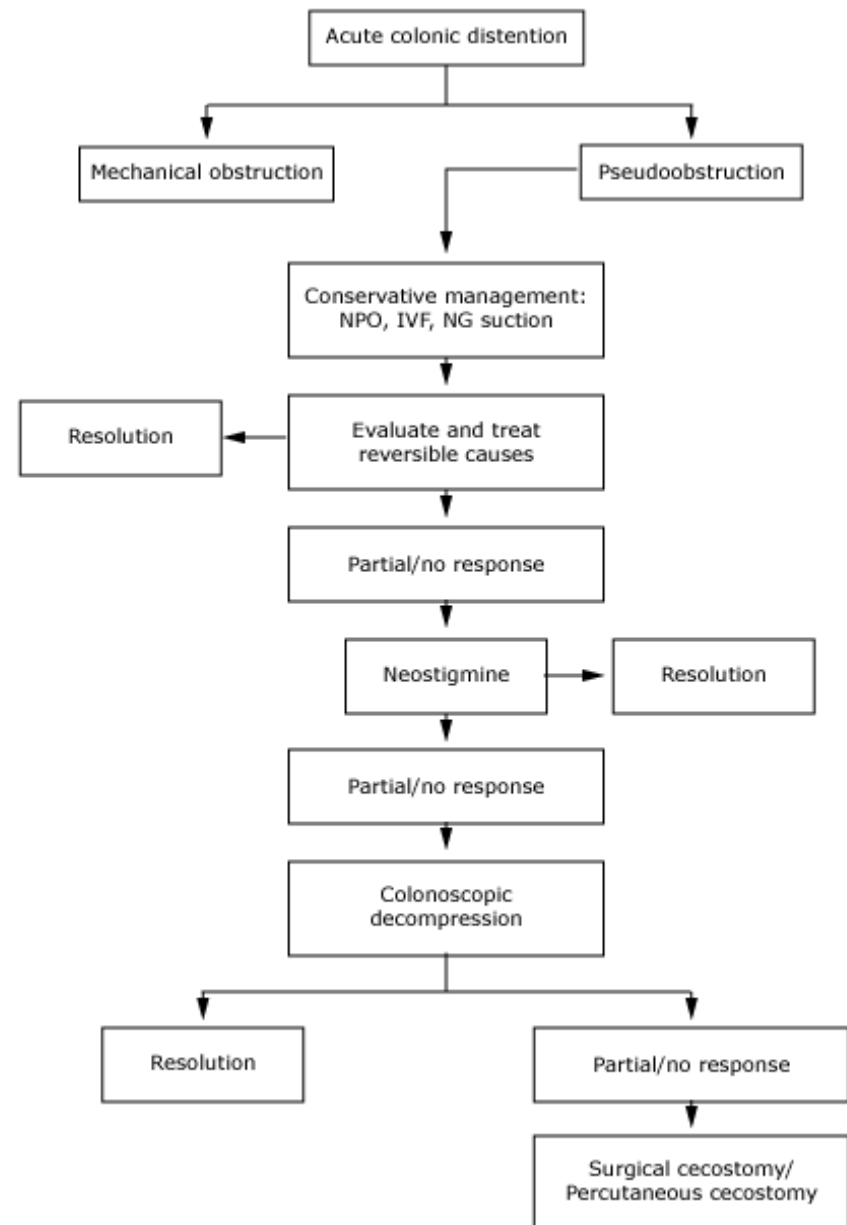
Management:

- ALWAYS rule out mechanical obstruction (gastrografin enema or colonoscopy)
- Plain X-ray of abdomen
 - colonic dilatation
 - look at the cecal diameter

Treatment:

- Supportive care and removal of possible precipitants
- Pharmacologic agents or gentle enemas may stimulate colonic motility
- Colonoscopic decompression
- Surgery
 - cecostomy
 - colon resection

IS A DIAGNOSIS OF EXCLUSION





INFLAMMATORY BOWEL DISEASE

Crohn's Disease & Ulcerative Colitis

CROHN'S DISEASE

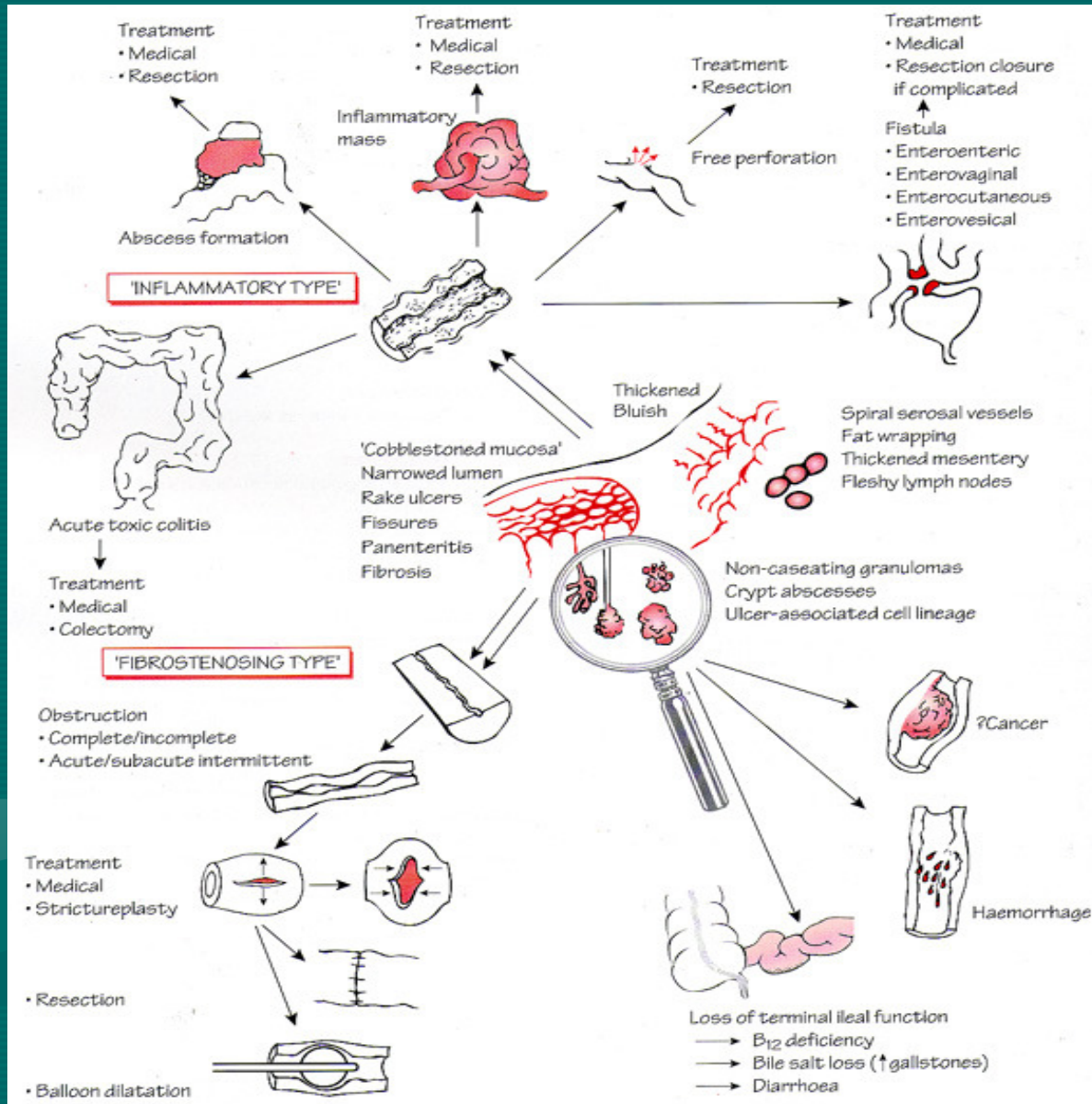
DEFINITIONS OF SEVERITY

- Mild to moderate disease :
 - Ambulatory patients able to tolerate an oral diet without dehydration, toxicity, abdominal tenderness, mass, or obstruction
- Moderate to severe disease :
 - Patients who have failed treatment for mild to moderate disease
 - patients with prominent symptoms such as fever, weight loss, abdominal pain and tenderness, intermittent nausea or vomiting, or anemia
- Severe-fulminant disease :
 - persisting symptoms despite treatment with steroids or immunomodulators
 - patients presenting with high fever, persistent vomiting, intestinal obstruction, rebound tenderness, cachexia, or an abscess
- Remission :
 - asymptomatic either spontaneously or after medical or surgical intervention.
 - patients requiring steroids to remain asymptomatic are not considered to be in remission

CROHN'S DISEASE

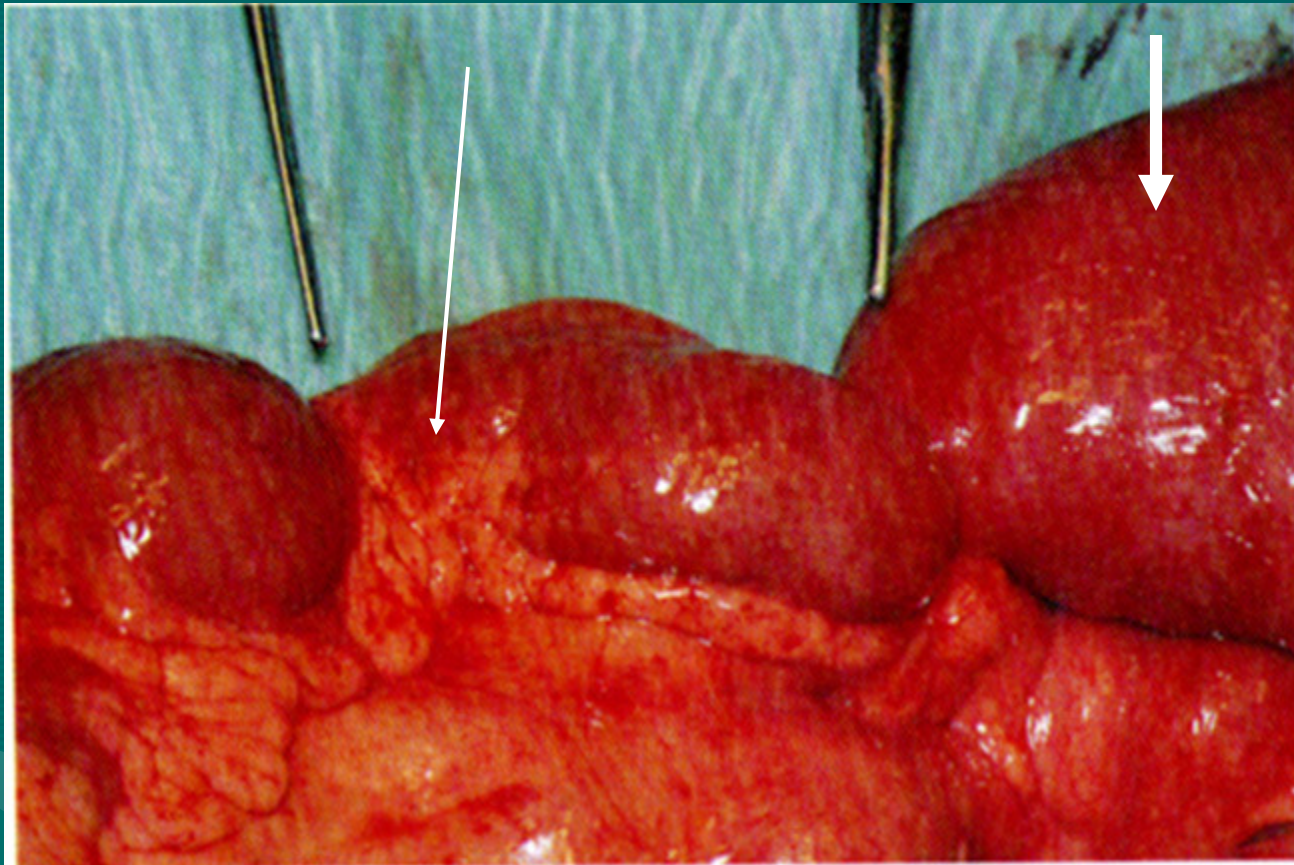
- Three principal patterns:
 - primarily inflammatory, which may evolve into either
 - primarily stenotic or obstructing
or
 - primarily penetrating or fistulizing
- These different clinical patterns dictate different therapeutic approaches.

CROHN'S DISEASE



CROHN'S DISEASE

Multiple small bowel strictures



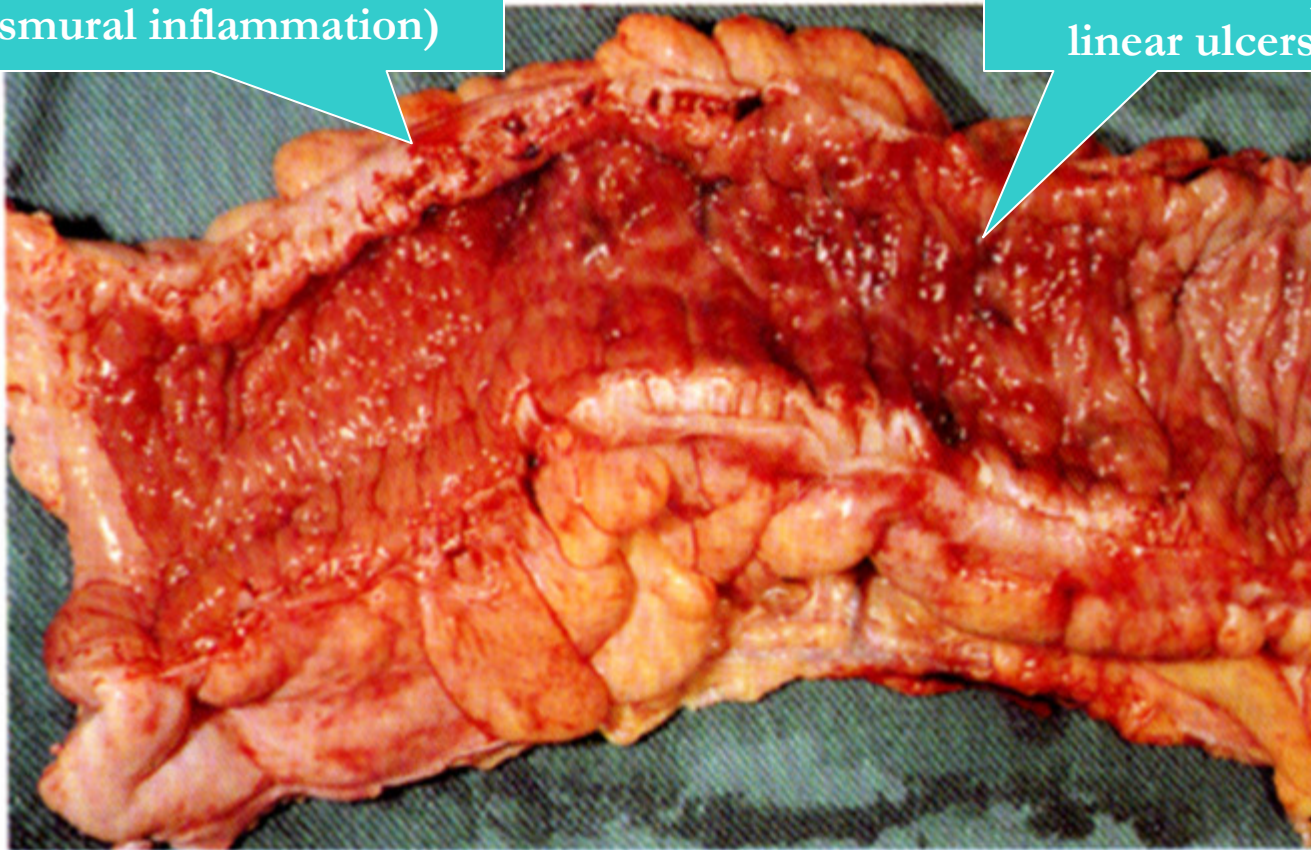
Thin arrow points to the 'creeping' fat (mesenteric fat creeping onto the bowel wall)

Bold arrow points to the dilated small bowel proximal to the stricture

CROHN'S COLITIS

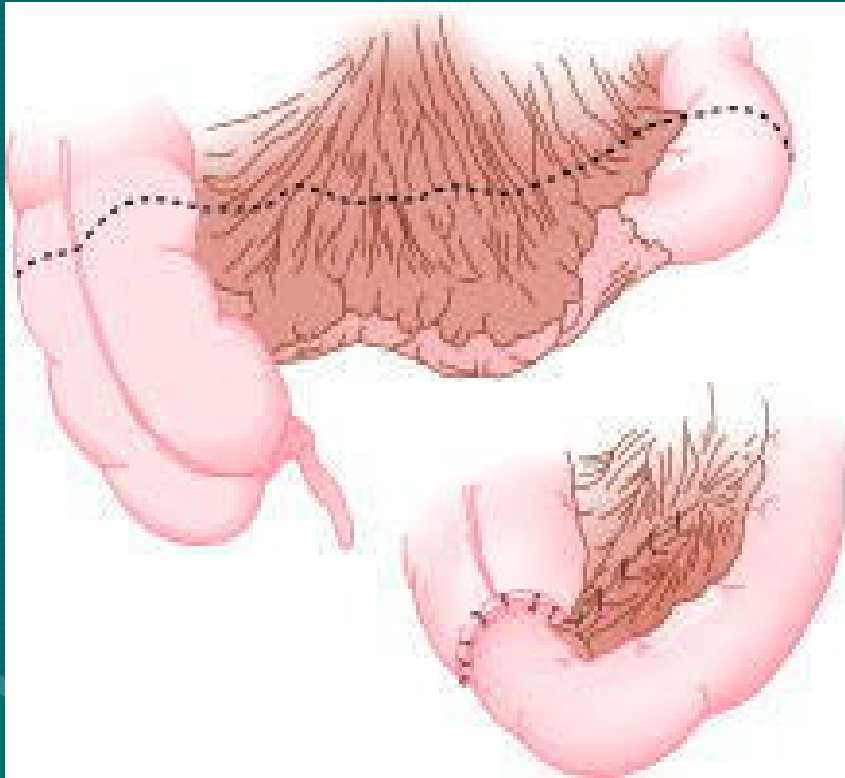
Note the thick bowel wall (due to transmural inflammation)

Note the deep linear ulcers

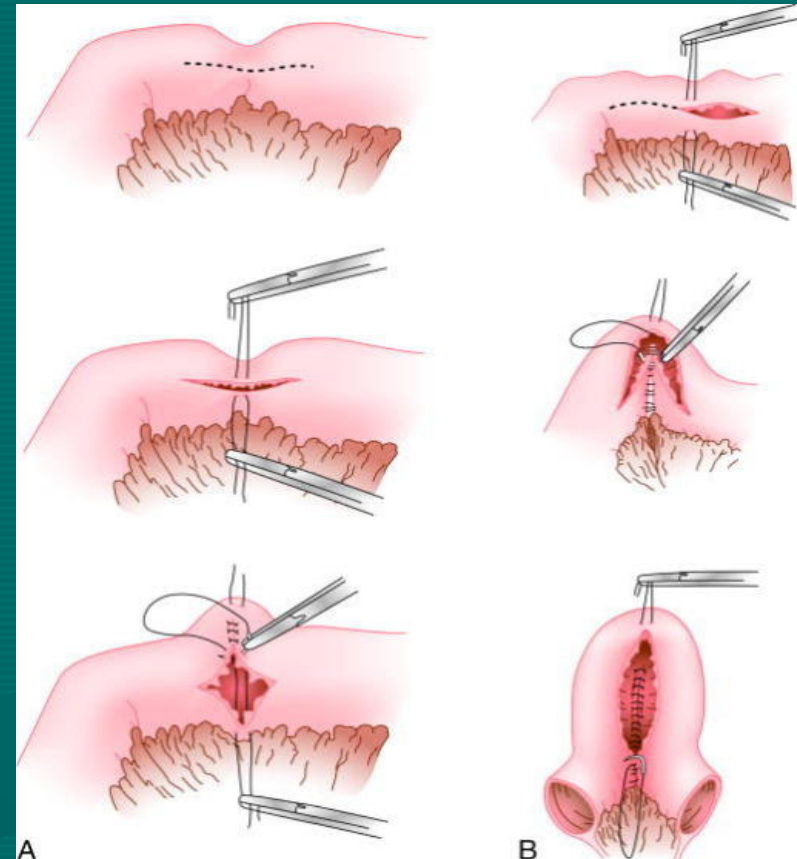


CROHN'S DISEASE

Ileocolic resection & Strictureplasties



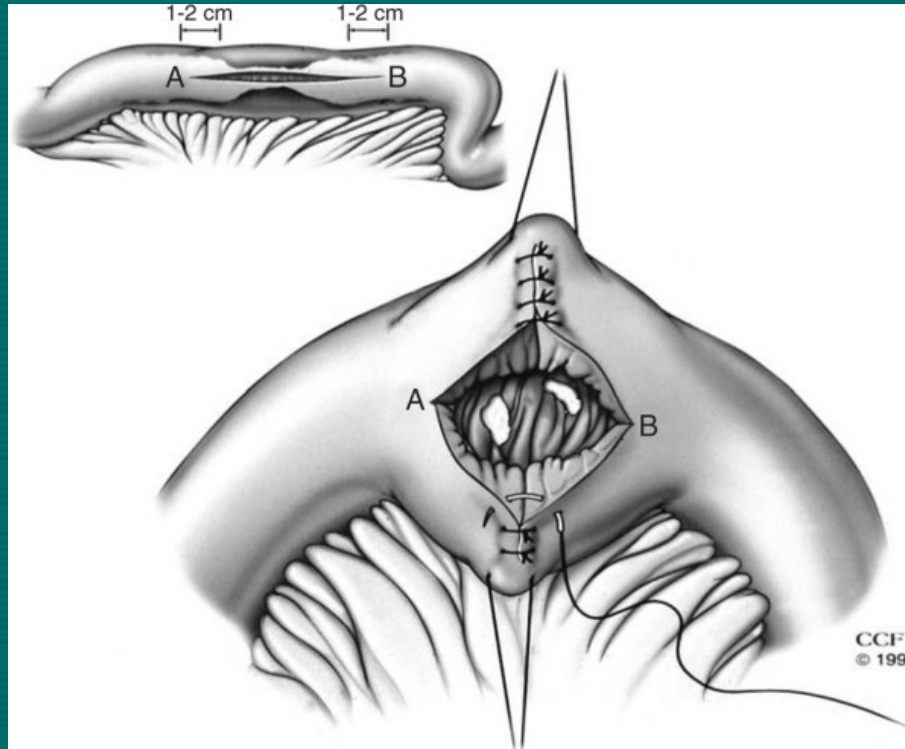
Ileocolic/Ileocecal resection – Resection of the terminal ileum, ileocecal valve, cecum, with/without ascending colon for Crohn's disease of the terminal ileum. Intestinal continuity is restored by end-to-end anastomosis.



- A.** Technique of short strictureplasty in the manner of a Heineke-Mikulicz pyloroplasty.
- B.** For longer strictures, strictureplasty may be performed in a manner similar to Finney pyloroplasty.

CROHN'S DISEASE

Stricturoplasty



- Stricturoplasty – open the stricture longitudinally and suture it transversely
- Stricturoplasty does not require bowel resection, thus preserves bowel length
- Multiple stricturoplasties can be performed unless the strictures are close to each other
- Do not do stricturoplasty in malignant strictures or if there is active infection in that area

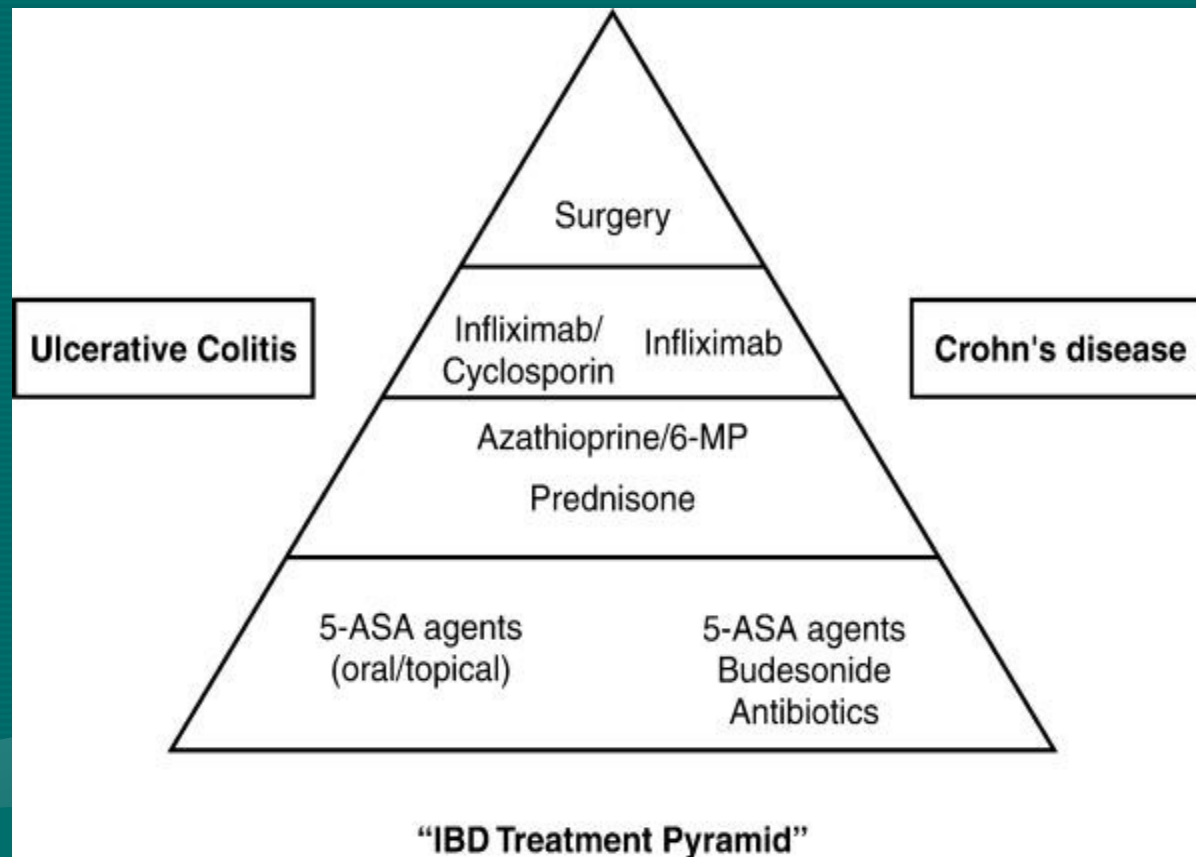
CROHN'S COLITIS



Linear ulceration of the mucosa, giving appearance of “**railroad track**” or “**bear claw ulcers**.”

INFLAMMATORY BOWEL DISEASE

Treatment Pyramid

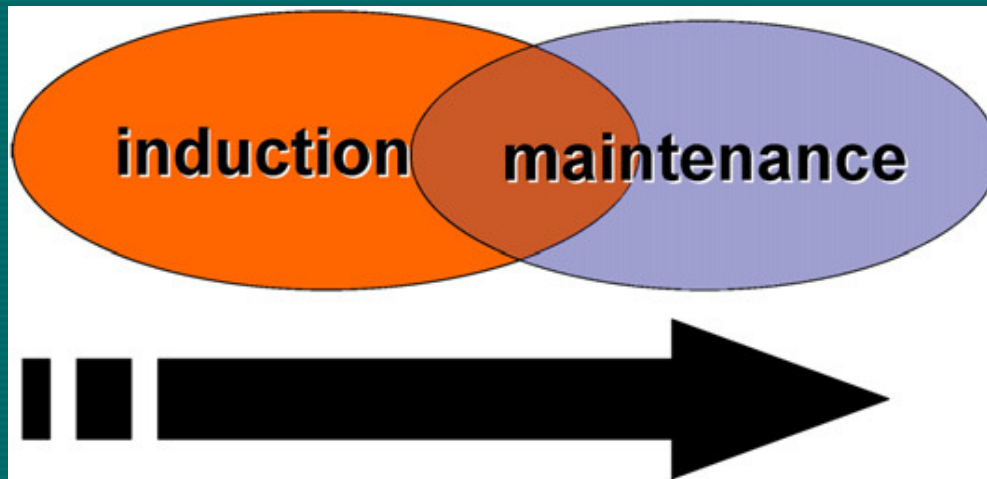


The broad treatment strategy is not much different for both UC & CD

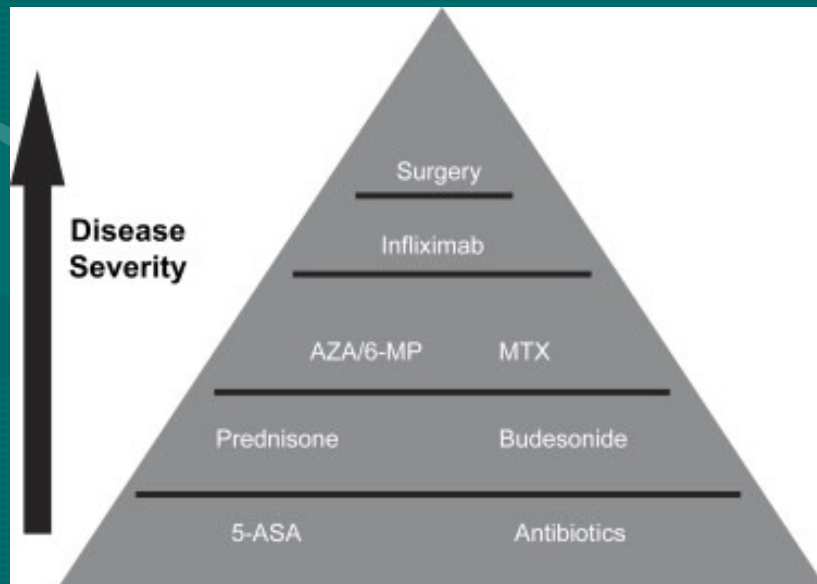
The goal of treatment in IBD: Remission, not cure

INFLAMMATORY BOWEL DISEASE

Treatment Strategy

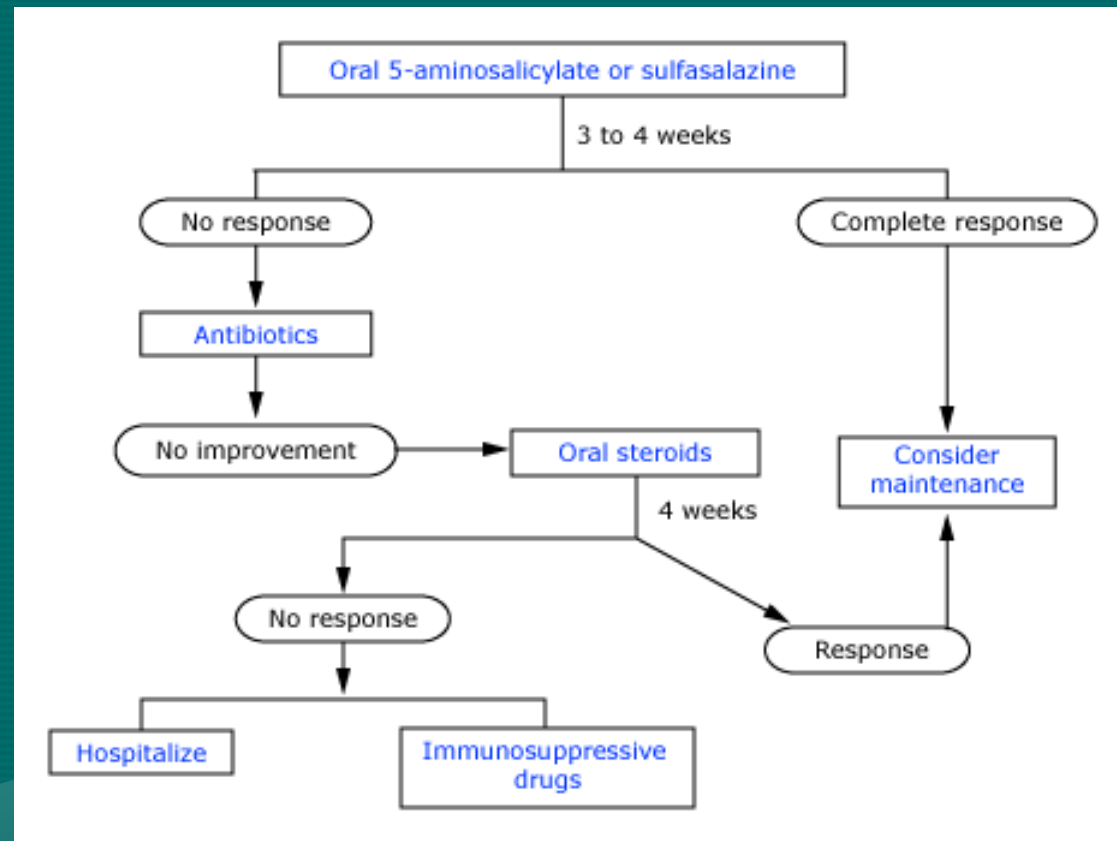


- Overlapping induction and maintenance therapy in IBD.
- Goal of IBD Therapy: Remission.



- Crohn's disease: traditional “step-up” therapeutic pyramid.

CROHN'S DISEASE



Overview of the medical therapy of Crohn's disease

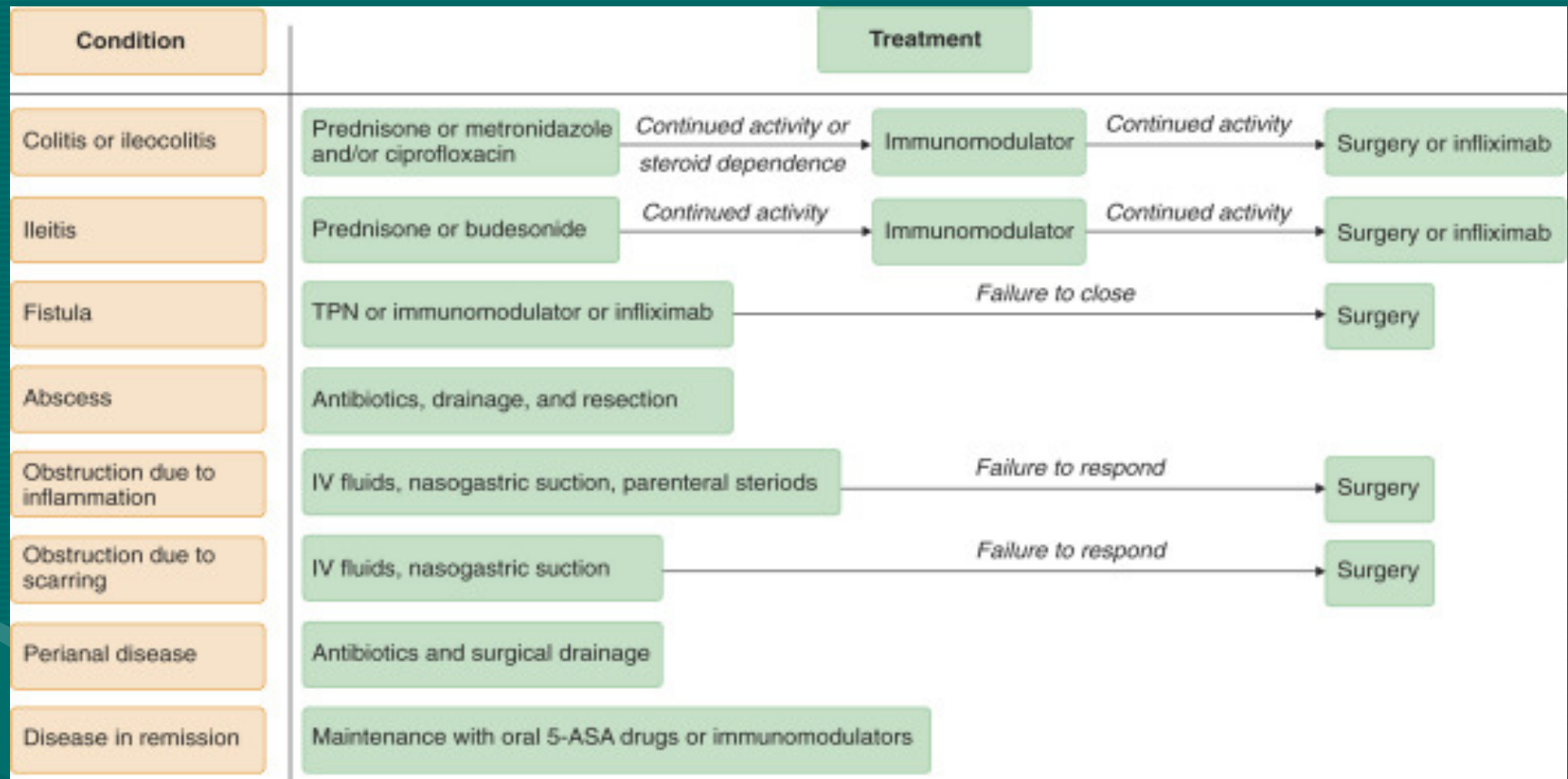
CROHN'S DISEASE

Surgery

- The most common indication for surgery is disease activity that has been intractable (which is hard to define) to medical therapy.
 - persistent/progression of symptoms despite adequate medical therapy
 - dependence upon high dose steroids to maintain remission
 - significant treatment-related complications and side effects
- Colitis/ileo-colitis/ileitis not responding to therapy
- Obstruction (eg: small bowel strictures)
- Unequivocal dysplasia in patients with long-standing colitis
- Suspicion of a malignant stricture
- Fistula not responding to medical therapy
- Toxic colitis/megacolon
- Intra-abdominal abscesses (which are most likely due to severe disease or 'walled off' perforation)
- Perianal disease (may require surgical drainage)

CROHN'S DISEASE

Treatment Algorithm



ASA = aminosalicylic acid IV = intravenous TPN = total parenteral nutrition.

PERIANAL CROHN'S DISEASE



Crohn's perineum with fistula in ano showing placement of multiple draining setons
– draining setons (*blue in color*) keep the fistula tracks open and prevents accumulation of pus

Note that these are draining setons (tied loosely) and not cutting setons

Cutting setons are sometimes used for the regular fistula-in-ano to cut through the fistula slowly (tied tightly to cut through the muscles over a period of time)

CROHN'S DISEASE

Keys to Surgery for Crohn's Disease

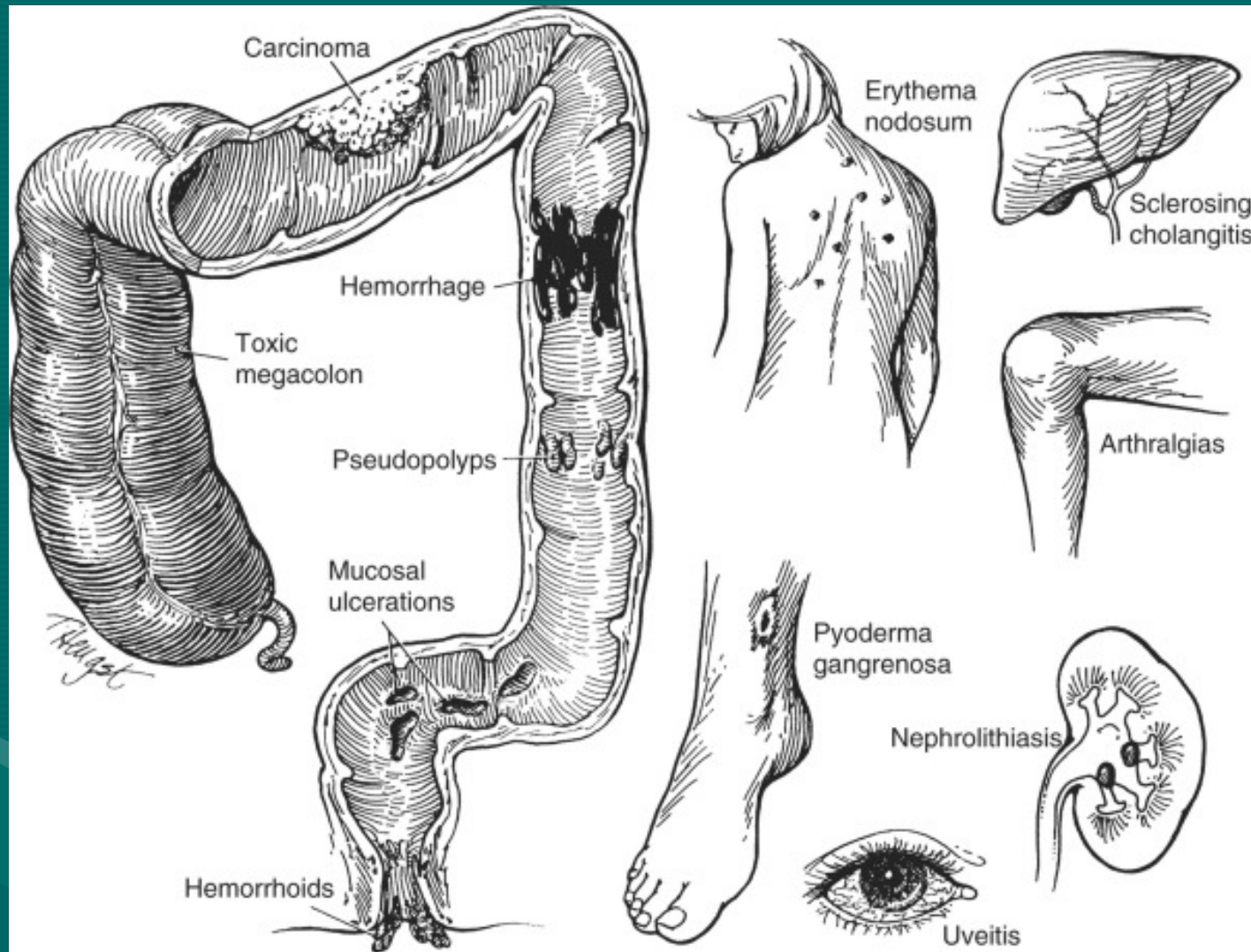
- Adequate medical management is essential before elective surgery.
- 75% of patients will need surgery, and 50% of them will have a recurrence after initial surgery.
- Laparoscopic surgery is most feasible for small bowel resection, ileocolic resection, and stoma procedures.
- Crohn's disease is incurable, but surgery, when necessary, can restore function and improve quality of life.
- Avoid resection of normal bowel - i.e. anastomosis should be between macroscopically normal bowel ends (not histologically normal bowel ends), because these patients may require bowel resection in future.
- Do stricturoplasty to preserve small bowel length.

ULCERATIVE COLITIS

Definitions

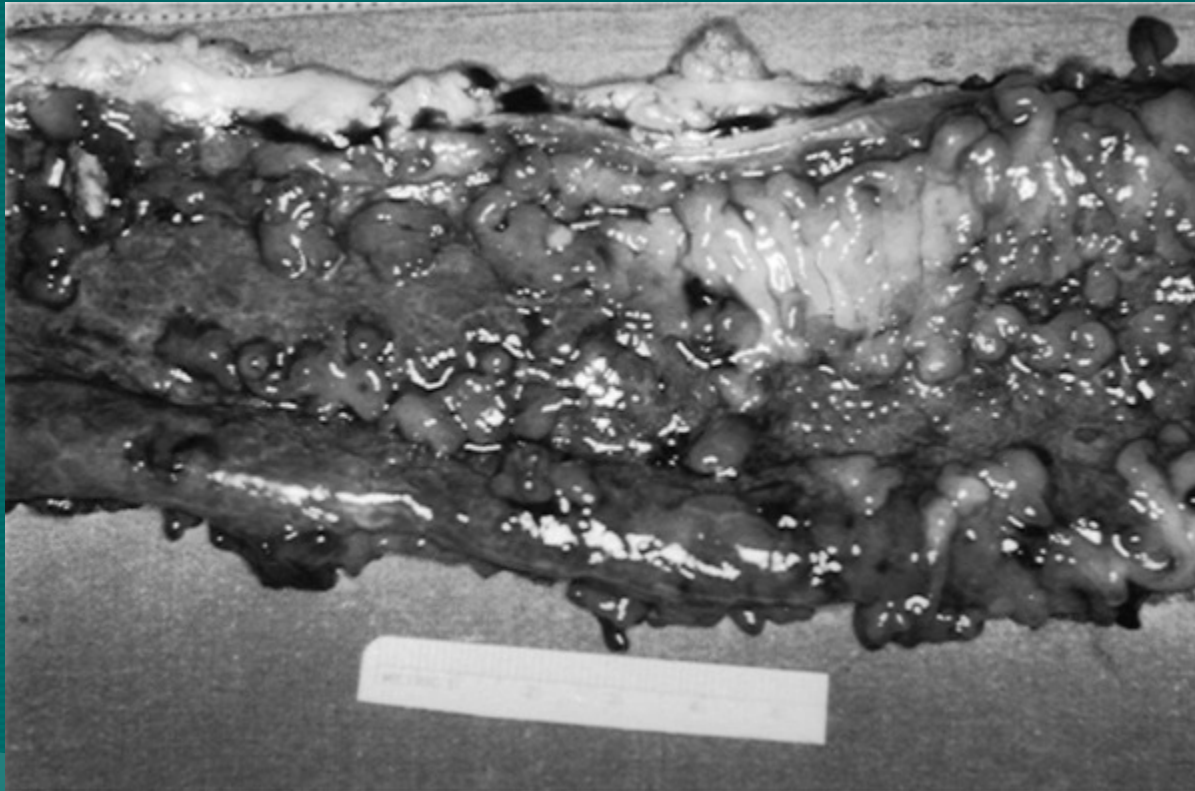
- Ulcerative proctitis refers to disease limited to the rectum.
- Distal colitis or proctosigmoiditis is used when the inflammatory process extends into the mid-sigmoid colon, usually reachable by the flexible sigmoidoscope.
- Left sided colitis for disease extending to but not beyond the splenic flexure
- Extensive colitis is defined as disease that extends beyond the splenic flexure but not as far as the cecum
- Pancolitis is used when the inflammatory process extends to the cecum

ULCERATIVE COLITIS



Manifestations of ulcerative colitis in the colon and rectum.
Extracolonic disorders occur in more than 60% of children with ulcerative colitis

ULCERATIVE COLITIS



- Open segment of the left colon from patient with chronic UC
 - Note the presence of large pseudopolyps and the absence of normal mucosal folds

ULCERATIVE COLITIS

Barium enema radiograph from a young girl with chronic ulcerative colitis.

Note the

- shortening of the colon
- loss of haustral markings,
- gives the colon a characteristic “lead-pipe” appearance.



ULCERATIVE COLITIS



A double-contrast barium enema in a patient with long-standing ulcerative colitis indicated by a marked loss of haustration (“lead-pipe” appearance).

The mucosa is finely granular throughout the colon, consistent with mildly active disease. The terminal ileum (*arrow*) is normal.

ULCERATIVE COLITIS

TOXIC MEGACOLON

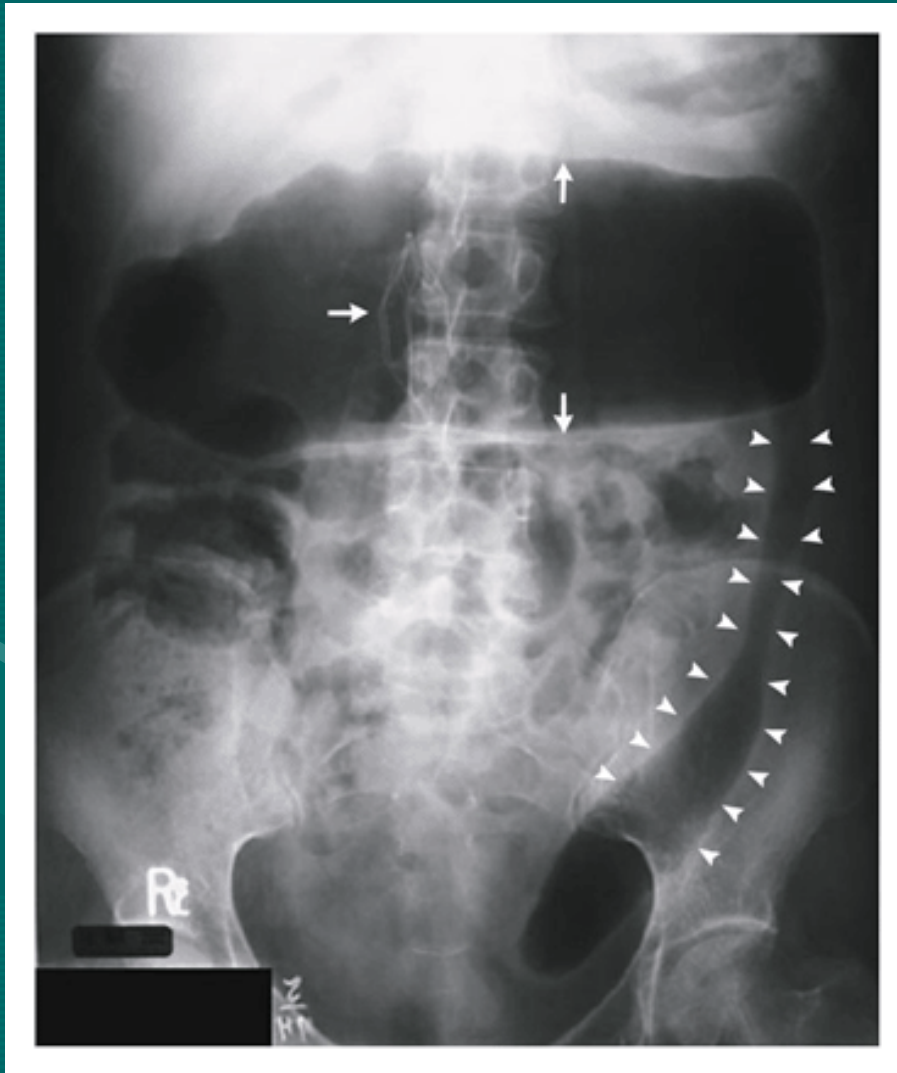
How do you diagnose toxic megacolon?

- Radiographic evidence of colonic distension
 - Transverse colon diameter of >6cm
- PLUS at least three of the following:
 - Fever >38°C
 - Heart rate >120 beats/min
 - Neutrophilic leukocytosis >10,500/microL
 - Anemia
- PLUS at least one of the following:
 - Dehydration
 - Altered sensorium
 - Electrolyte disturbances
 - Hypotension
- Clinically these patients have
 - > 10 bowel movements/day
 - continuous bleeding
 - increased transfusion requirements
 - hypoalbuminemia
 - abdominal distention
 - abdominal tenderness
 - signs of systemic sepsis
- Without any colonic distention, it is referred to as toxic (fulminant) colitis

THESE PATIENTS ARE VERY SICK & REQUIRE ICU CARE

ULCERATIVE COLITIS

TOXIC MEGACOLON



- Patient with history of ulcerative colitis presented with abdominal pain and bloody diarrhea.
- The abdominal examination revealed a distended and mildly tender abdomen with hypoactive bowel sounds.
- Plain films of the abdomen showed two characteristic features of ulcerative colitis
 - megacolon, with the transverse colon (normal diameter up to 6 cm) dilated to the height of 2.5 vertebrae (vertical arrows)
 - burned-out chronic colitis, with the left side of the colon showing foreshortening and a loss of haustra (arrowheads).

ULCERATIVE COLITIS

TOXIC MEGACOLON – Treatment

- Main goal is to reduce the severity of colitis in order to restore normal colonic motility and decrease the likelihood of perforation.
- Initial therapy is medical, may prevent surgery in up to 50%
- Surgical consult should be obtained at admission, and the patient should be evaluated daily by both the medical and surgical teams
- Medical treatment:
 - ICU care
 - NPO, IVF, correction of electrolytes, transfusion, AxR (for colon diameter)
 - IV steroids (mesalamine products are not useful at this time)
 - IV antibiotics
 - Frequent abdominal exams
- Surgery (subtotal colectomy with end ileostomy), if there is
 - free perforation, massive hemorrhage, increasing transfusion requirements, worsening signs of toxicity, and progression of colonic dilatation
 - no improvement in 48-72 hours

ULCERATIVE COLITIS

Treatment Algorithm

Condition	Treatment
Proctitis	5-ASA enemas or 5-ASA suppositories or oral 5-ASA drugs or corticosteroid enemas $\xrightarrow{\text{Continued activity}}$ Prednisone or immunomodulators $\xrightarrow{\text{Continued activity}}$ Colectomy
Mild to moderate pancolitis	Oral 5-ASA drugs $\xrightarrow{\text{Continued activity}}$ Prednisone $\xrightarrow{\text{Continued activity or Steroid dependence}}$ Immunomodulators or colectomy
Severe or fulminant pancolitis	Parenteral steroids $\xrightarrow{\text{Continued activity}}$ Cyclosporine or colectomy
Disease in remission	Maintenance with oral 5-ASA drugs

- Treatment algorithm for ulcerative colitis

ULCERATIVE COLITIS

INDICATIONS FOR SURGERY

Urgent Surgery

- Toxic megacolon
- Free colonic perforation
- Uncontrolled hemorrhage
- Fulminant ulcerative colitis

Elective Surgery

- Failure of medical management
- Intolerable side effects of medical therapy
- Development of dysplasia
- Evidence of carcinoma
- Colonic stricture
- Growth retardation in children

ULCERATIVE COLITIS

SURGICAL OPTIONS

Emergency Procedure

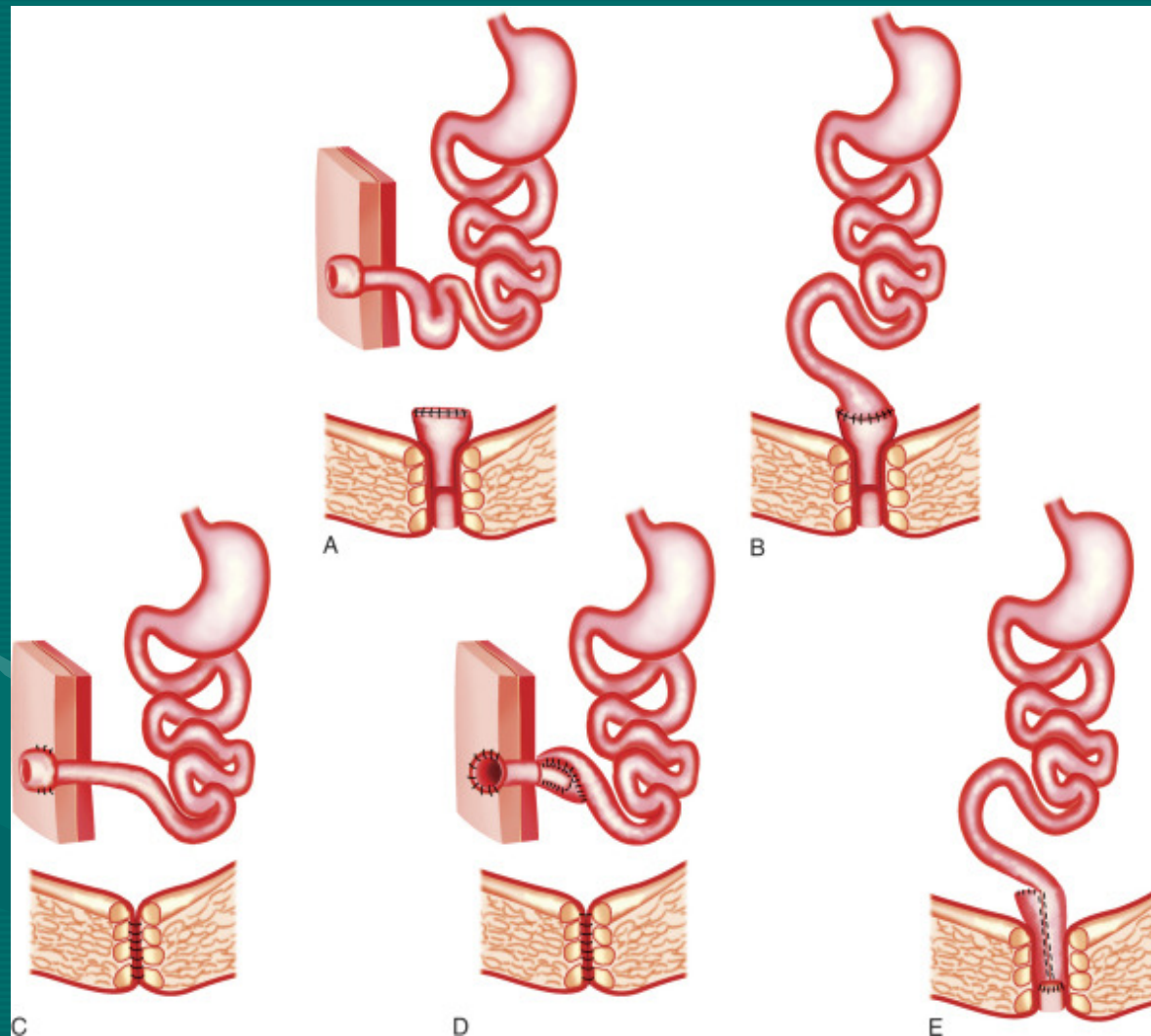
- Subtotal colectomy with end ileostomy
- Proctocolectomy with end ileostomy
- Loop ileostomy with colostomy (rarely done)

Elective Procedure

- Proctocolectomy with end ileostomy
- Subtotal colectomy with ileorectal anastomosis
- Proctocolectomy with Koch continent ileostomy (rarely done)
- Proctocolectomy with ileal pouch-anal anastomosis with or without diverting loop ileostomy

ULCERATIVE COLITIS

SURGICAL OPTIONS



A - Subtotal colectomy and a Hartmann pouch with end (Brooke) ileostomy

B - Subtotal colectomy with ileorectal anastomosis.

C - Total proctocolectomy with end (Brooke) ileostomy

D - Total proctocolectomy with continent ileostomy (Koch pouch)

E - Restorative proctocolectomy with ileal pouch anal anastomosis

CROHN'S COLITIS vs. ULCERATIVE COLITIS

	<u>Crohn's Colitis</u>	<u>Ulcerative Colitis</u>
Mucosal lesions	<p><i>Early:</i> <u>Aphthous ulcers</u> are common</p> <p><i>Late:</i> - “bear claw,” linear, <u>serpiginous</u> ulceration</p> <p>- <u>cobblestoning</u> is another feature</p>	<p>Microulcers are common</p> <p><u>Pseudopolyps</u> are more common</p>
Distribution	<p>- <u>discontinuous</u> and asymmetric</p> <p>- <u>skipped segments</u> with normal intervening mucosa</p>	<p>- <u>Continuous</u>, symmetric, and diffuse,</p> <p>- granularity or ulceration found</p> <p>- throughout the involved colon segments</p>
Rectum	Completely or relatively spared	Typically <u>involves the rectum</u> with proximal involvement to a variable extent
Ileum	<u>Often involved</u> ($\approx 75\%$ of CD)	Not involved, except as “backwash” ileitis
Inflammation	<u>Transmural</u>	<u>Mucosal</u> (submucosa may be involved)
Serosal findings	Marked erythema and <u>creeping fat</u> (the latter is virtually pathognomonic)	Absent, except in severe colitis or toxic megacolon

CROHN'S COLITIS vs. ULCERATIVE COLITIS

	<u>Crohn's Colitis</u>	<u>Ulcerative Colitis</u>
Perianal disease	<p><u>Prominent perianal findings</u></p> <ul style="list-style-type: none"> - large anal skin tags - deep fissures - complex perianal fistulas & abscesses 	Perianal findings are not prominent (any fissures or fistulas are uncomplicated)
Strictures	<u>Often present</u>	Rarely present; suggestive of adenocarcinoma
Fistulas	<u>Common</u> such as perianal, rectovaginal, enterocutaneous, enterovesicular, etc,...	Not present, except rarely for rectovaginal fistula
Granulomas	Present in 15-60% of patients (higher frequency in surgical specimens than in mucosal pinch biopsies)	Generally not present (microgranulomas may be associated with ruptured crypt abscesses)
Other histologic features	<ul style="list-style-type: none"> - Crypt abscesses may be present - Focally enhanced inflammation, often on a background of normal mucosa is a hallmark 	<ul style="list-style-type: none"> - <u>Crypt abscesses and ulcers</u> are the defining lesions - Ulceration on a background of inflamed mucosa
Malignant potential	Present, less than UC	Present, higher than CD

ULCERATIVE COLITIS

EXTRAINTESTINAL MANIFESTATIONS



- A. Erythema nodosum: characteristic red nodular areas on the shins
- B. Pyoderma gangrenosum: early lesion presents as a pustular and violaceous plaque with incipient breakdown
- C. Multiple active and healing lesions of pyoderma gangrenosum

DO THE
QUESTIONS

The background is a solid teal color. In the center, there is a faint, semi-transparent image of two hands shaking, rendered in a lighter shade of teal. The text "DO THE QUESTIONS" is centered over the image in a white, serif font with a thin black outline.

Diverticulitis

- Unusual presentation:
 - Lower extremity joint infection with enteric pathogens
 - Adnexal mass
 - Hepatic abscess with enteric pathogens
 - Colo-cutaneous fistula
 - Inflammation/necrosis of perineum & genitalia
 - Complex anal fistula
 - Suprlevator abscess
 - Fournier's gangrene
 - Subcutaneous emphysema of abd wall and flank/buttock

Diverticulitis

- Physical Exam:
 - Positive psoas sign & obturator signs can be present
 - Retroperitoneal and pelvic inflammation

Diverticulitis

- Role of endoscopy
 - Use extreme caution if acute diverticulitis is suspected
 - Danger of perforation and/or spread of infection
 - Less likely to get a complete colonoscopy
 - Only for urgent valid indication i.e diagnostic dilemma
- Role of Contrast enema
 - To evaluate the lumen if LBO is suspected
 - Possible stent placement
 - Needs a valid indication
 - NEVER do a barium enema

Diverticulitis

- At emergent laparotomy for acute diverticulitis, significant inflammation of the sigmoid colon and the surrounding areas are noted. No definite tissue planes can be identified. What do you want to do?
- At elective laparotomy for sigmoid resection for diverticulitis, significant inflammation of the sigmoid colon and the surrounding areas are noted. No definite tissue planes can be identified. What do you want to do?

Diverticulitis

- During Hartmann's take-down, identifying the rectal stump is difficult. What 'tricks' could have been employed while performing Hartmann's ?
 - Try to leave a long rectal stump (may be the distal sigmoid also, if not inflamed)
 - Avoid entering the presacral space
 - Try not to divide the superior rectal artery
 - Tack the rectal stump to the sacral promontory
- Essentially try to do a limited resection ('perforectomy')
- Remove the rest of the sigmoid during 2nd surgery

Diverticulitis

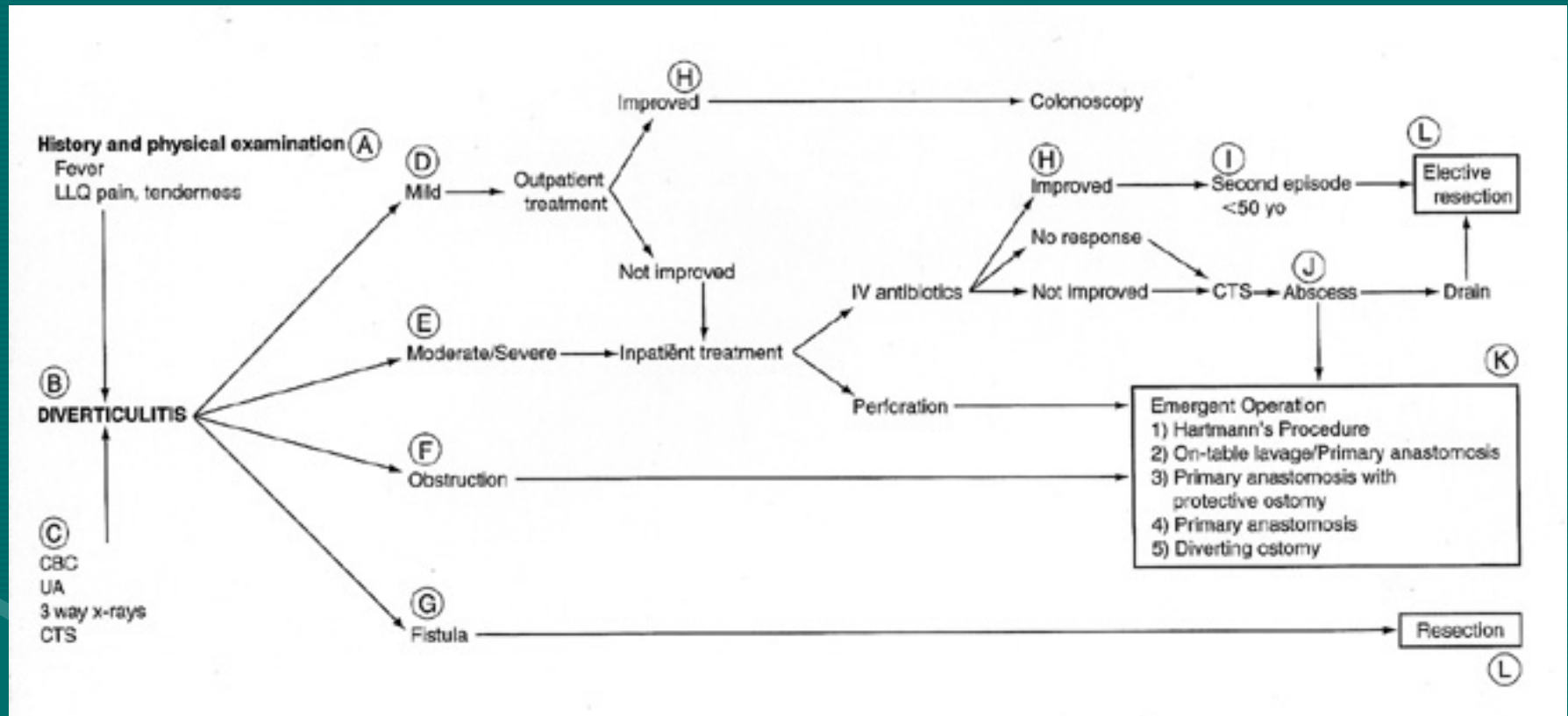
- Timing of elective surgery for complicated diverticulitis
- What should be the proximal level of resection?
- What should be the distal level of resection?
- How do you repair a colo-vesical fistula?
- Role of ureteric stents

Diverticulitis

- Role of primary anastomosis in an acute setting
- Management of left ureteric obstruction
- Management of anastomotic leak

DIVERTICULAR DISEASE

Management algorithm for diverticulitis



Addendum to the algorithm

- The emergency operation done is the Hartmann's procedure. The other choices are done only in selected patients.