

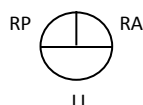
Anal Meds

- Irritation: Bougdrough's Butt Paste, A&D (Zinc Oxide), Calmoseptine (Zinc Oxide + Menthol)

Anal Structural Abnormalities

- **Hemorrhoids**

- Epidemiology
 - Prevalence: 4% of the population
- Definition
 - Hemorrhoids are actually normal vascular cushions and are thought to contribute to anal continence, protect the sphincter during defecation and operate as plugs for the anus at rest → they become a dz when symptoms develop b/c of enlargement, prolapse, etc
 - Three Locations (based on pt laying on left lateral decubitus position): (1) Left Lateral, (2) Right Posterior, (3) Right Anterior



- Internal Hemorrhoids
 - Location: proximal to dentate line covered by columnar mucosa
 - S/S: (1) persistent elevation of venous blood pressure 2/2 constipation, straining, prolonged sitting on the toilet even without straining, pregnancy, portal HTN, obesity (2) weakened supporting structure 2/2 aging, etc → engorgement and prolapse occurs → painless (b/c visceral innervation but 20% have concomitant anal fissures) bleeding (bright red blood (b/c it is presinusoidal arterial) on toilet paper, blood dripping into toilet bowl, bloating streaking the outside of stool), feeling of fullness following a BM
 - Tx (only if symptomatic otherwise leave them alone) Goligher Grading System
 - Grade I (no prolapse): dietary/lifestyle changes
 - stool softeners
 - high fiber/fluid diet to avoid straining
 - avoid meds that promote bleeding
 - avoid sitting on toilet for long period of time
 - topical steroid/analgesic agents are questionably effective but often tried
 - OTC (steroids/stringents)
 - Preparation H (1% hydrocortisone cream)
 - Tronolane (1% pramoxine)
 - Tucks (1% hydrocortisone cream / 1% pramoxine / mineral oil and zinc oxide)
 - Rx (steroid/analgesic combo)
 - Analpram HC (1,2.5% hydrocortisone / 1% pramoxine cream apply Q6hrs)
 - AnaMantle HC (0.5,2.5% hydrocortisone / 3% lidocaine cream apply Q12hrs)
 - Proctosol HC (2.5% hydrocortisone cream apply Q8hrs)
 - Grade II (prolapse thru anus during straining and reduce spontaneously after BM) and Grade III (prolapse thru anus at any time and reduce only manually): non-operative Tx which are designed to (1) decrease vascularity, (2) reduce redundant tissue, (3) fix hemorrhoid to wall to minimize prolapse
 - **Cryotherapy** (freeze IH destroying it, rarely used b/c of the foul-smelling discharge that resulted from tissue necrosis)
 - **Infrared Photocoagulation** (infrared radiation of IH causes coagulation and subsequent fibrosis, 50% effective)
 - **Sclerosis** (inject arachis oil into submucosa above the IH to create fibrosis which then tacks down the IH preventing prolapse, risk of pain and infection, 75% effective)
 - **Rubber Band Ligation (RBL)** www.crhsystem.com (get trained by CRH System (once trained you will be listed on their website), 75% effective)
 - Pre: do colonoscopy (if pt had a colonoscopy then do a out-pt proctoscopy) to get an idea of what hemorrhoids look like and location, hold AC/AP, assess for latex allergy, do NOT do in pts w/ portal HTN, pregnant or coagulopathic or thrombosed hemorrhoids or fissure
 - Procedure: have pt lay on L lateral decubitus, load one rubber band, generously lube the entire system, do rectal exam and find hemorrhoid, place a pea size amount of 0.125% nitroglycerine ointment, use speculum with handle towards hemorrhoid, pull out internal piece to visualize the

hemorrhoids, then place banding device (if doing it blind then pull back until groove is at dentate line which will bring tip to ~2cm above dentate line) and angle system only SLIGHTLY towards hemorrhoid (only aim slightly b/c it will pick up the most prominent tissue, if you angle deeply you may get too much tissue), suck up and hold for 15seconds and ask pt if there is sharp pain (if sharp then too low), if pressure only then place band, feel for band and "polyp" to make sure there is enough tissue and there is no muscular or surrounding tissue entrapment and that the neck is narrow, if lots of tissue or pain after band then roll it up or off, watch pt in office for 15min, give pt the handout that comes with the packet, tell pt that banding leads to necrosis and sloughing at 4-7d (generally pts will not feel band come off) and the hemorrhoid site scars over

- Avoid perineum direction b/c of parasympathetic plexus
- In the next two weeks have pt use nitroglycerin 0.125% ointment TID (consider steroid suppository at home x2wks to decrease inflammation)
- Repeat 2wks later for 2nd band and then 2wks later for 3rd band
- Complications
 - Bleeding: there will be some bleeding (tx w/ rest and ice compress) but if bad bleed (tx w/ rebanding or silver nitrate) but if overt hemorrhage is uncommon (unless they fall off prematurely and if it occurs then place a large caliber foley in rectum to tamponade and then inject epi at bleeding site or place suture)
 - Dull Pain: manage w/ Tylenol and Sitz Bath but if bad then nitroglycerin ointment
 - Vasovagal Response
 - Sepsis
 - Urinary Retention
 - Anal Stenosis

Post: come back at 2wk intervals b/c there are three separate plexi (only do one at a time), avoid constipation by increasing fiber in your diet, suppositories, enema, fingers, prolonged sitting, straining on toilet

- Refractory to Above Tx, Thrombosed, Concurrent EH, Grade IV (prolapse thru anus and cannot be reduced): operative Tx designed to remove the IH

- **Lord's Procedure aka Internal Sphincterotomy and Manual Dilation of Anus** (no longer b/c not very effective and high risk of incontinence)
- **Stapled Hemorrhoidopexy aka Procedure for Prolapsing Hemorrhoids** (performed by CRS, high rate of pain, 75% effective)
- **Excisional Hemorrhoidectomy** (performed by CRS, high rate of pain, 85% effective)

- External Hemorrhoids (actually uncommon, most people misinterpret prolapsed internal for external)

- Location: distal to dentate line covered by squamous anoderm
- S/S: " " painful inflamed thrombus (b/c somatic innervation) → redundant skin tags (from previous episodes of inflammation) which are generally asymptomatic but may be irritated during wiping and subsequently cause pruritus
- Tx

- Thrombosed EH
 - Early (acute pain): surgical enucleation of thrombus followed by excision of hemorrhoid followed by closure via secondary intention by CRS
 - Late (subsiding pain): conservative Tx w/ Sitz baths, analgesics, relax sphincter (nifedipine 0.2% cream or nitroglycerine compounded 0.125%/xylocaine 5% compounded ointment use "pea-size" PR BID-TID dispense 90mL, use glove, if headaches w/ nitroglycerin then use nifedipine)
- Skin Tag
 - always rule out Crohn's esp if multiple and unusual looking!!!
 - reassurance
 - proper anal hygiene (delicate washing)
 - avoid excision

- **Fecal Incontinence**

- Definition

- Must be differentiated from anal discharge of blood, mucus, pus AND diarrhea (but can make it worse)
- Often is not reported by pts b/c of embarrassment, seen in 50% nursing home population
- Urinary incontinence? How frequent? Incontinent during sleep? How much warning time does the pt have? Can defecation be deferred for any amount of time? Is pt aware the incontinence has occurred?

- Subtypes: (1) passive aka unawareness (suggest IAS problem from degeneration or autonomic damage), (2) urge aka awareness (suggests EAS problem from trauma), (3) fecal seepage, (4) overflow (seen in children, institutionalized, demented), (5) decreased reservoir (seen in IBD, Radiation, Surgery)
- RFs: women, elderly, immobility, poor health

			Neurogenic	
	IAS Weakness	EAS Trauma	Peripheral	Central
Resting P	↓	NL	NL	NL
Squeeze P	NL	↓	↓	↓
PRM	NL	NL	↓	↓
Sensation	NL	NL	NL	↓

PRM = puborectalis muscle

- Etiology (rarely is it just one problem b/c to have incontinence multiple abnormalities must exist b/c of redundancy of protective mechanisms)
 - Anatomy affecting Nerve/Muscle: 1° obstetric (episiotomy, forceps use, LBW), surgical (hemorrhoidectomy, fissurectomy, fistulectomy), prolapsed internal hemorrhoids, rectal prolapse, anal cancer, trauma, radiation, chronic inflammation from Crohn's
 - Nerve: CNS (dementia, CVA, MS, spinal cord injury, etc) vs PNS (DM, trauma, etc)
 - Muscle: MG, ischemia, etc
 - Children/Institutionalized-Elderly/Psychosis/Dementia: encoporesis w/ megarectum aka overflow incontinence
- Dx
 - Anal Manometry (measure pressures at rest/squeeze)
 - Rectal Balloon Manometry (measure rectal sensation, compliance, inhibitory reflex, contraction)
 - Electromyography (test muscle)
 - Nerve Conduction Studies (test nerve)
 - Imaging (visually assess anatomy)
 - Defecography (assess rectoanal angle / perineal descent / puborectalis fxn, barium is inject into rectum, pt sits on commode, side camera captures images as pt defecates)
 - Anal Endosonography, MRI (asses sphincter anatomy)
 - Functional Tests (assess fxn by having pt try to maintain continence against a reproducible stress)
- Tx
 - 1st:
 - treat underlying diarrhea if present
 - treating underlying problem if possible
 - schedule defecation at intervals (30min post meals to capturing gastro-colic reflex give glycerine suppositories which pulls water into rectum distending it or bisacodyl suppositories)
 - colonic irrigation
 - cotton plug
 - bulking agents b/c easier to hold onto firm vs liquid stool
 - antimotility agents if diarrhea esp on a prn basis for going out to prevent gastrocolic reflex
 - continence aids
 - skin care
 - book ("Keeping Control: Understanding and Overcoming Fecal Incontinence")
 - hygiene (use baby wipes then Sitzs baths, blow drier, calmoseptine moisture barrier)
 - 2nd: biofeedback
 - 3rd: other
 - sacral nerve stimulating device place by Dr. Jacobson
 - 4th: surgery
 - Sphincteroplasty (take out scar tissue and then reapproximate muscle) if altered anatomy 2/2 trauma
 - Total Pelvic Floor Repair aka Postanal Repair (puborectalis, isciococcygeus, and iliococcygeus are sutured together and the levator and sphincter are plicated) if neuropathic dz
 - Gracilis Transposition (gracilis is freed from its insertion at knee and swung around sphincter) if muscle is so bad that you can do a sphincteroplasty
 - Artificial Anal Sphincter (place a hydraulic ring around anus connected to a manual pump)
 - Anal Encirclement aka Thiersch Procedure (place mesh around anus)
 - Perianal Fat/Collagen/Polymer Injection
 - anal injection of Dextranomer in Stabilized Hyaluronic Acid (Dx NASHA)
 - Radiofrequency aka Secca Procedure (tightens collagen)
 - Fecal Diversion w/ Colostomy
- Anal Stenosis
 - Etiology: anal surgery, trauma, radiation, chronic fissures, CD, chronic diarrhea, TB, syphilis, cancer
 - Tx: mild aka finger can be passed (higher fiber/liquid diet, pt directed gradual dilation in the shower using a dilator), mod aka finger can be passed but force is needed (endoscopic dilation), severe aka finger cannot be passed (surgical dilation)

- **Rectal Prolapse**
 - RFs: women, long term intussusception, pt at mental institution, hysterectomies, elderly
 - S/S: protrusion of rectum thru anus during defecation resulting in constipation, bleeding, pain
 - Tx: lap rectopexy
- **Congenital Anomalies**
 - Associations: Male Sex, Down's Syndrome, Other Anomalies (CV, Pulm, CNS, MS, GI, GU)
 - Anorectal Agenesis aka Imperforate Anus, Atresia/Stenosis, Ano-Cutaneous/Urethral/Vesical/Vaginal Fistulas, Persistent Cloaca (rectum/vagina/urethra are fused into a single common channel that opens in to one perineal orifice)

Anal Pain

- **Thrombosed EH (refer)**
- **Anal Abscess/Fistula (refer)**
- **Foreign Body (refer)**
- **Fecal Impaction (refer)**
- **GU (Prostatitis, Endometriosis et al) (refer)**
- **Anal Cancer (refer)**
- **Anal Fissure**
 - Definition: longitudinal cut in the anoderm from anal verge extending to the dentate line
 - Etiology
 - Post (90%)/Ant (10%) 2/2 passage of hard stool or severe diarrhea w/ concurrent ischemic injury (AS OPPOSED TO FISTULAS)
 - Lateral (rare) 2/2 systemic process usually CD, TB, Leukemia, HIV, Syphilis, SCC, et al
 - S/S: razor like pain during defecation and lasting a few hours afterwards w/ occasional mild bleeding (NB spreading cheeks causes pain as does a DRE therefore try to use lidocaine jelly)
 - Morphology
 - Acute: superficial tear
 - Chronic: triad (1) distal sentinel pile skin tag, (2) fissure w/ fibrosed borders, (3) proximal hypertrophic papilla
 - Complication: anal stenosis



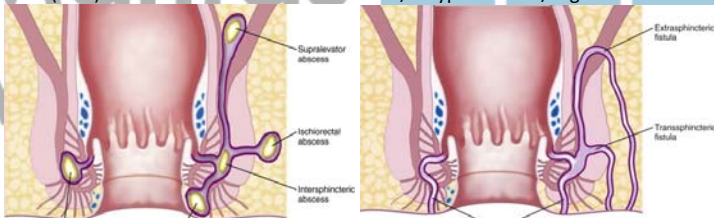
- Px/Tx (chronic fissures always need more than 1st line Tx)
 - 1st stool softeners, increased fiber/fluids, topical mineral oil, sitz baths, perianal analgesic creams
 - 2nd Nitroglycerine Ointment (0.13% pea size drop into anal canal using finger tip 360 degrees BID x6 wks then QD x6wks) to relax sphincter and promotes blood flow to help healing
 - SEs
 - Mild: headache, lightheadedness, flushing, dizziness, nervousness, nausea, vomiting
 - Tx: dilute pea size with Vaseline
 - Severe: fainting, palpitations, paleness, sweating, seizures, pain, blurred vision, dry mouth, dark urine, blue lips/nails/skin, rash, trouble breathing
 - Tx: stop treatment and seek medical attention
 - Contraindications: allergy to nitrates, severe anemia, hypotension, CHF, recent heart attack, increased brain pressure, exposure to nitrates at work, ED meds (eg. sildenafil, tadalafil, vardenafil), weight loss meds, migraine meds (eg. ergotamine)
 - Store at room temp and keep away from light and moisture
 - NB heart patients use 2% ointment
 - 3rd BoTox Injection by CRS to relax sphincter
 - 4th Lateral Internal Sphincterotomy (LIS) but risk of incontinence
- **Coccygodynia**
 - Mech: painful coccyx 2/2 trauma/arthritis
 - Sx: pain reproduced on manipulation of coccyx during DRE
 - Tx: sitz baths, NSAIDs, stool softeners → steroid injections → surgical removal of coccyx
- **Levator Ani Syndrome (often confused w/ proctalgia fugax)**
 - Pt: young adult female
 - Mech: spasm of levator muscles

- Sx: prolonged episodic (>20min/episode) chronic vague aching sensation high in the rectum worse after defecation and while sitting with relief from walking or lying down, NB PEX is generally normal except for occasional levator muscle tightness and tenderness
- Tx: reassurance, sitz baths, NSAIDs, pain modifiers, relax sphincter (refer to hemorrhoids), muscle relaxants, levator muscle massage
- **Proctalgia Fugax (often confused w/ levator ani syndrome)**
 - Pt: young adult men w/ other functional bowel disease
 - Mech: dysfunction of anal smooth muscle triggered by a stressful event
 - Sx: brief episodic (seconds-minutes/episode) chronic sharp stabbing pain
 - Tx: similar to levator ani syndrome, but b/c short acute episodes also try hot packs, oral diltiazem/clonidine

Anal Mass

- **Hemorrhoid (refer)**
- **Condyloma Acuminatum aka Warts (refer to STD notes)**
- **Anal Cancer**
 - Types (SCC and its variants represent 80% of anal cancers, AC represents 15%)
 - Above Dentate Line
 - 1° Cloacogenic aka Transitional Cell Carcinoma (essentially a variant of SCC)
 - Other: Paget's Dz to Adenocarcinoma (15%), Epidermoid Carcinoma, Amelanotic Melanoma, et al
 - Below Dentate Line
 - 1° Bowen's Dz to CIS to SCC
 - Other: BCC, et al
 - S/S: painful bleeding mass (NB 20% have no Sx)
 - Epidemiology: 1% of GI cancers
 - RFs: HPV, HIV, anal sex, immunocompromised, smoking tobacco
 - Mets: usually lymphatically to inguinal LNs and rarely hematogenously to liver/lung/bone
 - Dx: anoscopy w/ EUS followed by CT-P
 - Tx: surgery ± radiation ± chemo (5FU + cisplatin)

Anal Infection

- **Anal Fistula/Abscess**
 - Mechanism: anal crypt infection → anal gland infection → intersphincteric abscess → perianal (50%) / ischiorectal (40%) / supralevator (10%) abscess → chronic fistula-in-ano b/t crypt and skin/vagina
- 
- Etiology
 - Anterior/Single/Simple/Straight: just happens (AS OPPOSED TO FISSURES) "A for fistula"
 - Posterior/Multiple/Complex/Curved: CD, Radiation, Leukemia, TB, Actinomycosis
 - S/S: drainage and pain (unlike fissure it is present all the time) and other typical abscess Sx, sometimes if deep the overlying skin actually appears normal
 - Dx: probe, methylene blue dye, US, MRI, EUS
 - Tx
 - Abscess: I&D + Abx
 - Fistula: marsupialization aka fistulotomy, seton placement, fibrin/collagen plug, advancement flap, et al (performed by CRS)
- **Pilonidal Disease**
 - Pt: young adult
 - Mech: hair in the gluteal cleft drills into skin → foreign body reaction creating a few sinuses opening several centimeters cephalad to the anus (often confused w/ fistula-in-ano) → infection/abscess
 - Tx: marsupialization, shave hair monthly for prevention
 - **Hidradenitis Suppurativa (refer to dermatology notes)**
 - **Bartholin's Gland Abscess (refer to GU notes)**

Pruritus Ani

- **Idiopathic (75%)**
 - General Tx
 - Basic
 - avoid irritants (moisture, fecal matter, soaps, lotions, creams, powders, baby wipes, witch hazel)

- avoid trauma (scratching, dry toilet paper, vigorous scrubbing in shower)
- What you can do: moist toilet paper to blot skin, Sitz Baths, wear night gloves to decrease itching, keep dry and cool w/ cool hair drier, loose fitting underwear, cotton ball w/ cornstarch, avoid diarrhea
- First Line Tx: nighttime antihistamine, 4x4 w/ baby powder during the day, short term topical lotrisone
- Refractory Tx: rule out secondary causes, dermo-epidermo jxn injection of methylene blue (destroys nerve endings, risk of skin necrosis)
- **Infection**
 - **Bacteria: Strept, Staph, Corynebacterium (Erythrasma)**
 - **Fungi: Candida, Dermatophytes**
 - **STDs: HSV, Syphilis, Gonorrhea, HPV**
 - **Parasites: Scabies, Lice, Enterobiasis vermicularis "Pinworm"** (world-wide, seen in school children and their family, F→O transmission, larva develop in colon and migrate to perianal region where they deposit eggs causing peri-anal itching at night, Complication: vulvovaginitis, Dx: "adhesive tape test" at morning grabs eggs, Tx: Mebendazole or Albendazole to pt and family)
- **Chronic Colorectal Dz: External Hemorrhoid, Fissure, Fistula, Diarrhea**
- **Derm: Lichen Simplex Chronicus** (sequela of chronic scratching), **Lichen Sclerosis et Atrophicus aka Linchenification Psoriasis, Lichen Planus, Contact Dermatitis, Atopic Dermatitis, Seborrheic Dermatitis**
- **Cancer: Paget's & Bowen's Dz**
- **Meds: Colchicine, Quinidine, Mineral Oil**
- **Systemic Dz: DM, Leukemia & Lymphoma, Obstructive Jaundice, Hyperthyroidism, Vitamin Deficiency (thiamine, A, D)**
- **Diet: 1° Caffeine** (very important but mechanism unclear), **2° Dairy, Citrus, Beer, Tomato, Nuts, Chocolate, Spices**

Motility

	Acute	Chronic
SB	SBO/AIPO~PI	CIPO
LB	LBO/ACPO~O	Constipation

	Obstruction	Pseudo-Obstruction
Def	<ul style="list-style-type: none"> • acute mechanical obstruction of SI or LI lumen by either extrinsic/intrinsic process 	<ul style="list-style-type: none"> • acute disorganized (ACPO) or loss of (AIPO) intestinal peristalsis in the absence of mechanical obstruction due to disruption of the complex normal neurohormonal control of the gut resulting in acute dilation
S/S (all depends on degree, duration and presence of complications specifically ischemia) <ul style="list-style-type: none"> • fluid accumulates b/c there is increased secretion and decreased absorption for some reason and this results in hypovolemia • gas accumulates from SIBO and swallowed air • SIBO leads to bacterial translocation and sepsis 	<ul style="list-style-type: none"> • More Sick and Faster S/S • Increased BS (rushes/tinkles aka Borborygmi that correspond w/ pain below separated by intervals of quietness) then completely Decreased BS as muscles fatigue • Severe Ab Pain (initially paroxysmal severe visceral crampy/colicky pain at ~5min intervals for SI and less Hz for LI but as the obstruction continues the bowel fatigues and pain subsides until there is a complication at which point one has an acute abdomen) NB pts are surprisingly not very tender until a complication occurs • N/V (more SI dz, bilious, feculent b/c of SIBO) and distension/constipation/obstipation (more LI dz) 	<ul style="list-style-type: none"> • Less Sick and Slower S/S • Decreased BS the entire time • Mild Ab Pain (dull, diffuse) • N/V (more SI dz, bilious, feculent b/c of SIBO) and distension/constipation/obstipation (more LI dz)
Ab Obstructive Series (CXR, supine, upright or L lat decub if can't stand) <ul style="list-style-type: none"> • SI: smaller caliber, center of ab, complete partitions created by valvulae conniventes, normally minimal air, decompressed colon if true obstruction if not then consider LBO or ileus 	<ul style="list-style-type: none"> • Proximal: multiple dilated bowel loops on supine, air-fluid levels on upright, string of pearls on supine • Distal: cut off point w/ distal absence of air 	<ul style="list-style-type: none"> • Diffuse (all the way to anus): dilated bowel loops, NO air fluid levels

<ul style="list-style-type: none"> LI: larger caliber, perimeter of ab, incomplete partitions created by haustral folds, normally a little air Strangulation, etc: seen as free air under diaphragm in CXR, air outlining falciform ligament and subhepatic air on supine, portal vein gas seen as branching gas in peripheral liver (vs pneumobilia which is more central) 		
CT <ul style="list-style-type: none"> SI LI Strangulation, etc: bowel wall thickening w/ rings of varying attenuation creating a "target/halo sign", pneumatosis intestinalis linearis, porto-mesenteric venous gas, pneumoperitoneum, hazy mesentery, mesenteric vessel engorgement, high density Ascites (NB decreasing wall enhancement is the most important sign for worsening ischemia) NB barium fluoroscopic studies are good for atypical signs w/ mild Sx 	<ul style="list-style-type: none"> Proximal bowel dilation w/ discrete transition zone aka "beak sign" w/ distal bowel collapse w/o passage of contrast Small bowel shows "feces sign" Mesentery shows "whirl sign" as mesentery is tightly twisted around obstruction if volvulus 	

Small/Large Bowel Obstruction (S/LBO)

- Etiology
 - Small Intestine
 - Intrinsic
 - Congenital Atresia/Stenosis/Webs**
 - Stricture: Anastomotic, Ischemia, Radiation, IBD, etc**
 - Active Inflammation**
 - Obturation: Cancer** (rare in the SI unlike LI), **Bezoar, Foreign Body, Gallstone Ileus** (refer), **CF Meconium Ileus**
 - Intussusception**
 - Epidemiology: usually seen in children (usually b/t 4-7mo old) which is usually idiopathic but if it occurs in adults it is almost uniformly due to a pathologic process
 - Mech: peristalsis of a "leadpoint" (Pediatric: idiopathic or hypertrophic Peyer's patch from preceding viral illness vs Adult: malignancy) downstream which carries bowel with it telescoping proximal bowel aka "intussusceptum" (usually terminal ileum) into lumen of distal bowel "intussusciens" (usually ascending colon) NB rotavirus vaccine linked w/ intussusception
 - S/S: obstructive Sx (refer above) + currant jelly (blood+mucus) stools and a palpable mass
 - Complication: bowel ischemia, most common cause of small bowel obstruction in <2yo
 - Dx: KUB (no gas in RLQ and two concentric circles of fast density), US (two hypoechoic bowel rings separated by hyperechoic fat ring), BE (coiled spring appearance to bowel), CT (concentric rings intermediate density inner and outer bowel separated by low density mesenteric fat ring)
 - Tx: in children air/barium enema can reduce 65% of time but if unsuccessful then laparoscopic reduction, in adults b/c a pathologic process is underlying cause surgery is always done
 - Extrinsic
 - Congenital Ladd's Bands w/ Malrotation**
 - Post Inflammatory Adhesions** (most common, increased risk if intra-ab infection, anastomotic ischemia, foreign material, lower ab surgery, highest risk first few years post-op)

- **Abscess**
- **Carcinomatosis, Serosal Mets, Retroperitoneal, etc**
- **Endometriosis**
- **Hernia** (incisional/inguinal more common than intra-ab, higher risk of complications, less likely to resolve spontaneously and higher recurrence rate compared to other causes of obstruction)
- **Volvulus** (rare in the SI unlike LI, usually due to congenital malrotation (refer) and thus present as a neonate)
- **Annular Pancreas** (specifically at duodenum)
- **Superior Mesenteric Artery Syndrome aka Wilkie's Syndrome**
 - Mech: rapid weight loss in a young female w/ eating disorder resulting in lack of retroperitoneal fat cushion OR prolonged immobilization in a body cast OR rapid growth in children OR pressure trauma from body cast OR congenital anomaly such as high LOT resulting in obstruction due to the SMA taking a sharp turn over the 3rd part of duodenum compressing it
 - Dx: SBFT (abrupt cut off w/ dilation proximally) and CTA
 - Tx: weight gain w/ small frequent liquid feeds and surgical release of Ligament of Trietz or duodenojejunostomy if refractory
- Large Intestine (evidence of obstruction backing up into the SI is all dependent on the competency of the ICV)
 - Intrinsic
 - **Cancer (1°)**
 - **Strictures: Diverticulitis (1°), Anastomotic, Ischemia, Radiation, IBD, etc**
 - **Obturation: CF Meconium Plug Syndrome**
 - Extrinsic
 - **Carcinomatosis, Serosal Mets, Retroperitoneal, etc**
 - **Volvulus (1°) (requires a redundant freely moveable segment of bowel and mesocolon)**
 - Cecum
 - Pt: infant female (15% of population do not have a fixed cecum)
 - Mech: clockwise twist so that cecum ends up in LUQ
 - S/S: cecal obstruction + fibrous bands that are normally attached to colon extend over duodenum causing additional SBO
 - Complication: twisting of vascular pedicle resulting in ischemia
 - Dx: BE (dilated cecum that is abnormally in the LUQ, there is also SBO)
 - Tx: surgical counter clockwise reduction followed by cecopexy if not strangulated or two stage right colectomy if strangulated
 - Sigmoid
 - Pt: old male w/ R/Fs of bedridden, chronic illness, institutionalized, chronic constipation, laxative abuse, antimotility drugs, prior ab surgery, etc
 - Mech: counterclockwise twist
 - S/S: sigmoid obstruction
 - Complication: " "
 - Dx: BE (dilated sigmoid in the normal LLQ whose apex points toward RUQ)
 - Tx: sigmoidoscopy decompression and rectal tube will resolve in ¼ of pts however ¾ will recur therefore two stage sigmoidectomy
- **Complication**
 - Perforation b/c of LePlace's Law (increase in bowel diameter leads to increased wall tension w/ subsequent ischemia)
- **Tx (divided into partial vs complete based on severity of symptoms)**
 - Partial: conservative medical management b/c 80% resolve on own w/in 2d (check exam Q1hr to make sure that it does not turn into complete, if no improvement in 48hrs then surgery)
 - Hypovolemia 2/2 altered fluid balance in bowel and developing sepsis is the most concerning finding therefor aggressive fluids w/ correction of electrolytes is necessary
 - NPO w/ NGT Decompression
 - If severe then BS-antibiotics
 - NB if oral contrast reaches cecum at 24hrs on contrasted studies then almost all pts will never need surgery
 - NB palliative stenting in the case of cancer
 - Complete: immediately to OR b/c very high r/o perforation AND/OR ischemia ("Never let the sun rise on a SBO")

Acute Intestinal Pseudo Obstruction aka Paralytic Ileus / Acute Colonic Pseudo Obstruction aka Ogilvie's

- Mech: alteration in the autonomic regulation of intestinal motor function (hypersympathetic activity, increased inhibitory nonadrenergic-noncholinergic (NANC) NTs including NO, VIP, Neuropeptide-Y), inflammatory cytokines, fluid overload
- Etiology (NB mainly seen in hospitalized pts w/ causes similar to secondary constipation, Ogilvie's is uncommon, occurs in old males and is more dangerous than PI)
 - Post-Op (<1d (SI) or <2d (stomach) or <3d (LI)) it is an obligatory physiologic response 2/2 autonomic imbalance w/ increased sympathetic and decreased parasympathetic tone and called "post-op ileus" but when >2d it is pathologic problem and called "paralytic ileus" and due to multiple causes including meds esp opiates, underlying illness, metabolic derangement, infection)

- Infection: abscess, infected ascites, sepsis, any extra-GI infection
 - Inflammation: trauma, any GI –itis
 - Metabolic Process: low (K, Mg, Na) vs high (Ca, Phos)
 - Meds: opiates, anesthetics, anticholinergics
 - Surgery: Ab, Pelvic, any extra-GI surgery
 - Other: anxiety, immobility, pain, any general in-pt medical problem (MI, CVA)
- Specifics for Ogilvie's
 - Affects mainly the right colon w/ a cut off sign at the hepatic/splenic flexure
 - Seen in generally very sick elderly pts
 - New Concept: a small percentage of these patients actually get a unique type of secretory diarrhea (as opposed to constipation and obstipation) characterized by increased secretion of K, Fordtran, et al published a case report in 2005
 - DDx of ACPO is Toxic Megacolon from *C.diff*, Ischemic Colitis, Ulcerative Colitis
- Complication (always assess w/ serial exams and radiographs)
 - Ischemia → Perforation
- Px
 - Selective Peripheral (μ) Opioid Antagonist: **alvimopan (Entereg)** give 12mg PO x1 120min b/f surgery and then 12mg PO BID x7d after surgery (**only effective in post-op state**) or **methylnaltrexone (Relistor)** 0.15mg/kg SC QOD (**more for terminally ill pts on chronic narcotics**)
 - Mainly used in BUMC CRC surgery
 - shown to decrease ileus by 24hrs and pts report overall improved quality of life during this period
 - NB naloxone/naltrexon blocks all opioid receptors hence has affect on the CNS diminishing analgesia
 - Minimally Invasive Laparoscopic vs Open Surgery
 - Epidural vs General Anesthesia
 - Non Pre-op Bowel Cleansing
 - Avoid Aggressive Fluids
- Tx
 - 1st rule out mechanical obstruction w/ CT
 - 2nd always initiate conservative management ("fast-track approach")
 - Q12-24hrs obstructive series and PEx to monitor progress
 - treat underlying condition
 - IVF (don't be aggressive b/c volume overload exacerbates ileus and lengthens hospital stay by causing cardiopulmonary problems) and correct electrolytes
 - 100% O₂ via face mask to diffuse out nitrogen from colon lumen
 - Meds
 - Avoid narcotics (consider Entereg/Relistor) and try to alleviate pain w/ IV NSAIDs (Ketorolac), Gabapentin/Pregabalin, etc
 - antiemetics (best ones include Zofran, Dexamethasone, Inapsine, Aprepitant)
 - Lower Prokinetics (MOM and Bisacodyl suppository, the use of Neostigmine in paralytic ileus is unclear, other laxatives like Lactulose can be damaging and worsen distension b/c fermentation) vs Upper Prokinetics (none work including Erythromycin/Metoclopramide)
 - Consider water soluble contrast enemas to exclude mechanical obstruction (and may also be therapeutic)
 - Mobilize (bed repositioning to ambulation) & attempt expulsion maneuver (have pt sit on bed face down w/ knees to head and butt sticking up and have pt fart)
 - NPO (consider sham feeding w/ chewing gum which promotes motility then GI recovery diet but some say be more aggressive w/ early postop feeding b/c it decreases catabolism and reduces intestinal permeability and subsequent infections)
 - decompression w/ rectal tube (placed by nurses) attached to gravity drainage if LI involvement
 - NGT (recently falling out of fashion as there is a higher r/o aspiration pneumonia, etc) to suction (high/low-intermittent Q1min/continuous-wall suction aka H/L-I/C-WS) if SI involvement, NB once doing better then clamp NGT, check residuals and if <100 over 3hrs than d/c NGT, start clears then advance to GI recovery diet as tolerated
 - 3rd if no improvement w/ 3d of conservative therapy then medical therapy (**for Ogilvie's only**)
 - **Acetylcholinesterase Inhibitor: neostigmine (Prostigmine) ??? only for Ogilvie's???**
 - 1-2mg IV over 3-5min x1 and then repeat x1 8hrs later if no response
 - pt needs to be on bed pan b/c works fast ~5min
 - consider cardiology consultation
 - Contraindications: bradycardia HR <60 and hypotension SBP <90 (if above threshold then proceed but use telemetry and check VS Q15min x2hrs and have atropine available), bronchospasm (have meds nebs available), AKI/CKD Cr>3
 - Other SEs: hypersalivation, ab cramping, sweating, N/V
 - NB Not Recommended (erythromycin, metoclopramide, beta-blockers, laxatives)
 - 4th if no improvement after x2 rounds of neostigmine OR neostigmine contraindicated OR megacolon (>12-9cm cecum (nl 7.5cm), >8cm transverse (nl 5cm), >6.5cm descending/sigmoid (nl 2.5cm)) then endoscopic/radiologic/surgical therapy (**for Ogilvie's only**)

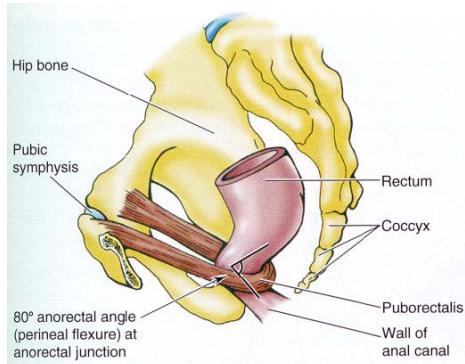
- **Decompressive Colonoscopy w/ Decompression & Rectal Tube Placement by GI**
 - How? No prep, obtain a 7/8.5/10/14F decompression tube for a regular/therapeutic (for 8.5/10/14F) scope, advance scope to cecum using as little air as possible (only use CO₂), remove white cap and feed tube w/ wire in it thru the therapeutic channel, as you pull out scope advance an equal amount tube, eventually the scope is out the body and the tube w/ wire is in place, remove wire and then replace white cap (NB the tube is just hanging out not attached to anything), next place a normal rectal tube and inflate the balloon with the decompression tube along the outside of it, check placement w/ KUB, pt will spontaneously pass it like a BM)
 - NB there is a 3% r/o perforation
 - NB high recurrence rate
- **Percutaneous Cecostomy by IR** (if failed decompression and no signs of acute abdomen)
- **Segmental Colectomy by CRS** (if failed cecostomy or signs of acute abdomen)

CIPO (it actually globally affects the entire GI tract not just the small intestine including gastroparesis, etc)

- Etiology (NM defect 2/2 metabolic disorder, inflammation, infiltration, meds, autoimmune condition or paraneoplastic process)
 - Idiopathic (most common)
 - Primary
 - Familial/Sporadic Visceral Myopathy
 - Familial/Sporadic Visceral Neuropathy
 - Secondary
 - CTD: SSc, DM/PM, SLE
 - Endo: DM, HyperPTH, HypoTH, Pheo, Pregnancy
 - ID: *Trypanosoma cruzi* Chagas' Disease, CMV, EBV, any GI infection
 - Infiltrative: Amyloidosis
 - NM: Muscular Dystrophies, Parkinson's, Paraneoplastic (Anti-Hu, Anti-CV2, Anti-NNA, B-type Calcium Channel Antibody, Purkinje Cell Cytoplasmic Antibody), Spinal Cord Injury, Idiopathic Myenteric Ganglionitis
 - Meds: Opiate, Anticholinergics
 - Post-Inflammation: Radiation, Ischemia
- NB megacolon/rectum 2/2 Hirschsprung's, Chronic Constipation, Chagas' Dz, CIPO
- S/S: insidious progressive Sx punctuated by acute episodes (cramping ab pain, bloating, distension, N/V, weight loss, D/C)
- Dx: CT/Xray, Fluoro studies, SI Manometry, Bx, Scintigraphy (rarely done)
- Complications: malnutrition, SIBO, bezoar formation, pneumatosis intestinalis
- Tx: nutritional support usually TPN, Tx SIBO, prokinetic agents (acute short term erythromycin and chronic long term metoclopramide and octreotide at low dose esp in scleroderma, osmotic/stimulant laxatives, avoid bulking agents), surgery (venting gastrostomy/enterostomy, research into partial resection or bypass for localized dz, lastly bowel transplant)

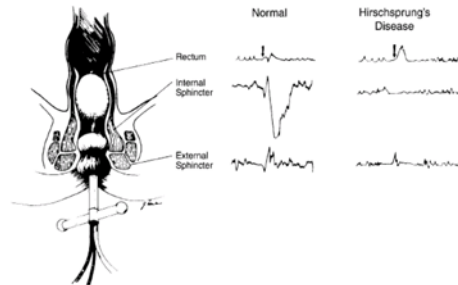
Constipation

- Normal
 - Stool accumulates and stretches rectum → activates stretch receptors in muscularis propria → spinal cord reflex & sense of need to evacuate → stimulation of inhibitory nerves that relax (1) Internal Anal Sphincter (IAS – smooth muscle), (2) pelvic floor (pubococcygeus, etc) resulting in perineal descent, (3) Puborectalis (originates on one side of the anterior pubic symphysis and wraps around the posterior rectum and inserts on the other side of the anterior pubic symphysis creating a sling pulling the jxn of rectum/anus anteriorly creating a bend aka rectoanal angle) resulting in widening of the anorectal angle from 80° to 130° → stool reaches External Anal Sphincter (EAS – skeletal muscle) → when pt is prepared to evacuate the EAS is relaxed → rectal peristalsis, diaphragmatic contraction, ab wall contraction → stool evacuates

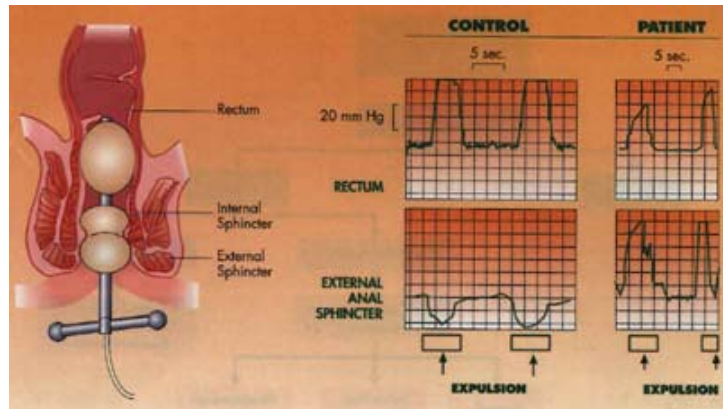


- Etiology
 - Secondary/Systemic (10%) (always rule out)
 - **General RFs**

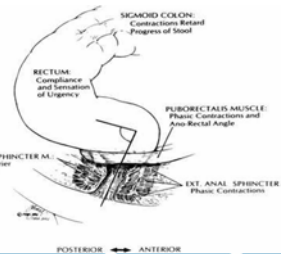
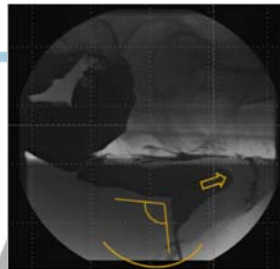
- female, older age, polypharmacy, MMP, low socioeconomic status, non-white, low level of education, anxious/depressed
- **Diet**
 - Low Overall Intake
 - Low Fiber
 - Dehydration
- **Medications** (it has been reported that 40% of prescriptions meds have as their primary GI SE constipation)
 - Cations: Aluminum, Calcium, Iron
 - Anticholinergics: Antihistamines, Antispasmodics, Antiemetics, TCAs, Antiparkinsons, Antipsychotics
 - μ -Opiates
 - NSAIDs
 - Anticonvulsants esp Phenytoin
 - Diuretics esp Lasix
 - CCB esp Verapamil
 - Chemo esp Vincristine
 - Heavy Metal Poisoning
 - Clonidine
- **Metabolic**
 - Electrolyte
 - Hypo: Na, K, Ca, Mg
 - Hyper: Ca, Mg
 - Hypothyroidism 2/2 slow motor activity and myxedema infiltration
 - DM and DKA
 - Pregnancy
 - Uremia
 - Addison's
 - Porphyria
- **NM Dz**
 - Traumatic sacral nerve damage
 - MS
 - Chagas Dz
 - Parkinson's
 - CVD (scleroderma)
 - **Hirschsprung's Disease**
 - Mech: (1) premature arrest in the caudal migration of neural crest cells through the gut during embryonic development or (2) alterations in colonic microenvironment necessary for development and survival of ganglion cells → absence of ganglion cells of the myenteric AND submucosal neural plexi from anorectal line and proximally w/ 80% up to sigmoid, 10% up to splenic flexure and 10% entire colon and even distal small intestine → interruption of the inhibitory parasympathetic nerves that causes relaxation → obstruction
 - IAS is always involved
 - Dilated portion is normally innervated vs non-dilated portion is the diseased portion (fails to relax)
 - Genetics: several different AD mutations can result in HD (1° Rearranged During Transfection (RET) Gene, 2° GDNF, NTN, SOX10, EDNRB, EDN3, ECE1, ZFH1B, PHOX2B)
 - Epidemiology: 5% of having a second child w/ Hirschsprung's, M>F, Down's Syndrome, 1/5000 live births, 30% are associated w/ a syndrome of other congenital anomalies
 - S/S: dilation proximal to defect and narrowing where the gut lacks ganglion cells (NB rectosphincteric reflex is lost), failure to pass meconium in the first 48hrs, abd distension, feeding difficulties, partial obstruction can lead to bilious vomiting but can also present later (up to 3mo) w/ obstipation, constipation, diarrhea, failure to thrive, increased anal sphincter tone, empty rectal vault
 - NB if pts only have a short segment involved then they can present during adulthood w/ severe constipation otherwise these pts develop during childhood
 - Complications: enterocolitis can develop 2/2 ischemia from colonic distension and/or ischemia
 - Dx: KUB (air fluid levels w/ dilated colon and then no air in rectum), Barium Enema (transition zone), Anal Manometry (rectal distension fails to induce internal sphincter relaxation), Rectal Bx (submucosal suction biopsy which shows lack of stain at Auerbach's plexus, sometimes one will see sympathetic nerve hypertrophy, proliferating Schwann cells and increased acetylcholinesterase)
 - first anal manometry then confirm w/ rectal Bx



- Tx: two stage procedure w/ initial immediate colostomy followed by partial colectomy (depending on length of aganglionic segment) w/ coloano-anal anastomosis at 1yo
- NB Intestinal Neuronal Dysplasia (IND) increased and enlarged ganglia resulting in obstruction or severe chronic constipation
- Primary (90%)
 - **Functional Constipation (1°)**
 - Rome III Criteria (≥ 2 of the following for ≥ 3 mo in the past 6mo in $\geq 25\%$ of BMs)
 - Straining/Dyschezia
 - Lumpy/Hard Stool (Bristol Scale 1-2)
 - Sensation of Incomplete Evacuation
 - Sensation of Anorectal Obstruction/Blockage
 - Manual Maneuvers to Facilitate Defecation (digital evacuation, pelvic floor support, posterior vaginal pressure (helpful for rectocele), et al)
 - Hz: ≤ 3 BM/wk
 - Loose stools are rarely present w/o laxatives
 - **IBS-C (1°)**
 - Rome III Criteria (**Ab Pain** + ≥ 2 of the following for ≥ 3 mo in the past 6mo in $\geq 25\%$ of BMs)
 - Pain improves with defecation
 - Change in stool frequency occurred at onset of pain
 - Change in stool consistency occurred at onset of pain
 - **Impaired Evacuation (2°)**
 - Def: Functional Constipation + Impaired Evacuation Physiology (based on studies)
 - Predominant Sx
 - Straining
 - Manual Maneuvers
 - Stool is Variable in Consistency
 - Sensation of Incomplete Evacuation
 - Etiology
 - Mechanical Problems: fissures, strictures, cancer, mass, prolapse, intussusception, recto/sigmoidocele
 - Rectocele/Sigmoidocele (anterior rectum/sigmoid bulging into vagina 2/2 damage of supporting structures b/c of chronic intra-ab pressure, they cause obstruction b/c there is paradoxical sphincter contraction and also stool is misdirected into these pouches, women sometimes report the need to use their thumbs to support posterior vaginal wall to complete defecation, Dx by trapping of barium on defecating proctography, Tx: Kegel's if asymptomatic vs surgery if symptomatic)
 - Motor Problems: Excessive Perineal Descent, Inadequate Propulsive Forces, Short Segment Hirschsprung's, Dyssynergia/Anismus (inadequate relaxation or paradoxical contraction of IAS, pelvic floor, puborectalis, this is often a disorder acquired during childhood as child learns to avoid discomfort associated w/ passage of large stools called "Functional Fecal Retention – FFR" resulting in early on (encopresis, anal fissures, hemorrhoids, etc) vs later on (dyssynergia))
 - Sensory Problems: Megarectum
 - Dx
 - AnoRectal Manometry (ARM) w/ or w/o Balloon Expulsion Test (BET) (measures pressure across IAS and rectum at rest and after maneuvers of simulated defecation, in BET a balloon can be used to assess sensitivity when the balloon is progressively inflated w/ saline to 50cc and also the pt's ability to expel the balloon with nl <1 min)



- Defecography (barium is instilled into the rectum and the pt sits on a radiolucent toilet and films/videos are taken while the pt is at rest and defecating, can be used to accurately assess the changes that occur during defecation including anorectal angle, perineal descent, etc and abnormalities including rectocele and perineal descent (both are shown below) other types include Dynamic Pelvic MRI



• Tx

- (1) If inadequate relaxation or paradoxical contraction then consider sitz baths, muscle relaxants (Robaxin), NSAIDs (Relafen), BoTox Injection
- (2) If poorly coordinated evacuation then biofeedback therapy
- (3) If true structural/anatomic problem or failed conservative therapy then surgery: division of puborectalis muscle, fecal diversion with colostomy, STARR (Stapled Transanal Rectal Resection) Operation (reduces excess rectal tissue that may be seen w/ a rectocele)

▪ Slow Colonic Transit aka Colonic Inertia (3°)

- Def: Functional Constipation + Decreased Colon Transit Time
- Predominant Sx (pain is not a big Sx)
 - Decreased Hz
 - Blunted Gastrocolic Reflex
 - Lack of Urge to Defecate
 - Ab Distension
 - Poor Response to Fiber/Laxatives

• Etiology

- Idiopathic (young women beginning at time of puberty)
- Significant Chronic Constipation
- Neuropathy/Myopathy

• Dx

- You MUST have normal colon diameter and normal anorectal function before you can make a dx
- Colonic Transit Time (CTT) aka Sitz Marker Test (measured by monitoring the passage of radiopaque markers through the colon, have pt take a high fiber diet and to stop all laxatives/enemas, a single capsule containing 25 markers is ingested on day 0, five days later a KUB is taken and if more than five markers remain aka >20% (esp scattered throughout colon vs all collected in one spot suggesting obstruction) colon transit is prolonged) other types include scintigraphy, capsule transit, et al
 - NB normal pts average transit time of stool through colon is <72hours



- Full Thickness Bx (decreased ICC, neurons and levels of NTs (substance P, VIP, NO))
- **Make sure you are dealing with a more generalized GI slow transit process aka CIPO therefore check gastric emptying study and esophageal manometry**
- Tx
 - (1) Medications
 - Stimulant Laxatives
 - Misoprostol
 - Prokinetics
 - NeuroTrophin-3
 - NB osmotic laxatives and fibers just accumulate therefore don't give
 - (2) Continuous Low Amplitude Sacral Nerve Stimulation (European multicenter prospective NON-CONTROLLED study, 62 pts w/ slow transit constipation who failed conservative Tx underwent stimulation x21d, 87% of pts achieved the study's primary endpoints (increased defecation frequency and normalization of gut transit time based on Sitz marker test))
 - Kamm MA. Sacral nerve stimulation for intractable constipation. Gut. 2010;59:333.
 - (3) Subtotal Colectomy with Ileorectal Anastomosis but YOU MUST RULE OUT impaired evacuation b/c if the "door" is not working you don't want to increase transit time
- Complication
 - **Fecal Impaction w/ or w/o Encoporesis aka Overflow Diarrhea** (constipation is so bad that stool becomes hard and dry as it sits in the rectum, Tx: mineral oil enema first then manual disimpaction)
 - **Megacolon/Rectum** (in the elderly/schizophrenics/Parkinsons/children there is general impaired perception resulting in forgetting to defecate, over time the rectum dilates to accommodate and eventually becomes atonic, pts then lack the urge to defecate, Tx disimpact, Px: low fiber diet, 8oz water enemas, small volume of PEG QD and if still getting Sx then diversion or resection)