MRAD 254: Fluoroscopic Imaging

Outcomes: 2 and 3

Large Bowel Exams

MRT Program

Objectives

2.1) Describe the gross anatomy, relational anatomy, and physiology of the digestive system

2.2) Describe the radiographic procedures used for imaging the digestive system

2.3) Identify contrast media used for individual imaging procedures of the digestive system

2.5) List the indications and contraindications for examinations of the digestive systems

2.6) State the key components when verifying a patient's clinical history

2.7) Determine patient preparation and post-procedural care of each of the individual digestive system procedures

2.8) Identify procedures for prioritizing examinations according to medical status and resource availability

3.4) Identify topographical landmark locations of the digestive system

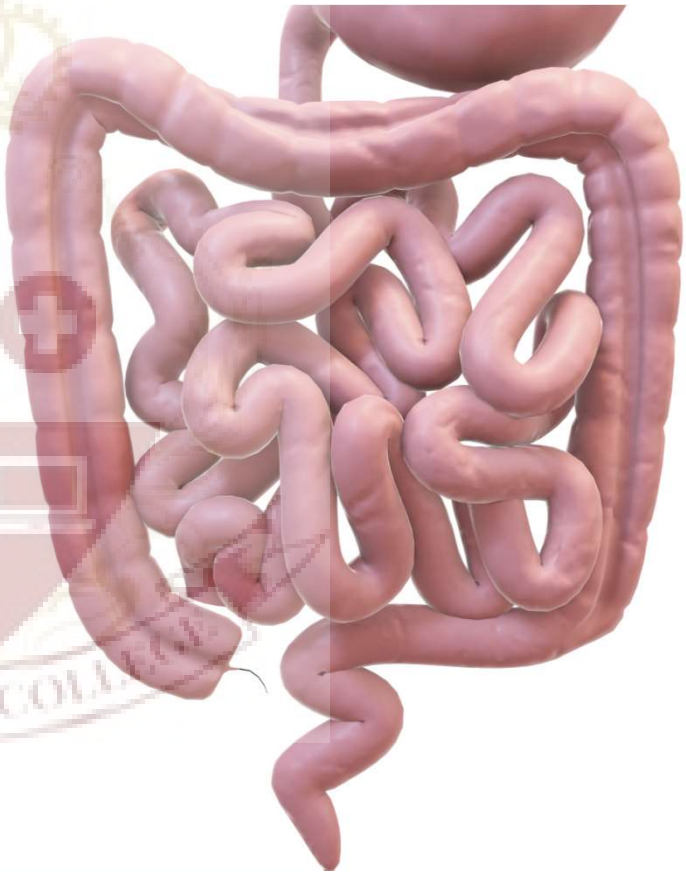
Generalize how to increase patient comfort during an exam of the digestive system

3.5) Generalize how to increase patient comfort during an exam of the digestive system

3.6) Determine if corrective and supplemental images are needed

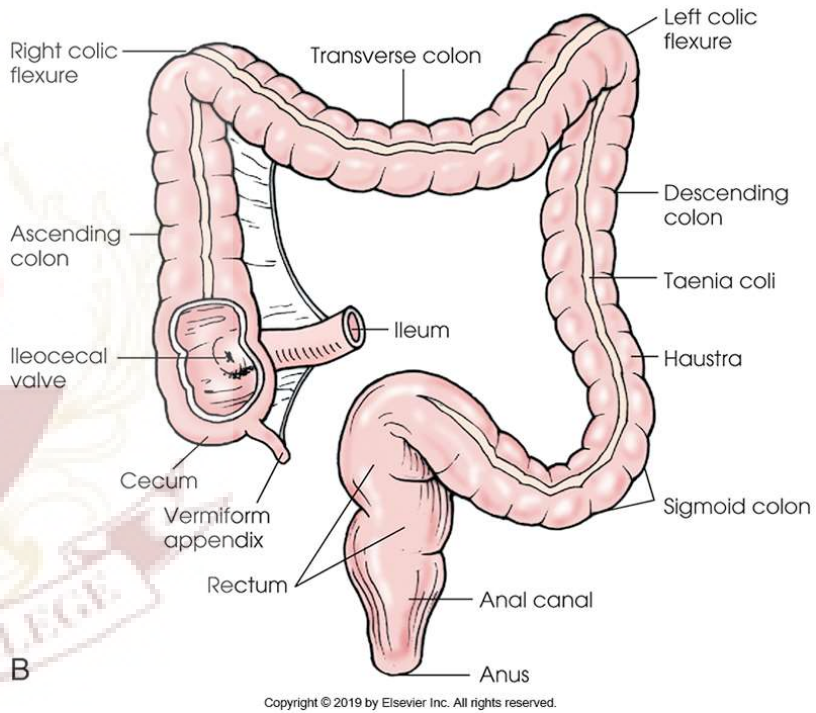
Anatomy – Large Bowel

- 5 parts
  - Cecum
  - Colon
  - Sigmoid
  - Rectum
  - Anal canal
- Final portion of the digestive tract
- Absorbs liquid from what we eat
- 4 layers of tissue
- Distinctive pattern



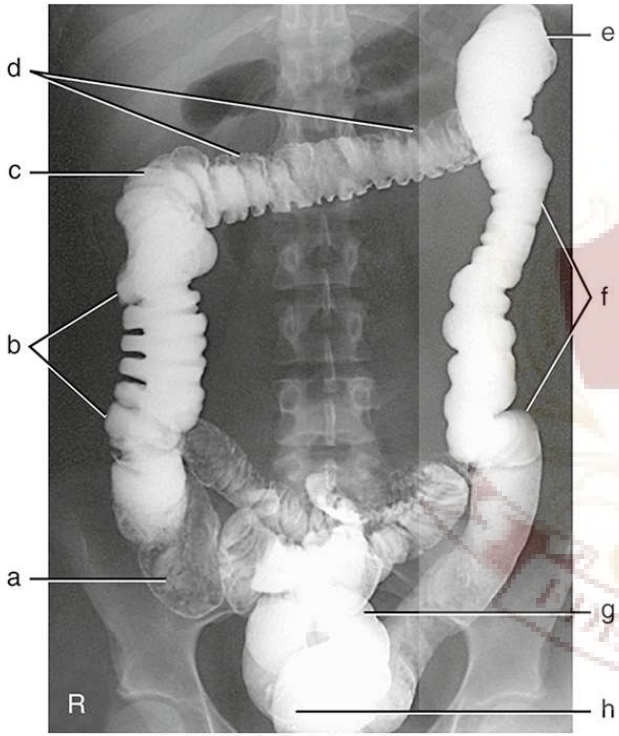
Anatomy – Colon

- Ascending, transverse, and descending
  - Ascending on the right side
  - Descending on the left
  - Transverse more anterior
- Two colic flexures
  - Right/hepatic
  - Left/splenic

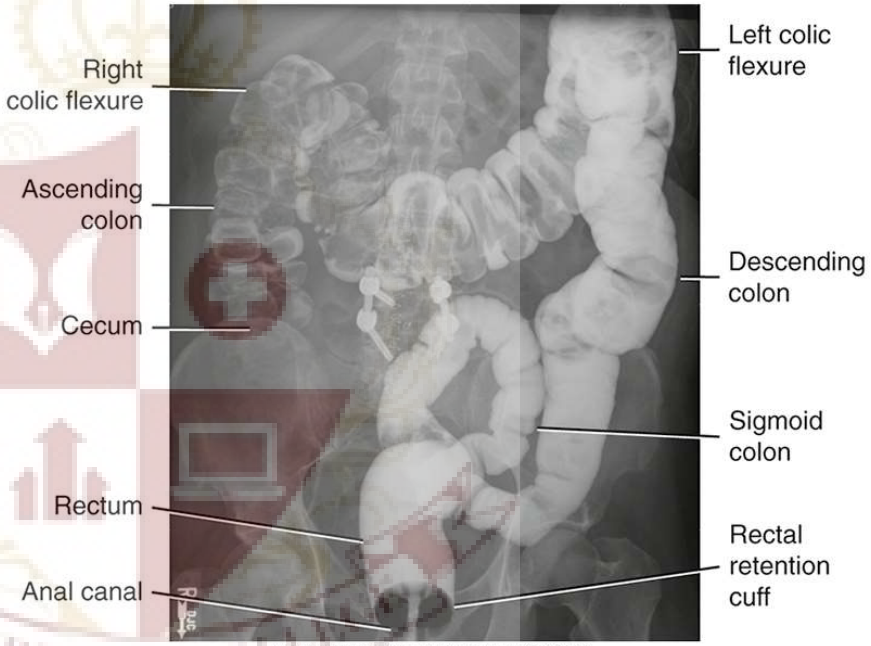


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No Two Are the Same!



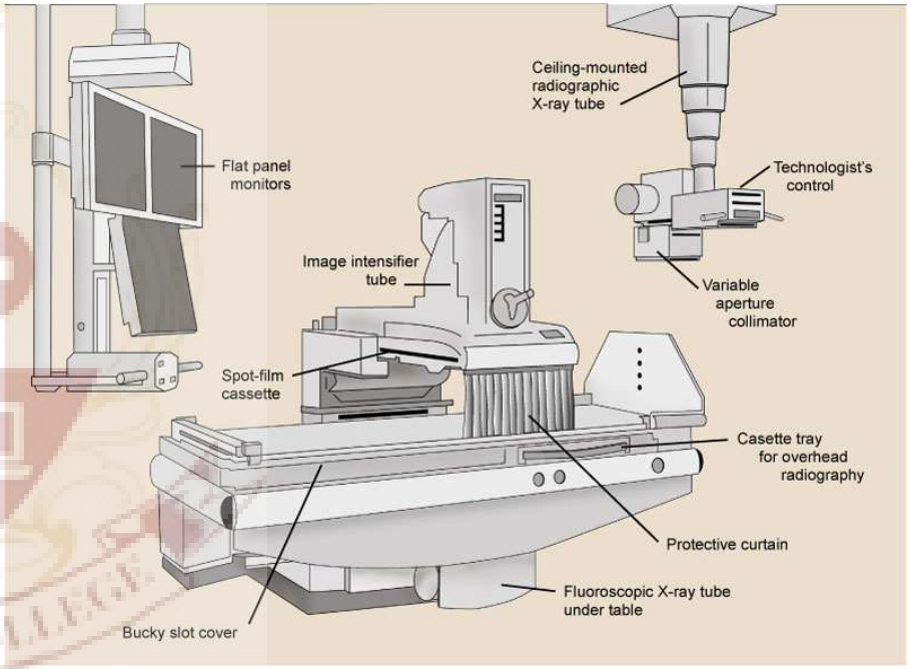
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Imaging the Large Bowel

- Barium enema
- Combines fluoroscopy and general radiography
  - Exam requires privacy
  - Done in fluoro rooms with X-ray capabilities
- Separate radiographic tube allows full sized exposures
  - Fewer exposures needed = shorter exam



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On the Requisition

- Abdomen pain
- Changes in bowel habits
  - Diarrhea
  - Constipation
  - Change in stool caliber
- Blood in stool
- Screening

Patient Preparation

- Must empty colon of all fecal matter, including anything sticking to the bowel walls
- 48 hours clear liquid diet
  - Not just liquified!
  - Transparent if held to the light
- Night before exam must drink a strong laxative with lots of water
  - Magnesium Citrate
  - Profuse diarrhea
  - Very hard on old or frail patients
  - Often the worst part of the exam
- Morning of exam may have to use a laxative suppository

Stool in Bowel



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Contrast

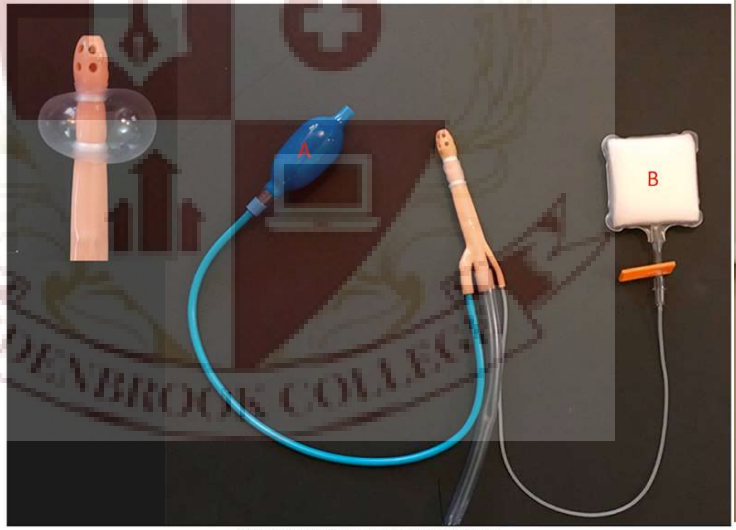
- Single or double contrast
- Positive contrast is barium (thin barium diluted according to site protocol)
- Negative is air or CO2
- Single contrast done on inpatients in poor physical health
  - Unable to roll or stand
  - Unable to retain barium
- Barium should be either cold or lukewarm. NEVER HOT!

Contraindications to BE

- Perforation (known or suspected)
- Obstruction
- Recent colonoscopy with a biopsy or polyp removal
- Appendicitis (rule out via U/S if suspected)
- Gross diarrhea
- Gross rectal bleeding

Equipment

- Enema bag
  - Tip depends on type of enema being done
- Inflation device
  - Fills retention cuff on enema tip
- Insufflator balloon



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Accessory Equipment

- Clamps
  - For tubing
  - Used even if tubing comes with clamp
- Lubrication for enema tip
- Tape
  - For patient's gown
- Blue pads, towels, spare gown
  - In case of messes
- Gloves!

Explaining the Exam

- Informed consent not technically required
  - Why do we still want to do a thorough explanation?
- What do we want to tell them?
  - Sequence of events
    - Prelim image, tube insertion, Radiologist's images, Tech's images, bathroom, post evac image, dismissal
  - Expected sensations
    - Need to have a bowel movement
    - Fullness and maybe cramping (breathe through it, it will subside)
  - Reassurance that you've seen it all (even if you haven't)
  - How long exam will take (overestimate if unsure)
    - 20-40 minutes (depends on radiologist and tech speed)
  - Post care
    - Drink lots of fluids
    - Eat and drink normally (start slowly)
    - Stay near a bathroom today
    - Bowel movements will be white

Setting Up

- Prepare enema bag, gather accessory equipment and cassettes, bathroom clean and stocked, console set
- Bring patient in the room and show them the tube and other equipment
  - Allow time for questions!
- Place patient's belongings in a safe place (usually bathroom).
- Remove shoes and socks
  - Cloth booties

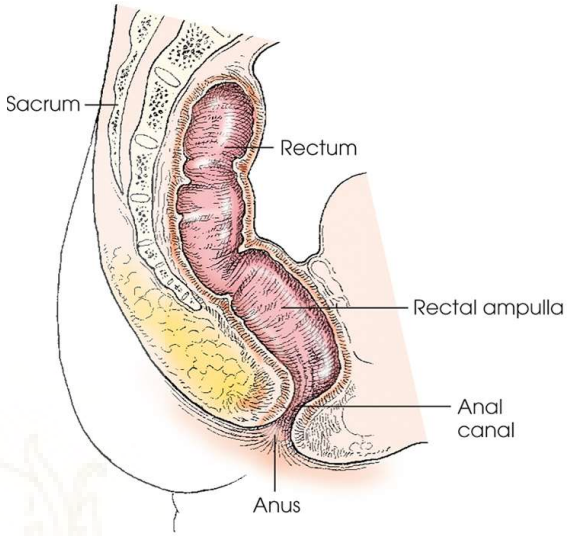
Inserting the Enema Tip

- Pt in left lateral or Sims
- Expose only as much as you need to
- Liberally lubricate enema tip & hold in right hand
- Use left hand to lift right buttock
- Encourage relaxation

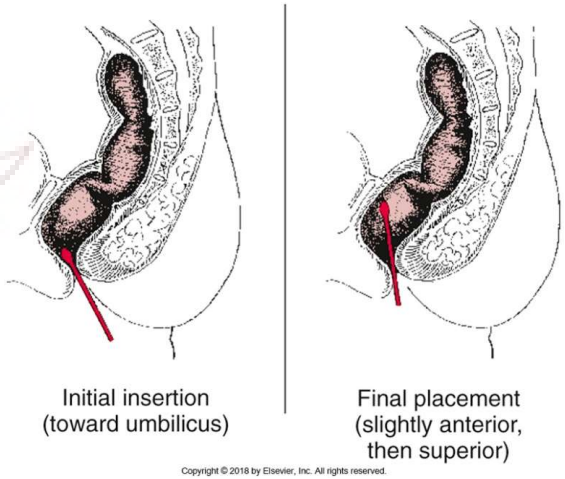

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Inserting the Enema Tip cont.

- Insert on expiration
- Insert in anterior/superior direction, toward umbilicus
- Once clear of anal sphincter, aim slightly more superior
- Advance 3-4 inches (7.5-10cm)
- NEVER FORCE IT!



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Inserting the Enema Tip cont.

- Once tube is in place, hold with one hand and use the other to inflate the retention balloon
  - Warn the patient first!
  - Remind them not to push the balloon out
- Tube should pull slightly farther into the rectum
- If it pushes out, you need to advance tip farther
- Double clamp balloon
- Cover patient and tape gown closed



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When the Rad Comes In

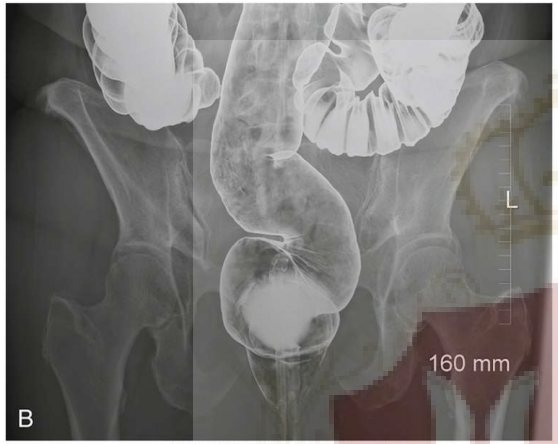
- Give relevant patient history
- Unclamp barium tube and begin contrast flow
  - Some rads like to do this themselves
  - Stop flow when instructed
- Assist the patient to roll on the table
  - Coats the bowel walls
- Place barium bag on the floor and open clamps
  - Draining excess barium out of colon
- Use insufflator to pump air into large bowel
  - Only for double contrast

When the Rad Comes In cont.

- Ensure tubing does not get wrapped around patient's legs
  - What will happen if the tube gets pulled out
- Stabilize patient and monitor condition while doing upright views
  - If your patient is going to pass out, it will be at this point
- Quickly clean up any leaked barium
  - Provide new gown if necessary

Radiologist Spot Images

Axial sigmoid



Courtesy NEA Baptist Memorial Hospital, Jonesboro, AR.



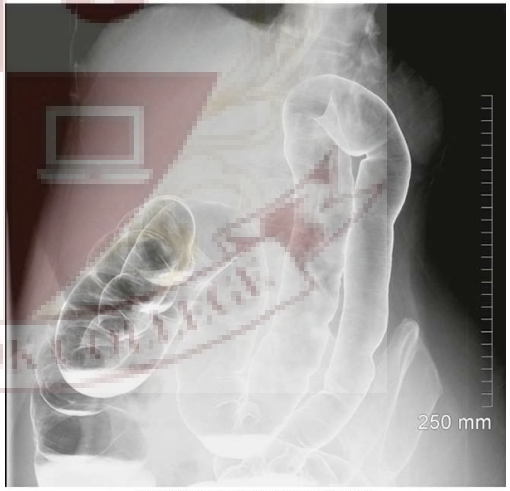
Courtesy NEA Baptist Memorial Hospital, Jonesboro, AR.

Cecum

LPO



Courtesy NEA Baptist Memorial Hospital, Jonesboro, AR.



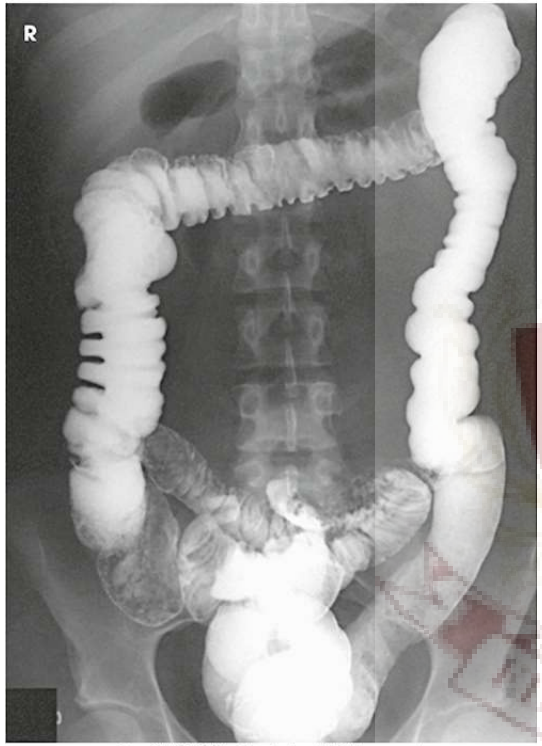
Courtesy NEA Baptist Memorial Hospital, Jonesboro, AR.

RPO

When the Rad is Finished

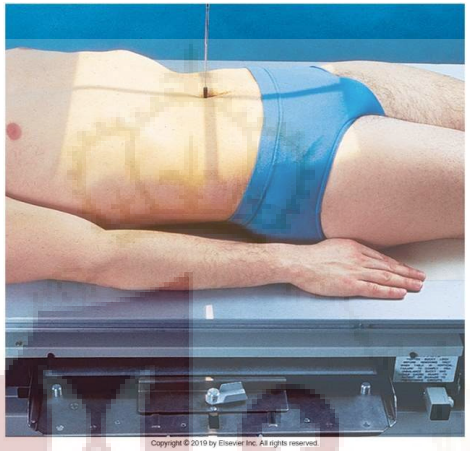
- It's your turn to shine!
- Take overhead radiographs according to site protocol
  - Abdominal images centered at crests
    - Adjust centering according to patient habitus
- Add puffs of air between images to maintain distention

Overhead Images - AP



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Single contrast



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- Where are we centering?

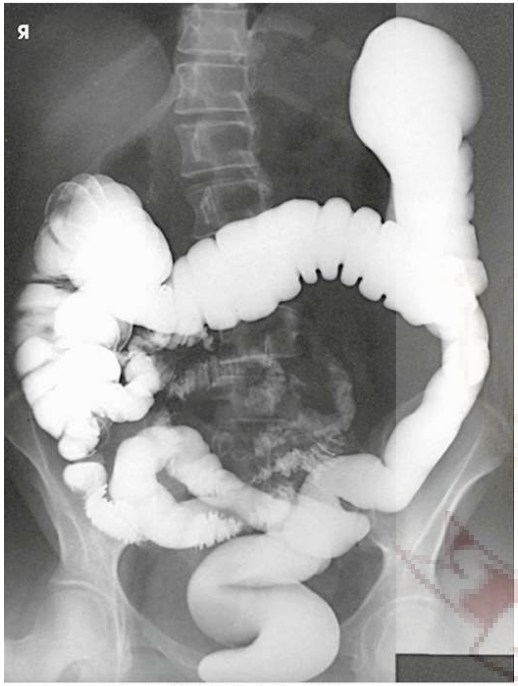


Image courtesy of Canada diagnostic Centres

Double contrast

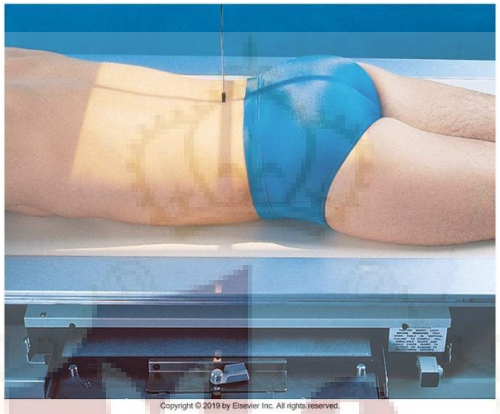
Where is the barium? The air?

Overhead Images - PA



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Single contrast



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- Where is the barium? The air?
- Why is one flexure higher than the other?



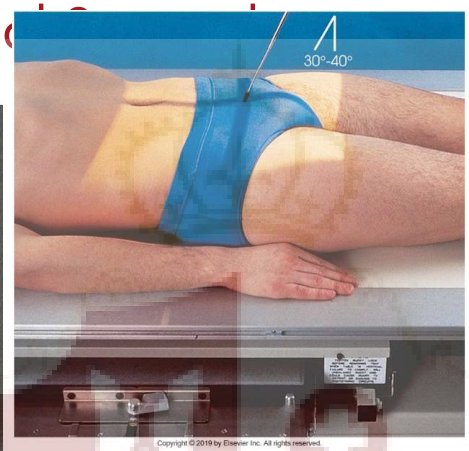
Image courtesy of Canada diagnostic Centres

Double contrast

Overhead Images – AP Axi

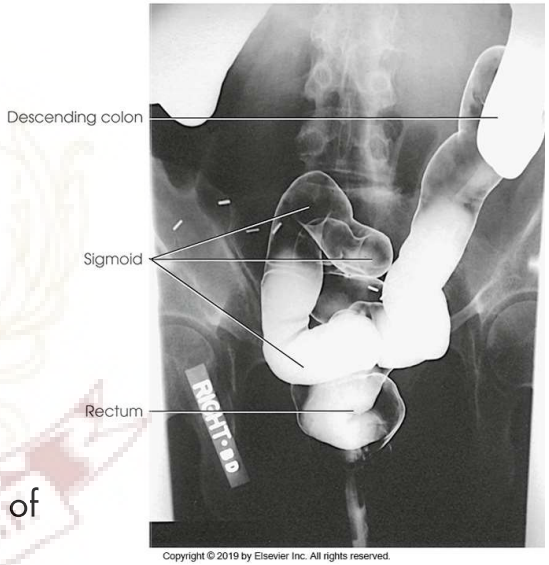


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- 30-40º cephalad angle
- Centered at ASIS
- "Unfolds" sigmoid portion of bowel

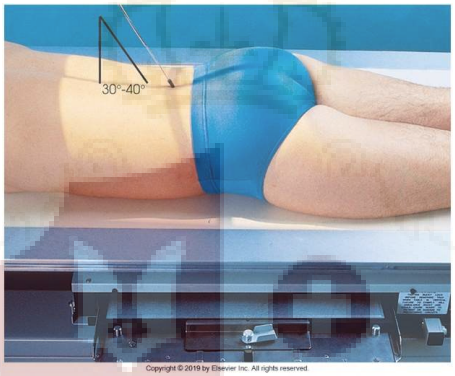


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Overhead Images – PA Axial Sigmoid


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Single contrast



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- 30-40º caudad angle
- Centered so the light exits at ASIS
- Also "unfolds" the sigmoid


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Double contrast

Overheads - Obliques



LPO



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RPO

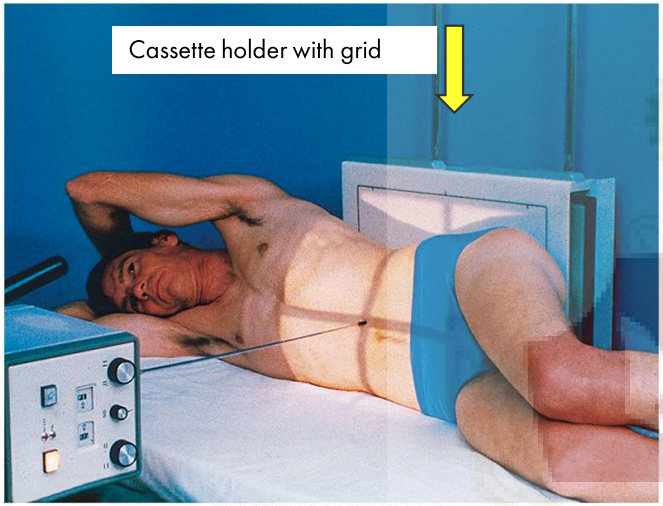




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- Oblique overheads only done on single contrast exams
- Demonstrates the flexures
- Not needed on double contrast because we get upright spot images of the flexures

Overheads - Right Lateral Decubitus



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- Done cross-table to show air/fluid levels
- Centered at crests and midline just like a regular abdomen
- **Medial** side of **ascending** colon
- **Lateral** side of **descending colon**



Image courtesy of Canada Diagnostic Centres

Overheads – Left Lateral Decubitus



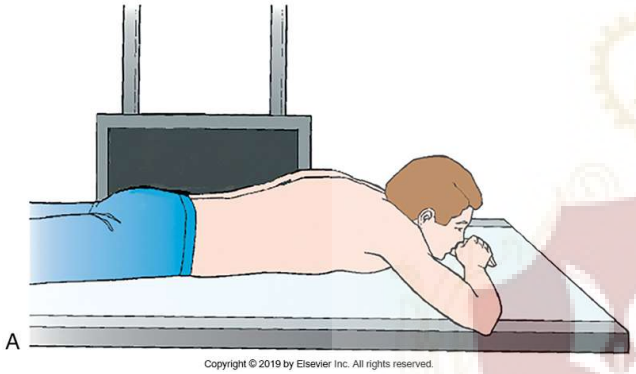
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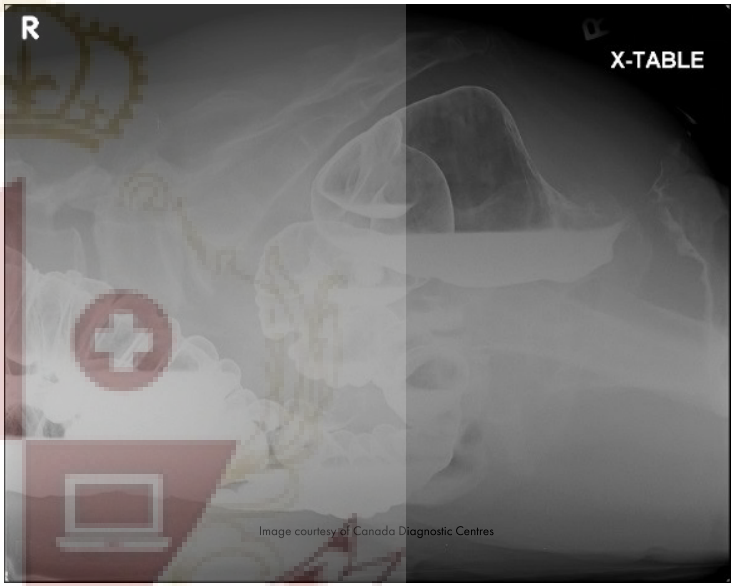
Image courtesy of Canada Diagnostic Centres

- **Lateral** side of **ascending** colon
- **Medial** side of **descending colon**
- Must use arrow markers to indicate side up
- Must include all parts of the bowels

Overheads – Cross-Table Lateral Rectum



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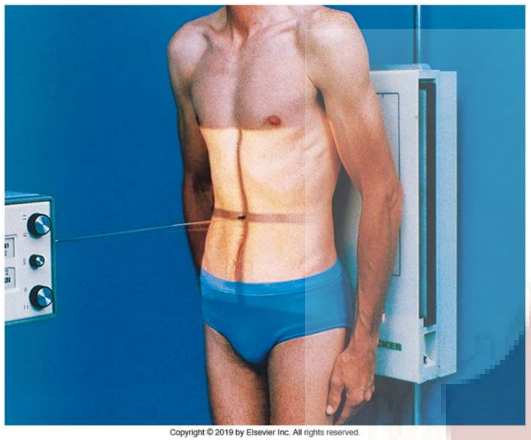
- Ventral decubitus position
- Evaluates posterior wall of rectum and presacral space
- Rectum **must** be air filled
- Removal of enema tip per site protocol

- Centered at the sacrococcygeal junction. Where the "buttcrack" starts
- At the level of the greater trochanter

After Your Images are Done

- Ensure patient is not feeling dizzy or unwell
- Assist them to the bathroom
  - Check on them frequently
- Send images, record fluoro time, clean room and prepare for the next patient
- When patient is finished in the bathroom, perform a post evacuation image

Post Evacuation Image



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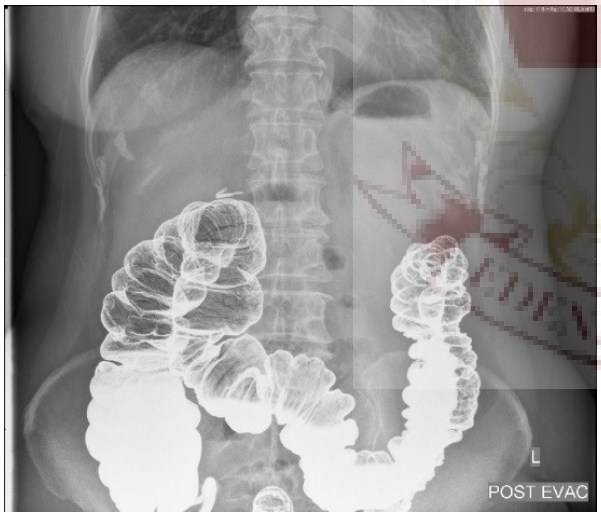
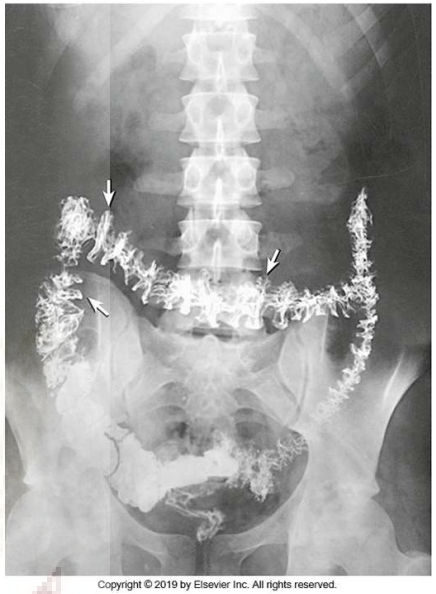


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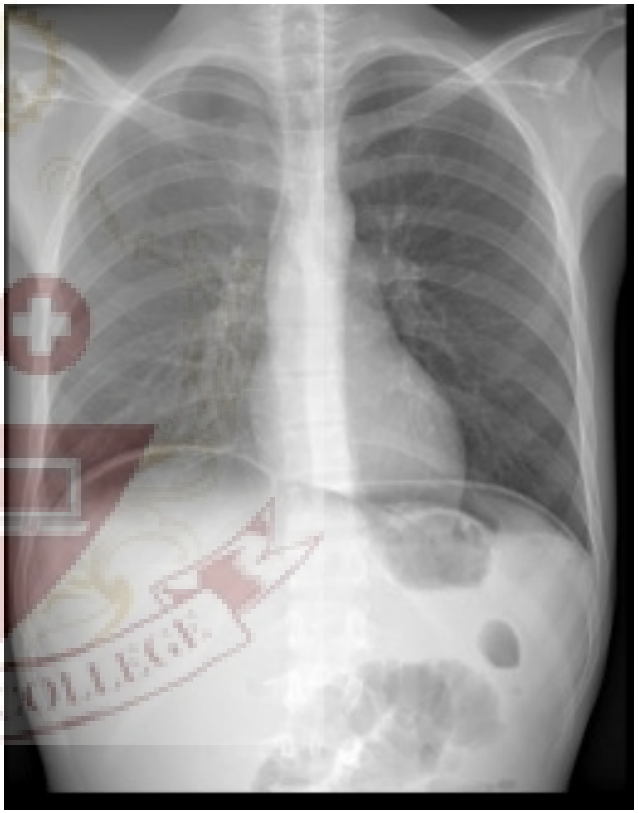
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- Upright abdomen from diaphragms down
- Looking for free air under diaphragms
  - Looks like an Oreo
  - Don't confuse gastric bubble
- Must be upright for at least 5 minutes

Free Air Under the Diaphragms



https://radiopaedia.org/cases/bowel-perforation-subdiaphragmatic-free-gas?lang=us



https://docs.google.com/document/d/1aa6g5_NyCwR709lBt-Ow_UYhe6s-RLsRur_rX_I3gvM/edit

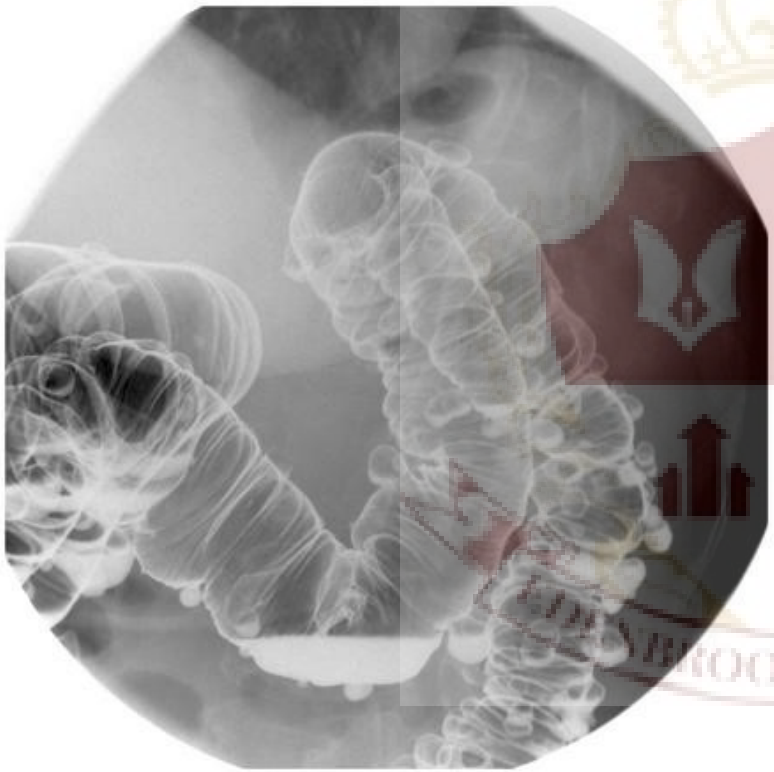
Post Procedural Care

- If post evac image show no cause for concern, the patient may leave the facility
- Eat and drink as normal
  - Starting with a light meal recommended
- Drink plenty of fluids for the next several days
- Bowel movements will be white
- Follow-up with your doctor for results
- Make any relevant tech notes before completing case

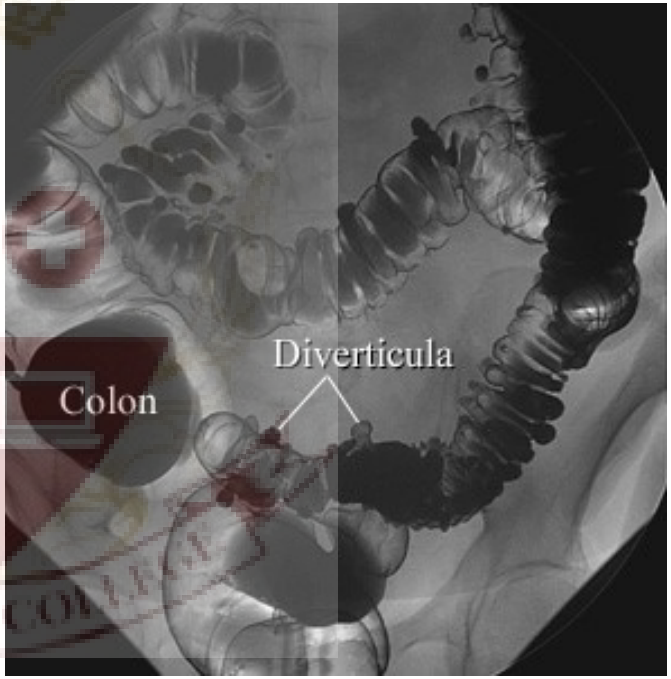
Pathology - Diverticulum

- Outpouching from bowel wall
- Usually on sigmoid colon
  - Can be anywhere along length of colon
- Can appear filled with air or contrast on a BE
- Diverticulosis = multiple diverticula
- Diverticulitis = inflamed diverticulum or diverticula

Pathology – Diverticulum



https://radiopaedia.org/articles/colonic-diverticulosis



https://www.healthlinkbc.ca/health-topics/zm5005

Ulcerative Colitis

- Inflammation of the mucosal wall
- Affects only inner mucosal layer
- Loss of haustral pattern
- “Stove-Pipe” or “Lead-pipe” sign
- “Collar-button” ulcers

Ulcerative Colitis

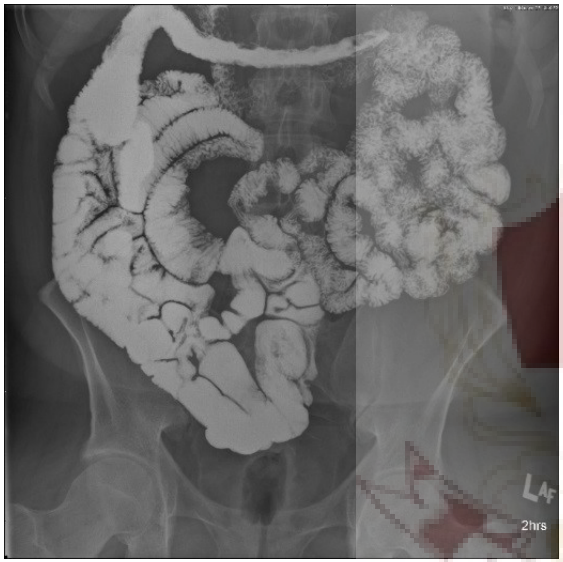
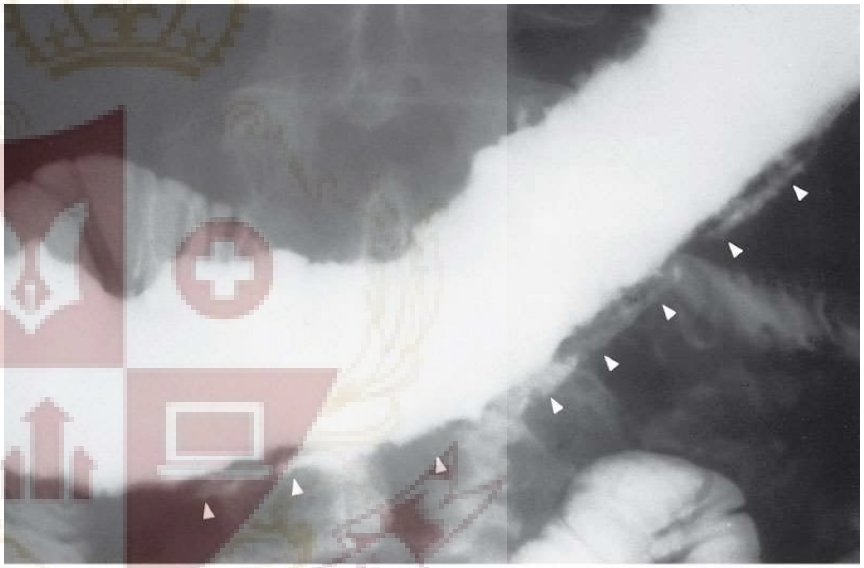


Image courtesy of Canada Diagnostic Centres



from Lichtenstein JE: Radiologic-pathologic correlation of inflammatory bowel disease, *Radiol Clin North Am* 25:3-23, 1987.

Colorectal Cancer

- Can happen anywhere along colon, but rectum is common
- "Apple-core" sign
- Rough margins
- Rectal bleeding may be the only symptom

Colorectal Cancer

