

GI and GU Fluoroscopy Primer

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Patient positioning:

LPO Left posterior oblique (patient's back to the table, rotated 45 deg to left)

RAO Right anterior oblique (patient facing the table, rotated such that right shoulder is touching table)

Double-Contrast Esophagram

Indications:

-Evaluate esophageal mucosal detail, specifically looking for ulcerations, masses, characterization of the mucosal folds

Preparation/Supplies:

- Effervescent agent, water, ~100cc high-density 'thick' barium (250% w/v), 13mm barium tablet

Procedure:

1. Position patient **upright LPO**. Fluoro to assess correct positioning. Magnify the image so that the proximal third of the esophagus is within the field-of-view. Make sure the spine is not overlapping with the esophagus. Instruct patient to hold the thick barium cup in their left hand.
2. When ready, add 10-15cc of water to effervescent granules and instruct patient to swallow mixture quickly. Instruct patient to keep swallowing to avoid belching.
3. Instruct patient to gulp cup of high-density barium
4. Acquire spot images of the proximal, mid, and distal (including the GE junction) esophagus with esophagus distended. You have to be quick with the image acquisition, otherwise you will lose esophageal distension! If needed, you may instruct patient to take gulps of air to distend the esophagus again.
5. Once the double contrast portion of the exam is completed, you may administer a barium tablet if there is concern for esophageal stricture. After patient swallows the tablet, watch passage of tablet under fluoroscopy.
6. When the double-contrast portion of the exam is completed, move on to the single contrast exam as described below.

Single-Contrast Esophagram

Indications:

-Evaluate esophageal motility, stricture, reflux

-Limited evaluation of mucosa

Preparation/Supplies:

-Supplies: low density 'thin' barium

Procedure:

1. Position patient **supine RAO** with table **horizontal** (pillow under head, right arm behind back, left knee bent). Patient should hold cup of thin barium with straw in the left hand.

2. Instruct patient to continuously drink barium through straw
3. While the patient is drinking, obtain a cine (video) of the esophagus (no need to magnify but collimate the image), watching as contrast moves through the esophagus and drains into the stomach. Position patient **supine**.
4. Fluoro, checking for spontaneous gastroesophageal reflux. If no reflux, ensure fundus of stomach contains a large amount of contrast (may need to get patient to drink more) and instruct patient to roll from supine to right posterior oblique position (right side down) while watching the GE junction under fluoroscopy
5. Provocative maneuvers for reflux include instructing patient to lift up their legs or to valsalva.

Upper GI Series

Indications:

-Evaluate gastric/duodenal mucosal detail, specifically looking for ulcerations, masses, characterization of the mucosal folds

Preparation/supplies:

- NPO after midnight
- No antacids morning of study (or any medications that will coat the stomach)
- No smoking, chewing gum, or tobacco on the day of (stimulates secretions)
- Diabetics on insulin should be scheduled early in the day to prevent hypoglycemia
- Supplies that should be ready: Effervescent agent, water, ~100cc high-density 'thick' barium (250% w/v), 13mm barium tablet, compression paddle

Note: Hypotonic agents (eg 0.1mg of IV glucagon) are sometimes administered before examination to prevent muscular contraction in the stomach and prevent rapid emptying of barium into the small bowel

Procedure:

1. Complete a double-contrast esophagram, steps 1-4, as described above.
2. Position patient **supine** with table **horizontal**. Magnify image (or collimate for young patient) so that only stomach is within the field of view.
3. Roll the patient to the right, rotating a full 360 degrees 2-3 times to coat the stomach with barium. Return patient to supine position.
4. Acquire spot image(s) of the **gastric body/antrum**.
5. Position patient **right lateral**.
6. Acquire spot images of the **cardia/fundus**
7. Position patient **LPO (right side slightly up)**.
8. Acquire spot images of the **duodenal bulb** and **duodenal C-loop**.
9. Once double contrast portion of the exam is completed, move on to the single-contrast esophagram as described above and assess for reflux.

Double-Contrast Barium Enema

Indications:

- Evaluate polyps, carcinoma, diverticular disease, and inflammatory bowel disease when colonoscopy cannot be performed or is incomplete
- Contraindicated if suspected toxic megacolon, colonic perforation, acute abdomen, or within 1 week of colonoscopy with colonic biopsy. Relatively contraindicated in suspected colonic obstruction or acute diverticulitis—use single contrast exam in these instances.

Preparation/supplies:

- Clear liquid diet day before study and NPO after midnight
- Go-lytely prep the day before and 4 bisacodyl tablets the night before exam.
- On the morning of exam, a bisacodyl suppository is administered per rectum.
- Supplies: medium density barium (70 to 100% w/v), Miller air catheter tip, half-inch rectal tubing, barium enema bag

Note: Patients with hypomotility (bed-ridden, diabetes, opiates, anticholinergics) may have incomplete cleansing. If significant feces on KUB, delay study for 24 hours.

Procedure:

1. Obtain scout film of the abdomen to assess for free air, masses, bowel wall changes, and colonic cleansing.
2. Inject 1mg glucagon IM to prevent colonic spasm.
3. Position patient **left lateral** with table **horizontal**. Perform rectal exam to exclude masses and assess rectal tone.
4. Insert rectal tip into anus. Once past the anus, direct tip posteriorly, paralleling the sacrum. If patient has good rectal tone, you do not need to inflate the rectal tip balloon. If during the exam, air or barium is leaking, then the balloon should be inflated. Contraindications to balloon inflation include suspected colitis, perianal disease (Crohns), rectal mass, or history of pelvic radiation.
5. Position patient **prone horizontal**. Slowly instill barium by gravity with tubing half open. Fill barium column to approximately half-way through the transverse colon, just past the splenic flexure. If the sigmoid is redundant, stop before the splenic flexure.
6. Drain barium from the rectum by gravity.
7. Position patient **prone Trendelenburg**. Gently insufflate air into the colon.
8. Position patient **left lateral Trendelenburg**. Acquire spot image of **rectum**.
9. Position patient **LPO Trendelenburg**. Acquire spot image of sigmoid.
10. Position patient **RAO Trendelenburg** to advance barium column into the ascending colon. Gently insufflate air into the colon.
11. Position patient **prone Trendelenburg**. Fluoro to check that barium column has passed the hepatic flexure into the ascending colon. Acquire spot image of the **rectum**.
12. Position patient **left lateral Trendelenburg**. Acquire spot image of the **rectum**.
13. Position patient **LPO Trendelenburg**. Acquire spot image of the **sigmoid**.
14. Position patient **upright RPO Trendelenburg**. Acquire spot image of **splenic flexure**.
15. Position patient **upright LPO Trendelenburg**. Acquire spot image of the **hepatic flexure**.
16. Change table to **horizontal** position with patient **supine**. Acquire spot images of the **transverse colon**.

17. Position patient **horizontal RPO**. Acquire spot images of the **descending colon**.
18. Position patient **horizontal LPO**. Acquire spot images of the **ascending colon/cecum**.
19. Obtain multiple abdominal radiographs in the following positions: prone (PA of abdomen, rectosigmoid view, cross table lateral view of rectum), supine, RAO, LAO, right lateral, left lateral

Retrograde Urethrogram (RUG)

Indications:

--Evaluate anterior urethra (male)

Preparation/Supplies:

--Foley catheter kit

Procedure:

1. Position patient supine with table in horizontal position.
2. Flush Foley catheter with sterile saline prior to insertion. Insert pediatric-sized foley catheter using sterile technique.
3. Insert catheter tip about 10cm into penile urethra and place penile clamp to maintain catheter position.
4. Position patient supine RPO or LPO with penis placed laterally over patient's thigh. Apply moderate traction to the penis.
5. Instill 20-30 cc of contrast very slowly until the urethra is completely opacified and contrast begins filling the bladder. Do not push against resistance—this may cause intravasation of contrast.
6. Acquire images of the anterior and posterior urethra while maintaining penile traction.
7. Remove catheter and immediately acquire image of the anterior urethra.

Voiding cystourethrogram (VCUG)

Indications:

--Evaluation of posterior urethra (male) and female urethra; evaluation for reflux.

Preparation/Supplies:

--Foley catheter kit

Procedure (Male patient):

1. Position patient supine with table in horizontal position.
2. Flush Foley catheter with sterile saline prior to insertion. Insert pediatric-sized foley catheter using sterile technique.
3. When catheter tip is within the bladder, place penile clamp.
4. Begin filling the bladder with contrast by gravity.
5. Acquire AP, and bilateral oblique images of the bladder during early filling to assess for bladder pathology (ureteroceles or diverticula).

6. During bladder filling, intermittently fluoro to assess for bladder pathology and vesicoureteral reflux.
7. Fill the bladder with contrast by gravity, approximately 300-400 cc, or until patient feels strong urge to void.
8. When the bladder is full, remove Foley catheter. Position patient in the upright RPO or LPO positions. Instruct patient to apply traction to penis while voiding in a container.
9. Acquire images of the posterior urethra, then anterior urethra while voiding.
10. When patient has finished voiding, acquire frontal image of the bladder and kidneys to assess for urinary retention and vesicoureteral reflux.

References:

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