

GUIDELINES FOR RESIDENTS IN FLUOROSCOPY

Welcome to GI/GU Fluoroscopy

Introduction:

The aim of the Fluoroscopy Service at UF is to provide complete and accurate studies performed in an expeditious manner, with attempts to minimize patient discomfort and delay while assisting referring physicians in answering clinical conundrums. While many answers can be provided through the use of cross-sectional imaging, fluoroscopy provides real-time visualization of dynamic processes as they occur.

- Each day begins after morning conference where you will stop by in Fluoroscopy to obtain the list of daily cases (from Nanci - Lead Fluoroscopy Technologist).
- Review your schedule and find out which studies are happening in the North and South Tower. If you notice that there are studies that are scheduled at the same time (requiring you to be two places at once!), please ask a resident who has already completed his/her fluoroscopy rotation for assistance (covering resident) in your schedule. As the GI/GU resident you will have first choice on which study you would like to do!
 - The covering resident will likely be able to assist you by doing a few of the swallowing studies that have been scheduled in the North Tower.
 - Please make sure that you notify the head fluoro tech that the covering resident will be covering cases in the North Tower, while you perform cases in the South Tower.
 - Provide the Head Fluoro Tech with the name of your covering resident **and an efficient means** to communicate with him/her.

- After obtaining the list of cases it is important to determine why the studies are being requested. The key to a successful fluoroscopy rotation is taking an active role a patient care advocate. This involves obtaining a good history- through EPIC (medical records), conversations with the referring clinicians as well as the review of prior imaging. Do not forget to review recent procedures such as endoscopies, colonoscopies and the operative reports. This information will help you understand what you might see during the examination, allow you to anticipate certain findings and possible changes that may need to be made in a "routine" study protocol.
- In some cases, you may note that the examinations which are ordered are not in fact actually needed. Please check with your attending cancelling any of the cases on the schedule.
- Once you have done your homework, present the cases to the GI/GU attending and discuss what are you planning to do and what you may see in the clinical setting.
- After performing the study, send the pictures via PACS. Call the attending to review the images. The attending may ask you to obtain more images. **DO NOT SEND THE PATIENT** without reviewing the images with an attending. If the GI/GU attending has stepped out ask for an alternate attending.
- You may be requested to add additional cases onto the schedule, before adding cases check with your attending.

The remainder of this packet will contain your educational goals, guidelines, and most common procedural protocols as well as a list of references to guide your reading for this month.

COMPETENCY-BASED GOALS AND OBJECTIVES

1. Medical Knowledge

a. Instrumentation and Protocols

i. Basic fluoroscopic instrumentation

A. The first time you are on fluoro - ask your attending for an introduction to the fluoro tower and buttons

ii. Common fluoroscopic artifacts

iii. Become familiar with common fluoroscopic protocols

iv. Types of oral contrast

b. Bowel

i. Normal and abnormal appearances of the esophagus, stomach, small bowel and colon on fluoroscopy (details to follow in the packet)

c. Gynecology

i. Normal and abnormal appearance of the uterus and uterine tubes on hysterosalpingography (HSG)

d. Urethra and Bladder

i. Normal and abnormal appearance of the urethra on retrograde urethrogram (RUG)

ii. Normal and abnormal appearance of the urinary bladder and urethra on voiding cystourethrogram (VCUG)

2. Patient Care

a. Gather clinical information about patients relevant to the interpretation of the examination as described in the introduction.

b. Communicate with the patient prior the procedure. Introduce yourself, including the fact that you are a radiology resident. Let them know what you will be doing and what you are looking for. Demonstrate caring and respectful behavior.

i. In your pediatric fluoroscopy rotation - you will be explaining the procedure to the patient's parents who will be present for the entirety of the study.

- c. Use of information technology to support patient care decisions - IE
Look up things you don't know!
 - d. Effectively perform fluoroscopic procedures in a way that minimizes patient discomfort but answers the clinician's question.
 - e. If an attending is not present and if asked or you sense the patient or family member is uncomfortable with the lack of direct supervision ask the attending to participate.
 - f. If you are uncomfortable with the procedure or concerned with findings that may need further evaluation, inform the attending.
3. Practice-Based Learning and Improvement
- a. Participate in self-learning including outside reading, Statdx, radiopedia and articles found in Radiology and Radiographics. See the list provided.
 - b. Participate in QI/QA activities - watch out for artifacts. Remember to consider fluoro time and reduce dose by collimating etc.
4. Interpersonal and Communication Skills
- a. Dictate prompt, concise, accurate and concise radiological reports.
 - b. Promptly communicate urgent, critical or unexpected findings to residents, referring physicians or clinicians and document the communication in the report. (Name of clinician, findings discussed, time and date).
5. Professionalism
- a. Demonstrate respect and compassion to patients, physicians, and staff.
 - b. Demonstrate positive work habits, such as punctuality.
 - c. Commitment to ethical principles and patient confidentiality.

6. Systems Based Practice

- a. Understand how medical decisions affecting patient care within the larger system.
- b. Demonstrate knowledge of appropriateness criteria.

FLUOROSCOPIC GI/GU STUDIES

- Esophagram/Barium Swallow
- Modified Barium Swallow (performed with Speech Pathologist) with or without limited esophagram
- Upper GI examination (UGI)
- Small bowel follow through (SBFT)
- Post-surgical: Esophageal repair/stent, POEM, Gastric pull-up, Whipple, Gastric Bypass
- Barium Enema Examination
- Air contrast Enema for Intussusception Reduction
- Fistulogram
- Voiding Cystourethrogram
- Retrograde Urethrogram
- Fluoroscopic Assistance for Hysterosalpingogram

This list contains the most commonly performed fluoroscopic studies at Shands Hospital, although this is not exhaustive of the procedures performed in the Fluoroscopic Suite, it should suit your needs for this rotation

- Radiologic placement of an enteric tube (RARE - and must make sure that all the criteria for floor placement and Core-trak attempt have been performed - please see document by Dr. Abbitt below)

Shands at University of Florida
Fluoroscopy Department

Enteric Feeding Tube (Dobhoff Tube) Placement Policy

Our policy with enteric feeding tube placements (DHTs) is that the ward physicians are to attempt to place ALL DHTs first, and to give the tube time to migrate into position (overnight) after placement prior to contacting us. This is to be documented by KUB films. All patients needing our assistance (barring extenuating circumstances such as altered post-surgical anatomy) should present to the Fluoro Department with the tube already in the stomach. We will use fluoroscopic visualization simply as an aid to further place the DHT transpylorically, in those circumstances where they have been unsuccessful. We are more than happy to assist in transpyloric advancement of the DHT AFTER prior unsuccessful attempts on the floor.

Nanci LeVake, Fluoro Coordinator

Per Dr. Patricia Abbitt and Dr. David Wymer

OVERVIEW OF CONTRAST AGENTS

There are a few types of contrast that are used in Fluoroscopy:

1. Barium Sulfate: is a relatively inert agent; however it can incite an inflammatory response if spilled into the MEDIASTINUM or PERITONEAL CAVITY. Use barium cautiously if there is a colonic obstruction.
 - a. Consult Peds attending if there is a question.
 - i. Peds surgery prefers Barium over water soluble.
 - ii. Peds tends to use Barium in most cases, except in the post-op state.

2. Iodine-based contrast agents:
 - a. High Osmolality Agents (HOCM) - include agents such as Gastroview and Gastrograffin (**never used in kids!**). These tend to be flavored (not well!) and are for enteric use ONLY. All of these agents are ionic.
 - i. WARNINGS: HOCM agents can cause bronchospasm, pulmonary edema, pneumonitis and are CONTRAINDICATED IN THOSE PATIENTS WITH TRACHEAL ASPIRATION OR TRACHEOESOPHAGEAL FISTULA (TEF).
 1. Do not use these agents in patients who are status post esophageal interventions! Please use LOCM agents.
 2. These agents are hyperosmolar - so do not use them in the elderly or infants - they will draw fluid into the bowel lumen.

 - b. Low Osmolality Agents (LOCM) - include agents such as Omnipaque and Isovue. LOCM agents include both ionic and NON-ionic compounds.

HELPFUL HINTS FOR PATIENT POSITIONING

Meet the Fluoro tower...

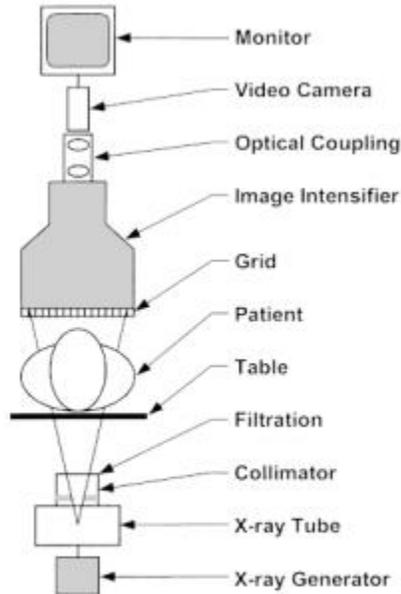


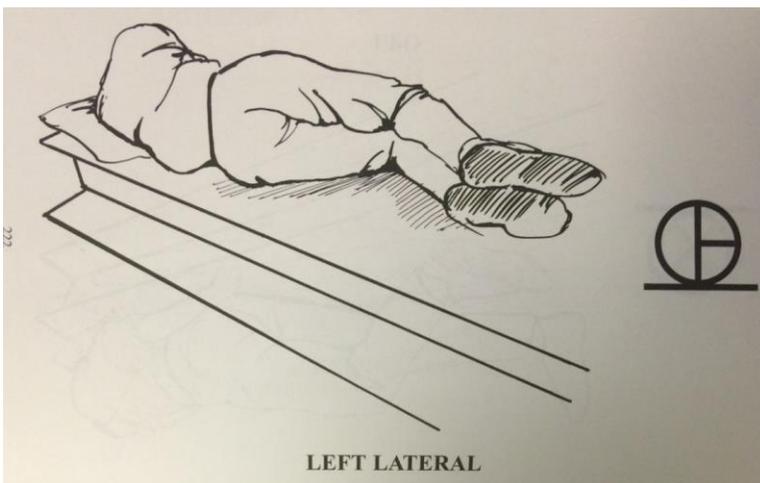
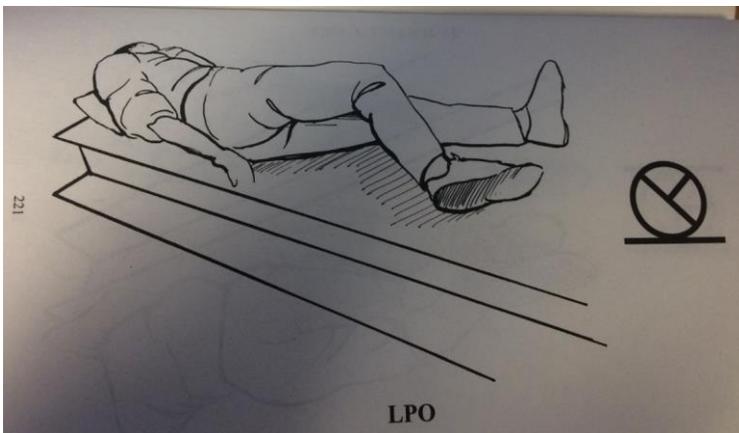
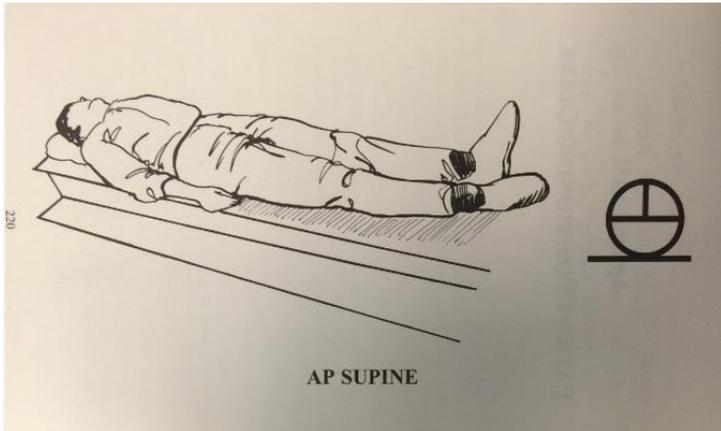
Figure 2. Diagram shows the components of a fluoroscopic imaging chain.

Picture Reference: <http://pubs.rsna.org/doi/pdf/10.1148/radiographics.20.4.g00jl301115>
(*Suggest reading*)

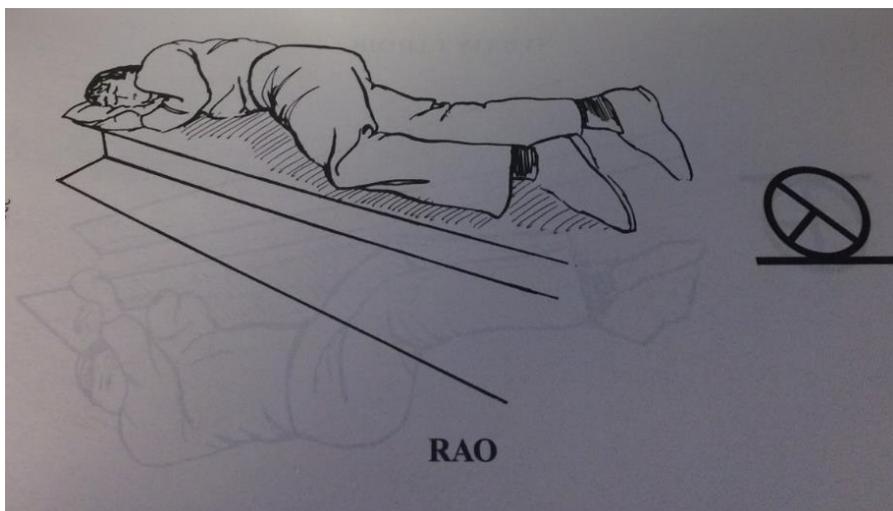
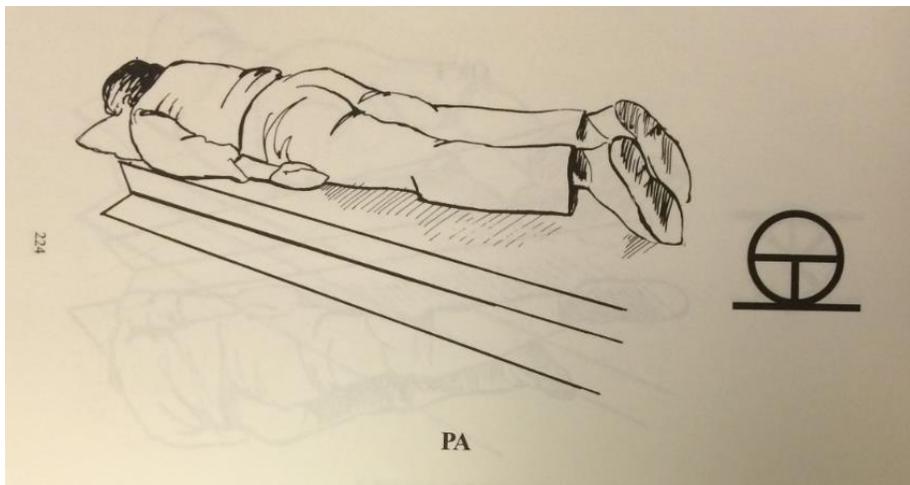
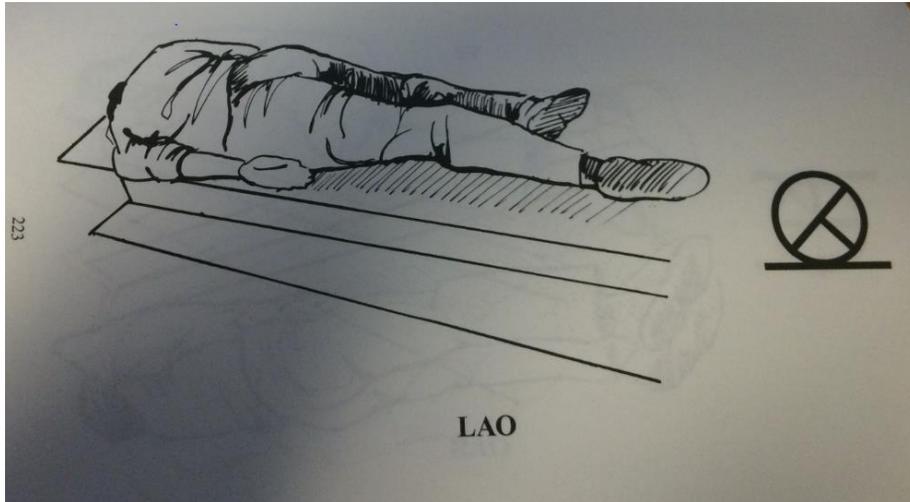
We will orient the patient in reference to the X-ray Table. The patient is in the supine position above.

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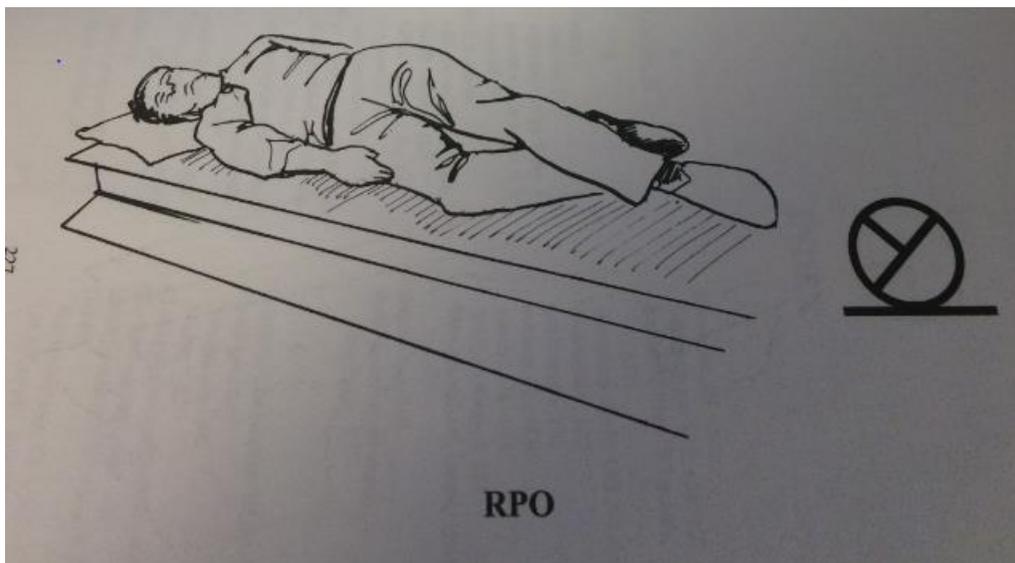
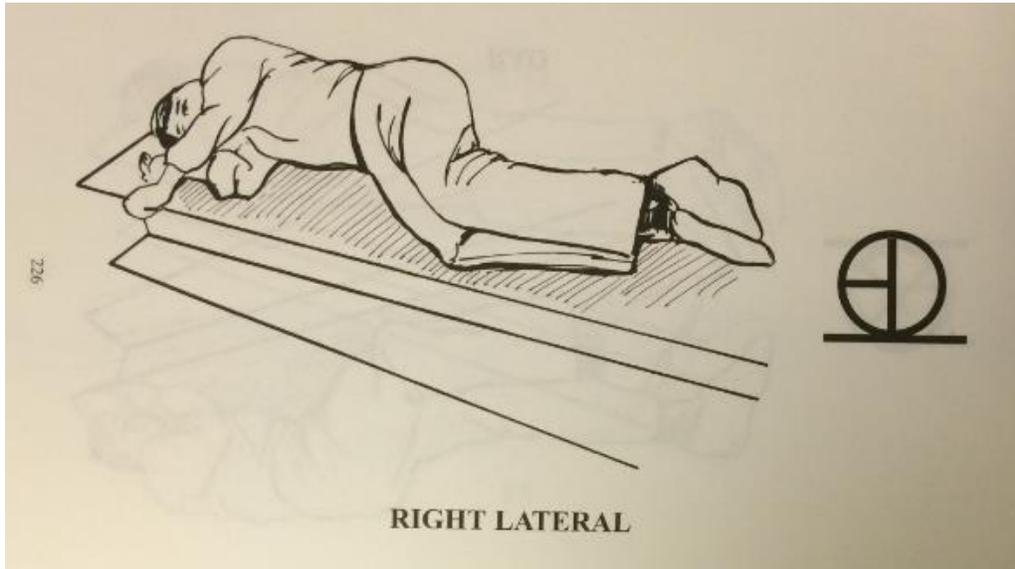
Javors BR. *Manual of GI Fluoroscopy*. 1st ed. New York, NY: Thieme Medical Publishers Inc.; 1996.



Javors BR. *Manual of GI Fluoroscopy*. 1st ed. New York, NY: Thieme Medical Publishers Inc.; 1996.



Javors BR. *Manual of GI Fluoroscopy*. 1st ed. New York, NY: Thieme Medical Publishers Inc.; 1996.



REFERENCES

There are a wide range of useful articles that can be used to learn about the procedures and imaging findings of certain pathologies. These articles are listed under suggested reading which can be found after each procedure. However, there are a few books which I do suggest that you use as your primary references for "how -to" and for pathologic findings.

Books:

1. Houston JD, Davis M. *Fundamentals of Fluoroscopy*. 1st ed. Saunders, 2001.
2. Javors BR. *Manual of GI Fluoroscopy*. 1st ed. New York, NY: Thieme Medical Publishers Inc.; 1996.
3. Johnson, CD, Schmit, GD. *Mayo Clinic Gastrointestinal Imaging Review*. Rochester, MN: Mayo Clinic Scientific Press, 2005.

Journal Articles

1. Geise, R. Fluoroscopy: Recording of Fluoroscopic Images and Automatic Exposure Control. *Radiographics* 2001; (21): 227-236.
<http://dx.doi.org/10.1148/radiographics.21.1.g01ja19227>
2. Schueler, BA. General Overview of Fluoroscopic Imaging. *Radiographics* 2000; 20 (1) 1115-1126.
<http://pubs.rsna.org/doi/abs/10.1148/radiographics.20.4.g00j1301115>

ESOPHAGRAM/BARIUM SWALLOW

Most Common Indications: Dysphagia, odynophagia, globus sensation

Patient Preparation: NPO for a minimum of 2 hours

Materials: "Thin" and "Thick" Barium (or Water Soluble contrast), 12.5 mm Barium Tablet

Please note that if this exam is being done in a patient who is post-operative or there is a question for perforation you will be using WATER SOLUBLE CONTRAST. Additionally, if the patient is at risk for both PERFORATION and ASPIRATION, a low osmolar intravenous agent can be administered orally without the risk of hypertonic pneumonitis.

Procedure:

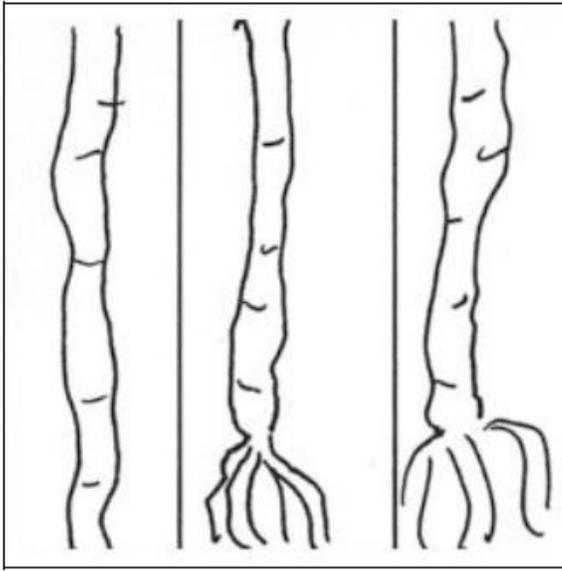
In the North tower Fluoroscopy suite, please note that most exams are done for inpatients and therefore techniques that you may see at the VA or in Plaza may differ. For example in the VA or Plaza you may see the use of "fizzies." This allows us to create "double contrast" and allows the radiologist to evaluate the mucosa of the esophagus. Since, most of the patients we do here at Shands are post-operative we do not typically use "fizzies" or the double contrast technique. However if mucosal evaluation is needed we will use "fizzies" per attending discretion.

Furthermore, "fizzies" are not used in the pediatric population.

Adults:

1. Start the procedure by explaining to the patient exactly what you are going to do today.
2. Begin with the adult in the standing position facing you. Since many of our patients are post-operative or frail they will not be able to stand. In that case the study can be performed in the supine or reverse Trendelenburg position.
3. Fluoro the chest and remove any artifacts - such as clips and leads from the patient.
4. Obtain a scout radiograph of the chest.
 - a. *****IF WE ARE USING FIZZIES, PLEASE ADMINISTER THEM TO THE PATIENT AT THIS POINT*****
 - i. Have the patient take the "gas crystals" like they are doing a shot, into the back of their throats, and have them chase it with water.
 - ii. INSTRUCT THE PATIENT NOT TO BURP!! The gas is what gives us the contrast for mucosal evaluation.
5. Ask the patient to take a mouthful of the "thick" barium" and watch the patient swallow. For the first swallow you do not have to obtain any images, this is for you to understand the patient's motility and ability to perform study.
6. Now position the patient in the LPO position standing and have them swallow a mouthful of barium (3 swallows for your 3 shots).
 - a. Shoot the proximal (cervical) esophagus. You may grab or shoot a full exposure.
 - b. Shoot the mid thoracic esophagus.
 - c. Shoot the distal thoracic esophagus.

Please note the following images are obtained with the double contrast technique outlining the mucosa If there is a mucosal question, the exam should be performed with "fizzies" - please see addendum at the end of this protocol.



Picture Reference:

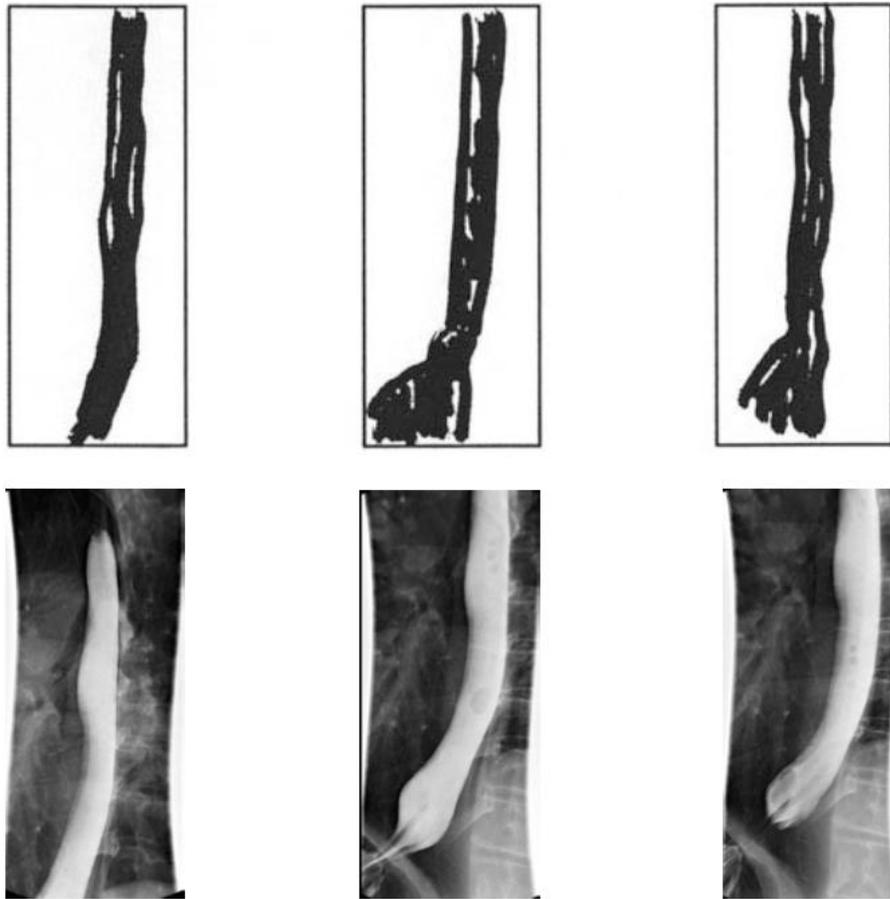
Smith, JP et al. (2009). *Guidelines for Residents in Gastrointestinal Radiology*. Available at:

http://www.uasom.uab.edu/PublicDocuments/Radiology/P&P/GI%20Protocols%20Revised_8-09.pdf

HELPFUL HINT 1: Also when, obtaining images, remember if there is something that looks like a stricture - have the patient drink and either demonstrate that the finding remains, or the contrast clears and that it was likely peristalsis.

HELPFUL HINT 2: If you do see something abnormal remember this is what are evaluating, Take pictures, magnify your image etc. But **DO KEEP AN EYE** on your fluoro time!

7. We will now lie the patient down on the table and place them in the right lateral position and obtain lateral pictures of the esophagus (obtain a column of barium in the esophagus). You may use "thin barium" as you will have the patient taking multiple sips quickly or "chugging the barium".
 - a. Center first over the upper thoracic esophagus.
 - b. Include a shot of the open lower esophageal sphincter (LES) on the last two views that you take
 - c. Obtain a magnified image of the LES.



Picture Reference:

Smith, JP et al. (2009). *Guidelines for Residents in Gastrointestinal Radiology*. Available at:

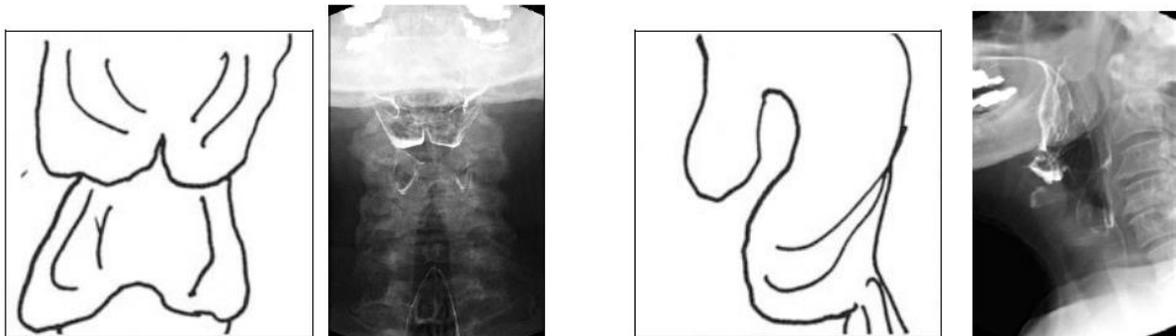
http://www.uasom.uab.edu/PublicDocuments/Radiology/P&P/GI%20Protocols%20Revised_8-09.pdf

8. Now we will evaluate for reflux.

- a. Place the patient in the RPO position, this will allow the contrast to pool into the cardia of the stomach. In peds, fluoro intermittently for 3-5 minutes to evaluate completely.
 - i. To illicit reflux, there are three maneuvers that one can apply:
 1. Observe the GE junction while the patient performs a Valsalva maneuver and coughs.
 2. Watch while the patients rolls over onto the right lateral position.
 3. "Water siphon test" - have the patient take two sips of water in the RPO position. Watch the water go down the GE junction and check if there is any reflux.

- ii. If you observe the patient refluxing, it is important to note three things:
 1. The maneuver that elicited the reflux.
 2. How far patient refluxed (cervical, upper, mid, distal thoracic esophagus).
 3. Time it takes for the esophagus to clear the reflux.
9. Now we will examine the pharynx by centering on the pharynx. The patient will be standing (if able) for this portion of the exam.
You may use 1-2x magnification for this portion of the exam.
 - a. Have the patient take a few sips of thick barium and ask them to "gargle" with the barium. Instruct the patient that you are trying to "coat their throat" with the barium so that we may outline their anatomy.
 - b. With the patient's throat coated we will perform a series of maneuvers to demonstrate the anatomy of the pharynx.
 - i. Ask the patient to hold their chin up
 - ii. Take a scout image
 - iii. Now ask the patient to say "EEEEEE" and take an image
 - iv. Now have the patient PUFF OUT their cheeks, take an image
 - v. Repeat the above maneuvers with the patient in the lateral position.

The following images demonstrate your scouts in the AP and Lateral positions



**2. Standing AP pharynx
(digital, 6" II).**

**3. Lateral pharynx
(digital, 6" II).**

Picture Reference:

Smith, JP et al. (2009). *Guidelines for Residents in Gastrointestinal Radiology*. Available at:

http://www.uasom.uab.edu/PublicDocuments/Radiology/P&P/GI%20Protocols%20Revised_8-09.pdf

If you do see abnormalities on this portion of the exam - obtain a CINE like study. Ask the patient to hold the contrast in their mouth- change the film speed on the tower to 3 frames/second and have the patient swallow on the count of three and obtain images.

10. Complete the exam by having the patient swallow the barium pill.
 - a. The barium tablet is typically 12.5mm in size as strictures that are less than 13 mm are the ones that cause dysphagia in patients.
 - b. Strictures ranging in size from 13-19mm may or may not cause symptoms.
11. Demonstrate where the barium pill ends up.
 - a. If the pill gets "caught" - have the patient drink water to move the pill along.
 - b. The pill will eventually dissolve so reassure the patient that it will not be stuck.
12. Now check the images with your attending and repeat any portions of the exam that your attending may feel are unclear.
13. Upon completion of the exam, feel free to let the patient know if the preliminary findings, noting of course that the final read will be send to their ordering physician.

Peds

The above can be used as guidelines in the pediatric population; however, often times the indications are different. As mentioned above, double contrast is not used in pediatric patients.

Make sure the TECH has used pediatric settings on the fluoro tower and there is pulsed fluoro.

You will NOT take full exposures, but instead will use FLUORO Grabs, last image hold saves.

You will NOT use MAGNIFICATION.

Also, we do not typically exam the pharynx in peds, the pharynx is usually examined in the setting of a modified barium swallow study with a speech pathologist.

Suggested Reading:

1. Levine, MS, Rubensin SE. Diseases of the Esophagus: Diagnosis with Esophagography. *Radiology* 237(2): 414-427.
http://geiselmed.dartmouth.edu/radiology/resources/fluoroscopy/pdf/esophageal_disease.pdf
2. Levine, MS. Radiologic Evaluation of the Esophageal Phase of Swallowing: In Levine, MS. *Manual of Diagnostic and Therapeutic Techniques for Disorders of Deglutition*. http://link.springer.com/chapter/10.1007%2F978-1-4614-3779-6_4
3. Leudtke, PA et al. Radiologic Diagnosis of Benign Esophageal Strictures: A Pattern Approach. *Radiology* 23 (4): 897-909.
<http://pubs.rsna.org/doi/pdf/10.1148/rq.234025717>
4. Gupta S, Levine MS, Rubesin SE, Katzka DA, Laufer I. Usefulness of barium studies for differentiating benign and malignant strictures of the esophagus. *AJR* 2003; 180:737-744.
5. Baker et al. Gastroesophageal Reflux Disease: Integrating the Barium Esophagram before and after Antireflux Surgery. *Radiographics* 243 (2): 329-339. <http://pubs.rsna.org/doi/pdf/10.1148/radiol.2432050057>

Websites:

<http://www.radiologyassistant.nl/en/p472458f15c55a/esophagus-part-i.html>

MODIFIED BARIUM SWALLOW WITH LIMITED ESOPHAGRAM

For this exam we are providing fluoroscopic assistance to the Speech Pathologist as they evaluate the patient's ability to swallow a variety of consistencies of foods coating in barium.

1. Introduce yourself to the speech pathologist as the radiology resident on service.
2. Discuss what the expected imaging findings are.
3. Discuss the speech pathologist expectations of the study and whether or not a limited esophagram will be performed.
4. Introduce yourself to the patient as the radiologist who will be assisting the Speech Pathologist for this exam.
5. Line up the patients head/neck under fluoroscopy, remember to collimate to the region of interest.
6. Make sure the patient's eyes are NOT included in your field.
7. Observe the Speech Pathologist giving the patient a variety of consistencies. As the radiologist, it is your job to note any instances of aspiration or penetration on the exam and what consistency of barium they occurred with.
8. Observe the patient for any other pathologies, such as premature slippage, delayed swallow etc.
9. If there are any unexpected findings not related to a swallow study that you feel would warrant more imaging. Please save shots and discuss them with your attending at the time of interpretation.
10. The Speech Pathologist may ask you to perform a limited Esophagram.
 - a. This means we will observe the esophagus in ONLY ONE VIEW. If there is pathology - please take an image to document. We will then suggest to the clinicians to perform a full diagnostic esophagram.
11. Discuss the case with the Speech Pathologist upon completion and note any findings that he/she may add to your interpretation.
12. It is not necessary to review the images with your attending prior to sending the patient.

- a. However, take down any notes that you feel are necessary for discussion with your attending at the time of interpretation.

Suggested Reading:

1. Matsuo, K et al. Anatomy and Physiology of Feeding and Swallowing - Normal and Abnormal. Phys Med Rehabil Clin N Am. 2008 Nov; 19(4): 691-707.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2597750/>

UPPER GI SERIES (Back)

Most Common Indications: Epigastric pain, anemia, heme+ stools, GERD, hiatal hernia

Patient Preparation: NPO after midnight, or at least 4-6 hours.

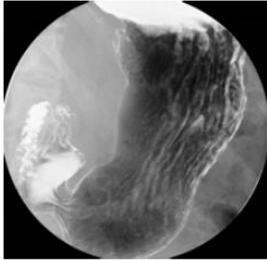
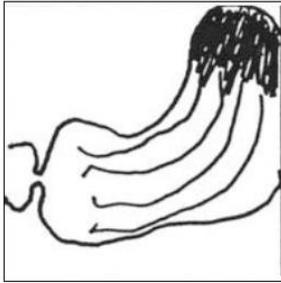
Materials: "Thin" and "Thick" Barium (or Water Soluble contrast)

Please note that if this exam is being done in a patient who is post-operative or there is a question for perforation you will be using WATER SOLUBLE CONTRAST. Additionally, if the patient is at risk for both PERFORATION and ASPIRATION, a low osmolar intravenous agent can be administered orally without the risk of hypertonic pneumonitis.

Procedure:

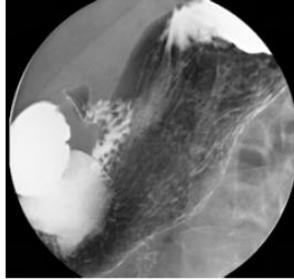
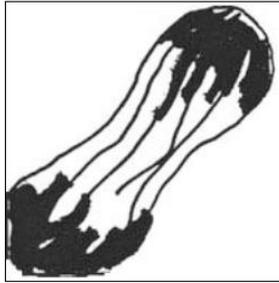
1. Start the procedure by explaining to the patient exactly what you are going to do today.
2. Begin with the adult in the standing position facing you. Since many of our patients are post-operative or frail they will not be able to stand. In that case the study can be performed in the supine or reverse Trendelenburg position.
3. Fluoro the chest and abdomen and remove any artifacts - such as clips and leads from the patient.
4. Look for four things:
 - a. Full stomach (cannot evaluate stomach if the stomach is full)
 - b. Bowel obstruction
 - c. Free air
 - d. Barium present in small bowel or colon
5. ***IF WE ARE USING FIZZIES, PLEASE ADMINISTER THEM TO THE PATIENT AT THIS POINT***

- a. Have the patient take the "gas crystals" like they are doing a shot, into the back of their throats, and have them chase it with water.
 - b. INSTRUCT THE PATIENT NOT TO BURP!! The gas is what gives us the contrast for mucosal evaluation.
6. Ask the patient to take a mouthful of the "thick" barium" and watch the patient swallow. For the first swallow you do not have to obtain any images, this is for you to understand the patient's motility and ability to perform study.
7. Now position the patient in the LPO position standing and have them swallow a mouthful of barium (3 swallows for your 3 shots).
 - a. Shoot the proximal (cervical) esophagus. You may grab or shoot a full exposure.
 - b. Shoot the mid thoracic esophagus.
 - c. Shoot the distal thoracic esophagus.
8. You may need to instruct patient to drink more barium if you do not feel there is enough in the stomach.
9. Next we will move the patient into the supine position.
 - a. If we are using the "fizzies" (ie doing a double contrast exam) and looking at mucosa please do the following:
 - i. Instruct the patient that we are attempt to coat their stomach with barium (this is important if we are looking at the mucosa using the fizzies technique).
 - ii. We will ask the patient to roll through the left lateral position to the prone position and back ("roll like a cement mixer").
10. Capture images of the stomach in the supine position.
11. Now we will obtain contrast filled images of the stomach. Please see the images below for guidance.
 - a. Shoot the cardia and fundus of the stomach
 - b. Shoot the mid body of the stomach outlining the greater curvature
 - c. Shoot the antropyloric region of the stomach (if you miss this here don't worry you'll get it when you evaluate the duodenal bulb)



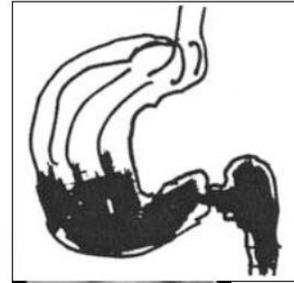
2. LPO stomach

(9" II): This view provides detail of the body and antrum.



3. RPO stomach

(9" II): (Check for reflux at this time.) This view is optimized for the lesser curve.



4. Lateral stomach

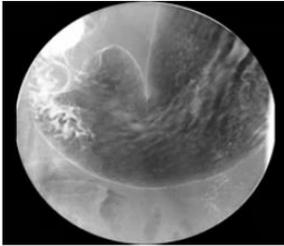
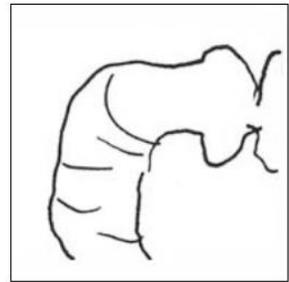
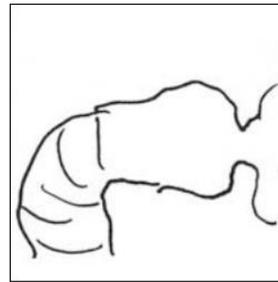
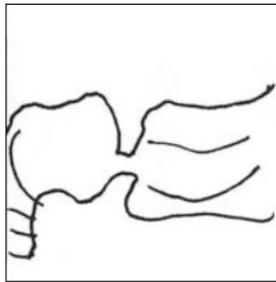
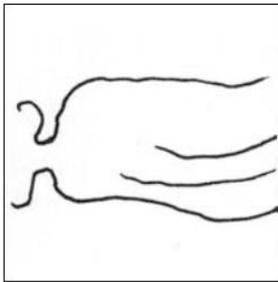
(12" II): This view assesses the gastric cardia ("rosette") and fundus as well as the anterior wall of stomach.

Picture Reference:

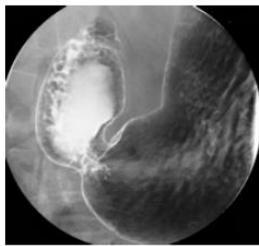
Smith, JP et al. (2009). *Guidelines for Residents in Gastrointestinal Radiology*. Available at:
http://www.uasom.uab.edu/PublicDocuments/Radiology/P&P/GI%20Protocols%20Revised_8-09.pdf

Although not pictured above, please obtain images of a contrast filled cardia, as attempted in the first image (labelled two) above.

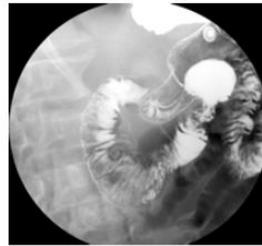
12. Now we will watch the duodenal bulb (spade shaped). If performing a double contrast exam (ie with fizzies). Please follow the instructions below
 - a. Have the patient moved into the LPO position, and try to capture an air-filled duodenal bulb. It may help to initially place the patient in a left lateral decubitus position, and gently roll them into an LPO position while coughing to capture an air-filled bulb. Note if you cannot obtain this come back to this LATER.



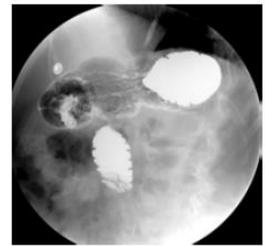
**5. LPO antrum
(4.6 or 6" II).**



**6. LPO antrum
and bulb
(4.6 or 6" II).**



**7. LPO bulb
(4.6 or 6" II).**



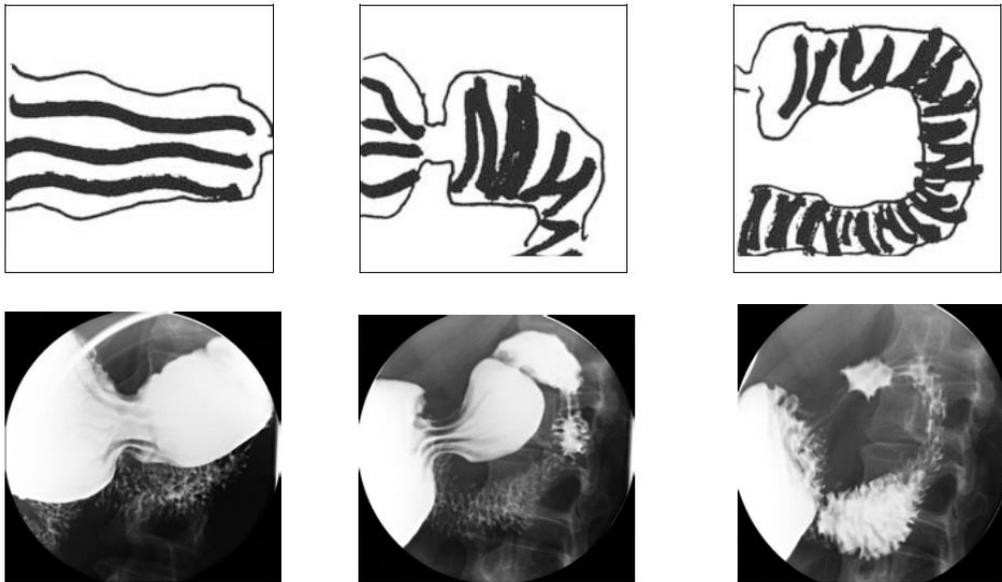
**8. LPO bulb
(4.6 or 6" II).**

Picture Reference:

Smith, JP et al. (2009). *Guidelines for Residents in Gastrointestinal Radiology*. Available at:

http://www.uasom.uab.edu/PublicDocuments/Radiology/P&P/GI%20Protocols%20Revised_8-09.pdf

13. For the standard contrast filled duodenal bulb we will have the patient move into the RPO to Right lateral position. This encourages the contrast to move through the stomach to the gastroduodenal junction and for contrast to move through the duodenal C-loop.



Picture Reference:

Smith, JP et al. (2009). *Guidelines for Residents in Gastrointestinal Radiology*. Available at:
http://www.uasom.uab.edu/PublicDocuments/Radiology/P&P/GI%20Protocols%20Revised_8-09.pdf

14. Once you see the C-loop of the duodenum place the patient in the supine position.
 - a. The contrast will flow across the third and fourth portions of the duodenum and will cross the Ligament of Treitz (In a peds case you are done here!).
 - i. Take this picture
 - ii. You should also have a good picture of a contrast filled stomach and be able to evaluate the proximal small bowel
15. Now test for reflux (please see guidelines for the [Esophagram](#)).
16. Obtain a picture of the standing stomach and proximal small bowel as your final image (full exposure on adults).
17. *If there was a request to evaluate for distal stricture you can give the patient the barium pill and demonstrate it passing through to the stomach.
18. Otherwise, review your images with your attending and repeat any portions that are needed.
19. Discuss the preliminary findings with the patient if desired.

Peds

Overall the peds upper GI is a quick study to typically rule out malrotation, evaluate equivocal cases of HPS, duodenal atresia/web and/or diagnose GERD.

We will always use the single contrast technique and fluoro grabs to obtain any pictures with the pediatric fluoro settings.

We will examine the esophagus in the AP and lateral planes with fluoro grabs as the child/infant is drinking. Typically given patient size we can fit the stomach on our views (without having to move the patient and obtain multiple pictures). The most important part of the study is document the normal positioning of the ligament of Treitz.

Be careful when you have the baby in the lateral positioning the quickly move the infant supine to watch the contrast cross over the ligament of Treitz.

Suggested Reading:

1. Rubensin et al. Double-Contrast Upper Gastrointestinal Radiography: A Pattern Approach for Diseases of the Stomach. *Radiology* 2008; 246 (1): 33-48. <http://pubs.rsna.org/doi/pdf/10.1148/radiol.2461061245>.
2. Rubensin et al. Upper Gastrointestinal Tract: Imaging Techniques. In: Rubensin et al. *Abdominal Imaging*. Springer Verlag 2013. http://link.springer.com/referenceworkentry/10.1007%2F978-3-642-13327-5_13

Small Bowel Follow Through (SBFT)

Most Common Indications: Crohn's Disease, heme+ stools, abdominal pain NOS

In peds: This study is often done in post-operative patients who have had bowel resected or due to atresias/strictures or webs. It is also performed in children with gastroschisis repairs.

Please note this exam is different than the Gastrograffin Challenge which is often ordered in the setting of potential bowel obstruction. The Gastrograffin Challenge (which is a misnomer, as we do not use Gastrograffin) is a series of abdominal x-rays which are taken after the administration of contrast (by the tech) documenting the passage of contrast through the bowel.

Patient Preparation: NPO after midnight

Materials: "Thin" and "Thick" Barium (or Water Soluble contrast can be used but often gets "washed out" as it is not as dense as barium)

Procedure:

This study is typically performed just following an upper GI. In the majority of case CT or MR enterography is used when evaluation of ONLY the small bowel is requested.

1. Please see preceding protocol for how to perform an [UPPER GI](#) and obtain the proper scout radiograph.
2. We will begin our instruction after the contrast has crossed the ligament of Treitz.
3. Obtain radiographs (fluoro grabs in peds, although may consider spots in children with known motility disorders to reduce radiation) in approximately 30 minutes intervals. If there is extremely slow transit as may be seen in post-surgical infants you may increase this interval of time between radiographs.

- a. During the interval time the patient may go ahead and eat and walk around the hospital to encourage bowel transit.
4. Once the contrast has reached the level of the ascending colon, for an adult or outpatient examination we will go and specifically exam the terminal ileum (esp for those with Crohns).
 - a. Obtain the balloon paddle and compress "spot" the terminal ileum (fluoro grab or spot the image). You may even see the appendix.
5. Compress the small bowel in all four quadrants of the abdominal and make sure that there appears to be normal compressibility and that the bowel does not appear "stuck."
6. You should at least fluoro grab images of the four quadrants.
7. Review all images with your attending. Upon his/her approval you may let the patient go.

Suggested Reading:

1. Levine, MS et al. Pattern Approach for Diseases of Mesenteric Small Bowel on Barium Studies. *Radiology* 2008; 249 (2): 445-460.
<http://pubs.rsna.org/doi/pdf/10.1148/radiol.2491071336>.

POST-SURGICAL CASES

We see a wide variety of patients here at Shands who often undergo complex surgeries which need fluoroscopic evaluation for complications. The following are a series of post-operative cases that we do see and some helpful hints for how to complete the requested studies.

For all surgical studies: REMEMBER to obtain a scout image of the area of study prior to beginning any study. There are often devices and sutures that we need to be aware of. ALSO, upon completion of the study obtain a POST radiograph.

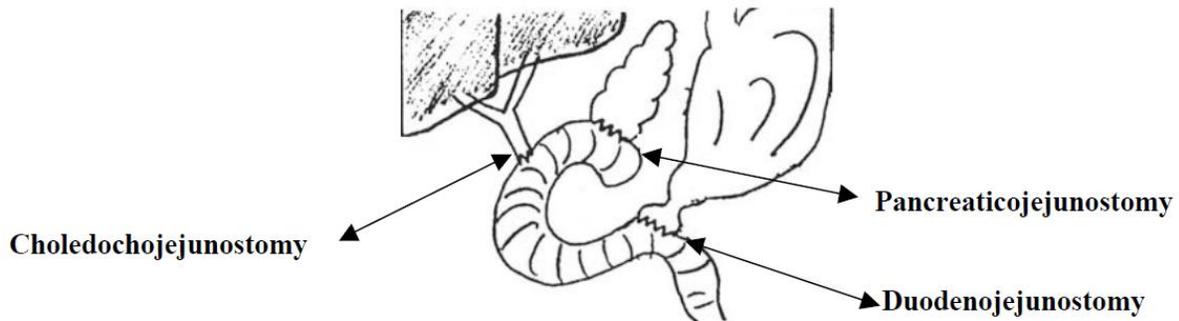
Esophageal Studies:

- These are often requested after esophageal repair, stenting, POEM procedure or gastric pull-through/gastric pull-up. The goal of these studies is to evaluate for leak. Therefore, distention of the esophagus is paramount and the patient should be encouraged to take large gulps of contrast.
- The esophagus is typically dysmotile. However, leak and contained leak are often noted as well.
- In this case, you will perform a single contrast water soluble exam of the esophagus with the post-surgical patient lying down on the fluoro table.
- Attempt to view in the esophagus in at least the AP and Lateral planes. However, oblique views may reveal subtle leaks if you are able to position the patient. Obtain mag views if you do demonstrate a leak. Note any areas of stricture or narrowing. If the narrowing is transient demonstrate a fully distended esophagus.

Fluoroscopic Evaluation of Whipple:

Whipple's operation is most often performed in patients with ductal adenocarcinoma of the pancreas. The duodenum, part of or entire pancreas, and

distal common bile duct are resected. Mostly commonly, the common bile duct, pancreas, and proximal duodenum are anastomosed to a loop of jejunum.



Picture Reference:

Smith, JP et al. (2009). *Guidelines for Residents in Gastrointestinal Radiology*. Available at:

http://www.uasom.uab.edu/PublicDocuments/Radiology/P&P/GI%20Protocols%20Revised_8-09.pdf

Diagram of the Post-surgical appearance of the Whipple

Remember to use LOCM contrast and attempt to distend the anastomoses. Obtain views in the AP, lateral and oblique planes. If the patient has an NG tube remember to remove the contrast from the stomach as these patients are an aspiration risk.

Fluoroscopic Evaluation of Gastric Bypass

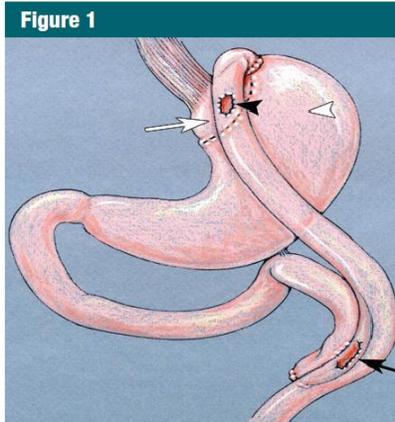
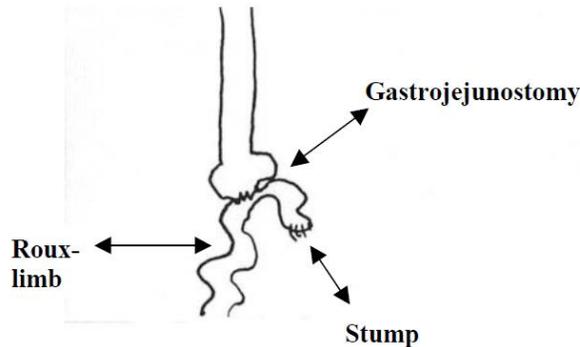


Figure 1: Diagram shows normal surgical anatomy after Roux-en-Y gastric bypass. A staple line partitions the stomach into a small fundal pouch (white arrow) and a much larger excluded stomach (white arrow-head). The jejunal Roux limb is joined proximally to the fundal pouch via a gastrojejunal anastomosis (black arrowhead) and distally to the biliopancreatic limb via a jejunojejunal anastomosis (black arrow). (Reprinted, with permission, from reference 12.)



Picture Reference:

Left: Levine, MS et al. . *Imaging of Bariatric Surgery: Normal and Post-Operative Complications*. Available at: <http://pubs.rsna.org/doi/pdf/10.1148/radiol.13122520>.

Right: Smith, JP et al. (2009). *Guidelines for Residents in Gastrointestinal Radiology*. Available at: http://www.uasom.uab.edu/PublicDocuments/Radiology/P&P/GI%20Protocols%20Revised_8-09.pdf

Typically for gastric bypass, a pouch is formed at the cardia of the stomach. A jejunal Roux-limb is brought through the transverse mesocolon. A side to side anastomosis is gastrojejunostomy is created.

1. Obtain digital scout film of left upper quadrant.
2. In a standing lateral position, have the patient swallow one swallow of water-soluble contrast and fluoro the lateral pharynx. If there is no aspiration, place patient erect AP and have them drink a few swallows of contrast, centering over left upper quadrant. Watch for emptying and extravasation. Table spot image over pouch.
3. Then place the patient in the supine position (make sure the patient does not exceed the table weight limit!). Obtain 3 to 4 digital spot images of the gastric pouch and Roux-limb in several obliquities.

- a. Do not magnify these images as most patients are so large that exposure time would be long and result in motion artifact.
4. Don't forget to get delayed images of the upper abdomen to confirm contrast emptying into the distal jejunum, beyond where the Roux-limb courses through the transverse mesocolon.
 - a. Is there a leak? This usually occurs at the gastrojejunostomy anastomosis or the blind jejunal stump.
 - b. Is there obstruction? Usually at gastrojejunostomy, as the Roux-limb traverses the mesocolon, or at the jejunojejunostomy,

<http://pubs.rsna.org/doi/pdf/10.1148/radiol.13122520>

Suggested Reading:

1. Levine, MS, Carrucci, LS. Imaging of Bariatric Surgery: Normal and Post-Operative Complications. *Radiology* 2014; 270 (2): 327-341.
<http://pubs.rsna.org/doi/pdf/10.1148/radiol.13122520>.
2. Swanson JO, Levine MS, Redfern RO, Rubesin SE. Usefulness of high-density barium for detection of leaks after esophagogastrectomy, total gastrectomy, and total laryngectomy. *AJR* 2003;181:415-420.
3. Gervais, DA et al. Complications after Pancreatoduodenectomy: Imaging and Imaging-guided Interventional Procedures. *RadioGraphics* 2001; 21:673-690.
http://geiselmed.dartmouth.edu/radiology/pdf/complications_radiographics.pdf.
4. Hamath et al. Fluoroscopic Findings post-peroral esophageal myomectomy. *Abdominal Imaging* 40 (2): 237-245.
<http://link.springer.com/article/10.1007%2Fs00261-014-0209-7>

SINGLE CONTRAST ENEMA

Indication: Failed colonoscopy, stricture, mass, fistula evaluation (i.e. rectovaginal/rectovesicular), colostomy reversal. The ordering physician should consult with the Fluoro Radiologist to discuss whether CT with rectal contrast or fluoroscopic enema is the most appropriate exam given patient history and mobility. The contrast agent (barium or dilute Omnipaque) is protocolled by the radiologist performing the fluoroscopic study.

Please note that Radiology will not perform a therapeutic “gastrograffin” enema, and is not permitted to dispense MD Gastroview for this purpose, nor is MD Gastroview ever used as a contrast agent in Radiology with the exception of the Gastrograffin Challenge Small Bowel Study.

Patient Preparation: Requires a preceding bowel clean-out beginning the day before the procedure and NPO on day of procedure. No prep is done in children.

Materials: Enema bag with attached catheter tubing with rectal tube tip, barium or water soluble contrast (in adults we use the Polibar kit)

****Please note the techniques used for a double contrast enema do vary slightly. However given colonoscopy, CT/MR enterography these are rarely performed. The single contrast enema is also very rare - given the ease of CT and rectal contrast-as stated above.****

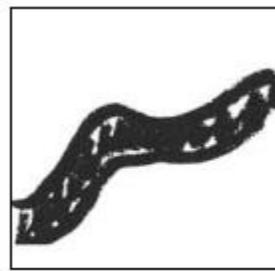
Procedure:

1. Obtain a routine scout to evaluate stool burden and exclude any potential free air.
2. Do a careful rectal examination - this will help you orient the proper direction of the anal canal and rectum as a guide to inserting the enema tip.

- a. This should also help you assess the presence of rectal mass or stricture.
3. Insert the tip of the enema with the patient in the left lateral decubitus position with the knees drawn up towards the chest.
4. Tape the buttocks together and ask the patient to hold their butt cheeks together for the entirety of the exam.
5. We will now cover the technique for an adult patient - single contrast barium enema and review the necessary images. We will discuss the peds single contrast enema afterward with a concentration on differences in technique.
 - a. Now allow the patient to roll into the supine position.
 - b. Fill and distend the rectum with barium (shoot image)
 - c. Roll the patient to the supine LPO and add barium until the column reaches descending colon.



1. Supine rectum
(9" II).



2. LPO sigmoid
(9 or 12" II).



Picture Reference:

Smith, JP et al. (2009). *Guidelines for Residents in Gastrointestinal Radiology*. Available at:
http://www.uasom.uab.edu/PublicDocuments/Radiology/P&P/GI%20Protocols%20Revised_8-09.pdf

- d. Obtain a spot image of the sigmoid colon.
- e. Continue rolling the patient towards the right and obtain an image of the transverse colon - stop the barium.
- f. Then roll the patient RPO and spot the splenic flexure - stop the barium.
- g. Turn on barium and fill the ascending colon and look for reflux into the terminal ileum. Turn off the barium.
- h. You may use the paddle to spot the terminal ileum.

6. For pediatric patients:

- a. In peds - usual indication of this study is for evaluation of Hirschsprungs' or Meconium plug - so we will begin with evaluation of the rectum in the left lateral position.
 - i. In the case of evaluation for meconium plug make sure that you use Cysto-Conray (not barium!).



Barium enema demonstrating transition zone. The transition zone shows the transition from dilated, normally innervated bowel to normal caliber, noninnervated bowel.

Picture Reference:

Neville, HL et al. Pediatric Hirschsprung Disease Workup. Available at: <http://emedicine.medscape.com/article/929733-workup#c4>

- b. We will then obtain fluoro grabs of the same as the adult patients (but only grabs! No spots!)
7. Once you feel certain that you have obtains all the images necessary, review them with your attending and respot any necessary.
8. Unclamp the barium and lower the enema bag so that the contrast drains by gravity.
9. Obtain a post radiograph.

Suggested Reading:

1. Rubensin, SE et al. Double-Contrast Barium Enema Examination Technique. *Radiology* 2000; 215:642-650.
<http://pubs.rsna.org/doi/pdf/10.1148/radiology.215.3.r00jn36642>.
2. Levine, MS et al. Diagnosis of Colorectal Neoplasms at Double-Contrast Barium Enema Examination. *Radiology* 2000; 216:11-18.
<http://pubs.rsna.org/doi/pdf/10.1148/radiology.216.1.r00jl3311>
3. Greenall, MJ et al. Complications of diverticular disease: A review of the barium enema findings. *Gastrointestinal Radiology* 1983;8:353-358.
<http://link.springer.com/article/10.1007%2FBF01948150#page-1>

Suggested Reading on Peds:

1. Berrocal et al. Congenital Anomalies of the Small Intestine, Colon, and Rectum. *Radiographics* 1999; 19 (5): 1219-1236.
<http://pubs.rsna.org/doi/pdf/10.1148/radiographics.19.5.g99se041219>.
2. Laya et al. Patterns of Microcolon: Imaging Strategies for Diagnosis of Lower Intestinal Obstruction in Neonates. *J Am Osteopath Coll Radiol* 2015; 4 (1): 2-11. <http://www.jaoacr.org/articles/patterns-of-microcolon-imaging-strategies-for-diagnosis-of-lower-intestinal-obstruction-in-neonates>

Websites:

Hirschsprungs

<http://emedicine.medscape.com/article/409150-overview>

AIR CONTRAST INTUSSUSCEPTION REDUCTION ***PEDIATRICS ONLY***

Indication: Intussusception seen on ultrasound, high clinical suspicion despite negative US

Patient Preparation/Radiology Prep: Obtain left lateral radiograph to exclude the presence of intraperitoneal air, Make sure that surgical resident or fellow is present in the event of perforation.

Materials: Catheter tubing, in peds we use feeding tubes ranging from 5-8 Fr depending on the patient size, sphygmomanometer

Procedure:

1. Insert the rectal tube and begin taping the buttocks.
 - a. You can use 4x4 gauzes for additional reinforcement
2. Obtain a scout image hold.
3. Make sure the catheter tubing is well connected to the sphygmomanometer.
4. You may pump the sphygmomanometer up to 120 mmHg in attempts to reduce the intussuscepted bowel.
5. Successful intussusception means seeing air in the distal ileum.
6. If intussuscepted bowel recurs - you may try up to 3 times or for 10 minutes.
7. Upon completion obtain a grab to document success.

Suggested Reading:

1. Del-Pozo, G. et al. Intussusception in Children: Current Concepts in Diagnosis and Enema Reduction. *Radiographics* 1999; 19: 299-319.
<http://pubs.rsna.org/doi/pdf/10.1148/radiographics.19.2.g99mr14299>
2. <http://emedicine.medscape.com/article/930708-overview>
3. Applegate, KE. Clinically Suspected Intussusception in Children: Evidence-Based Review and Self-Assessment Module. *Journal of Roentgenology*.

2005;185: S175-S183. 10.2214/ajr.185.3_supplement.0185s175

http://www.ajronline.org/doi/full/10.2214/ajr.185.3_supplement.0185s175

FISTULOGRAM

Most Common Indications: Enterocutaneous Fistula

Patient Preparation: None

Materials: Small bore feeding tube, water soluble contrast

Procedure:

1. Use a small bore feeding tube to cannulate the fistula at the surface of the skin.
2. Inject water soluble contrast under pressure.
3. Make sure to turn the patient to document any fistula as well as the flow of contrast.
4. Obtain spot images in supine, lateral and oblique views.

Suggested Reading:

1. Lee, JK, Stein SL. Radiographic and Endoscopic Diagnosis and Treatment of Enterocutaneous Fistulas. *Clin Colon Rectal Surg.* 2010 Sep; 23(3): 149-160.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2967314/pdf/ccrs23149.pdf>
2. Pickhardt, PJ et al. Acquired Gastrointestinal Fistulas: Classification, Etiologies, and Imaging Evaluation. *Radiology* 2002; 224:9-23.
<http://pubs.rsna.org/doi/pdf/10.1148/radiol.224101185>

VOIDING CYSTOURETHROGRAM

Most Common Indications:

Peds: Vesicoureteral reflux, multiple febrile UTIs, posterior urethral valves, congenital abnormalities

Adults: Post-operative evaluate for bladder injury, trauma, dysuria

Patient Preparation: None.

Materials: 5-8 French catheter tubing (PEDS), Foley Catheter, Cysto Conray or Omnipaque

Procedure:

1. Place the catheter/Foley using aseptic technique.
2. Obtain a scout image prior to instilling contrast in the bladder (grab only for peds)
3. Fill the bladder.
 - a. For adults fill the bladder until the patient can no longer bear the presence of contrast
 - b. Alternatively, when you are doing this in a pediatric patient you will use the cyclical technique of filling the bladder.
 - i. IE the patient will pee around the catheter and you will fill the bladder a few times to evaluate for the presence of reflux.
 - ii. Estimated bladder capacity in kids: $(AGE + 2)30 = \text{BLADDER CAPACITY}$ (in milliliters/cubic centimeters)
4. Obtain images of the full bladder in the supine, oblique and lateral positions (bilaterally).
 - a. If you have any questions or concerns: STOP and discuss the case with your attending. In the next step we will remove the catheter.
5. For adults: if the patient is able to urinate, you may remove the catheter prior to the urethra images.

- a. However, often times, patients with long term in-dwelling Foley catheters have difficulty urinating - so in those patients allow them to begin urinating and then remove the catheter.
- b. For males make sure the patient is in the oblique lateral position so that all of the urethra is clearly seen.
 - i. Make sure all the portions of the urethra are seen.
6. For little peds patients:
 - a. Since we do not have control over when the patient will urinate - we have to be very fast and quick with our imaging.
 - b. Make sure you are centered over the urethra (you only get one shot once the catheter is out, otherwise we will have to re-catheterize the patient ☹)
 - i. Make sure they are in the oblique lateral position to get optimal visualization of the urethra
 1. In males we are looking for posterior urethral valves!
 - c. As the patient urinates, QUICKLY remove the catheter and obtain images of the contrast filled urethra.
7. Try to have the patient urinate as much contrast as possible.
 - a. Do not leave the patient with a large amount of contrast in the bladder without notifying the ordering physician.
8. Obtain a post-void image (grab for peds).
9. Review imaging and findings with attending before releasing the patient.

Suggested Reading:

1. Fernbach, SK. et al. Pediatric Voiding Cystourethrography: A Pictorial Guide. RadioGraphics 2000; 20:155-168.
<http://pubs.rsna.org/doi/pdf/10.1148/radiographics.20.1.g00ja12155>
2. Yu, NC. et al. Fistulas of the Genitourinary Tract: A Radiologic Review. RadioGraphics 2004; 24:1331-1352.
<http://pubs.rsna.org/doi/full/10.1148/rg.245035219>
3. Cystography Technique Emedicine Description
<http://emedicine.medscape.com/article/1893772-technique>

RETROGRADE URETHROGRAM

Most Common Indication: Penile/Urethral trauma, urethral stricture, hematuria

Patient Preparation: None

Materials: Smaller bore foley catheter tubing 16-18 French, Omnipaque or CystoConray

Procedure:

1. Position the tower over the patient's pelvis with the center focused just below the pubic bone.
2. Flush the 16-F or 18-F Foley catheter with radiopaque contrast to remove any air bubbles.
 - a. The penile glans and urethral meatus should be cleaned with antiseptic.
3. The Foley catheter is then placed just inside the urethral meatus so that the Foley catheter balloon rests in the fossa navicularis.
 - a. Some attendings will use a red rubber catheter and/or foley and do not inflate the balloon, but hold pressure at the glans to seal the tube.
 - i. Ask your attending their preferred method.
4. With the Foley in position, fill the catheter balloon with 1-2 mL of radiopaque contrast or saline solution.
 - a. Overfilling must be avoided, or it will rupture the distal urethra. (A conscious patient can be asked if pain accompanies balloon filling).
 - b. Pull the penis laterally (or ask the patient to) to straighten the urethra, grasping the penis as distally as possible, and distal to the inflated balloon.
5. Obtain a pre-injection scout image.

6. The catheter-tipped syringe is then filled with approximately 50 mL of radiopaque contrast, and 20-30 mL of contrast is injected in a retrograde fashion.
 - a. Consider obtaining a fluoro loop of the injection - the tech may help you with the settings on the machine to do this.
7. Static images of the urethra are taken during retrograde injection of radiopaque contrast.



Picture Reference:

Burks, FN et. al. Urethrogram. Available at: <http://emedicine.medscape.com/article/1893948-overview>

8. You should see a jet into the bladder. Then you have completely evaluated the entirety of the urethra.
9. Check images with your attending and obtain any other necessary images.
10. When the exam is completely you may remove the catheter

Suggested Reading:

1. Urethrogram Emedicine website (see above)
2. Kawashima, A. et al. Imaging of Urethral Disease: A Pictorial Review. RadioGraphics 2004; 24:S195-S216.
<http://pubs.rsna.org/doi/pdf/10.1148/rq.24si045504>

3. Berrocal, T et al. Anomalies of the Distal Ureter, Bladder, and Urethra in Children: Embryologic, Radiologic, and Pathologic Features. *RadioGraphics* 2002; 22:1139-1164.

<http://pubs.rsna.org/doi/pdf/10.1148/radiographics.22.5.g02se101139>

FLUOROSCOPIC ASSISTANCE FOR HYSTEROSALPINGOGRAM

Most Common Indications: Tubal occlusion, tubal patency, endometrial polyp, evaluation for mullerian anomalies

This procedure is done with the OB/GYN attending and it is your job to provide fluoroscopic assistance and obtain all the view necessary to document spillage or non-spillage of contrast from the Fallopian Tubes.

The patient will be lying supine on the fluoro table.

1. Obtain a scout image of the catheter once it has been inserted.
2. Obtain a picture in the early filling phase of the endometrium to assess for subtle filling defects as well as a later phase when the endometrial cavity is full of contrast.
3. Spot pictures of the contrast spilling from the fallopian tubes
 - a. Obtain pictures with the patient in the supine and bilateral oblique positions.
 - b. If you are ever unsure of contrast spillage from the fallopian tubes, please do a full exposure. Contrast is often easier to see on fully exposed images.
4. Upon completion of the study confirm imaging findings with the OB/GYN attending.

Suggested Reading:

1. Simpson, WL et al. Hysterosalpingography: A Reemerging Study. *RadioGraphics* 2006; 26:419-431.
<http://pubs.rsna.org/doi/pdf/10.1148/rq.262055109>
2. Chalazonitis A. et al. Hysterosalpingography: Technique and Applications. *Current Problems in Diagnostic Radiology* 2009; 38 (5): 199-205.
<http://www.sciencedirect.com/science/article/pii/S0363018808000200>

3. Behr, SC et al. Imaging of Müllerian Duct Anomalies. *RadioGraphics* 2012; 32:E233-E250. <http://pubs.rsna.org/doi/pdf/10.1148/rq.326125515>

RADIOLOGIC PLACEMENT OF ENTERIC TUBE
WITH FLUOROSCOPIC GUIDANCE

We may be asked to provide fluoroscopic assistance to clinicians in placement of enteric tubes - and even asked to place them ourselves. Please follow radiology protocol (see document by Dr. Abbitt - hung above your work stations before agreeing to assisting).

Please note we do not stock enteric tubes in the Fluoroscopic suite.

Below I will describe the placement of a nasojejunal tube with guidewire.

1. Lubricate the guidewire well and assure that the wire and catheter fit together properly.
2. If there is oral anesthetic spray available (Benzocaine topic anesthetic) spray the patient's pharynx for about 1 sec duration.
 - a. Have the patient swallow the material.
3. Insert the guidewire into the tube leaving 10-20 cm floppy at the tip.
4. Lubricate the end of the catheter with viscous xylocaine (2%).
5. With the patient sitting on the edge of the table, pass the catheter through the nose.
6. Have the patient flex their neck, chin to the chest and move the catheter through the pharynx into the esophagus.
7. Continue pushing the catheter until you feel resistance.
8. Place the patient in the right lateral decubitus position and pass the tube with fluoroscopic guidance.
9. Typically the catheter will pass into the antrum in the right lateral position.
10. Then move the patient into the LPO position so that the catheter can pass into the pylorus and duodenal bulb.
11. Keep the tip of the guidewire at the pylorus, slipping the catheter over the wire in the distal duodenum or proximal jejunum.
12. When the tip makes it to the duodenojejunal junction tape the tube in place at the nose.
13. Document your success with a radiograph.

Note: Try not to exceed five minutes of fluoro time in your attempts. If the Fluoro alarm notifying you of the five minute mark rings, you may complete the study and notify the ordering physician that the procedure was not successful although multiple attempts were made.