Esophagram Fluoroscopy Protocols: The Dr. Wolf Method

Updated February 2018

Video Esophagram

1. Upright standing shallow LPO (to get the esophagus "off the spine"). Instruct patient **not to belch during exam!** Swallow 1 ounce of water mixed with fizzies (give this as soon as you prepare it) and then IMMEDIATELY continually drink ½ cup of thick Barium as fast as possible (NO sipping) with cup in left hand and right arm slightly behind the back. 3 coned rectangle double contrast esophagus views in the same plane with the GE junction in the lower field of view.
2. ***"Esophageal Motility Assessment:"***
   Warn the patient that you will lower the table. In the Swimmer's position, give patient bottle of thin Barium with a straw in left hand and right arm up. Move tower over cervical esophagus but do not fluoro on the way up. Swimmer's Coned Rectangle Esophagus view. Instruct patient to take one swallow [no sipping] and video the bolus passage starting in the mouth keeping top of the contrast column on top of the image and follow it down to the EG junction to assess motility. **(If you image below the top of the contrast column, you will be unable to assess motility AND need to repeat the swallow staying at the top of the column. If the patient takes too small of a bolus, you must repeat the swallow with a larger bolus because you will be unable to assess motility).** Video 3 swallows (taking 1 or 2 extra if the patient does not follow instructions properly) separating each swallow by 25-30 sec. If motility is poor and there is delayed esophageal emptying, do NOT continue to fluoro the barium column. If there is delayed emptying, make sure to include a view of the GEJ to assess its relaxation by bringing the camera down.
3. Esophagus Single Contrast Rectangle Swimmer's Spots: (ask patient to continually drink to get good esophageal distension)
   A. Two coned DISTAL rectangle esophagus views (GEJ in the lower field of view)

B. One coned PROXIMAL rectangle esophagus view (upper third of esophagus in the upper field of view). Do not fluoro on the way up.

4. Stomach Spots:
   A. Swimmer's Stomach and Bulb- **it is important to check for residual barium in the esophagus before changing position** so you can later determine and distinguish it from incompletely cleared esophageal contrast. Quickly fluoro up distal esophagus to determine if contrast has cleared the esophagus. IF IT HAS NOT CLEARED, raise the table 45 degrees and check for clearing. IF IT HAS STILL NOT CLEARED, have patient drink a small amount of water to expedite clearing.
   B. LPO Stomach and Bulb- **before taking image center on GEJ while tapping on fluoro to check for spontaneous GERD. If none, ask patient to cough x 3. If reflux occurs, document it with an esophageal spot that includes the level** l so the degree of reflux can be quantified (Mild-distal esophagus; moderate-mid esophagus; severe-proximal esophagus). Your report should indicate grade of reflux and if it occurred spontaneously or after provocation.
   C. Supine Stomach and Bulb
5. Warn patient that the table will rise. Patient is positioned upright lateral facing you with **CUP IN HAND TO THE FRONT, STRAW IN MOUTH, HEAD MIDLINE AND CHIN UP (make sure to tilt the patient's chin up if they fail to do so; optimize coning from front to back to best visualize the bolus)!** Upright Lateral Neck Coned Rectangle view-video 3 continuous swallows-do not follow into the chest.
6. Turn patient AP upright with **HEAD MIDLINE, CHIN UP, STRAW IN MOUTH AND CUP TO THE SIDE (make sure to tilt the patient's chin up if they fail to do so; optimize coning from side to side to best visualize the bolus)!** Upright AP Neck Coned Rectangle view-video 3 consecutive swallows following the third to the stomach.
7. Upright AP Rectangle Coned view- video patient swallowing the Barium pill continually drinking (not one sip) Barium and follow pill to stomach. If the pill gets stuck in the esophagus, ask patient to drink dilute Barium (half water/half Barium) to see if it passes and is only transiently held up. If the pill is stuck at a site of pathology, stop

imaging because the pill will eventually dissolve; you can give the patient some warm water to help it dissolve.

Videoesophagram with food bolus

1. If requested by referring physician, patient must come with provided food. Perform routine esophagram protocol XI; but add Coned AP Upright Swallow with video of patient swallowing the food after you have thoroughly dipped it in the thin barium. Follow bolus from mouth down to stomach.

Combined Video Esophagram and UGIS

Prepare 3 things: ½ cup thick Barium, 1 bottle thin Barium with a straw, and medicine cup of 1 oz water with fizzies dropped in just before use.

1.Supine scout abdomen NOT routine-obtain if h/o prior surgery or suspect pathology.
2.Upright standing shallow LPO (to get the esophagus "off the spine"). Instruct patient not to belch during exam! Swallow 1 ounce of water mixed with fizzies (give this as soon as you prepare it) and then continually immediately drink ½ cup of thick Barium as fast as possible (NO sipping) with cup in left hand and right arm slightly behind the back. 3 Coned Rectangle Double Contrast Esophagus views in the same plane with the GEJ in the lower field of view
3. Turn the patient supine and warn them that you will be lowering the table. Turn patient a full 360 degrees around to the left stopping in the LPO position (assess gastric coating-if coating is poor, have patient turn a second 360 degrees). 3 Stomach Double Contrast Spots:

A. Supine LPO
B. Supine AP
C. Swimmer's

4. **"Esophageal Motility Phase:"**
Give patient bottle of thin Barium with a straw in left hand and right arm up. Move tower over cervical esophagus (INCLUDE THE MOUTH NOTE THE ENTIRE HEAD) but do not fluoro on the way up. Swimmer's Coned Rectangle

Esophagus view. Instruct patient to take one swallow [no sipping]. Video the bolus passage keeping top of the contrast column on top of the image and follow it down to the EG junction to assess motility. **(If you image below the top of the contrast column, you will be unable to assess motility AND need to repeat the swallow staying at the top of the column. If the patient takes too small of a bolus, you must repeat the swallow with a larger bolus because you will be unable to assess motility).** Video 3 swallows (take 1 or 2 extra if the patient does not follow instructions properly) separating each swallow by 25-30 sec. If motility is poor and there is delayed esophageal emptying, do NOT continue to fluoro the barium column. If there is delayed emptying, make sure to include a view of the GEJ to assess its relaxation by bringing the camera down.

5. Esophagus Single Contrast Rectangle Swimmer's Spots: (ask patient to continually drink to get good esophageal distension)
    A. Two coned DISTAL rectangle esophagus views (GEJ in the lower field of view)
    B. One coned PROXIMAL rectangle esophagus view (upper third of esophagus in the upper field of view). Do not fluoro on the way up.
5. Swimmer's Coned Antrum/Bulb/Sweep Single Contrast Spots: talk about food to improve bulb distension if necessary and wait for the bulb to distend BEFORE taking images (fluoro intermittently)!!!
    A. 2 bulb views
    B. 1 bulb AND antrum view

    ***It is important to check for residual barium in the esophagus before changing position** so you can later determine reflux. Quickly fluoro up distal esophagus to determine if contrast has cleared the esophagus. IF IT HAS NOT CLEARED, raise the table 45 degrees and check for clearing. IF ITS HAS STILL NOT CLEARED, have patient drink a small amount of water to expedite clearing.
7. Stomach Spots:
    A. Right Side Down Lateral
    B. Supine AP
    C. Supine LPO - **before taking image center on GEJ while tapping on fluoro to check for spontaneous GERD. If none, ask patient to cough x 3 and/or Valsalva by bearing down. If reflux occurs, document it with an esophageal spot that includes the level** so the degree of reflux can be quantified (Mild-distal esophagus; moderate-mid esophagus; severe-

proximal esophagus). Your report should indicate grade of reflux and if it occurred spontaneously or after provocation.

8. Supine LPO Spot Antrum/Bulb/Sweep-double contrast try to position image so small bowel is out of the way as much as possible!!! You may need to tilt the table and/or rotate the patient to improve double contrast visualization of the antrum and bulb.

9. Warn patient they will be standing as you raise the table remaining in LPO position (if patient is more comfortable, turn them supine as the table rises). Upright LPO Spot Fundus double contrast- ask patient to LIFT pendulous breasts out of the way.

10. 3 Compression Upright Coned Antrum/Bulb Single Contrast Spots:

    A. LPO Bulb
    B. AP Antrum AND Bulb
    C. RPO Bulb

11. Upright Lateral Neck Coned Rectangle view- video 3 continuous swallows- do not follow into the chest. Patient is positioned upright lateral with **CUP IN HAND TO THE FRONT, STRAW IN MOUTH, HEAD MIDLINE AND CHIN UP** (make sure to tilt the patient's chin up if they fail to do so; optimize coning from front to back to best visualize the bolus)!

12. Upright AP Neck Coned Rectangle view-video 3 consecutive swallows following the third to the stomach Turn patient AP upright with **HEAD MIDLINE, CHIN UP, STRAW IN MOUTH AND CUP TO THE SIDE** (make sure to tilt the patient's chin up if they fail to do so; optimize coning from side to side to best visualize the bolus)!

13. Pill Swallow Upright AP Neck Coned Rectangle view-video patient swallowing the Barium pill freely drinking Barium- video pill in mouth before swallowing and follow pill to stomach. If the pill gets stuck in the esophagus, ask patient to drink dilute Barium (half water/half Barium) to see if it passes and is only transiently held up. If the pill is stuck at a site of pathology, stop imaging because the pill will eventually dissolve; you can give the patient some warm water to help it dissolve.

Focused Esophagram s/p laryngectomy in early post-op period

1. AP and Lateral Scout Neck.
2. Give patient bottle of Omnipaque with straw.
3. Upright Lateral Neopharynx Coned Rectangle view- video 3 continuous swallows-do not follow into the chest. If patient cannot stand, do semierect position. Patient is positioned upright lateral facing you with **CUP IN HAND TO THE FRONT, STRAW IN MOUTH, HEAD MIDLINE AND CHIN UP** (make sure to tilt the patient's chin up if they fail to do so; optimize coning from front to back to best visualize the bolus)! ***Patient has aspiration risk, so proceed with caution.
4. Upright Lateral Neopharynx Coned Rectangle Spots: take 2 spots as patient takes 2 more swallows.
5. Upright AP Neopharynx Coned Rectangle Spots- take 2 spots as patient takes 2 swallows. Turn patient AP upright with **HEAD MIDLINE, CHIN UP, STRAW IN MOUTH AND CUP TO THE SIDE** (make sure to tilt the patient's chin up if they fail to do so; optimize coning from side to side to best visualize the bolus)!
6. Upright AP Neopharynx Coned Rectangle view- video 3 consecutive swallows, following the third down to the GEJ.

Esophagram s/p laryngectomy in late post-op period

1. AP and Lateral Scout Neck.
2. Give patient bottle of thin Barium with straw.
3. Upright Lateral Neopharynx Coned Rectangle view- video 3 continuous swallows- do not follow into the chest. Patient is positioned upright lateral facing you with **CUP IN HAND TO THE FRONT, STRAW IN MOUTH, HEAD MIDLINE AND CHIN UP** (make sure to tilt the patient's chin up if they fail to do so; optimize coning from front to back to best visualize the bolus)!
4. Upright Lateral Neopharynx Coned Rectangle Spots- take 2 spots as patient takes 2 more swallows.
5. Upright AP Neopharynx Coned Rectangle Spots- take 2 AP spots as patient takes 2 swallows. Turn patient AP upright with **HEAD MIDLINE, CHIN UP, STRAW IN MOUTH AND CUP TO THE SIDE** (make sure to tilt

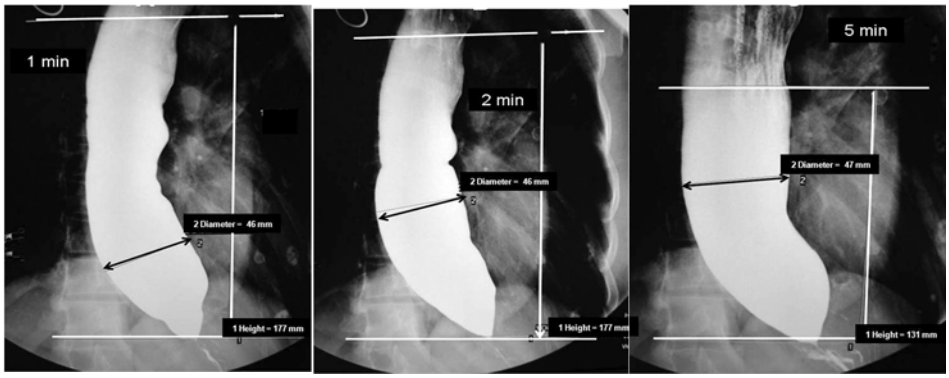
the patient's chin up if they fail to do so; optimize coning from side to side to best visualize the bolus)!

6. Upright AP Neopharynx Coned Rectangle view- video 3 consecutive swallows, following the third down to the GEJ.
7. Stomach Spots:
   A. Supine
   B. LPO
   C. RPO

Timed Barium Esophagram (TBE)

Indications: (1) Requested by gastroenterologist in a patient with suspected or confirmed Achalasia; (2) Requested by gastroenterologist to assess treatment response after pneumatic dilatation, botulinum toxin injection, POEM or Heller myotomy for Achalasia in late postop period.

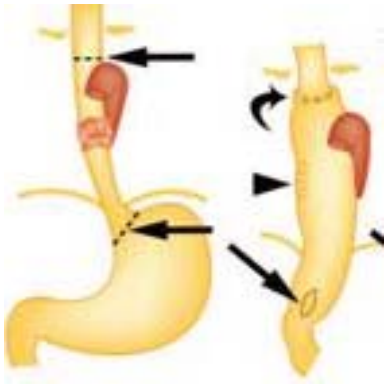
1. Patient must be fasting overnight prior to TBE.
2.Patient must drink 1 bottle (140 cc) of thin barium rapidly within 15-20 seconds. Volume should be recorded in report and the same amount administered on any follow up exam. Must make sure the patient can tolerate the volume without aspiration.
3.ERECT LPO take 3 Coned Rectangle Esophagus spots at 1 min, 2 min and 5 min after ingestion. The GEJ must be included at the bottom of the image and the top of the contrast column or barium foam interface (if debris is present) on the top. The distance between the fluoro carriage and patient must be kept constant for all 3 spot films and should be close to the patient. If the column is too tall to fit on the image, take one including the GEJ and a second higher up (a paper clip on the patient's mid chest can serve as a marker).
4. ***If the esophagus empties fully on the 1 min film, there is no need to take the 2 or 5 min film; proceed with routine video esophagram protocol XI.



(>50% reduction in post-treatment height compared with pre-treatment on 5 min spot is a good response. <50% reduction in height is treatment failure).

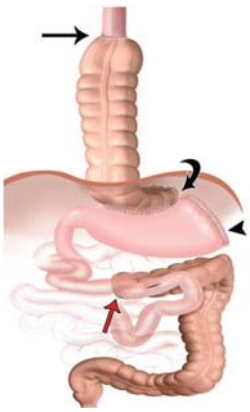
Focused Esophagram s/p esophagectomy (Ivor Lewis, McKeown or transhiatal esophagectomy) in the early post-op period (r/o leak)

***Most leaks occur at the EG anastomosis, but can also occur at the pyloromyotomy site if pyloric drainage procedure was performed or at the gastric staple line.



(a) **(b)**

Ivor Lewis esophagectomy. (a) Resection lines dotted black with tumor. (b) Esophagogastric anastomotic staple line (curved arrow); gastric staple line in the greater curvature/gastric conduit (arrowhead); pyloromyotomy (black arrow).



Retrosternal colonic interposition (a) with esophagocolonic anastomosis (black arrow), cologastric anastomosis (curved arrow), gastric staple line (arrowhead) and ileocolonic anastomosis (red arrow).

1. Scout Supine CXR (AP)-use this as a guide to see the level of the esophagogastric (EG) anastomotic clips, etc.
2.Give patient bottle of Omnipaque with straw.
3.Upright or Semierect LPO Coned Rectangle EG/EC Anastomosis view (Swimmer's is preferable but usually not possible)– ask patient to take several small swallows and video bolus as it passes into the stomach. **Must watch out for aspiration!!**
4.If no aspiration witnessed, video in the same position as the patient continues to drink concentrating on EG/EC Anastomosis.
5. Take 2 spots of EG/EC Anastomosis in same position. **Terminate the study if you see a leak.**
6.If no leak is seen, video the patient continually drinking Upright Coned rectangle EG/EC anastomosis gradually turning patient from LPO to RPO to get views all around the anastomosis.
7.Coned Rectangle EG/EC Anastomosis Semierect spots:

A. LPO
B. AP
C. RPO

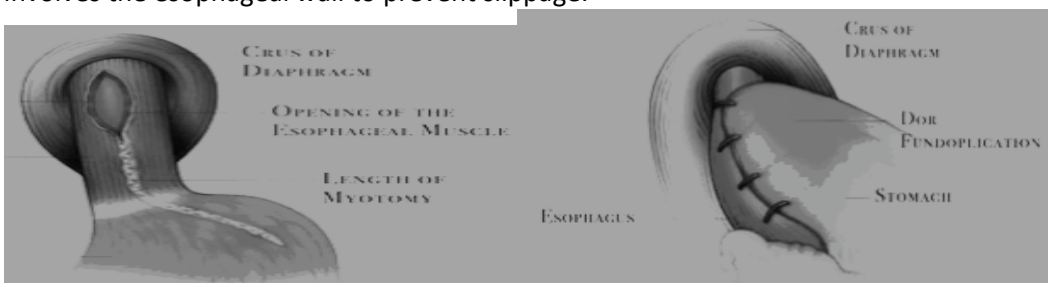
8.Semierect Stomach and Bulb spot (Swimmer's is ideal but usually not possible)-document gastric emptying by showing filling of the duodenum.
9.Overhead AP CXR (upright or semierect)- taken by tech.

Esophagram in the late post-op esophagus

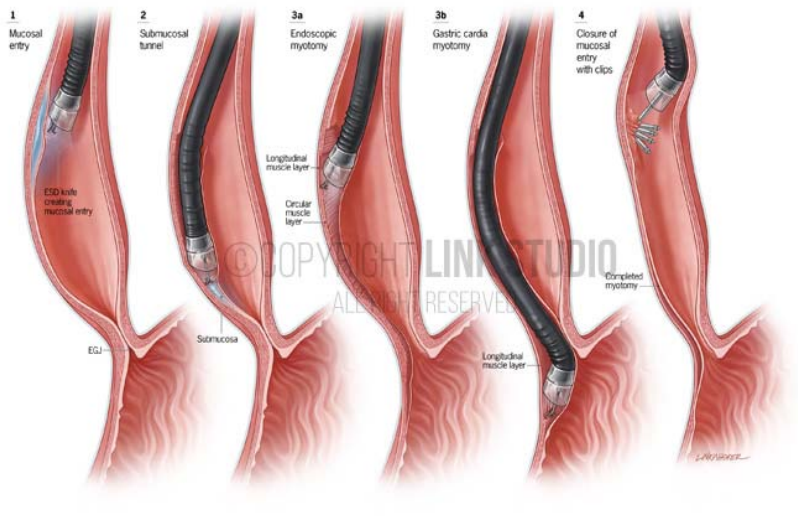
1. The remaining esophagus will be short and coned rectangle views will include the short remaining esophagus and the stomach. These patients have an increased aspiration risk, so look out for it at the start when you video the Swimmer's swallow!
2. Follow routine esophagram protocol XI.

Heller myotomy or POEM in the early post-operative period (r/o leak or wrap narrowing)

(a) Nissen fundoplication: fundus wrapped posteriorly around the distal esophagus and sutured anteriorly, making a 360° wrap. The wrap extends for approximately 2–3 cm, encircles the lower esophageal sphincter, and lies below the level of the diaphragm. At least one of the sutures involves the esophageal wall to prevent slippage.



(b) Heller Myotomy for achalasia (c) Dor Fundoplication after Heller Myotomy (270° wrap)



(d) Peroral endoscopic myotomy (POEM procedure)

1. Scout AP Supine CXR (centered on epigastric region)- use this as a guide to see surgical or endoscopic clips.
2. Give patient bottle of Omnipaque with straw.
3. Upright or Semierect LPO Coned Rectangle GEJ view –ask patient to take several small swallows and video bolus as it passes into the stomach. **Must watch out for aspiration!!**
4. If no aspiration witnessed, video in the same position as the patient continues to drink concentrating on GEJ.
5. Take 2 spots of GEJ in the same position. **Terminate the study if a leak is seen**.
6. If no leak is seen, video the patient continually drinking Upright Coned rectangle GEJ view gradually turning patient from LPO to RPO to get views all around the GEJ.
7. Coned Rectangle GEJ Semierect spots:
    A. LPO
    B. AP
    C. RPO
8. Supine Stomach and Bulb spot-document gastric emptying by showing the filled duodenum.
9. Overhead Lower Chest/Upper Abdomen AP (upright or semierect)-taken by tech.

Focused esophagram to r/o esophageal perforation or laceration (Borhaave Syndrome, trauma, endoscopy)

***Center exam on area of suspected perforation (Borhaave Syndrome is usually distal esophagus)

1. Scout CXR.
2. Give patient Omnipaque bottle with straw.
3. Swimmer's position Coned Rectangle Distal Esophagus view (upright or semierect LPO if patient cannot tolerate Swimmer's) allows best pooling of contrast in the esophagus and best chance to see perforation –take several small swallows and video contrast bolus as it passes to the stomach.
4. Take 2-3 spots of distal esophagus in the same position. **If leak is seen, terminate the study.**
5. If no leak is seen, video the patient continually drinking Upright Coned rectangle esophagus view gradually turning patient from LPO to RPO to get views all around the distal esophagus.
6. Coned Rectangle Distal Esophagus Semierect spots:
    A. LPO
    B. AP
    C. RPO
7. If no leak is seen, ***REPEAT*** exam with thin Barium (some small tears will not be detected with water-soluble contrast only)! Swimmer's position Coned Rectangle Distal Esophagus view (upright or semierect LPO if patient cannot tolerate Swimmer's). –take several small swallows and video contrast bolus as it passes to the stomach. **If leak is seen, terminate the study.**
8. Take 2-3 spots of Distal Esophagus.
9. If no leak is seen, video the patient continually drinking Upright Coned rectangle esophagus view gradually turning patient from LPO to RPO to get views all around the distal esophagus.
10. Coned Rectangle Distal Esophagus Semierect spots:
    A. LPO
    B. AP
    C. RPO
11. Semierect RPO Stomach and Bulb spot- to document duodenal filling.
12. Overhead AP Lower Chest/Upper Abdomen (upright or semierect)-taken by tech.

Focused esophagram to r/o aspiration

1. Scout CXR (PA).
2. Upright Coned Lateral Neck- **collimate from anterior to posterior keeping patient's chin up**! Give patient small cup of thin Barium (do not give a bottle with a straw or a large cupful because patients often drink everything fast before you even notice that aspiration has occurred!!!). Tell the patient to take a small sip while you video the Lateral Neck Swallow. **If you see aspiration, stop exam!**
3. If no aspiration, video 2 additional Upright Coned Lateral Neck swallows.
4. Upright Coned AP Esophagus-video one swallow to GEJ.
5. Post CXR (PA) (take upright if patient can stand)-obtained by tech.

Focused esophagram to r/o tracheoesophageal fistula

1. Scout CXR (PA).
2. Swimmer's Coned Rectangle Esophagus view. Give patient thin Barium (NOT water-soluble contrast) in a bottle with a straw. Instruct the patient to sip contrast and video bolus from neck to stomach so you can identify aspiration that could later be confused with a TE fistula (concentrate on mid esophagus where most fisulas occur).
3. Take 2-4 Coned Rectangle Esophagus spots in same position.
4. If no fistula seen, have the patient drink continuously and video the bolus from neck to stomach in the same position.
5. Take 2-3 Coned Rectangle Esophagus spots.
6. Post CXR (PA) (take upright if patient can stand)-obtained by tech.