

**Abdomen- Obstruction Series (Abdomen Complete)**

<b>Routine:</b>	AP Supine & AP Erect <u>or</u> Left Lateral Decubitus <u>or</u> Dorsal Decubitus (Erect done if possible. If impossible, do Left Lateral Decubitus. If impossible, do Dorsal Decubitus.)
<b>Position/Projection:</b>	<b>AP Supine (KUB)</b>
<b>Patient Prep:</b>	Remove everything except shoes, socks, and underwear. No metal on abdominal area.
<b>Technique:</b>	90 kVp ●● Table IR (10 mAs if not AEC)
<b>SID:</b>	40 inches
<b>Collimation:</b>	14 x 17 LW for average sized patients
<b>Patient Position:</b>	<p>The patient is in the supine position with the midsagittal plane centered to the image receptor. Ensure that patient is not rotated and is straight on the radiographic table. Place the patient's arms where they will not be in the image. Center the image receptor to <i>about</i> the level of the iliac crest. <b>Symphysis pubis should be at the bottom of the image receptor.</b> Make every effort to ensure symphysis is included without overcompensating too low.</p> <ul style="list-style-type: none"><li>• If using the free detector, place superior border of symphysis pubis one finger-width (<math>\frac{1}{2}</math>"") above the lower margin of the usable image receptor to ensure this.<ul style="list-style-type: none"><li>▪ <b>Find symphysis pubis:</b> Begin palpation at the level of ASIS moving inferiorly until palpation of the upper margin of the symphysis is palpated. Symphysis pubis is also in line with the patient's greater trochanter of femur (palpate lateral proximal femur).</li></ul></li></ul>
<b>Central Ray:</b>	Central ray perpendicular to about the level of the iliac crest and to the image receptor
<b>Marker Placement:</b>	Right or left marker on appropriate side.
<b>Shielding:</b>	Shield all males No shielding for females except when doing images of the upper abdomen.
<b>Breathing:</b>	Exposure is made on suspended expiration to prevent compression of abdominal organs.
<b>Purpose/Structures:</b>	<p>Demonstration of the size and shape of the liver, the spleen and the kidneys, and the intraabdominal calcifications or evidence of tumor masses.</p> <p>Entire bowel pattern is included if performed as part of an obstruction series <u>or</u> if KUB for bowel related concern such as nausea, vomiting or diarrhea.</p>

### Evaluation Criteria:

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest.
- Area from pubic symphysis to the upper abdomen (two images may be necessary if the patient is tall or wide)
- Proper patient alignment to the image receptor:
  - Centered vertebral column
  - Ribs, pelvis, and hips equidistant to the edge of the image or collimated borders on both sides
- No rotation
  - Spinous processes in the center of the lumbar vertebrae
  - Ischial spines of the pelvis symmetric, if visible (*\*rotated towards side in which spine is visible*).
  - Alae or wings of the ilia symmetric (*\*rotated towards wider side*).
- Exposure factors sufficient to demonstrate the following:
  - Psoas muscles, lower border of liver, and kidneys
  - Inferior ribs
    - Transverse processes of the lumbar vertebrae

\*\*Entire bowel pattern must be visualized if performed as part of an obstruction series or if KUB for bowel related concern such as nausea, vomiting or diarrhea.

### Special Considerations:

1. Patient is hypersthenic
  - In this case, the entire bowel pattern will most likely not fit on side to side.
  - Obtain two images:
    1. 17 x 14 CW- Center to include the superior margin of symphysis pubis on the bottom of the image.
    2. 17 x 14 CW – Center to include 1.5” of overlap from first image.

**\*\*Please note:** Imaging of individual quadrants should rarely be necessary. 17 x 17 may be used on patient's with larger body habitus per dept protocol

### How to proceed after first image is taken:

1. If the **upper portions** of the kidneys or bowel pattern is not fully visualized (going off top of image)
  - Obtain a **conedown** view, 14 x 11 CW of the upper area. Overlap bottom of the kidney shot with the top of the prior image (marker may be utilized as an indicator where top of light was from first image.) Overlap about 1.5” (3 fingers) Ideally, the costophrenic angles are visualized at the top of the image to ensure entire kidneys are visualized if only KUB is done for urinary concerns. The MSP is centered to the table. Must ensure overlap of top of initial image.
2. Bowel pattern is going off the side of the image
  - 17 x 14 CW- Overlap bottom of upper image with the top of the prior image (marker may be utilized as an indicator where top of light was from first image.) Overlap about 1.5” (3 fingers) The MSP is centered to the table. Must ensure overlap of top of initial image.
3. Pubic symphysis not visualized, but kidneys and bowel pattern are:
  - RH Radiology Department no longer supports imaging of cone down bladder shots. Every attempt should be made to image symphysis on the initial 14 x 17 image. If symphysis is missed, a 14 x 17 image, centered lower should be obtained.

## **Additional Notes:**

### **Obstructive series imaging based on Clinical Impression/Diagnosis of Exclusion:**

- Often, 1 view Abdomen AP is ordered when really the patient should be having a full obstruction series. If you receive a KUB (Abdomen AP) order for Obstruction/Ileus or Pneumoperitoneum (Free Air) and rad decides views is “yes”, proceed with imaging an Obstructive Series including a LLD or Erect image. (Send Co-sign required) If there is any question, please consult the Radiologist prior to imaging patient.

### **KUB's - 1 view Abdomen AP (not part of an obstructive series):**

- In most cases kidneys, ureter and bladder are of primary concern. If that is the case that is all that needs to be included.
- If KUB is ordered for nausea, vomiting, or diarrhea include all bowel pattern
- Any Abdomen AP (KUB) order to check for foreign body should be imaged skin to skin, symphysis to diaphragm. (examples include-- MRI clearance, evaluate for IUD, patency capsule etc.)

### **Portable Abdomen Supine**

- Must measure to obtain a technique. Measure where central ray is located around region of iliac crest. If an upper image is required, must re-measure over center of upper image. Grids are used on most patients.

### **Keofeed or NG Tube Placement:**

- Abdomen AP (supine) ordered to verify keofeed or NG tube placement
  - 14 x 17 portrait/LW
  - Centering will be dependent on if the study was ordered as a Chest or as an Abdomen
    - Ordered as a Chest: Centering should include majority chest but still making sure that the feeding tube tip is visible;
    - Ordered as an Abdomen: Centering should include majority abdomen but still making sure that the feeding tube tip is visible.
- . \* Usually done portable.

### **MRI Screening Protocol:**

- Abdomen AP (supine) prior to patient having an MRI study
- Remove heart monitor and leads; be sure to include the entire liver (need entire diaphragm on image). Also need to include skin to skin, side to side.
- If the diaphragm is clipped check to see if patient has had chest Xray within 24 hours before repeating. If there is a CXR within 24 hours, there is no need to repeat (because the diaphragm is seen on the chest Xray); document this info in EPIC.
- All other factors are the same as a regular Abdomen AP.
- *Criteria: Visualize entire abdominopelvic cavity, skin to skin and diaphragm to symphysis. \* Usually done portable.*

### **Hinton Marker Abdomen AP:**

- All bowel visualized. Follow instructions per Hinton Marker Policy found in Primordial.

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<b>Projection/Projection:</b>	AP Erect
<b>Patient Prep:</b>	Remove everything except shoes, socks, and underwear. No metal on abdominal area.
<b>Technique:</b>	90 kVp ●● Erect IR (10 mAs if not AEC)
<b>SID:</b>	40 inches
<b>Collimation:</b>	14X17 LW/CW depending on body habitus <ul style="list-style-type: none"><li>○ 14 x 17 average and thin patient</li><li>○ 17 x 14 for large (<i>wide</i>) thorax</li></ul>
<b>Patient Position:</b>	The patient is in the erect position with the midsagittal plane centered to the image receptor. Ensure that patient is not rotated. **Center high enough to include diaphragm which will depend on patient body habitus. Move the arms to where they are not in the exposure field.
<b>Central Ray:</b>	Central ray is perpendicular to the erect image receptor, to the midsagittal plane and 2 inches above the level of the iliac crest to include the diaphragm. Must include the entire diaphragm. <ul style="list-style-type: none"><li>● Center about 2 inches above the iliac crest and adjust from there depending on patient body habitus.<ul style="list-style-type: none"><li>○ Tall, skinny patients – longer lungs, center lower</li><li>○ Short, wider patients- shorter lungs, center higher</li></ul></li></ul>
<b>Marker Placement:</b>	Mark right or left side accordingly. Must use an erect marker or annotate erect.
<b>Shielding:</b>	No shielding required on males or females. If you provide a shield, ensure that it is placed below the collimation field. You may have to get the patient to hold it in place.
<b>Breathing:</b>	Exposure is made on suspended inspiration as per department protocol at RHS. <i>*Merrill's note</i> – suspended expiration should be used as to not compress abdominal organs
<b>Purpose/Structures:</b>	Shows the size and shape of the liver, spleen and kidneys. Demonstrates free air and air-fluid levels.

**Evaluation Criteria:**

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest.
  - ‘**ERECT**’ must be annotated on the image
- Entire diaphragm without motion must be visualized. (There should be a minimal amount of lung visualized.)
- Vertebral column should be in the center of the image.
- Ribs, pelvis and hips should be equi-distant to the edges of the radiograph on both sides.
- No rotation of patient as indicated by:
  - Spinous processes in the center of the lumbar vertebrae.
  - Ischial spines of the pelvis symmetric, if visible (rotated towards side in which spine is visible).
  - Alae or wing of ilia symmetric (rotated towards wider side).

**Additional Note:**

- Ensure that the patient did not have any pain medications before standing them (ED & House patients). Patients with abdominal concerns often receive pain medications prior to x-ray. If they had pain medication – do NOT stand the patient and perform a LLD. (Best practice is to check EPIC chart)
- If a patient has been lying down and is not on or given pain medication, still make sure patient is not dizzy and is ok to stand upright.
- If standing, patient must wear slipper socks or shoes
- If unable to stand for upright view, attempt Left Lateral Decubitus instead. If unable to lay on left side, perform Dorsal Decubitus
- Portable Erect Abdomen imaging is acceptable - Image must contain at least 70% abdomen, should not include the larger majority of chest. Patient should be as close to 90 degree upright as possible to acquire adequate air/fluid levels. Image should not be acquired in semi-erect position. If true erect cannot be achieved, decub image should be obtained

## **Abdomen- Obstruction Series (Abdomen Complete)**

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(Erect done if possible. If impossible, do Left Lateral Decubitus. If impossible, do Dorsal Decubitus.)
- Projection/Position:** **Left Lateral Decubitus (AP or PA)**  
\* To be done only if patient cannot stand
- Patient Prep:** Remove everything except shoes, socks, and underwear. No metal on abdominal area.
- Technique:** 90 kVp  Erect IR (11 mAs if not AEC)
- SID:** 40 inches  
56 inches may be used if patient on Bariatric litter or depending on body habitus. \*Must attempt 40 inches first.
- Collimation:** 14 x 17 with grid lengthwise to body for Free Detector  
17 x 14 collimation for DR
- Patient Position:** If remaining on litter make sure litter is locked.  
**\*\*Merrill's note:** Merrill's recommends that the patient should remain in this position for approximately 5 minutes prior to taking exposure to allow any free air to rise.  
Place the patient in the lateral recumbent position (left side down), AP or PA with the arms above the level of the diaphragm so they are not projected over the abdominal contents. Flex the patients knees slightly to provide stabilization and ensure that the stomach/back are as close to the image receptor as possible. Also, ensure that the patient is parallel with the IR and there is no rotation of the spine/pelvis and the patient is in a true lateral position. Adjust the height of the image receptor so the long axis is centered to the midsagittal plane.
- Free detector – set technique according to technique books for measurement obtained with the patient in the supine position (measure at the thickest part of the abdomen from anterior to posterior).
  - DR- Use AEC as indicated by the technique books.
- Central Ray:** Central ray perpendicular to the image receptor about 2 inches above the iliac crest. Ensure that there is a minimal amount of light above the upper side of the abdomen.
- Marker Placement:** Right marker is placed on the Upside (marking the right side of the body). Must Annotate 'DECUB' on image
- Shielding:** Shield males and females. Place shield lower than the collimated field.
- Breathing Instructions:** Expose on suspended expiration

**Purpose/Structures:**

- Shows the size and shape of the liver, spleen and kidneys. Demonstrates free air and air-fluid levels.

**Evaluation Criteria:**

- Evidence of proper collimation and presence of side marker, marking upside, placed clear of anatomy of interest. *\*Left Lat Decub must be lead or annotated*
- Diaphragm must be included without motion.
- The right side up should demonstrate free air if present
- Abdominal wall, flank structures and the diaphragm should be visualized.
- No rotation of the patient.
  - Spinous processes in the center of the lumbar vertebrae.
  - Ischial spines of the pelvis symmetric, if visible (rotated towards side in which spine is visible).
  - Alae or wing of ilia symmetric (rotated towards wider side).

**Additional Note:**

- Only right side of the diaphragm is need on left lateral decubitus view.  
*\*Merrill's note:* If being performed for fluid – the side down must be included. If being performed for free air, the side up must be included.

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(Erect done if possible. If impossible, do Left Lateral Decubitus. If impossible, do Dorsal Decubitus.)
- Projection/Position:** **Transabdominal/Dorsal Decubitus**  
\*(To be done in place of lateral decubitus view if patient unable to roll or lie on their left side for left lateral decubitus.)
- Patient Prep:** Remove everything except shoes, socks, and underwear. No metal on abdominal area.
- Technique:** 90 kVp  Erect IR (25 mAs if not AEC)
- SID:** 40 inches  
56 inches may be used if patient on Bariatric litter or depending on body habitus. Must attempt 40 inches first.
- Collimation:** 14 x 17 with grid lengthwise to body for free detector  
17 x 14 collimation for DR
- Patient Position:** If remaining on litter make sure litter is locked.  
Patient supine with arms across the upper chest or above head to ensure that they are not projected over any abdominal contents. Patient's knees can be flexed slightly to reduce strain of the back. Adjust the patient to ensure that no rotation from the supine position. Place patient's side as close as possible against the image receptor. Adjust the height of the image receptor so the long axis is centered to the midcoronal plane.
- Free detector – set technique according to technique book according to measurement obtained with the patient in the supine position (measure laterally across the abdomen).
  - DR- Use AEC as indicated by the technique book.
- Central Ray:** **RH:** Central ray horizontal and perpendicular to the center of the IR entering at the highest point of the abdomen. Ensure that there is some light above the abdomen.  
**\*\*Merrill's:** Central ray horizontal and perpendicular to the center of the IR entering approximately 2 inches above the level of the iliac crests
- Marker Placement:** Place right or left marker on the image receptor marking the anatomical side against. Must annotate 'Trans. Abd.' or 'Dorsal Decub'.
- Shielding:** Shield males and females. Place shield lower than the collimated field (and lateral to ensure coverage of the horizontal beam).
- Breathing Instructions:** Expose on suspended expiration

**Purpose/Structures:** Lateral projection of the abdomen to demonstrate air fluid levels in the abdomen

**Evaluation Criteria:**

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest.
  - \*\*Proper lead marker should be visualized indicating the side against IR and Trans Abd or Dorsal Decub. must be annotated.
- Highest point of abdomen must be visualized without motion. **(RH)**
- No rotation
  - Superimposed ilia
  - Superimposed lumbar vertebrae pedicles and open intervertebral foramina
- As much of the remaining abdomen as possible when the diaphragm is included