Adaptive Radiography: Tips and Tricks

Dennis Bowman RT(R), CRT(R)(F) - Retired Owner/Consultant - Digital Radiography Solutions (dRs)

ADAPTIVE RADIOGRAPHY with TRAUMA, IMAGE CRITIQUE AND CRITICAL THINKING

Quinn B. Carroll Dennis Bowman

The Double Ping Pong Ball Experiment

The following slides will prove how important it is to have a horizontal beam when looking for air/fluid levels or free air.

All mention of the Bucky also means the ping pong balls (which really means the patient). The middle of the right ping pong ball was 8 cm from the IR. The middle of the left ping pong ball was 18 cm from the IR. There was 20 cc of water injected into the balls.



Sameiferno

Bucky vertical and tube level with floor.



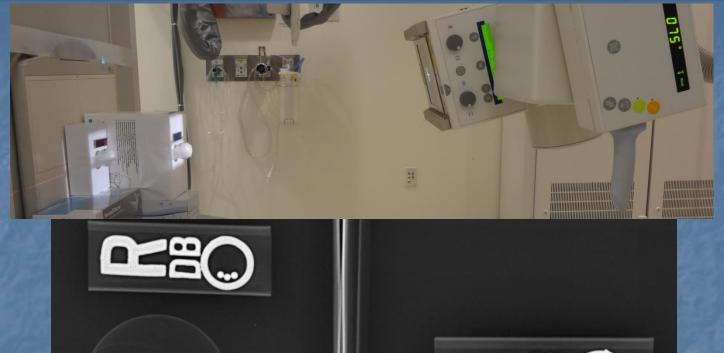
Bucky vertical and tube 5 degrees caudad.



Bucky vertical and tube 10 degrees caudad.



Bucky vertical and tube 15 degrees caudad.





Bucky vertical and tube 20 degrees caudad.



Bucky vertical and tube 5 degrees cephalad.









Bucky vertical and tube 10 degrees cephalad.







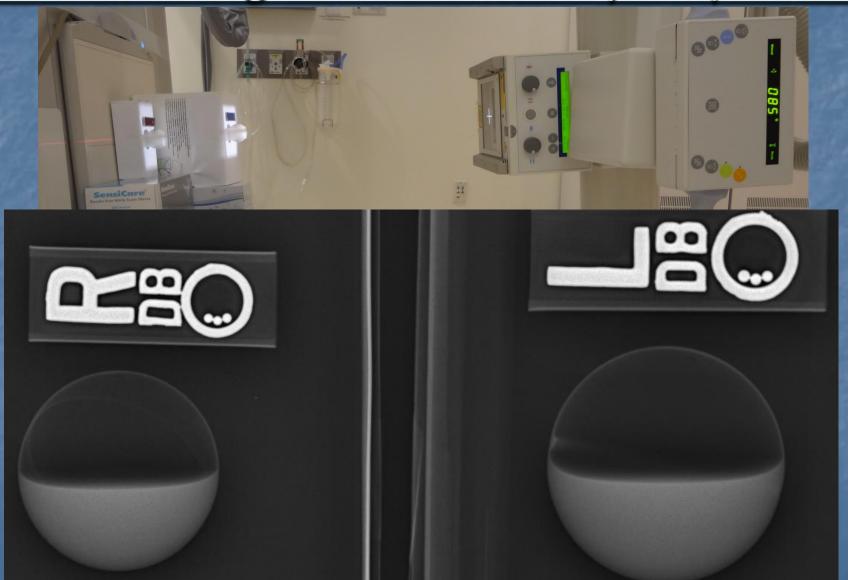
Bucky vertical and tube 15 degrees cephalad.

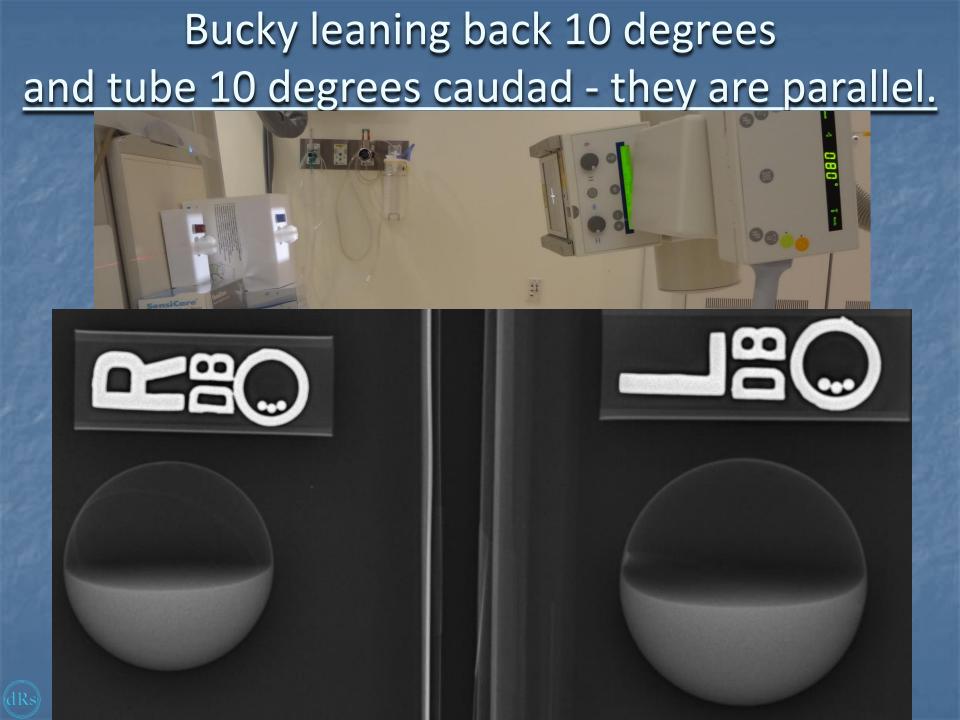


Bucky vertical and tube 20 degrees cephalad.



Bucky leaning back 5 degrees and tube 5 degrees caudad - they are parallel.





Bucky leaning back 15 degrees and tube 15 degrees caudad - they are parallel.



Bucky leaning back 20 degrees and tube 20 degrees caudad - they are parallel.





80

Bucky is angled back 20 degrees and tube is level with the floor.







This PA erect abdomen is the perfect example of free air that could be missed if taken with an angled beam.



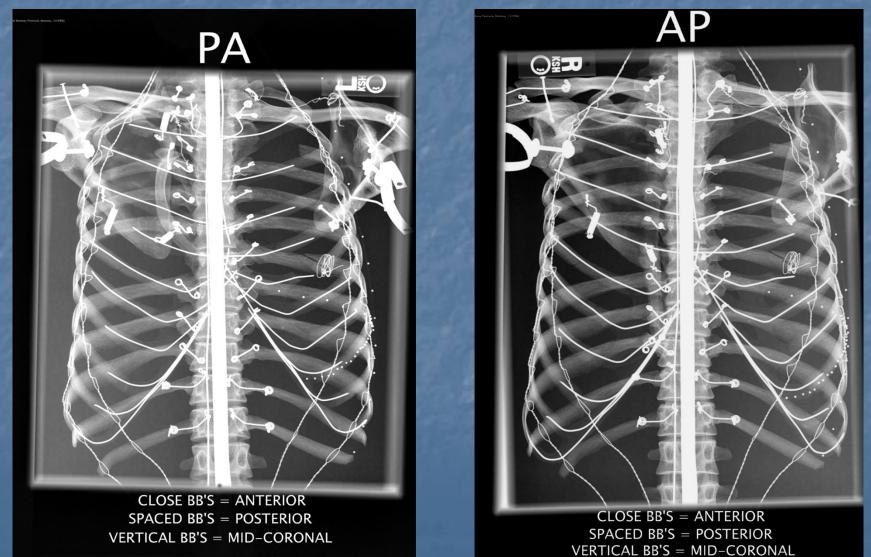
This is Billy – and the closet he lived in.







The posterior ribs are thicker and less curved. Even though on the PA view the anterior ribs are closest to the bucky, the posterior ribs will always show up better.



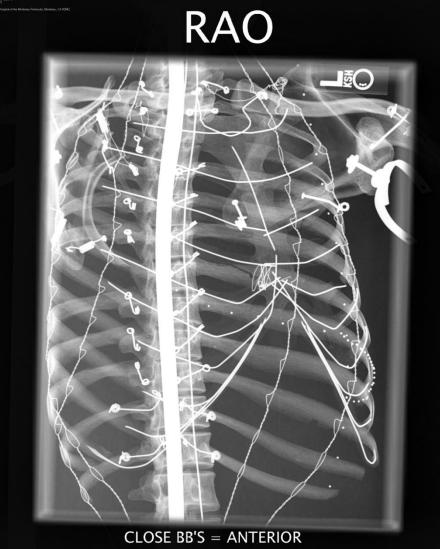
<u>PA Upper Ribs</u> – It's good to use the full 17" length to get on the lower ribs if possible.

The perfect PA. Sometimes air in the stomach or the colon can really help you out.



RAO Upper Left Ribs – Get spine to lateral border.

Anterior ribs foreshortened, posterior ribs elongated.



SPACED BB'S = ANTERIOR VERTICAL BB'S = MID-CORONAL

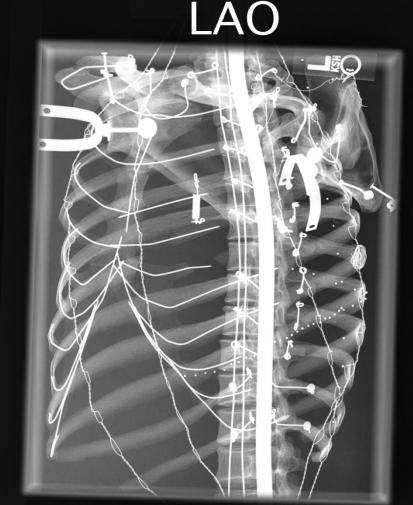
RAO - posterior ribs perfectly splayed out (even though they are further from the bucky).



LAO Upper Ribs – Remember that the sternum is now more medial than the spine.



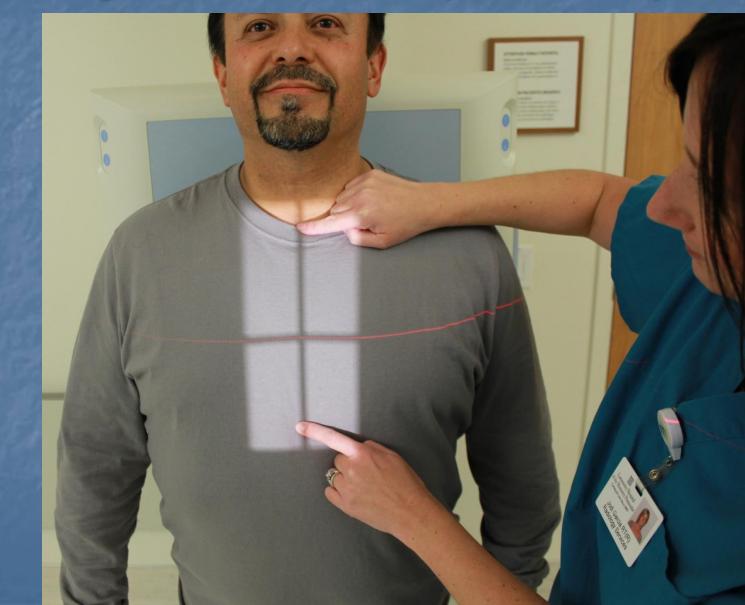
Posterior ribs now foreshortened, anterior ribs are elongated (note anterior ribs have come across the spine).



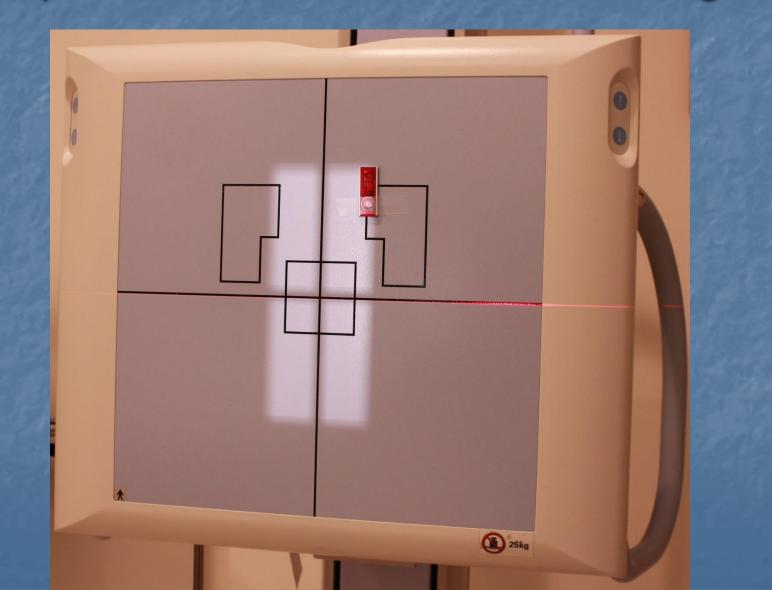
CLOSE BB'S = ANTERIOR SPACED BB'S = POSTERIOR VERTICAL BB'S = MID-CORONAL LAO - you can't get a better view of those anterior ribs than this.



<u>Sternum</u> – First get light field set-up by finding manubrium and xiphoid in AP position



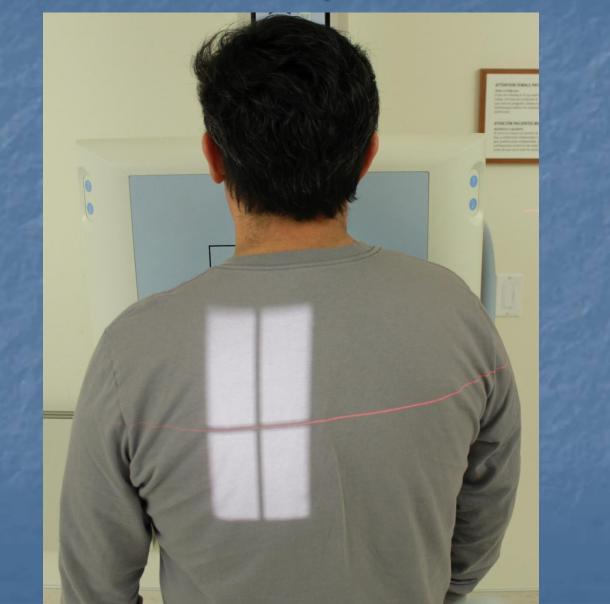
Then move the patient to the side, place your marker and center the IR to the light.



<u>RAO Sternum</u> – Shallow oblique of 20 degrees only. Center sternum to midline of detector.



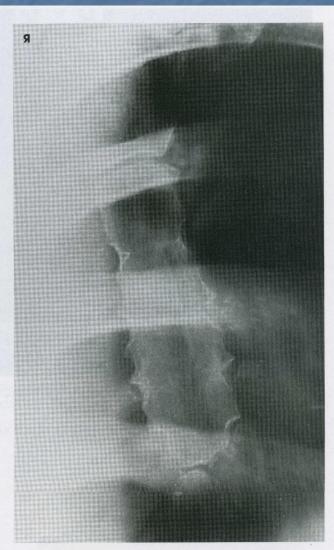
Never believe the light field because it will always look incorrect.



Nicely seen RAO sternum



Merrill's Sternum



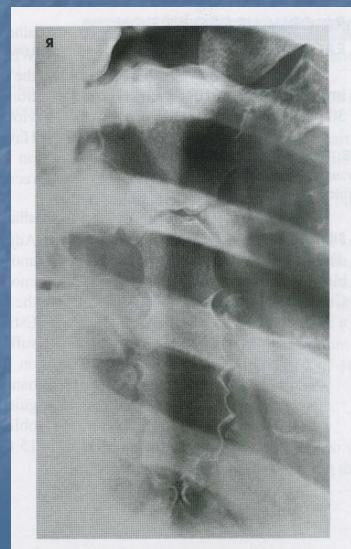


Fig. 9-12 PA oblique sternum, RAO position.

Fig. 9-14 Shallow breathing during exposure.

PCXR's - How to correctly line up the tube to the patient and grid so there is no distortion or grid cut-off.

Pull the tube out so that it's somewhat lined up to the center of the patient.

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Measure out your 72".



Step back as far as you can. The further you are away from the tube, the easier it is to see if the middle of the tube is exactly in line with the middle of the patient's sternum.

Here you can see that the tube is not lined up with the patient.

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If the tube is not lined up, go over to the clickers and move the tube in and out.

You might have to do this a couple of times until you have it perfectly aligned. I love to use my hand to help me line it all up. Turn on the light and see where you're centered. Most likely it will be off to the right or the left. This just means your side to side angle is off. Using the grip holders and not the handle clickers, rotate the collimator box without moving the tube. If you go too far, keep rotating the collimator box until the light is exactly in line with the patient's sternum. Once you're perfectly centered side to side, you can work on top to bottom centering and collimation.

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For ceiling to floor centering, it's easiest to hold the back of the tube and the edge of the handle (not the clicker) to pivot the tube head to foot.

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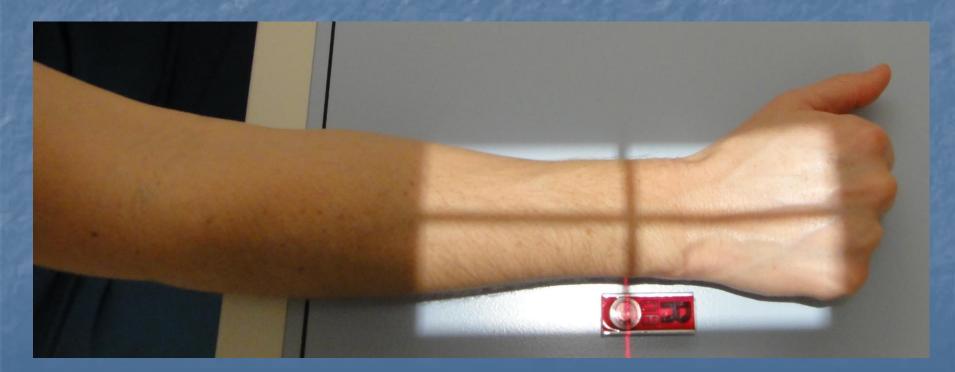
Collimate as needed.

Lead yourself up (and the patient if you haven't already done so), hide behind the machine and make the exposure.



Long PA Wrist (for trauma)

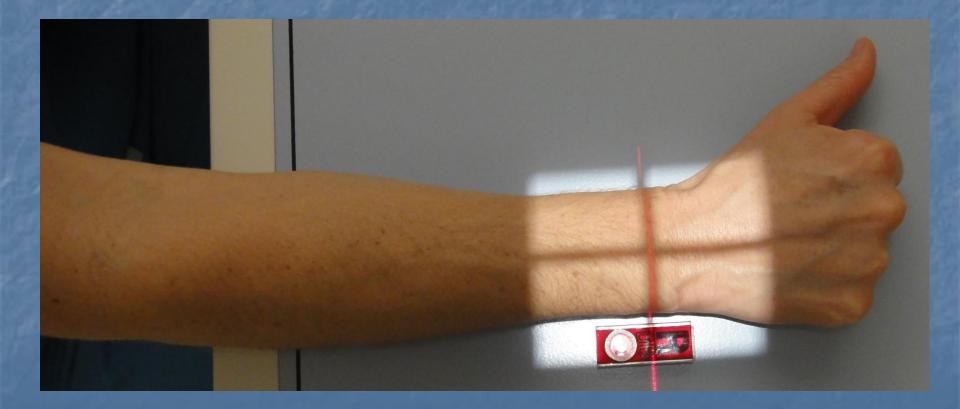
Centering just proximal to styloid process. Show close to one-half of the forearm.



Perfect long PA wrist.



<u>Short PA Wrist</u> – Centered on styloid process.



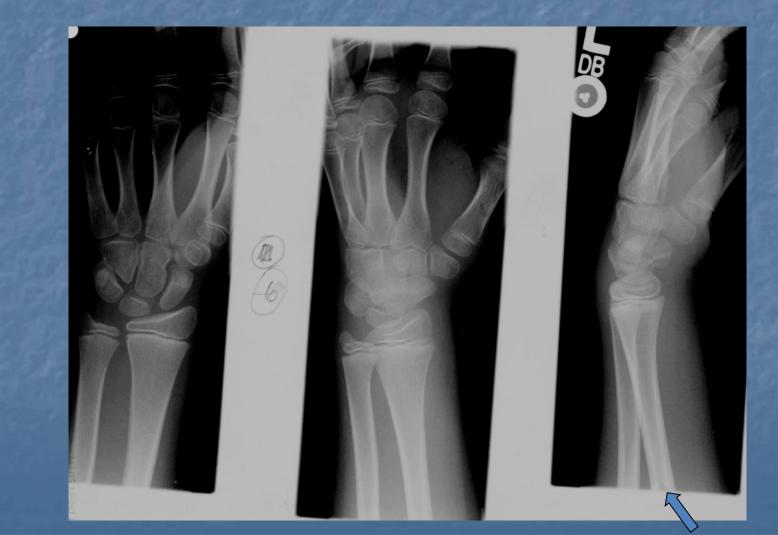
Classic 4 on 1 short wrist images.







Although I almost never do it, this one time I shot a short wrist on a 15 year old because he could easily move the wrist around.



Because of the little density he saw on the lateral, he had me shoot a forearm.



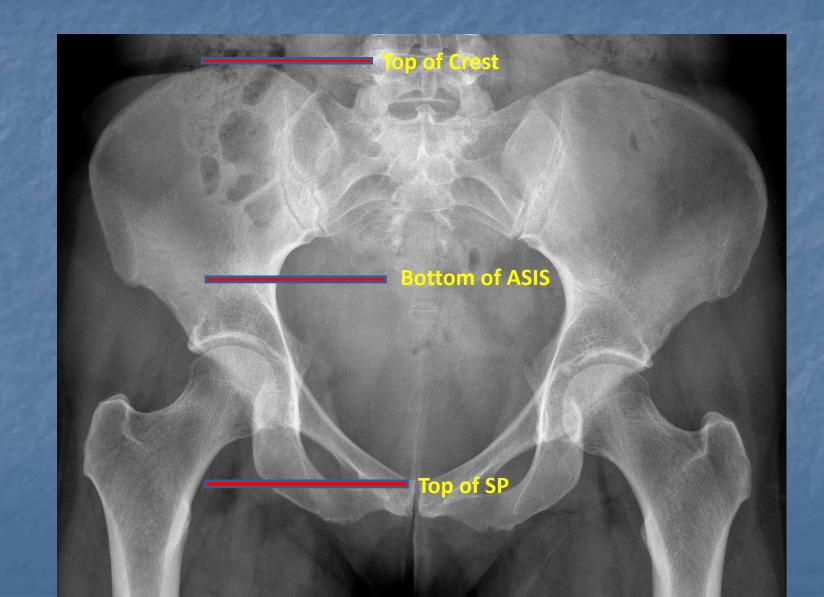
The ASIS, the "Universal Landmark"

Instead of using the symphysis pubis (SP), use the bottom of the ASIS.
The bottom of the ASIS is located 3" above the upper edge of the SP.
The bottom of the ASIS is also located 3" below the top of the crest.

Tip:

The ASIS, the "Universal Landmark"

Tip:



How much does a <u>scapula</u> move? In this true AP, the scapular body is parallel with the IR.



True AP scapula.



Patient PA and shoulder/scapula rolled forward (like a PA chest). Scapula is approximately 25-30 oblique from PA.



Scapula rolled forward approx. 25-30 degrees.



Patient still PA but with arm completely brought across chest. Scapula is approximately 50-60 degrees oblique.



Scapula approximately 50-60 degree oblique.



Patient's body only needs to be rotated 30-40 degrees.



Patient's body rotated 30-40 degrees for a perfect lateral scapula.





<u>PA Shoulder Y</u> – Humerus vertical, body rotated 45 degrees. Exit at mid humerus side to side.



You can either gauge the 45 degree angle across the chest or back.



Perfect Shoulder Y image. Note that humerus is directly superimposed over body of the scapula.



Perfect lateral scapula.



Waters projection. If the patient is unable to extend their neck adequately, instead of angling the tube <u>caudally and possibly missing the A/F level...</u>



AP Waters – Sit patient in chair, have them lift their chin as high as possible, and if needed, have them lean back in the chair until neck is correctly extended.



<u>New positioning line for Waters</u>

 MML not very accurate
 OML 37 degrees to IR must be measured with protractor

- EZ line (Ear-to-Zygoma line) extends from TEA to laterally palpated bottom margin of body of zygoma
- TEA is the top of the petrous ridge, and the zygoma is the bottom of the maxillary sinus





Now using the EZ Line to get the petrous ridges just below the maxillary sinuses



How much more anatomy can be seen on an abdomen when the SID is increased, or <u>72" is the new 40"(SID)!!</u>

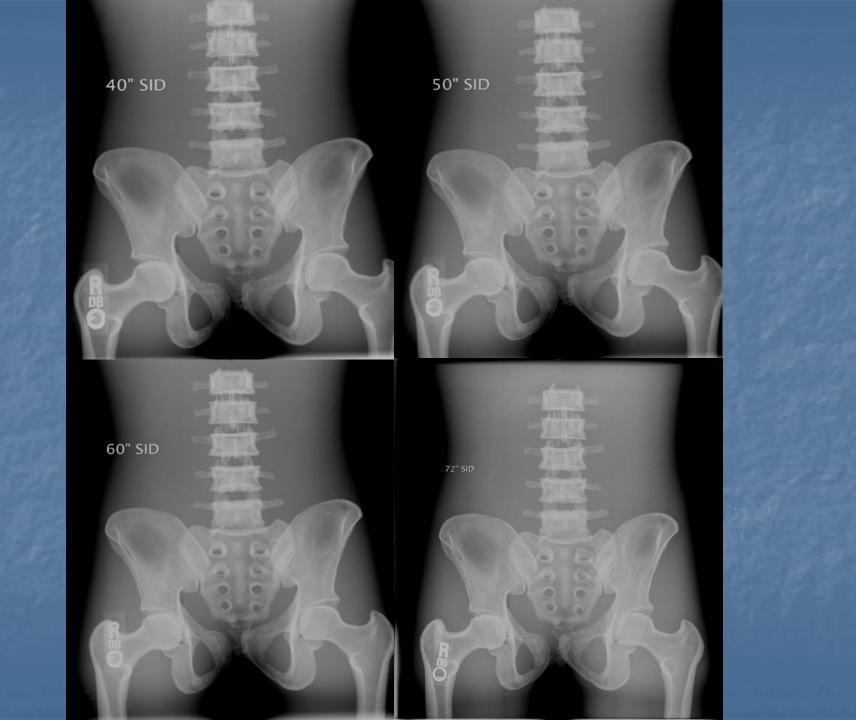
Classic distances are (were) 40" or 44" and 72."
Patients are much larger now.











dRs

Why a Lateral Chest X-Ray is So Important

<u>Right Lobes</u>



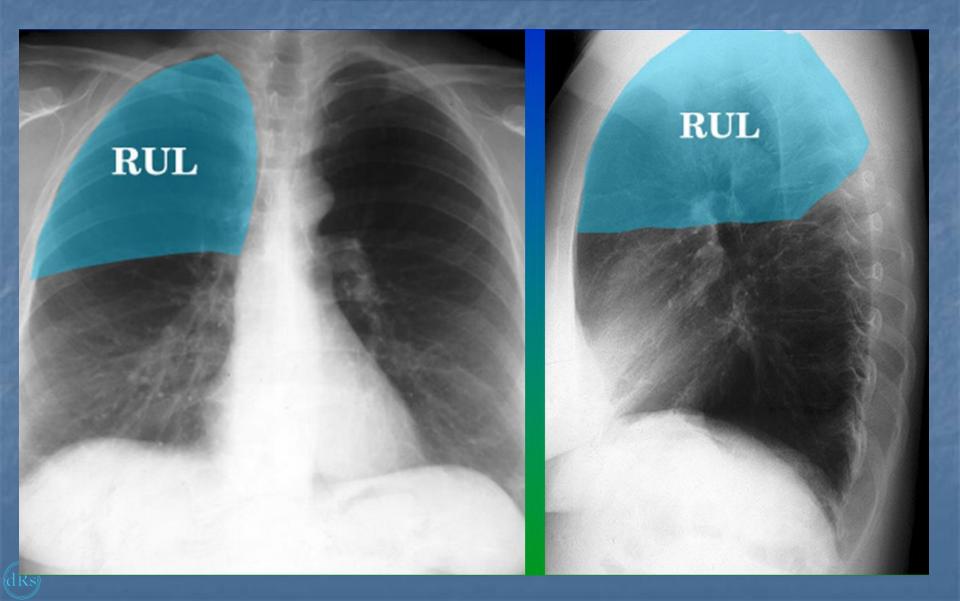
Middle Lobe



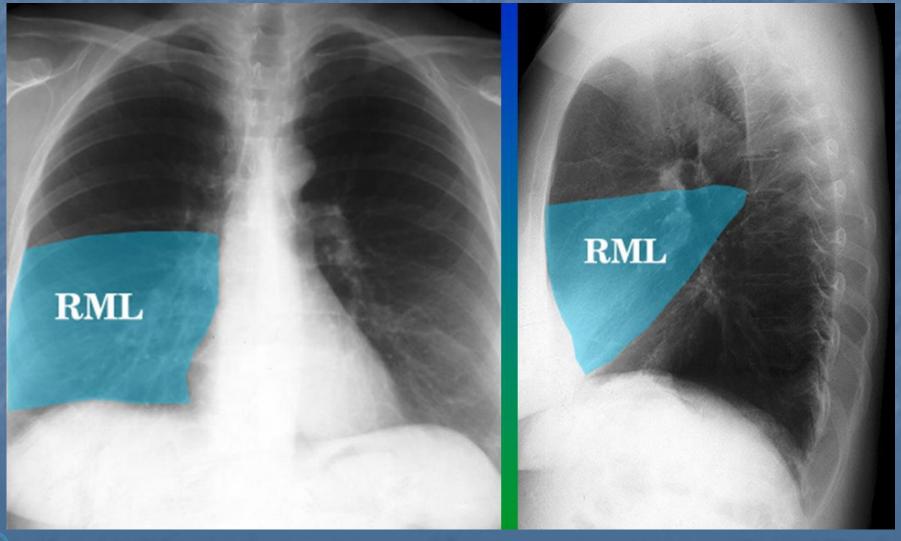
Minor Fissure

Major Fissure

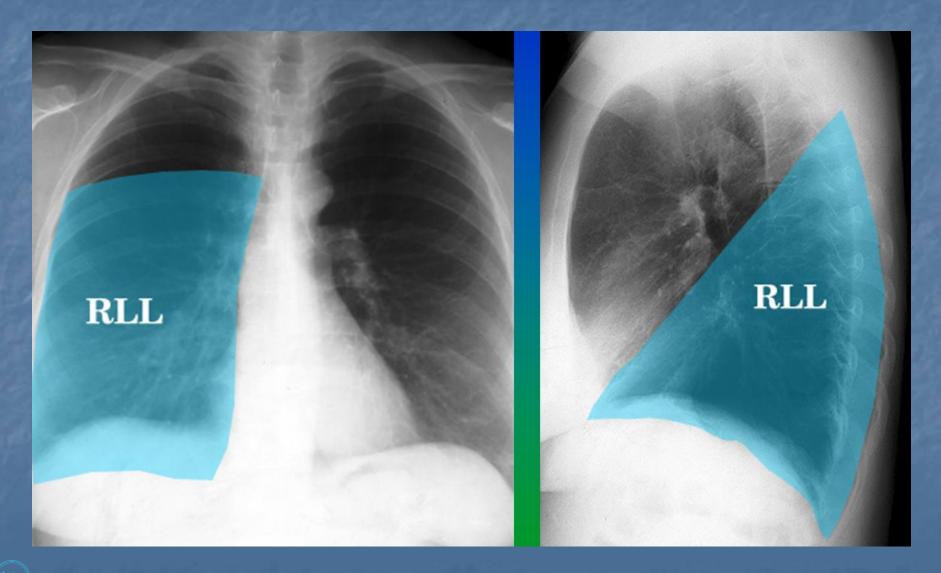




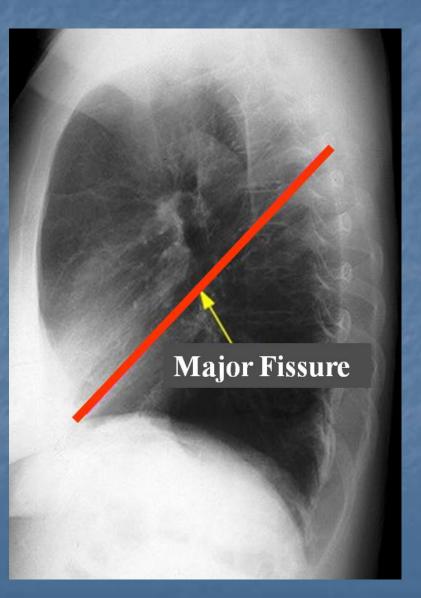




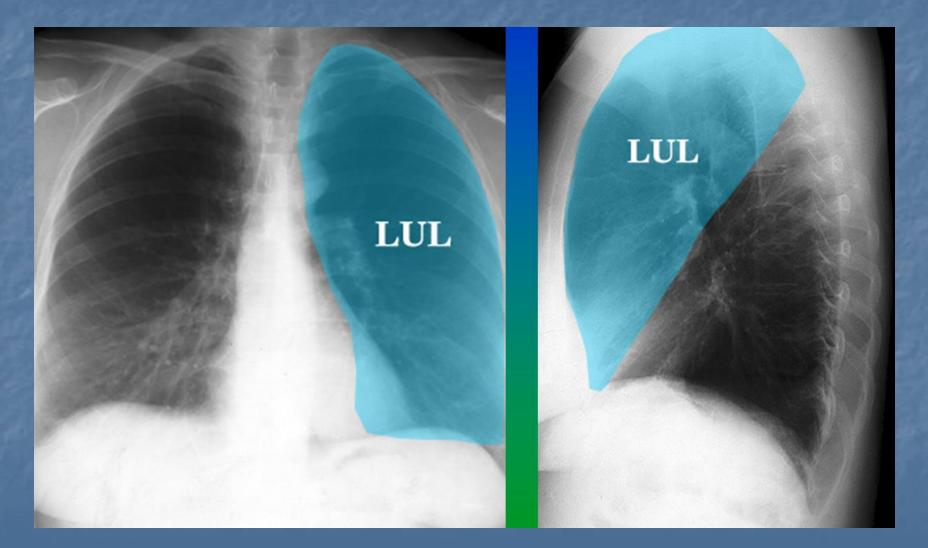




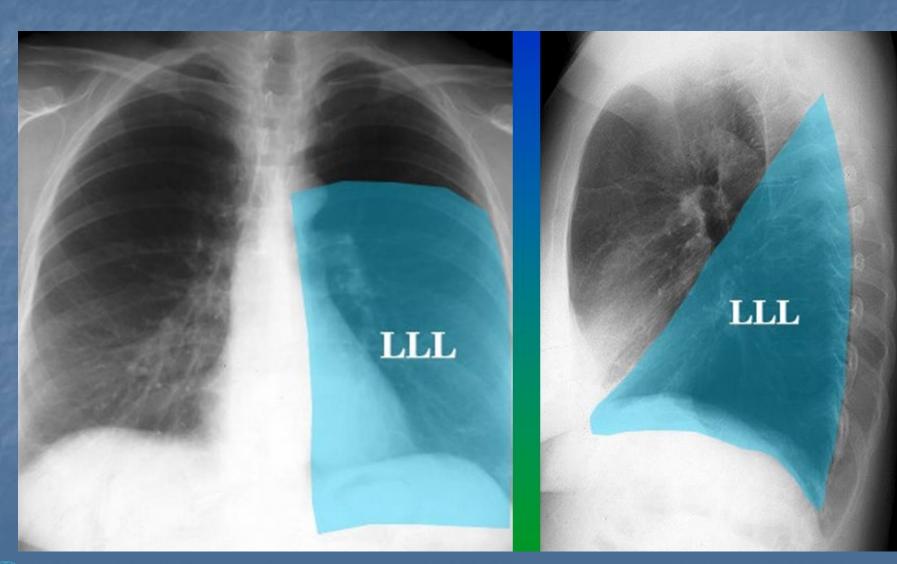








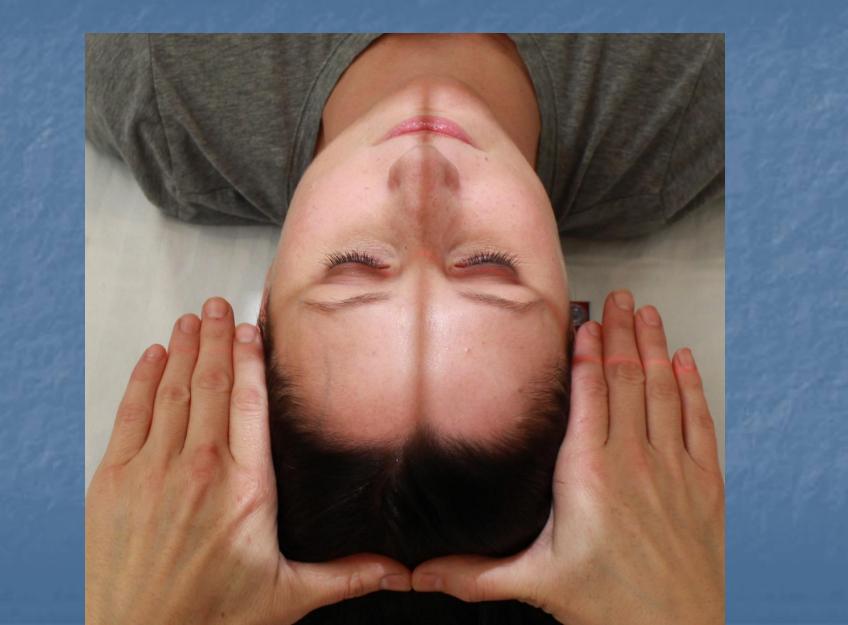




Getting the part perfectly centered

- The proper centering criteria is the perfect place to *start*.
- Just make sure you don't end there unless it's appropriate.
- You need to always double check that you have all four sides on with the perfect amount of collimation or anatomy.
- Most of the positioning I do does not have a particular centering – I just look at the top, bottom and both sides of the pre-built collimated lightfield.
- Final collimation (and moving the patient) may be needed.

1 finger collimation (1/2'') is perfect.





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so I could continue to have all of my low dose DR and CR digital technique charts, and radiation protection experiments and demonstrations, available for free.





Dennis Bowman dennismbowman@gmail.com (831) 601-9860 digitalradiographysolutions.com

