How to Approach an Abdominal CT

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Technique

CT of the abdomen and pelvis:

- oral (water or barium-based) and IV contrast
- Images obtained during the **portal venous phase** (~70 second delay)
- Images acquired in the (trans)-axial plane and computer reformats images into the coronal and sagittal planes. Axial images are predominantly used.

(Trans-)axial plane

Coronal plane

Sagittal plane

Approach- Checklist: Liver/Biliary Tree

1. Attenuation
2. Surface contour
3. Focal lesions (Couinaud segments)
4. Gallbladder
5. Biliary tree: intrahepatic & extrahepatic

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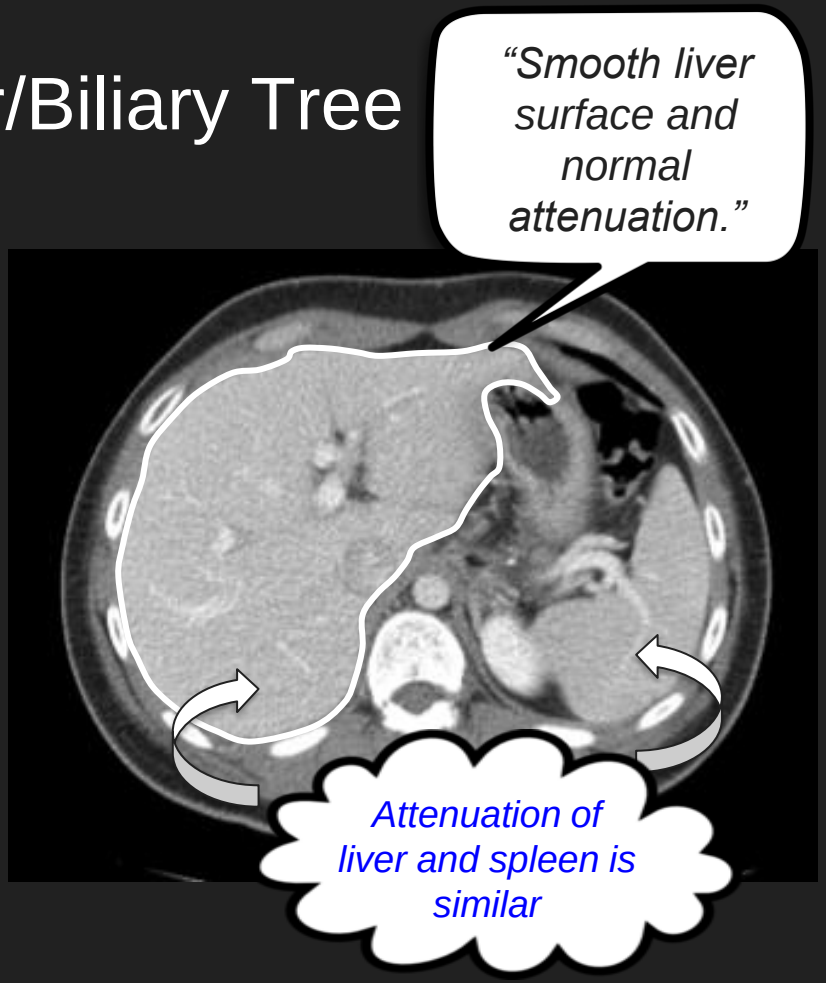

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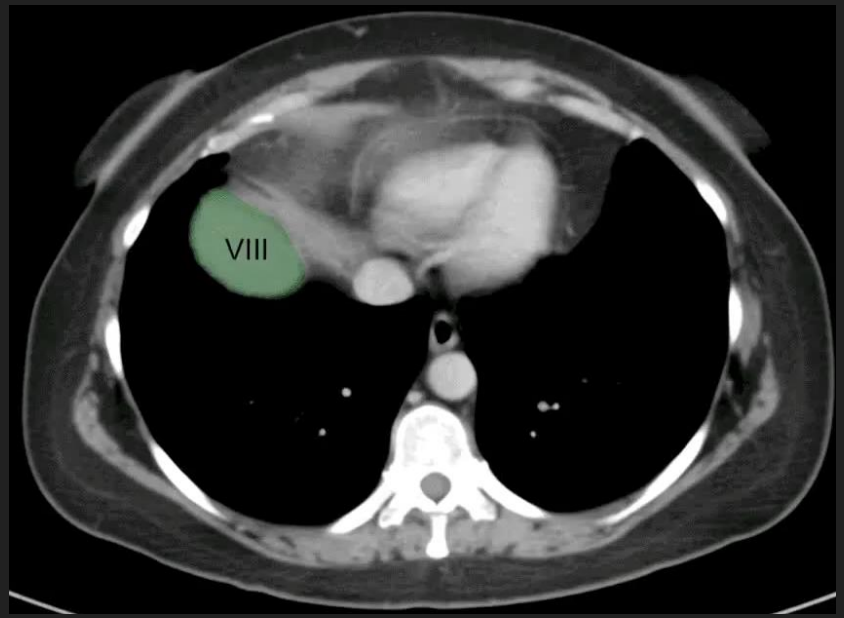

The oblique horizontal plane of portal veins (purple arrows) separates segments 2, 4a, 8 and 7 from 3, 4b, 5 and 6. The middle HV and gallbladder fossa separate R and L lobes.

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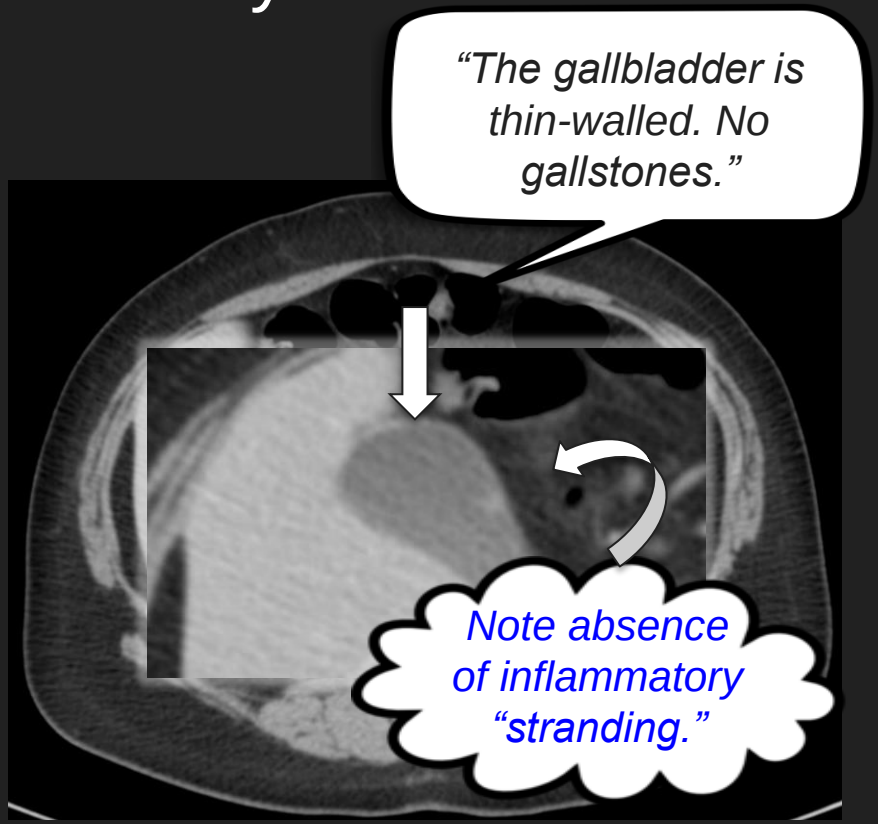

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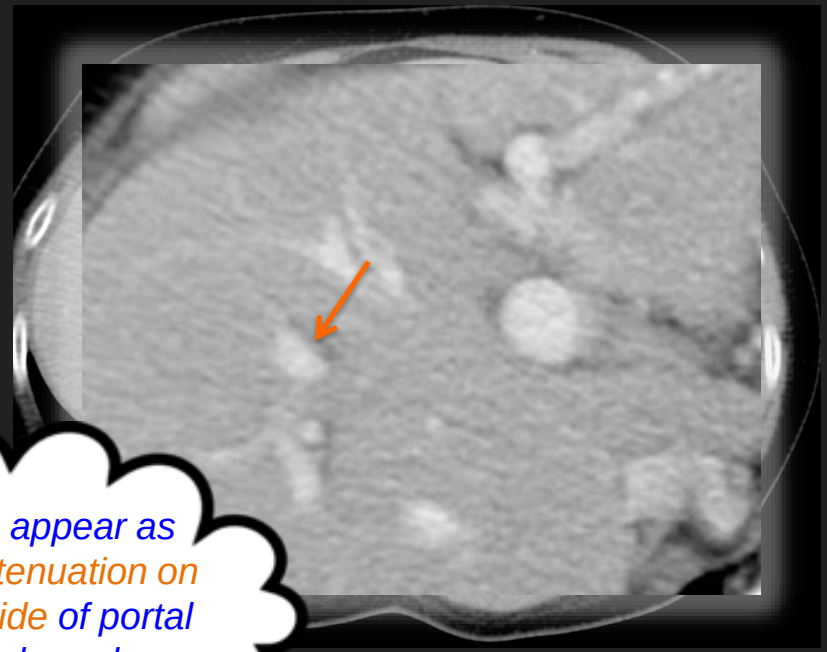

Ducts appear as hypoattenuation on ONE side of portal vein branch.

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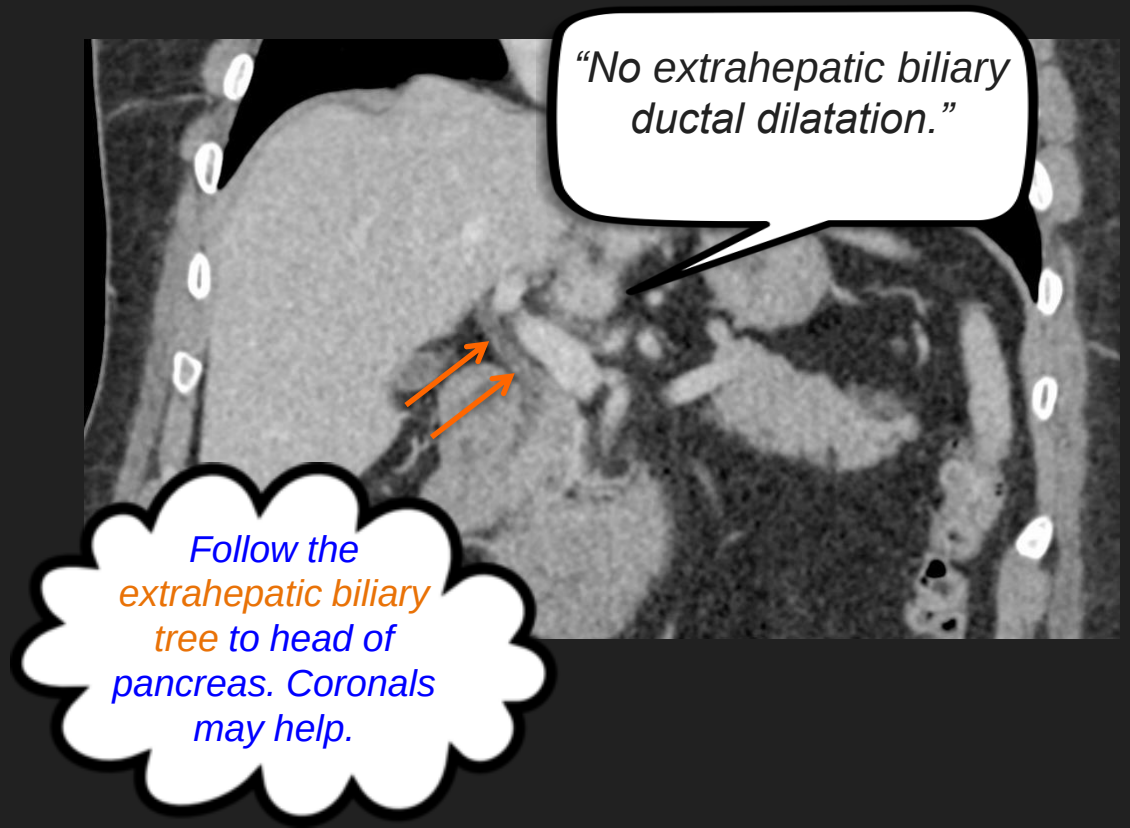
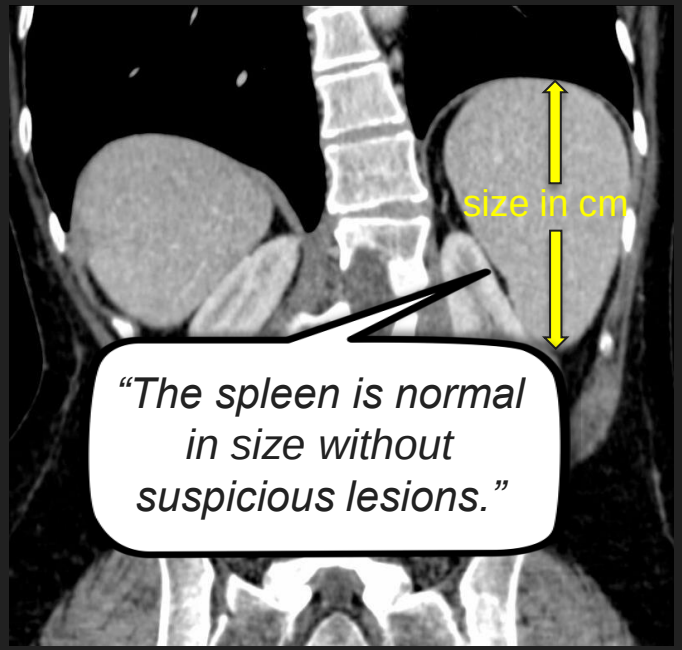


Approach- Checklist: Spleen

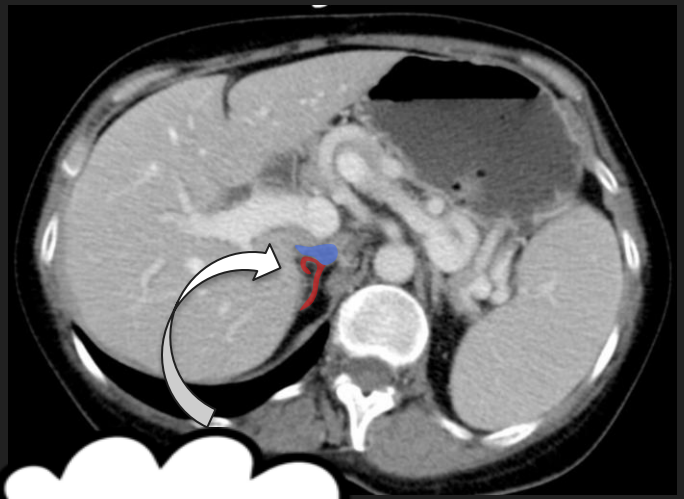
1. Look for lesions, such as masses, infarcts. (“Lesion” is term of art for any focal abnormality).

2. Use coronals to assess size

3. Screen vasculature (thrombosis, occlusion) – follow splenic vein to its connection to the portal vein. Many radiologists review splenic vasculature as part of their general vasculature search, and also include the portal and superior mesenteric veins.

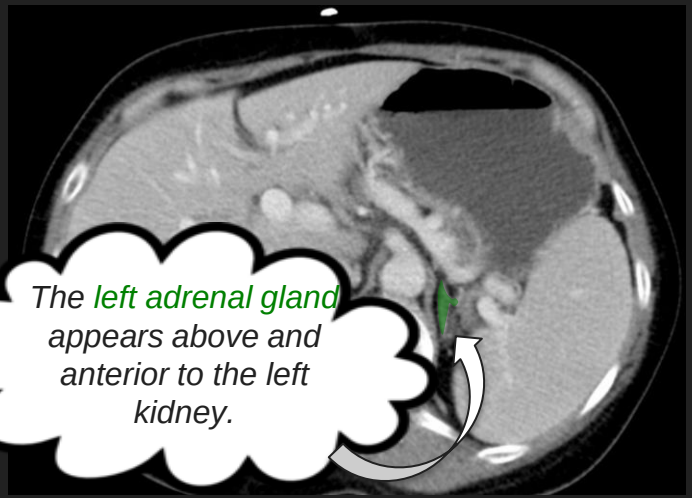


Approach- Checklist: Adrenal Glands



The right adrenal gland appears to be connected to the IVC

"No adrenal nodules."



The left adrenal gland appears above and anterior to the left kidney.

Approach- Checklist: Kidneys and ureters

1. Look for symmetric enhancement.

2. Look for hydronephrosis and calculi.

3. Try to follow the ureters to the urinary bladder (not always possible!).

4. Coronals increase sensitivity for detecting polar lesions.

“Kidneys enhance symmetrically. No suspicious masses or calculi. There is mild bilateral hydronephrosis.”

Approach- Checklist: Pancreas

1. Look for uniform enhancement
2. Look for ductal dilatation
3. Look for masses
4. Look for calcifications
5. Look for inflammatory change or fluid around the pancreas

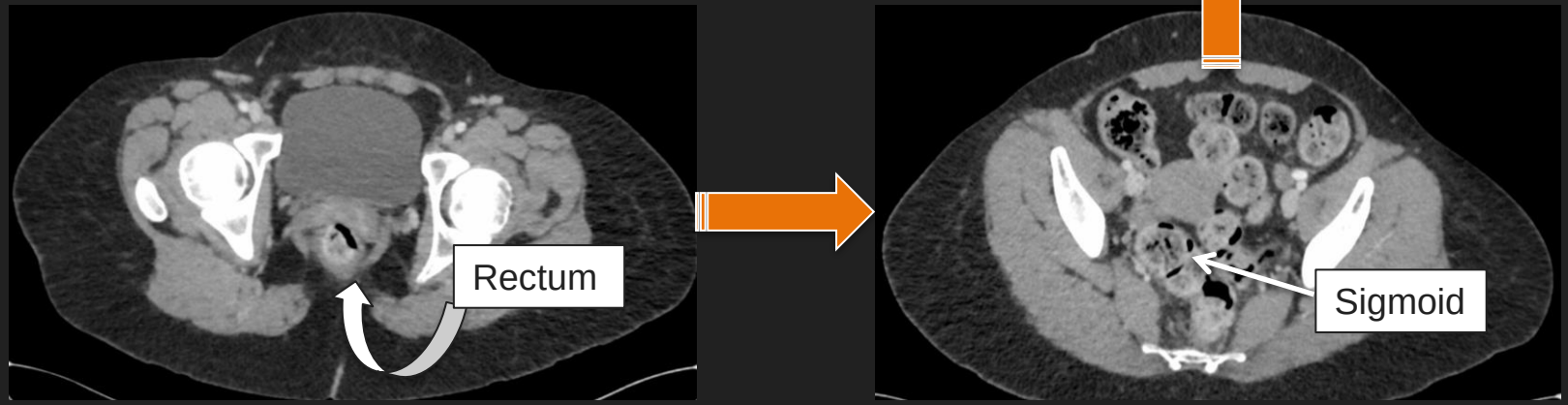
“Uniform parenchymal enhancement without masses. Normal duct. No peripancreatic inflammatory changes.”

Approach- Checklist: Colon

For the colon, start at the rectum and follow the colon backwards.

Look for:

- Diverticula and inflammation
- Wall thickening
- Dilatation

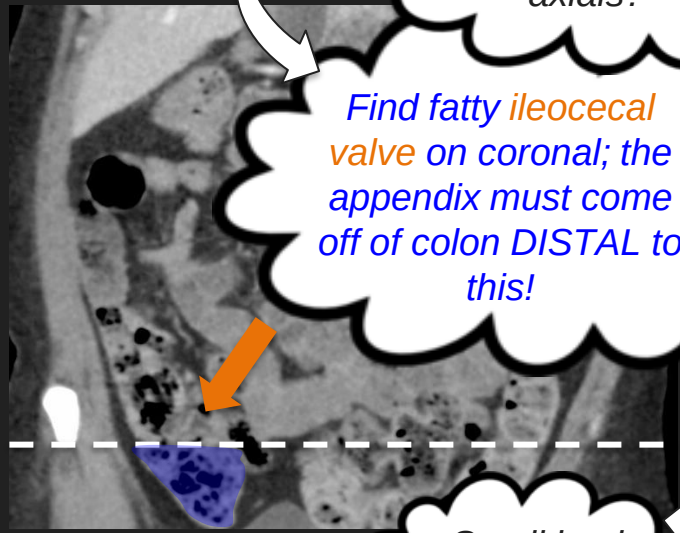


Approach- Checklist: The Appendix

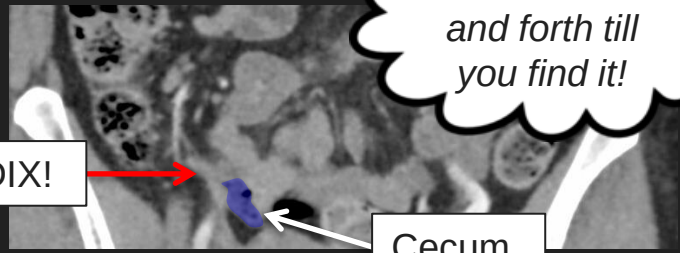
"The appendix is normal in caliber without inflammatory change."

What if you can't find the appendix on axials?

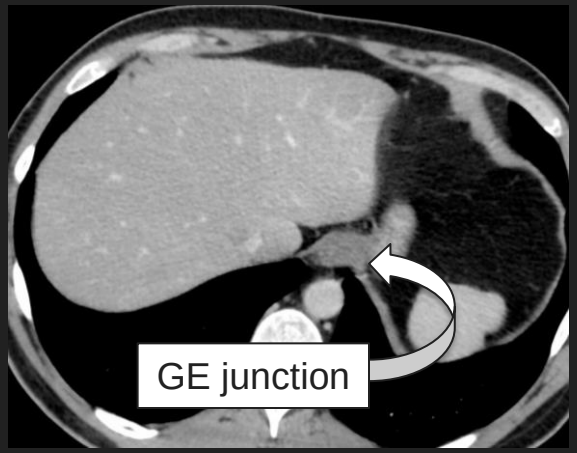
Find fatty ileocecal valve on coronal; the appendix must come off of colon DISTAL to this!



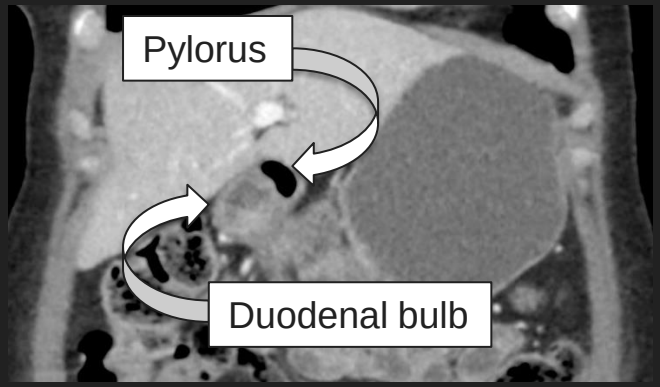
Scroll back and forth till you find it!

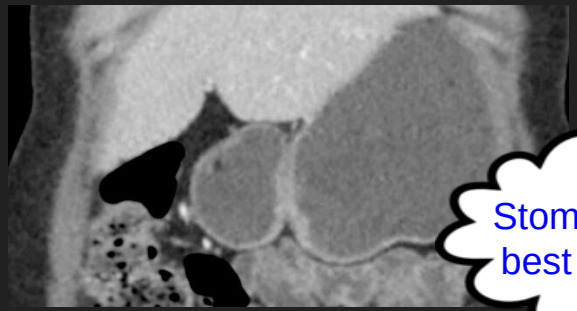


Approach- Checklist: Bowel/peritoneum/mesentery

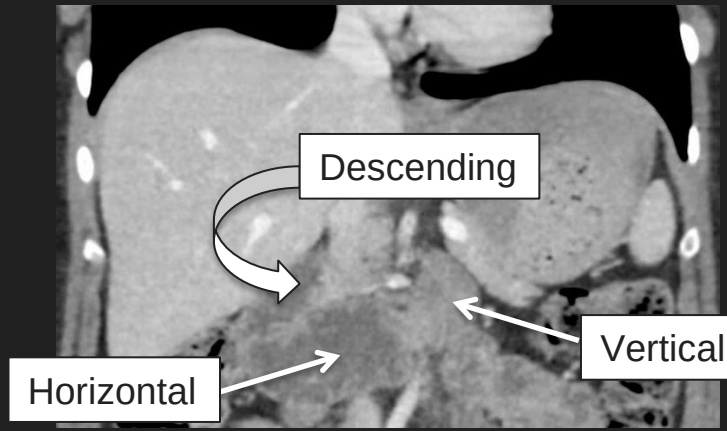


Coronals are used here to demonstrate anatomy. Usually, the stomach and duodenum are reviewed on axial images.





Stomach anatomy best on coronals.



Approach- Checklist: Bowel/peritoneum/mesentery

Divide the abdomen in right and left halves and screen for pathology as you scroll.

Use this opportunity to assess for mesenteric abnormalities, including free air/gas and LAD.

“No bowel dilatation or abnormal wall thickening.”

Approach- Checklist: Bowel/peritoneum/mesentery: Example of abnormal

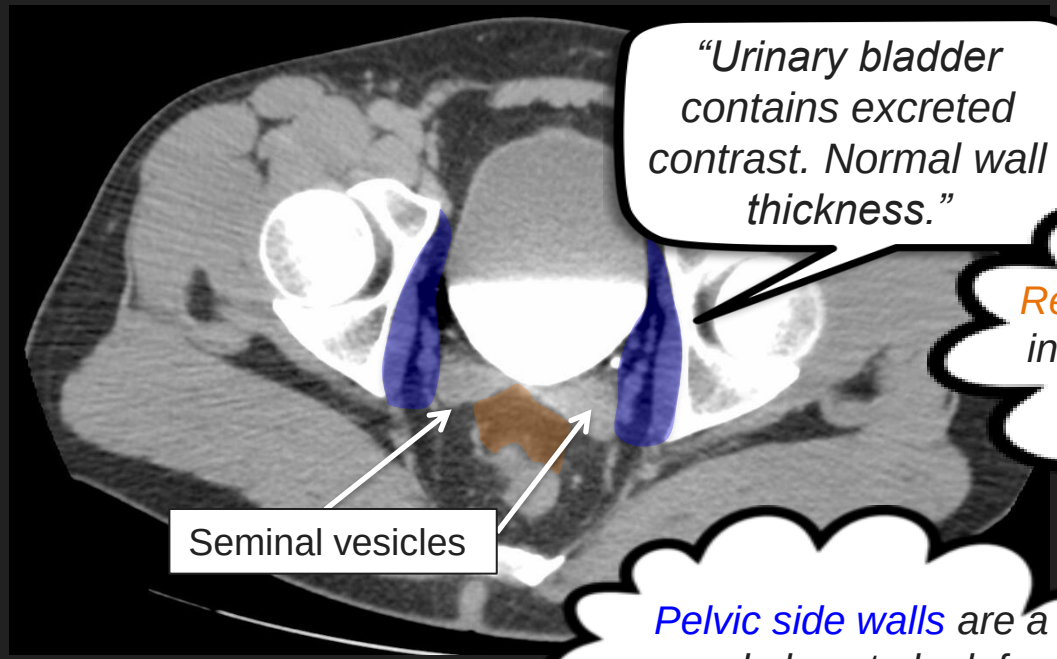
"Omental 'caking' is noted, consistent with peritoneal carcinomatosis"

Peritoneal drain

Ascites

Nephroureteral stent

Approach- Checklist: Pelvis



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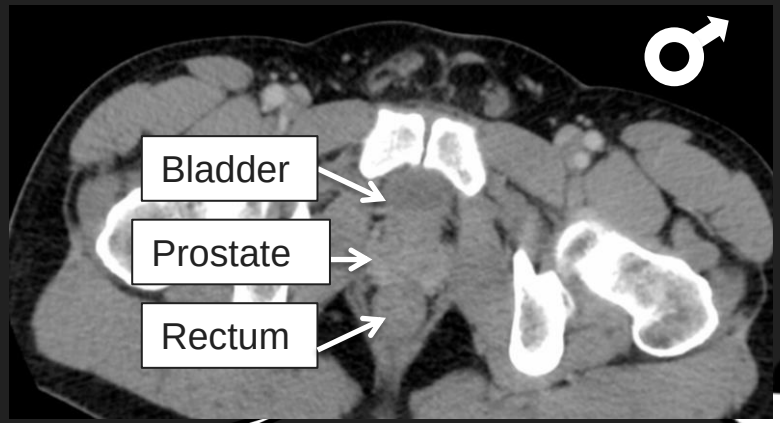
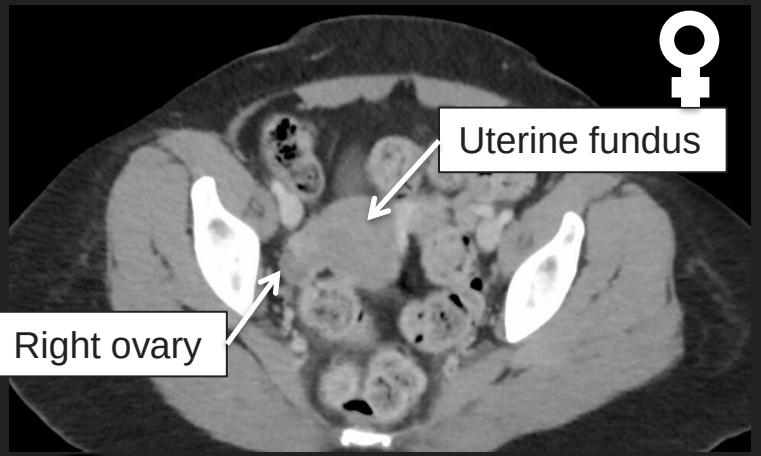
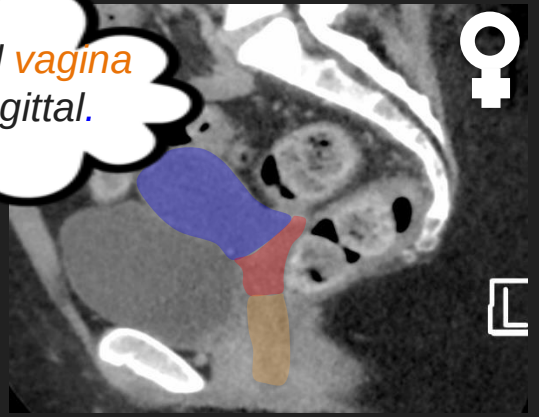


Prostate gland is norma in size”



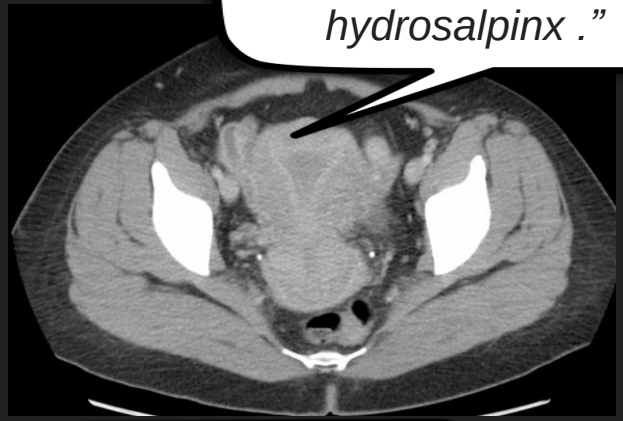
Uterus, cervix and vagina seen best on sagittal.



“Uterus and adnexa are normal.”

Approach- Checklist: Pelvis: Examples

Physiologic endometrial thickening

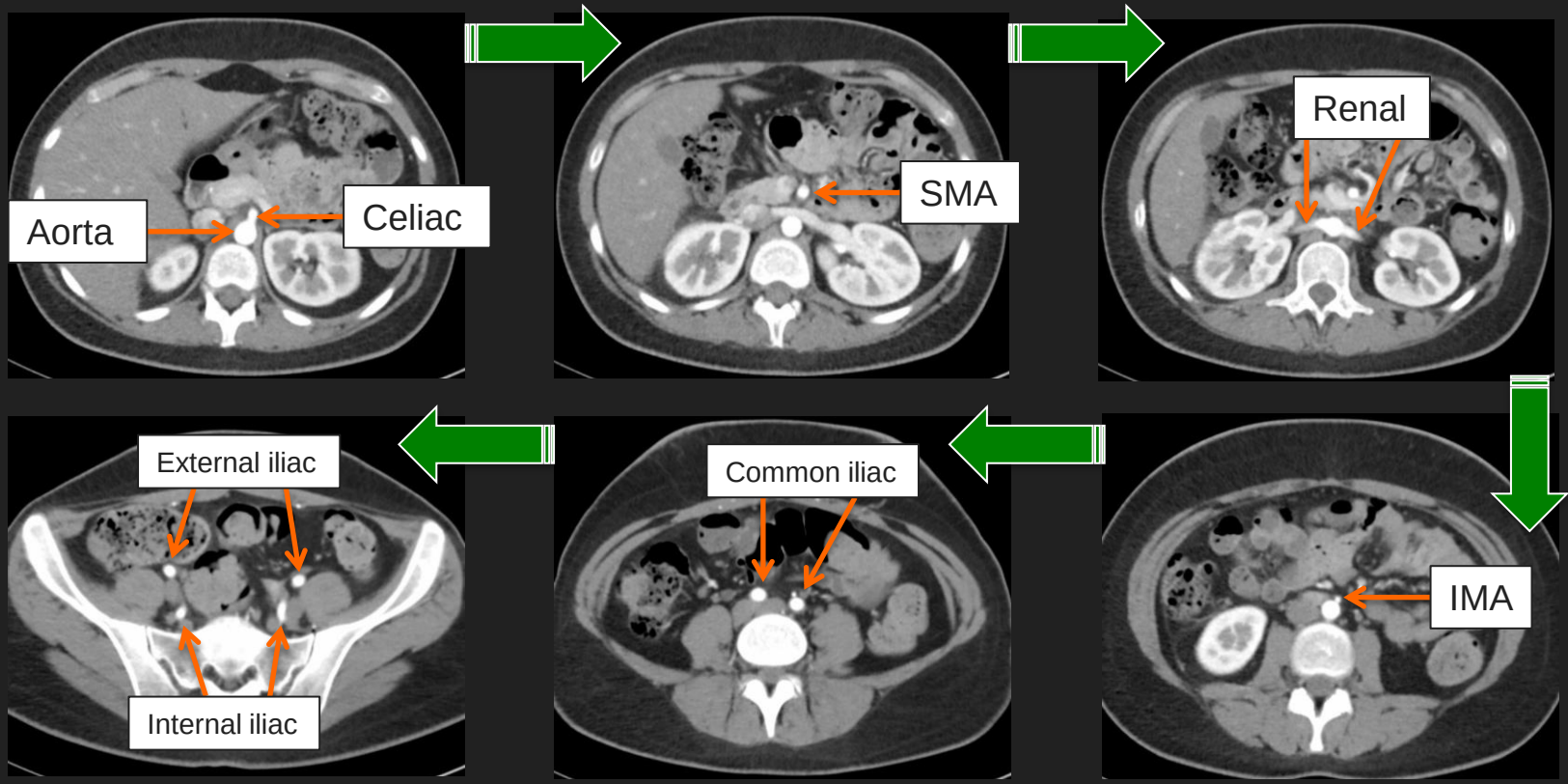


"Dilated right fallopian tube, consistent with hydrosalpinx ."

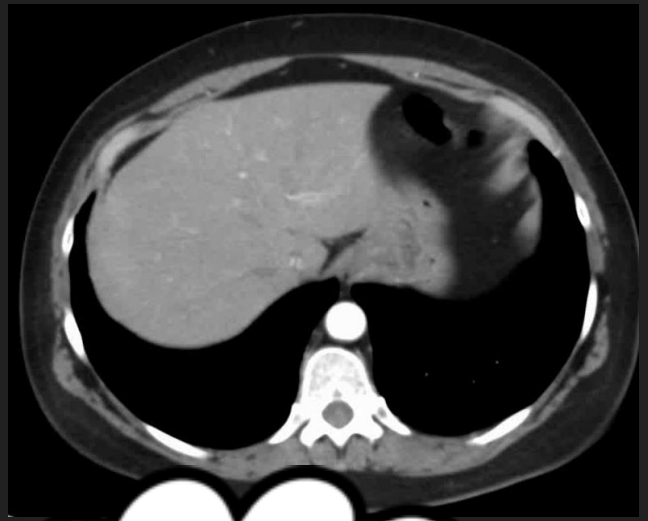
"Median lobe of the prostate gland is enlarged."

"The bladder wall is thickened and intraluminal gas is present, consistent with emphysematous cystitis."

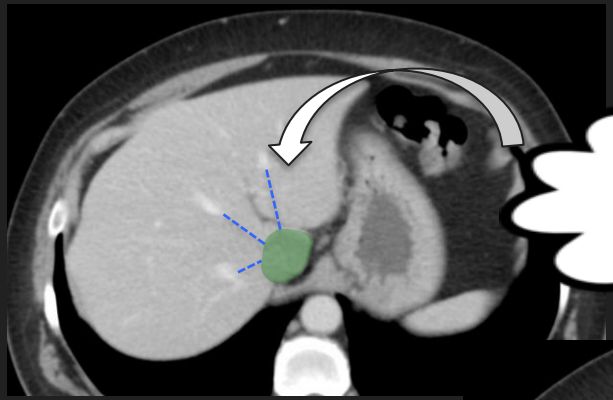
Approach- Checklist: Vasculature: Arteries



Approach- Checklist: Vasculature: Hepatic/Splenic

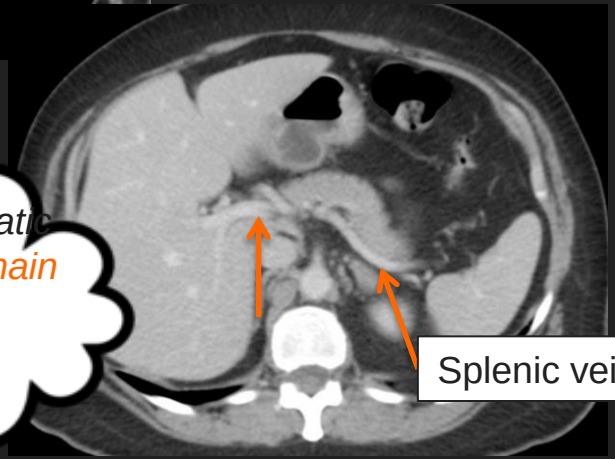


Many radiologists look at the hepatic vasculature separately from the liver.



Follow the hepatic veins to the IVC.

Follow the intrahepatic portal veins to the main portal vein.

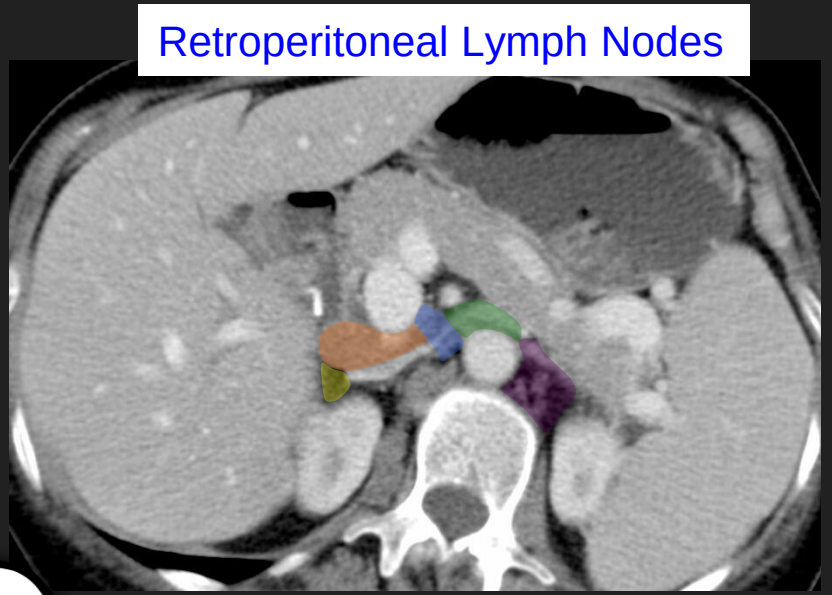


Approach- Checklist: Lymph nodes

Screening for lymph node abnormality is best done at the time of a review of the vasculature, as lymph nodes “co-travel” with the vasculature. Lymph node “stations” are named, for the most part, for their corresponding vessel (eg, “right external iliac chain lymph nodes”).

Additional sites for lymph nodes are around the liver hilum (“periportal”) and within the gastrohepatic ligament

“No pathologically enlarged retroperitoneal lymph nodes.”

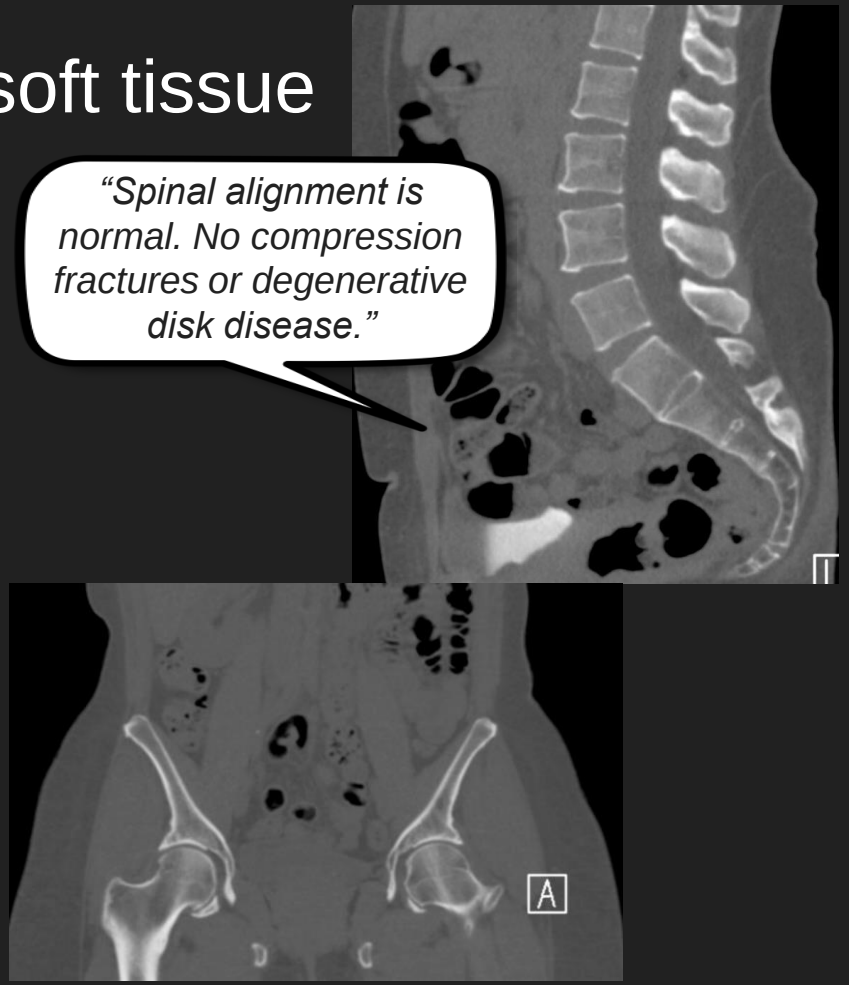


Approach- Checklist: Bones/soft tissue

1. On soft tissue windows, divide body into anterior and posterior halves; scroll from bottom to top and look anteriorly (eg. contusions, hernias), then scroll from top to bottom.

2. On bone windows, use axials to interrogate: visualized femurs, innominate bones, sacrum/coccyx, vertebrae, visualized ribs (eg, fractures, metastatic disease).

3. On bone widows, use sagittals to look for degenerative disk disease and compression fractures; coronals for hips (eg AVN, fractures, arthritis)



Review…

1. Axial images are your workhorse!
2. Liver
3. Gallbladder and biliary tree
4. Spleen (check coronals)
5. Adrenal glands
6. Kidneys (check coronals) and ureters
7. Pancreas
8. Vasculature (and lymph nodes)
9. Peritoneum (and lymph nodes)
10. Colon (and appendix), stomach and duodenum
11. Pelvis (and lymph nodes)
12. Body wall and bones (axials and reformats)