

Back To Chiropractic CE Seminars

X-Ray: Soft Tissue Pathology ~ 6 Hours

Welcome to Back To Chiropractic Online CE exams:


This course counts toward your California Board of Chiropractic Examiners CE & your Radiography Supervisor & Operator Permit.

(also accepted in other states, check our website or with your Chiropractic State Board)

The California Board requires that you complete all of your CE hours BEFORE the end of your Birthday month. We recommend that you send your chiropractic license renewal form and fee in early to avoid any issues.

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I'm always a phone call away... 707.972.0047 or email: marcusstrutzdc@gmail.com

Marcus Strutz, DC

Back To Chiropractic CE Seminars

Radiography Imaging

Soft Tissue Pathology

Jennifer Pedley, MS, DC, CCSP, DACBR
Chiropractic Radiologist

www.jprad.com

FYI

- This lecture will be concentrating/evaluating/diagnosing soft tissue pathology shown on spinal and pelvic radiographs.
- There are numerous findings involving the osseous structures, but those will not be the focus of this lecture.

Search Pattern for Cervical Spine

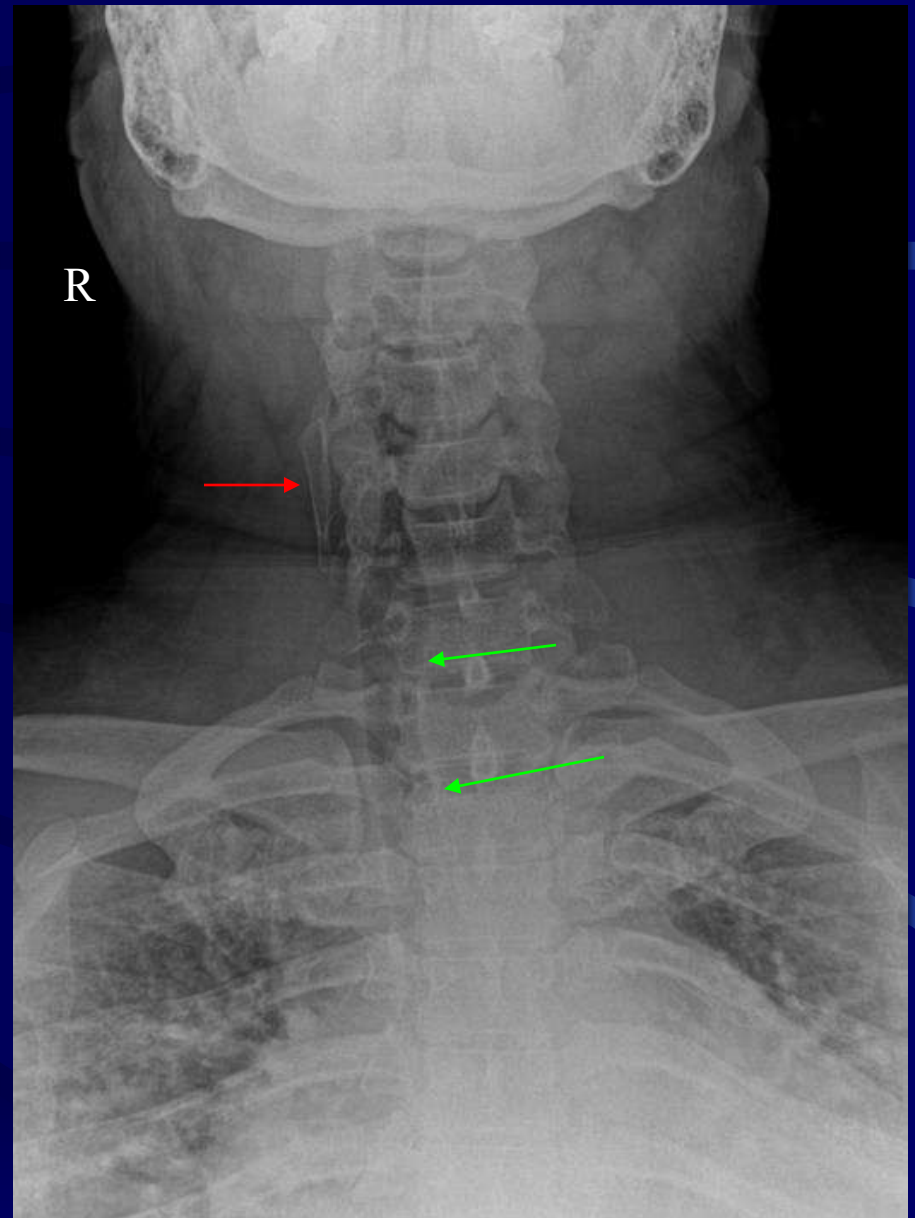
- Search pattern other than osseous of cervical spine:
 - Right and left carotid arteries
 - Stylohyoid ligament (ossification)
 - Posterior and anterior longitudinal ligament
 - Prevertebral soft tissues
 - Tracheal air shadow
 - Upper lung fields

Case 1: Cervical Spine

- 43 year-old male, neck pain.



- Right tracheal deviation
- Normal thyroid cartilage calcification



Deviation of the tracheal air shadow

- Differential Diagnosis:
 - Lymphoma
 - Teratoma
 - Goiter
 - Tumors of thymus or thyroid

Follow-up

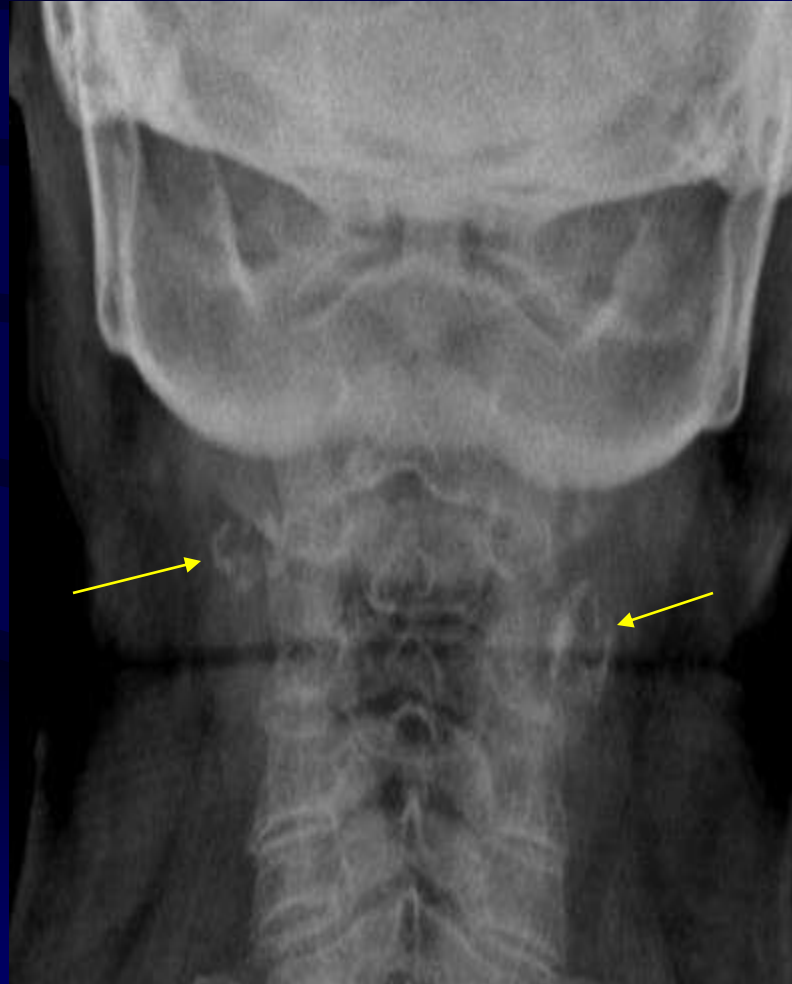
- Chest radiographs: PA and lateral with full inspiratory effort
- CT imaging of the chest

Case 2: Cervical Spine

- 85 year-old female chronic neck pain



Calcification within the right and left lateral soft tissues of cervical spine



Diagnosis

- Atherosclerosis of the right and left carotid arteries.
- Contraindication for soft tissue work/massage; treatment of ultrasound.

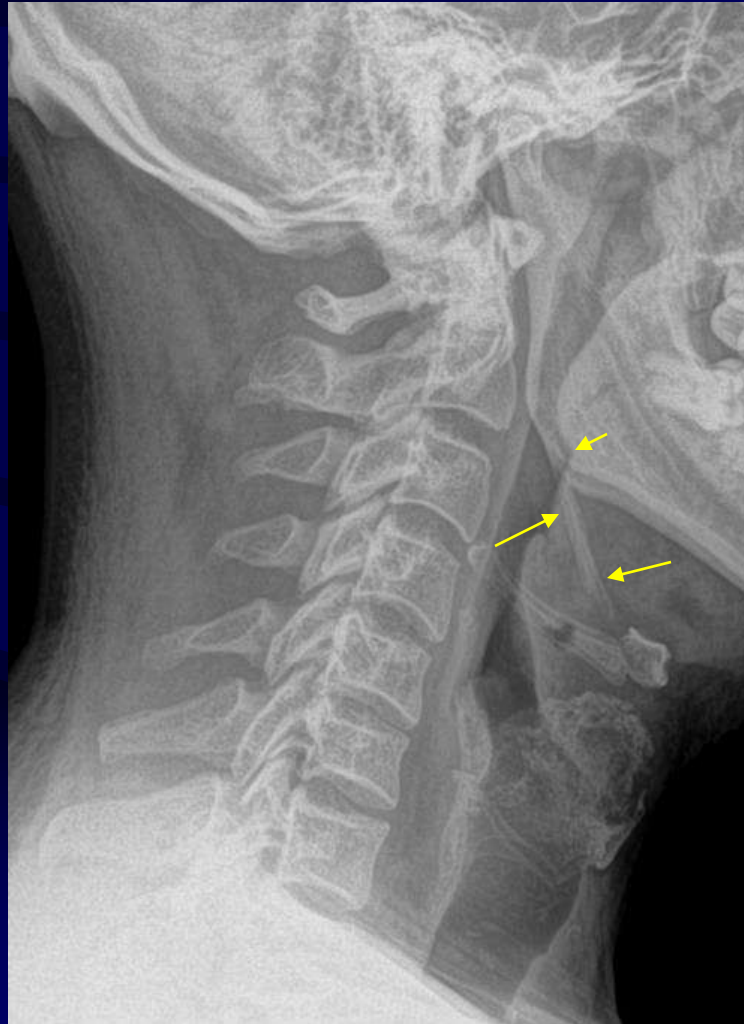
Follow-up

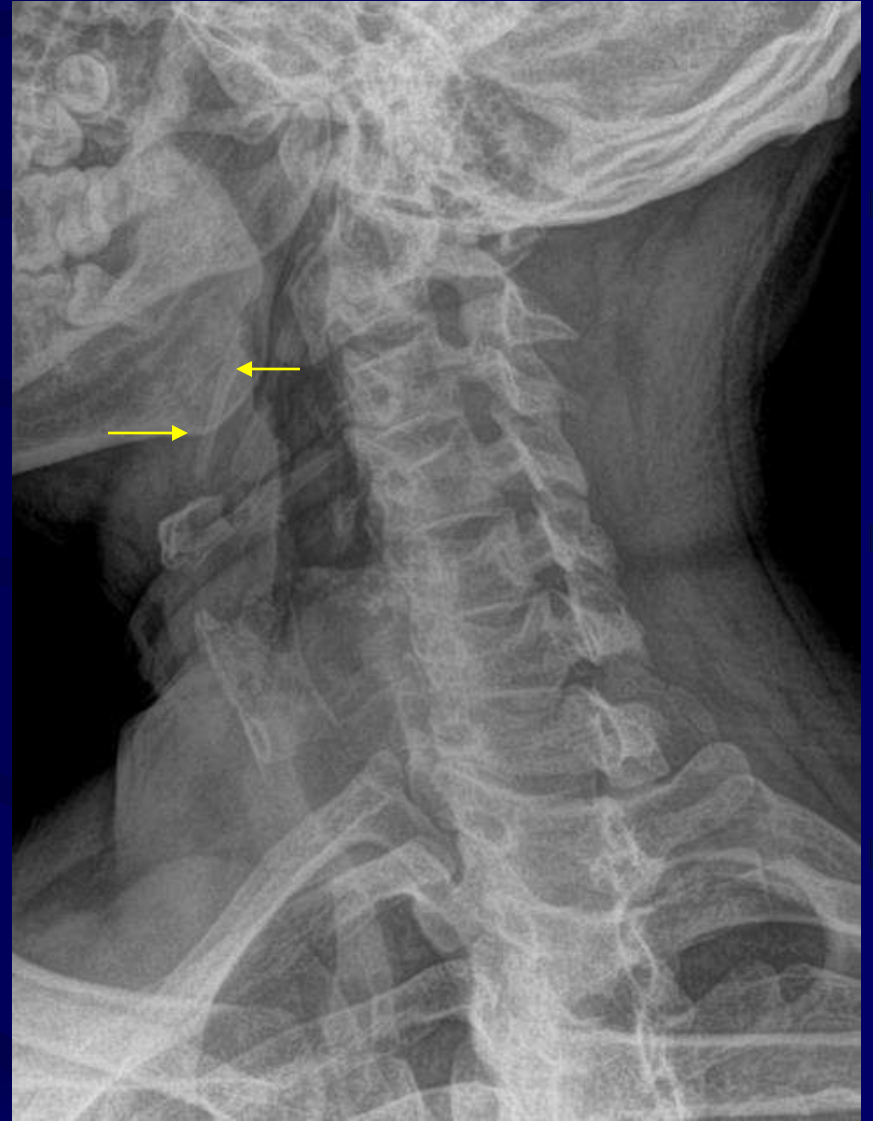
- Doppler ultrasound
- Referral to primary care physician

Case 3: Cervical Spine

- 35 year-old female with neck pain. No trauma.

Lateral cervical spine





Findings/Diagnosis

- Calcification of the stylohyoid ligament
- May be symptomatic
 - Clinically correlate for Eagle's Syndrome

Eagle's Syndrome

- Symptoms: sharp nerve-like pain in the jaw or back of the throat, or ringing or buzzing of the ears (tinnitus) increased with moving jaw, swallowing or the cervical spine rotation.
 - May come in contact with the internal carotid artery
- Cause: idiopathic
- Treatment: If symptomatic, surgical resection.
 - Regrowth are common

Case 4: Cervical Spine

Male with neck pain.





Findings

- Ossification of the anterior longitudinal ligament.
- Ossification of the posterior longitudinal ligament.

Diagnosis

- Diffuse Idiopathic Skeletal Hyperostosis (DISH)
- Complications: compress the esophagus with difficulty swallowing, and spinal cord stenosis.
- Associations: Correlate for diabetes

Case 5: Cervical Spine

- 73 year-old male neck pain following a motor vehicle accident.

Lateral radiograph



Findings

- Retropharyngeal soft tissue widening
 - 29.0 mm
- Retrotracheal soft tissue widening
 - 53.0 mm

Widening of prevertebral soft tissues



- Retropharyngeal soft tissue:
Normal= at C2 level is 7 mm
- Retrotracheal soft tissue:
Normal= at C6 and C7 level is 22 mm

Diagnosis/Cause

- Edema or hemorrhage resulted in widening of the prevertebral soft tissues following the motor vehicle accident.
- Complication: compressing the esophagus and displacing the trachea

Follow-up imaging

- MRI (without contrast)
 - Identify soft tissue swelling/edema
 - Evaluate the remaining soft tissues such as disc, posterior soft tissues, spinal cord and neural elements.

Other differentials

- Other differential diagnosis for widening of the prevertebral soft tissues (nontrauma):
 - Infection
 - Tumor of the thyroid gland

Case 6: Cervical Spine

- 55 year-old female with neck pain following motor vehicle accident

AP and lateral



Bilateral anterior oblique



Radiopacity of right upper lung field



Differential Diagnosis

- Pulmonary nodule
- Versus exostosis of the posterior 4th rib
- On a side note: There is a normal nuchal bone within the posterior soft tissues.

Follow-up

- Advanced imaging: CT imaging of the chest will determine the location (lung vs. rib) of the radiopacity
- Final diagnosis= unknown

Case 7: Cervical spine

- Chronic neck pain

Lateral cervical



Findings

- Continuous, thin ossification of the outer fibers of the annulus fibrosus.
- Fusion of the facet joints
- Normal nuchal bone within the posterior soft tissues.



Diagnosis

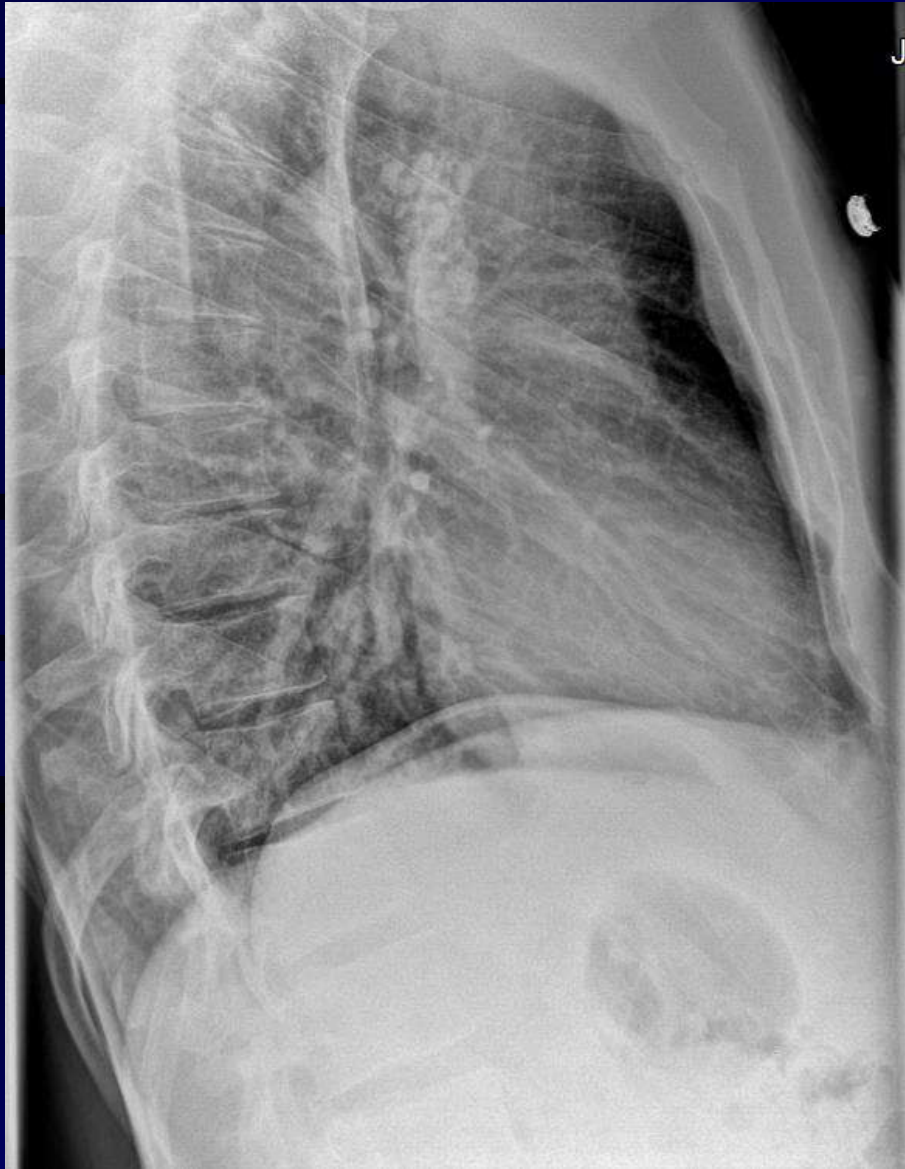
- Ankylosing Spondylitis
 - Thin ossification of the annulus fibrosus
 - Inflammatory arthritis, seronegative rheumatoid factor; positive lab study of HLA-B27
 - Favors the synovial joints such as the facet and sacroiliac joints.
- Differs from DISH which is thick, flowing ossification of the anterior longitudinal ligament.

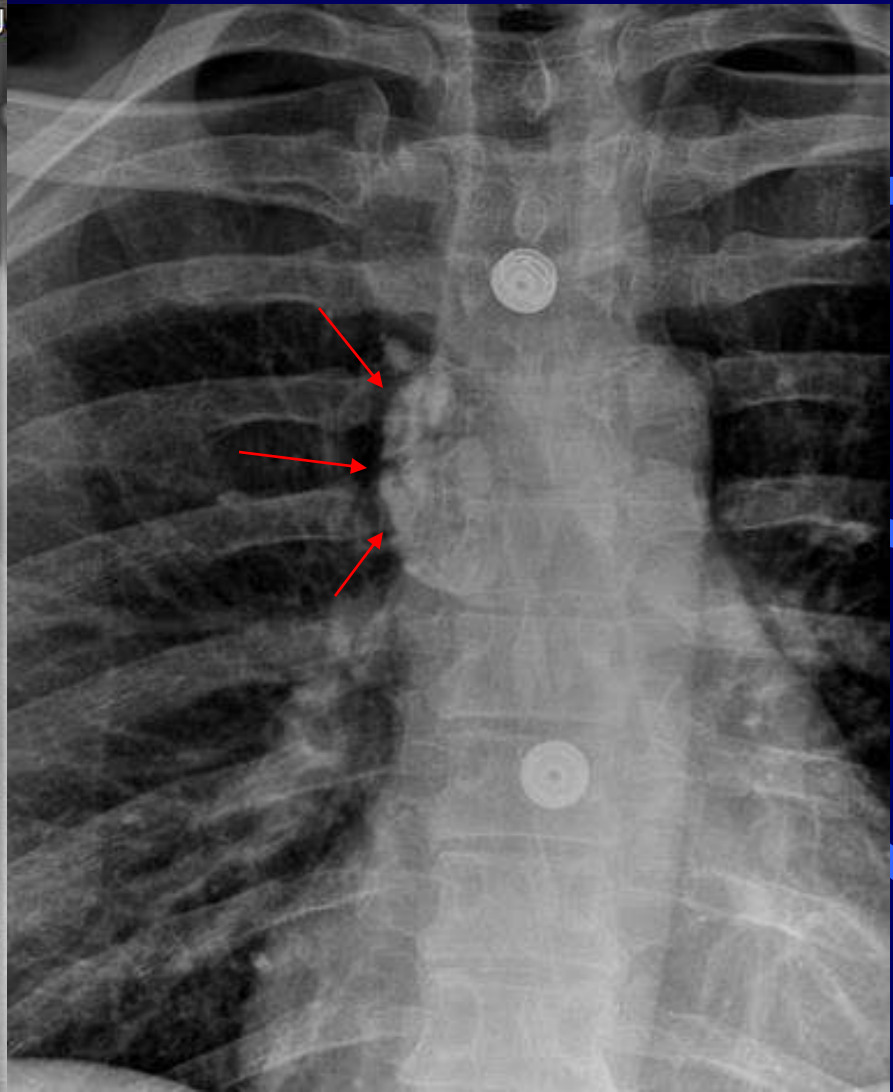
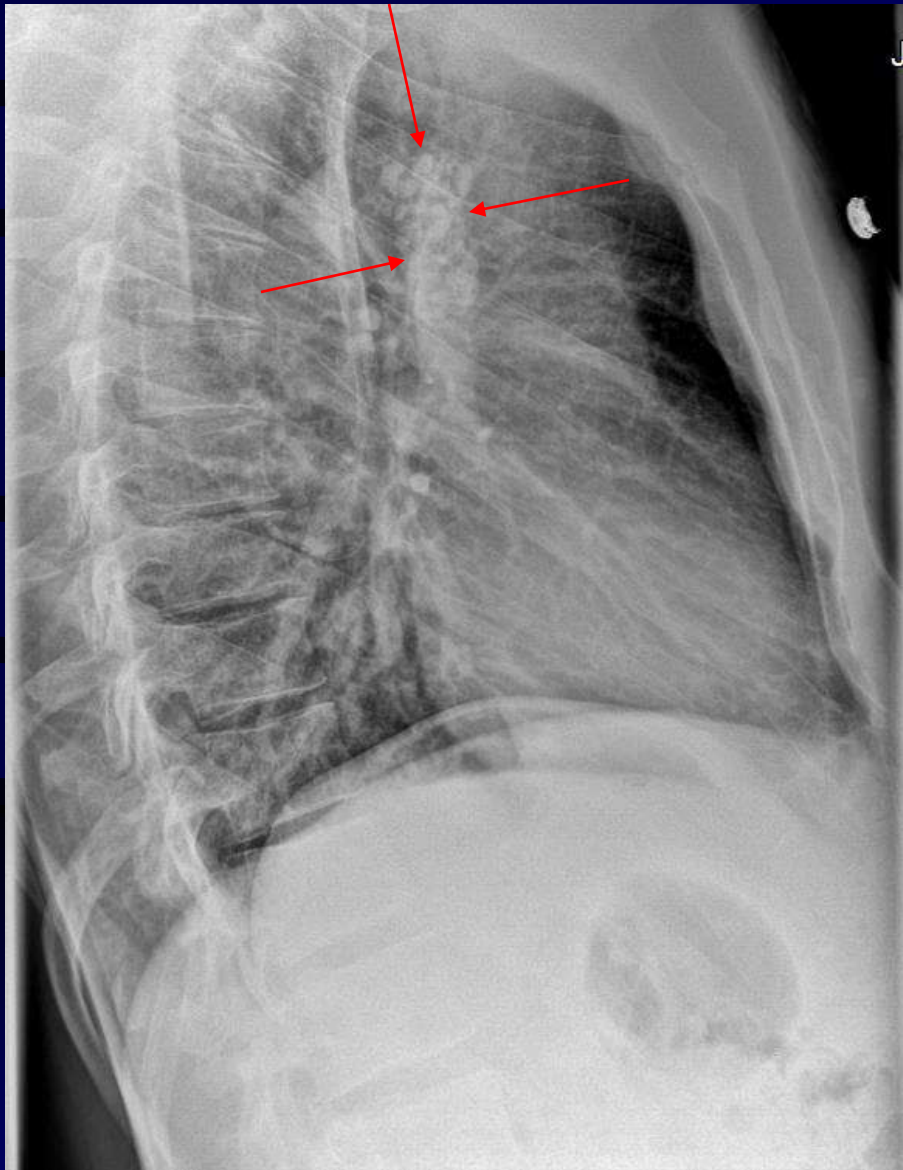
Search Pattern for Thoracic Spine

- Search pattern other than osseous of thoracic spine:
 - Lung fields/Chest
 - Tracheal air shadow
 - Vasculature
 - Spinal soft tissues

Case 1: Thoracic spine

- Neck pain; no trauma; healthy male.





Findings

- Cluster of radiopacities or calcifications within the right mediastinum, at the level of the aortic knob

Differential diagnosis

- Calcified lymph nodes versus space occupying lesion (tumor)

Follow-up

- Chest radiographs: PA and lateral views with full inspiratory effort.
- CT imaging

Diagnosis

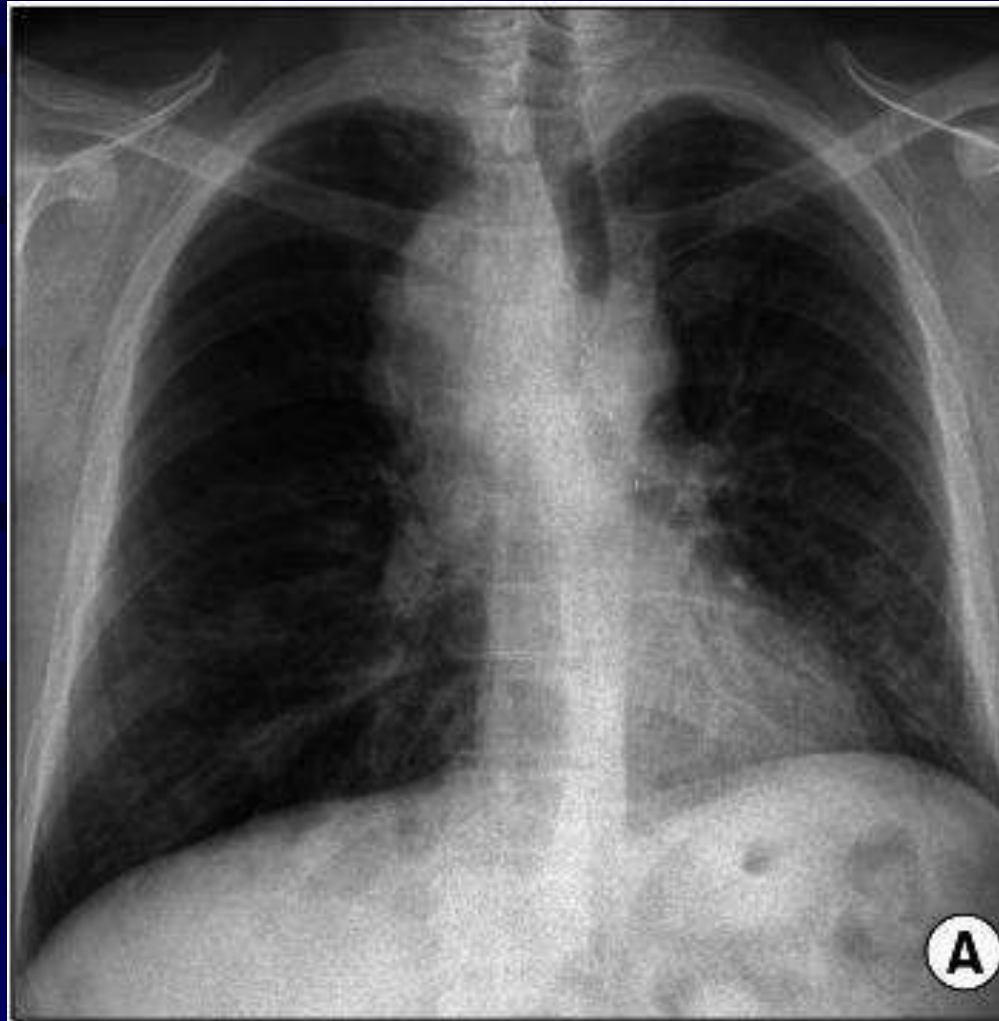
CT imaging:

Confirmed diagnosis with either calcified lymph nodes versus granuloma due to previous old infection. No tumor. No further follow-up is necessary.

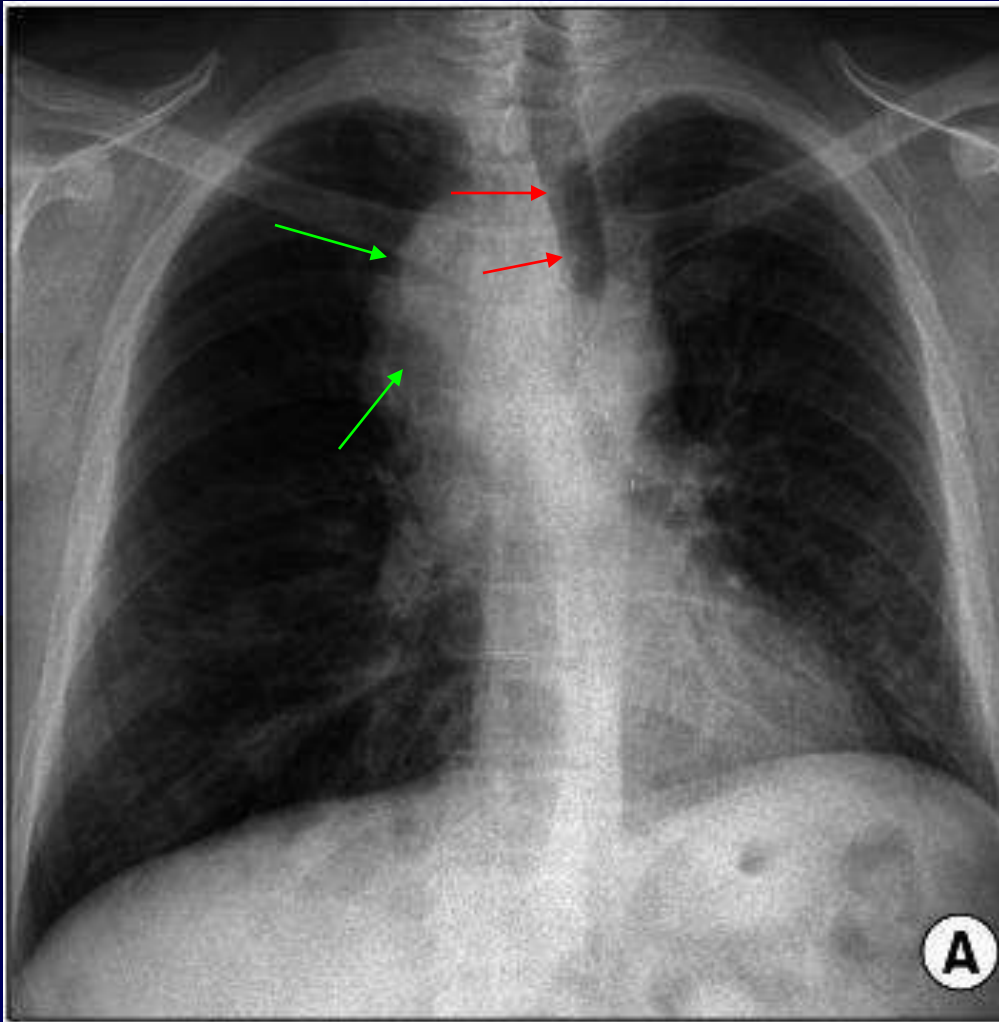
Case 2: Thoracic spine

- The search pattern on the AP thoracic spine should also include evaluating the chest anatomy such as the tracheal air shadow.
- If there is abnormality seen within the chest such as tracheal air shadow deviation, **PA and lateral chest radiographs** should be performed with **full inspiratory effort**.

PA radiograph of the chest



Findings



- Large **mass** of the right paratracheal region with mediastinal widening, and with left **deviation** of the tracheal air shadow.

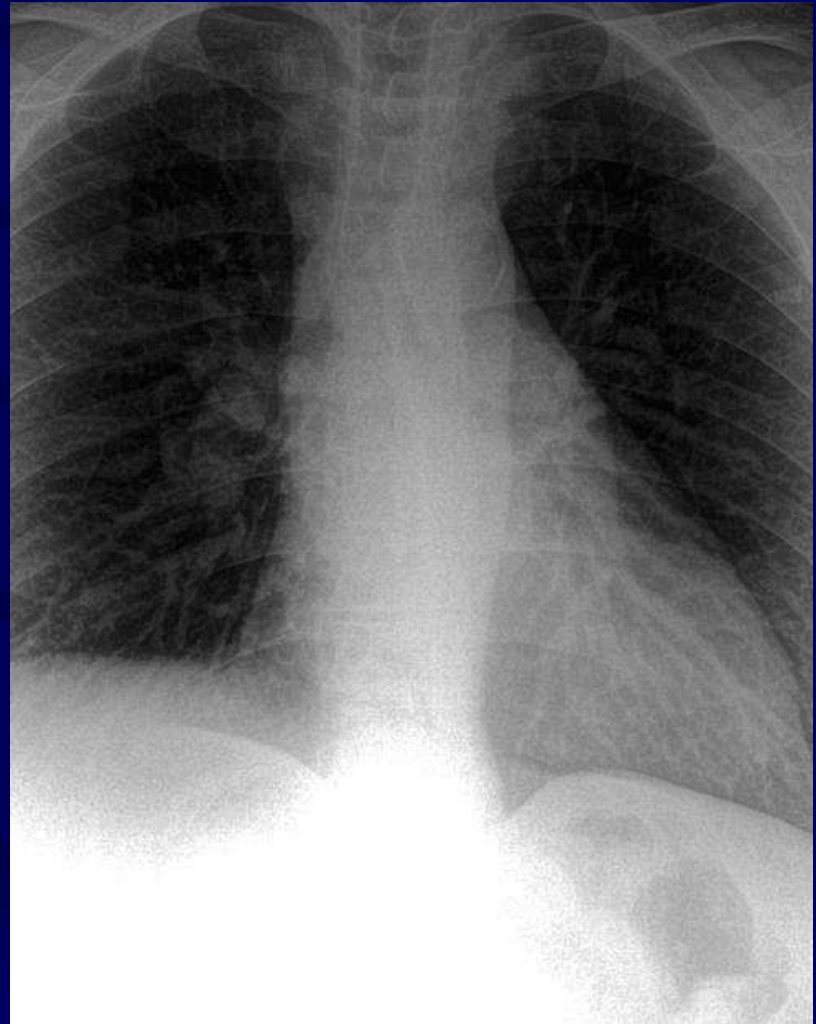
Follow-up

- CT imaging of chest
- Diagnosis: Tumor, adenocarcinoma of the lung.
- Referral to primary physician
 - Patient underwent chemotherapy

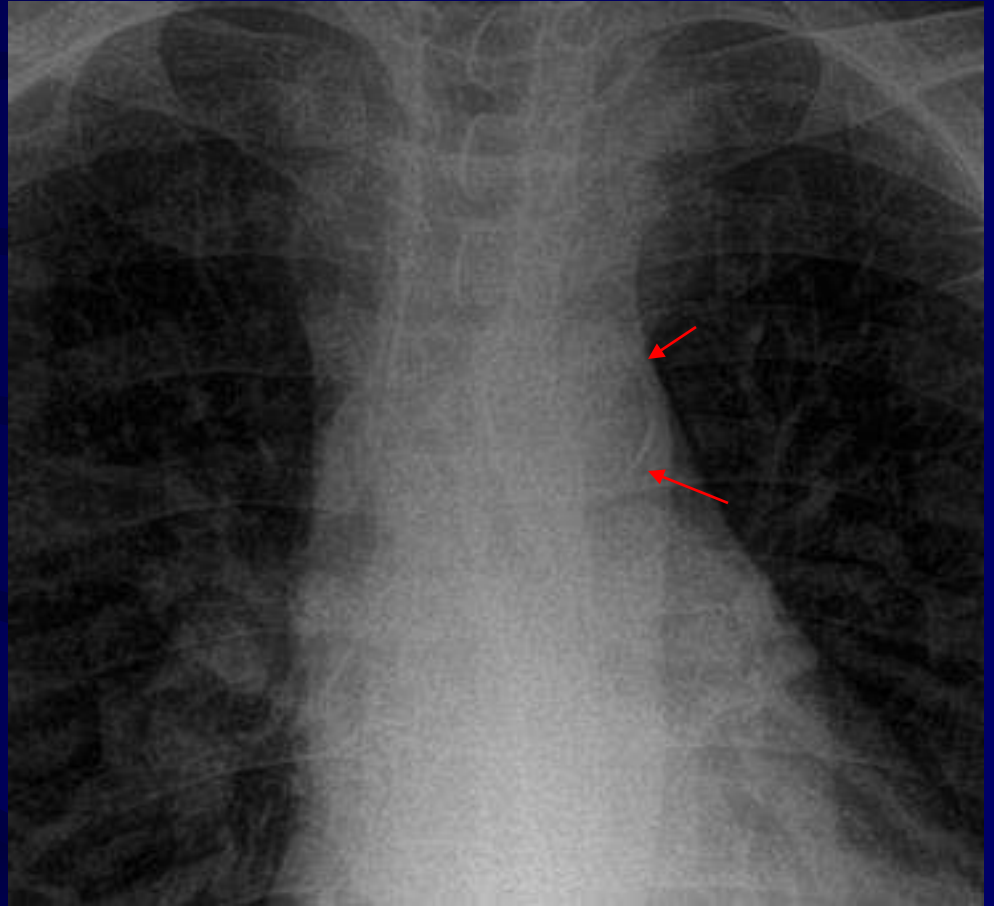
Case 3: Thoracic spine

- Mild mid back pain

AP and lateral thoracic spine



- Curvilinear calcification within the aortic knob



Diagnosis

- Atherosclerosis of the aortic knob
- Age related finding

Case 4: Thoracic spine

- Chronic mid back pain

Lateral Thoracic



Findings

- Thick flowing anterior ossification of the anterior longitudinal ligament.



Another patient-AP Thoracic

- Anterolateral ossification of the anterior longitudinal ligament, absent/less severity on the left side of the mid thoracic spine.



Diagnosis

- Diffuse Idiopathic Skeletal Hyperostosis (DISH)
- Avoids the left side of the mid thoracic spine due to the descending thoracic aorta.

Search Pattern of Lumbar Spine

- Search pattern other than osseous of lumbar spine:
 - Liver
 - Pancreas
 - Adrenal Glands
 - Kidneys
 - Spleen
 - Gallbladder

Search Pattern of Lumbar Spine

- Search pattern other than osseous of lumbar spine:
 - Bowel
 - Vasculature
 - Lower lung fields

Case 1: Lumbar spine

- Female with chronic low back pain; previous abdominal surgery (surgical clips)

AP Lumbar

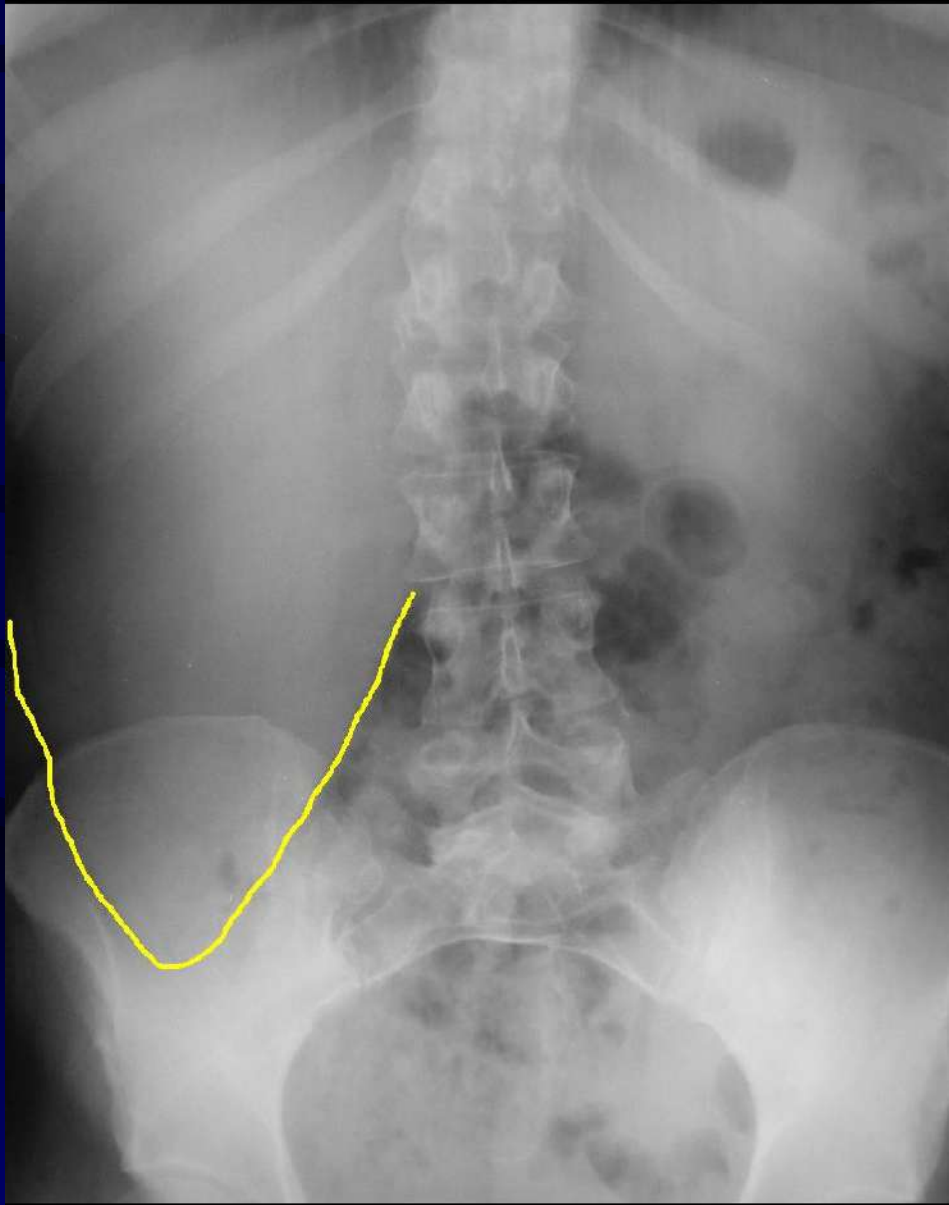


Findings

- The liver extends further medially and inferiorly than usual overlying the right iliac crest
- Spleen and kidneys are of normal size.
- Multiple surgical clips and sutures of the bowel (she still has an IUD---oops, probably forgot).

Another patient: 48 year-old female with low back pain





Findings/Diagnosis

- Enlarged liver= Hepatomegaly

Hepatomegaly vs. Reidel's Lobe of the Liver

Hepatomegaly

- Crosses the spine; **rounded fullness** of the inferior border extending below the kidney

Reidel's Lobe

- Normal variant of the right lobe of the liver
- Tongue-like projection that can extend to the iliac crest
- Most commonly seen in females

Differential Diagnosis of Hepatomegaly (many more causes):

- Congestive heart failure
- Diabetes Mellitus
- Alcoholism
- Cirrhosis
- Tumor mets
- Hepatitis
- Medications

Follow-up

- CT imaging
- Laboratory studies

Case 2: Lumbar spine

- 55 year-old male; alcoholic; low back pain

AP Lumbar



Findings

- Speckled calcifications of the midabdomen, from the left upper abdominal quadrant **crossing** the spine.
- The calcifications reside within the head, body and tail of this organ.
 - **Pancreas**

Diagnosis

Pancreatic Calculi

- Secondary to chronic pancreatitis- mc **alcohol abuse**.
- Other causes:
 - Gallstones- obstructing the entrance of the pancreatic duct into the CBD.
 - Hyperparathyroidism
 - Cystic fibrosis

Follow-up

- Diagnostic US
- CT of the Abdomen
- Endocrinologist

Brant W and Helm C. Fundamentals of Diagnostic Radiology, 3rd ed. 2007; 784-785.

Halpert R. Gastrointestinal Imaging, 3rd ed. The Requisites. 2006; 172.

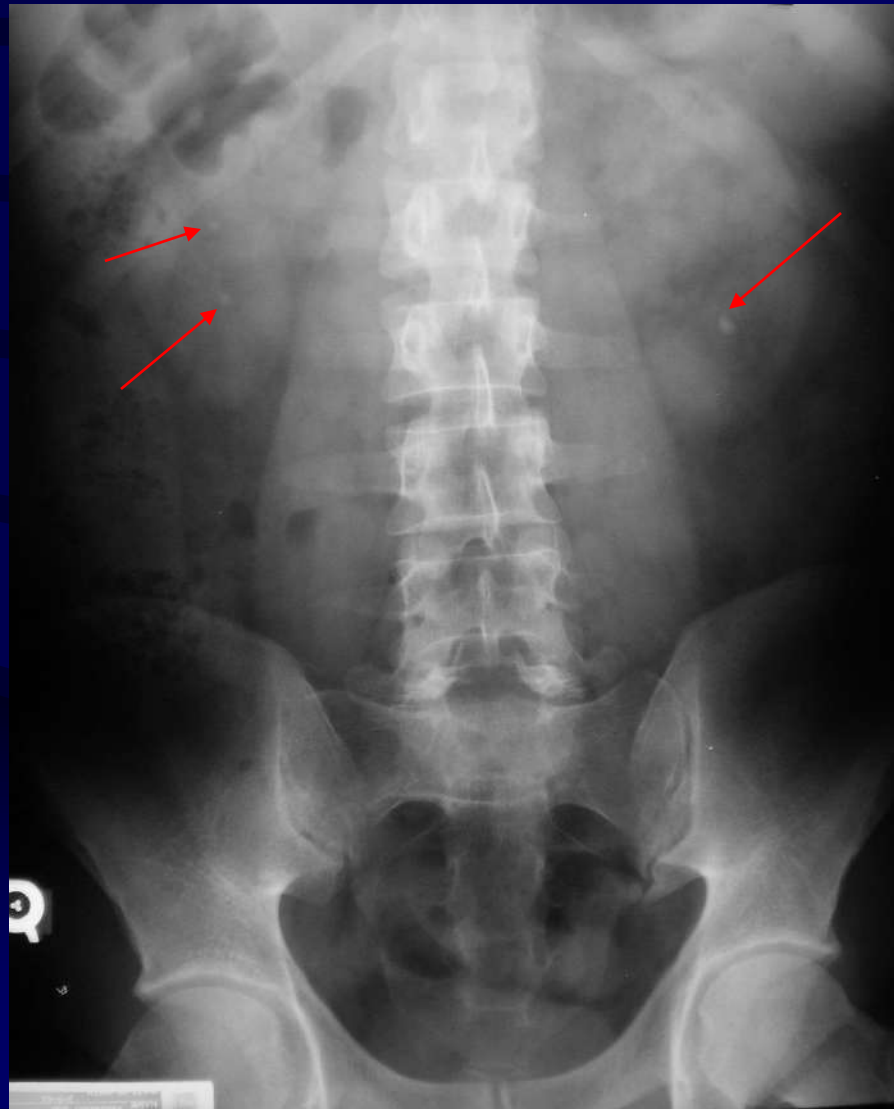
Case 3: Lumbar spine

- 45 year-old male with severe low back pain.

AP Lumbar Spine



Findings



Findings

- Bilaterally small round radiopacities in the right and left kidneys
- Always check in the path of the ureters and the bladder for more stones.
 - Ureters are anterior to the transverse processes.

Diagnosis

Nephrolithiasis

Symptoms:

- Cramping pain of the low back, flank, groin or abdomen
- Pain waxes and wanes; colicky
- Nausea, vomiting
- Fever
- Hematuria

Follow-up

Follow-up

- Ultrasound then if necessary,
- CT of the abdomen with and without contrast

Treatment

- Medication for pain
- If obstruction, **lithotripsy** or surgical (nephrologist)

Different patient



Findings/Diagnosis

- Extensive calcification within the right kidney
- Diagnosis: Staghorn Calculus

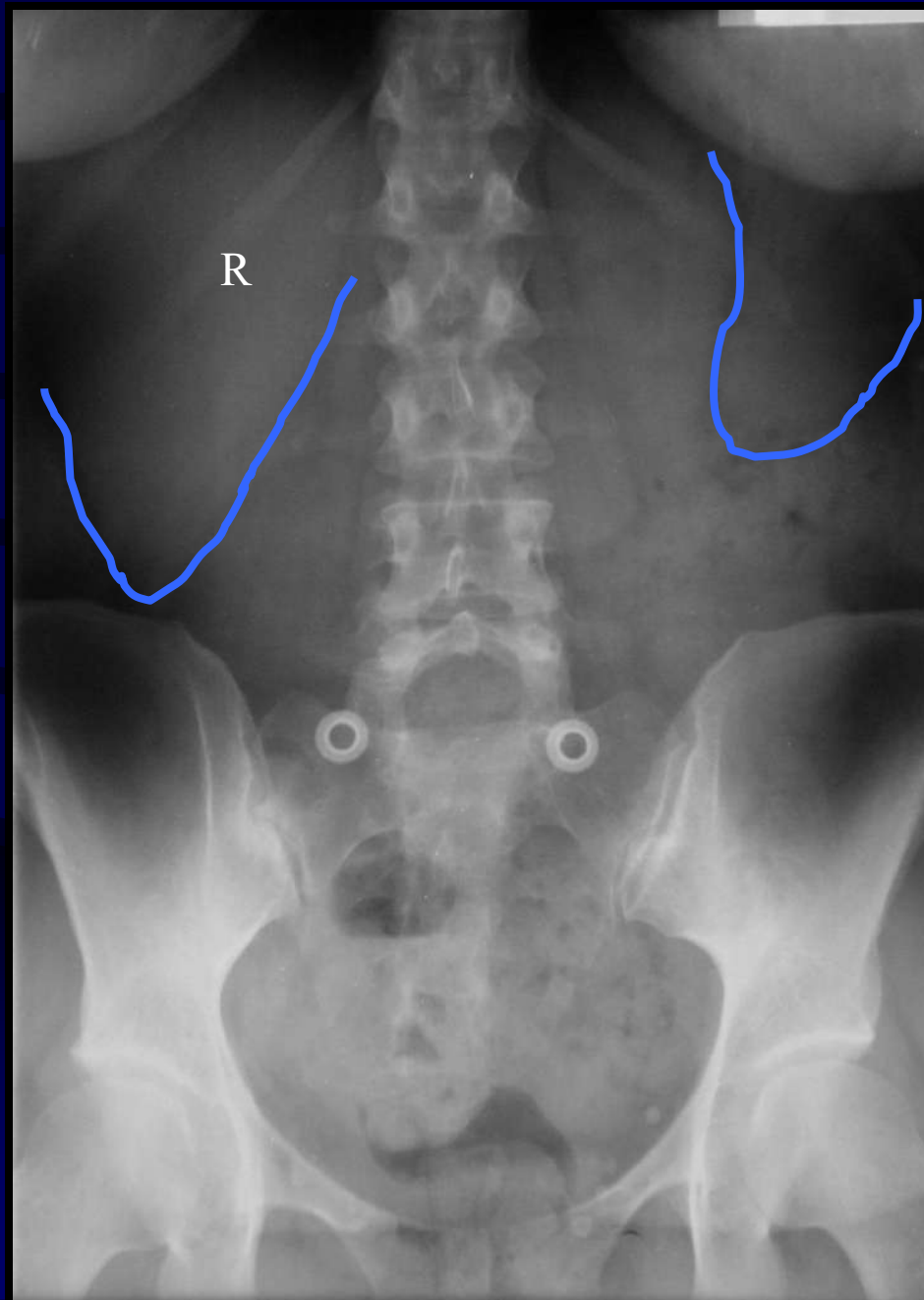
Staghorn Calculus

- Cause: recurrent infections; or renal tract anomalies.
- Symptoms: fever, hematuria, flank pain, and potential septicemia and abscess formation.
- Referral: Nephrologist

Case 4: Lumbar spine

- 48 year-old female with chronic low back pain for 9 months.





Note: metallic clothing artifact overlying the sacral ala, due to eyelets of sweatpants.

Diagnosis

- Normal liver: Reidel's lobe
- Enlargement of the spleen= Splenomegaly

Follow-up for Splenomegaly

- CT of the abdomen with and without contrast
- Referral/Consultation: Internist/Oncology

Diagnosis

- Lymphoma
 - Resulting in enlargement of the spleen

Differential Diagnosis of Splenomegaly

- Malignancy- lymphoma; leukemia
- Bacterial Infection- TB; lyme disease
- Fungal Infection- Toxoplasmosis; histioplasmosis
- Viral- Epstein barr virus (mononucleosis)
- Sickle cell anemia

Reidel's Lobe of the Liver

- Normal variant of the right lobe of liver
- Most common in females
- Narrow tongue-like projection, extending inferiorly and can extend to the iliac crest
- Never crosses the spine

Case 5: Lumbar spine

- 42 year-old female with thoracolumbar spine pain.

AP and lateral views



Radiopacity of right upper abdominal quadrant



Diagnosis

- Since the radiopacity is anterior to the spine, the radiopacity is not within the kidney (and not retroperitoneal in location)
 - Anatomically, the kidneys are retroperitoneal in location.
- Diagnosis: Gallstone (cholelithiasis)

Follow-up

- Ultrasound
- Consult with abdominal surgeon
 - Laproscopic, cholecystectomy (removal of gallbladder).

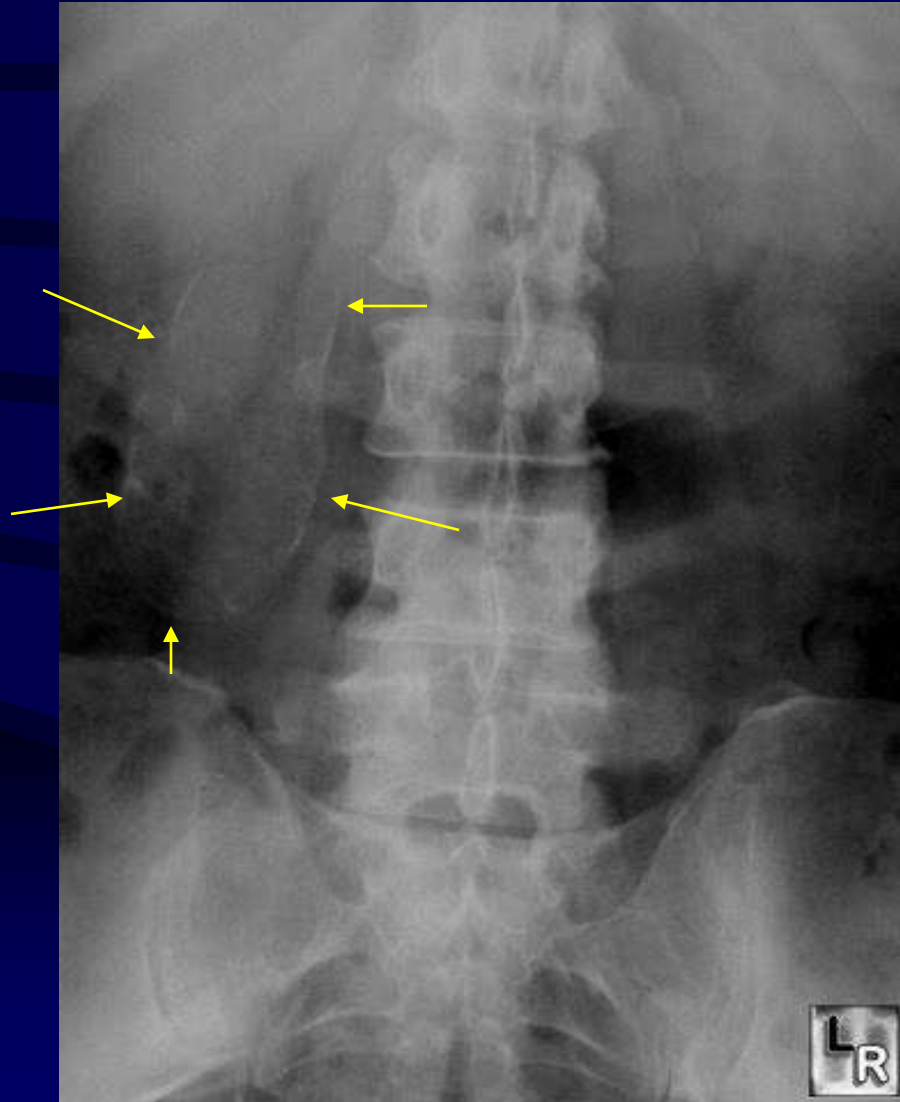
Cholelithiasis

- Most common 40 year-old female
 - younger patient with gallstone due to sickle cell anemia
- Symptoms:
 - Right upper quadrant pain, **especially** after a fatty meal
 - Pain radiates between the shoulders or under the right shoulder
 - Indigestion, bloating, nausea, and/or vomiting
- 10-15% radiopaque on xray; mostly made of cholesterol

Different patient

- Patient has chronic gallbladder disease (next slide)

Calcification of the gallbladder wall with multiple gallstones



“Porcelain Gallbladder”

- This is adenocarcinoma of the gallbladder

Follow-up

- Abdominal surgeon >> cholecystectomy
- Oncology

Case 6: Lumbar spine

- 52 year-old male with low back pain and abdominal pain.

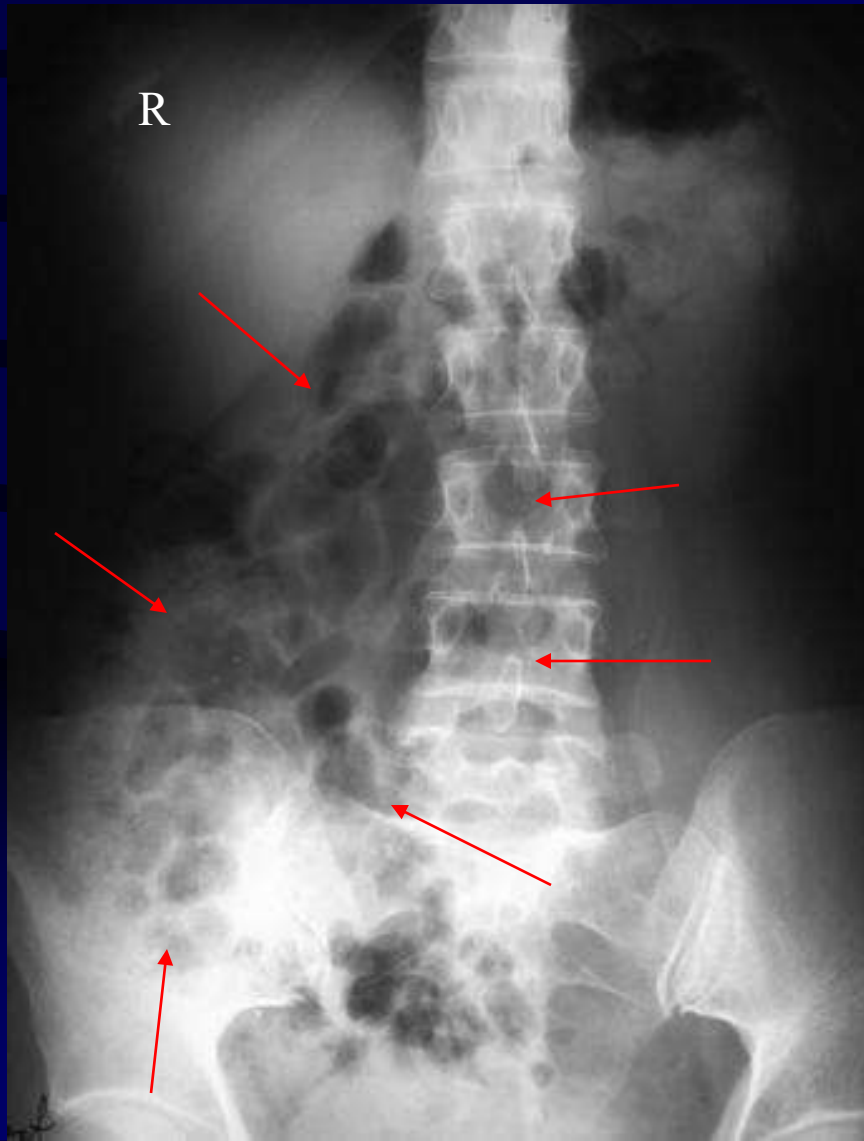
AP Lumbar



Normal Bowel gas

- Small bowel gas should be **centered** over the spine on the AP lumbar radiograph.
- Large bowel gas will be located in the **outer perimeter of the abdomen** with ascending, transverse and descending colon.

Findings

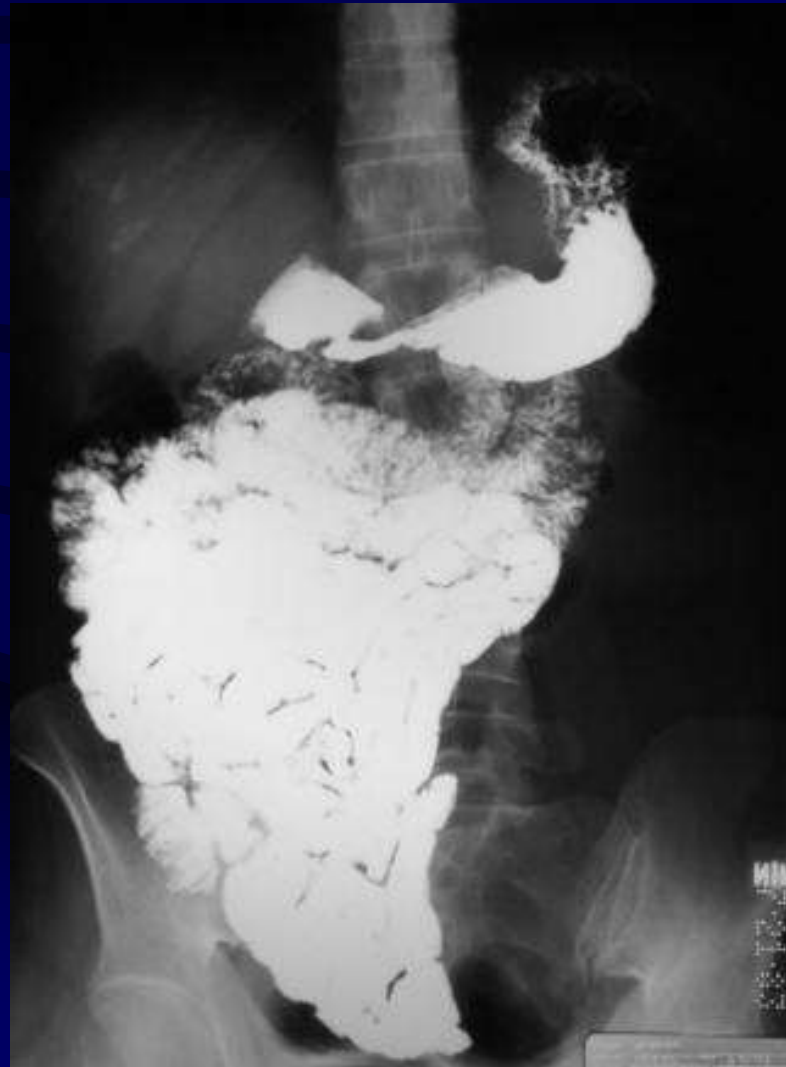


- Small bowel gas is being displaced to the right.

Follow-up

- CT imaging (not available for this patient)
- Barium study was performed

Barium study of the small bowel



The barium study outlines the small bowel nicely but likely a mass of the abdomen is pushing the bowel to the right.

CT confirmed mass

- Referral: Abdominal surgeon; oncologist
- End diagnosis: Retroperitoneal liposarcoma
 - A mass was compressing and displacing the small bowel to the right side of the abdomen.

Case 7: Lumbar spine

- 68 year-old male with low back pain. The pain began 4 weeks ago.

AP and Lateral Views



Lateral Spot view of the Lumbar Spine



Findings

- Compression fracture at L1 (patient forgot that they had trauma a few weeks ago).
- Atherosclerosis of the **abdominal aorta**
 - Widening the abdominal aorta of 3.5 cm
 - **Normal diameter is 2.0 cm**
 - Seen best on the lateral spot radiograph for this particular patient.

Diagnosis



- Aneurysm of the abdominal aorta at the level of L3
- Suspected aneurysm at the level of L2

Follow-up

- Ultrasound
- MRI was performed as well to evaluate the fracture of L1.
 - The abdominal aorta was measured as well on MRI axial images.

T2 Weighted Images of the Lumbar Spine



Case 8: Lumbar spine

- Chronic low back pain



Findings/Diagnosis

- Thick, flowing ossification of the anterior longitudinal ligament, along the anterior margins of the vertebral bodies.
- Diagnosis: DISH

Case 9: Lumbar spine

- No images available
- On the AP and lateral radiographs of the lumbar spine, the search pattern should also include the lower lung fields to check for any space occupying lesion(s).

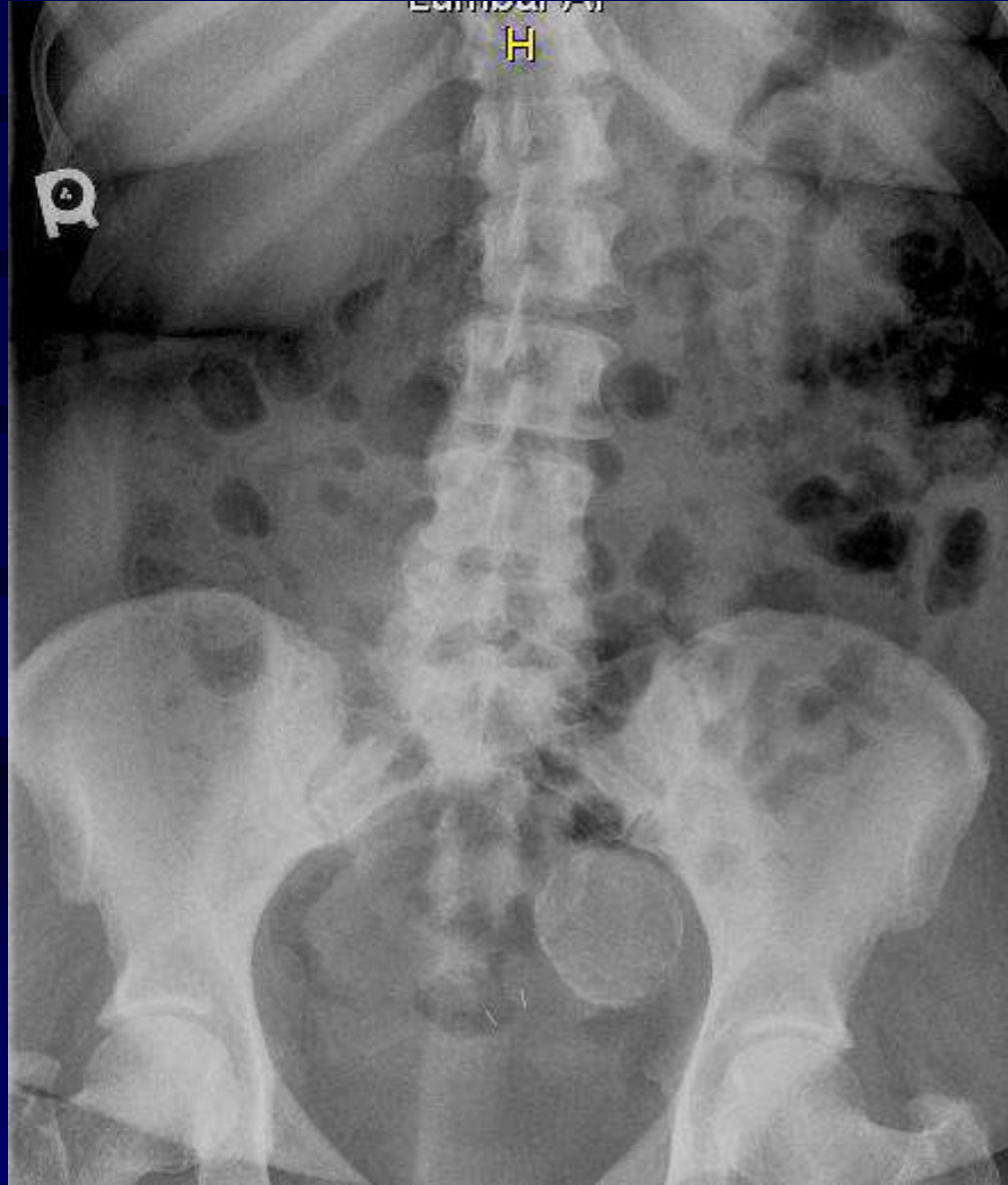
Search Pattern for Pelvis

- Search pattern other than osseous of pelvis:
 - Bladder/Prostate/Uterus
 - Vasculature
 - Vas deferens
 - Musculature/lateral soft tissues

Case 1: Pelvis

- 43 year-old female with low back and pelvic pain.
- History of cervical cancer; surgical resection and chemotherapy one year ago.

AP Lumbar



Findings

- Large calcific mass within the pelvic basin on the left with well-defined margins.
- Two surgical clips within the pelvic basin, correlates with prior history.

Diagnosis & Follow-up

- Uterine fibroid
- If you are still unsure of the mass, referral to gynecologist and ultrasound of the pelvis are recommended.

Uterine Fibroid aka Uterine Leiomyoma

- **Benign tumor** within the muscular tissue of the uterus
- Symptoms
 - None; or pain back of the legs
 - Heavy, prolonged periods
 - Pelvic pain
 - Constipation &/or bloating>>pressure on bowel
 - Infertility; Miscarriage

Uterine Fibroids

- Fibroids may shrink during menopause due to decrease in **estrogen** levels
 - Increase in size during pregnancy

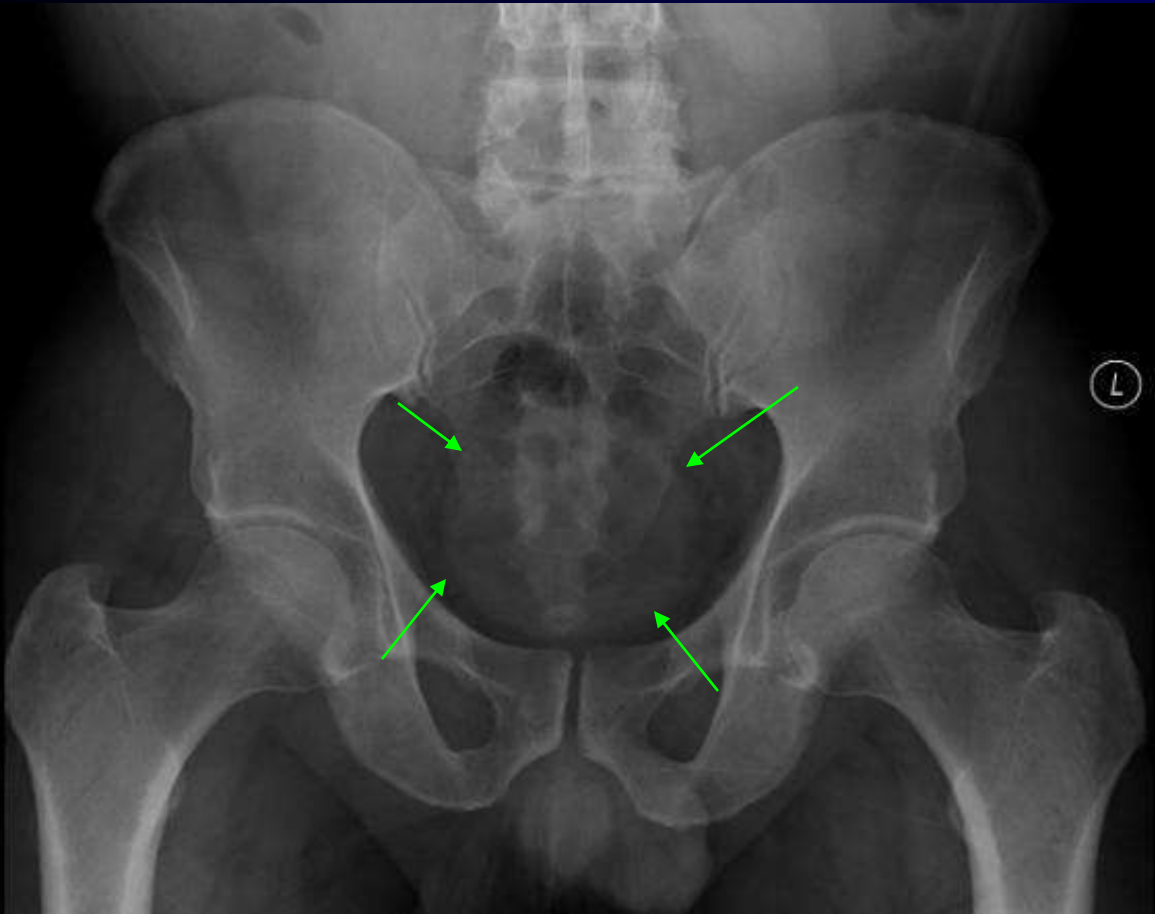
Case 2: Pelvis

- Male with back pain and difficulty urinating

AP Pelvis



Findings



- Distended bladder

Differential diagnosis

- DDX for distended bladder:
 - They had to pee and you did not let them pee before taking the xray 😊
 - Prostate pathology/enlargement

Follow-up

- Referral to Urologist
- Digital rectal examination
- Laboratory studies

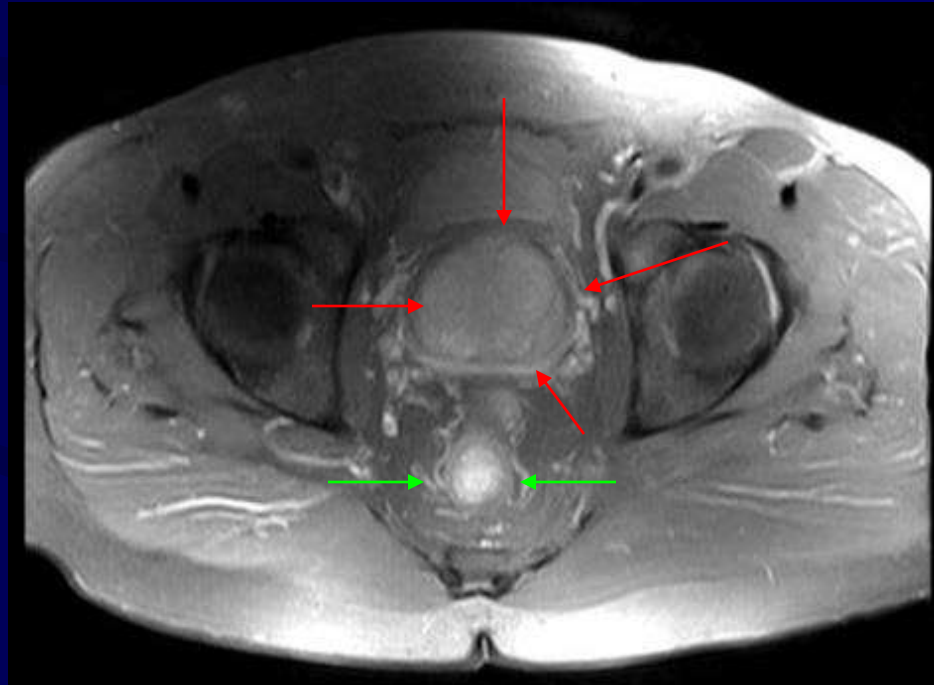
- Transrectal ultrasound with biopsy
- MRI maybe performed: Differentiate between benign prostatic hyperplasia and adenocarcinoma

MRI: Axial Proton Density weighted fat saturated images

- **Enlarged prostate**

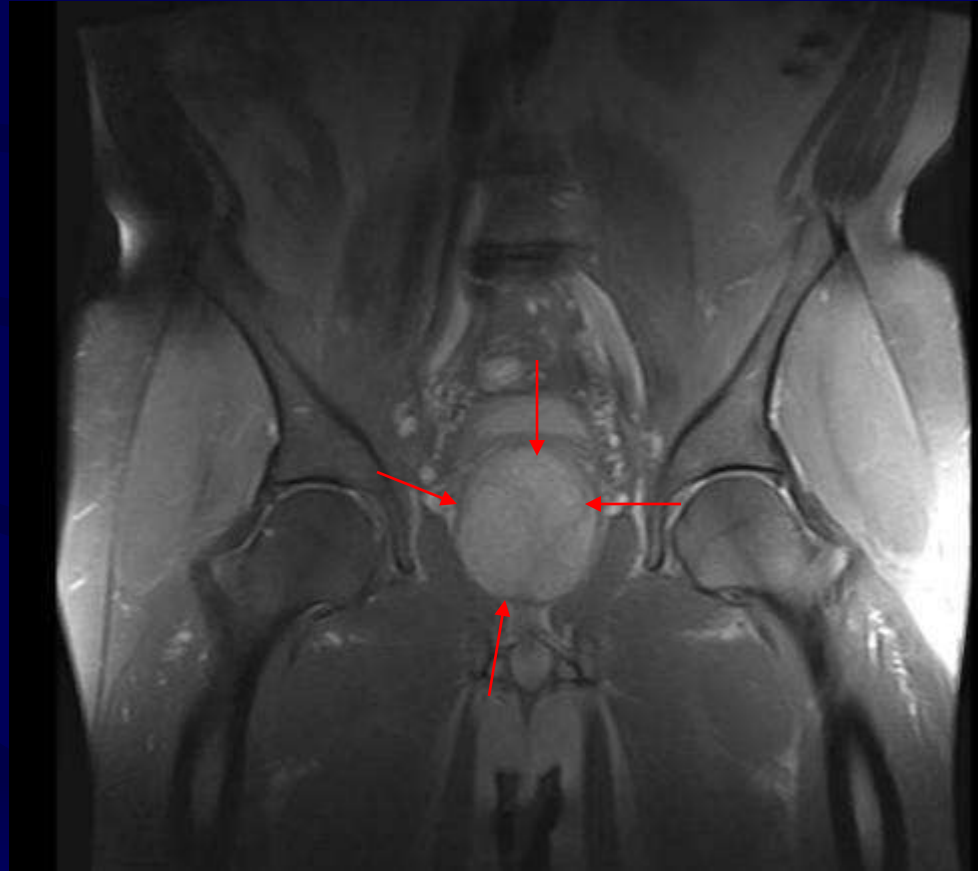
- **Normal size rectum**

- **Note:** A normal prostate should be approximately the same size as the rectum on the axial image.



Coronal PD Weighted Fat Sat Images

- Enlarged prostate



Diagnosis of the Prostate

- Adenocarcinoma
- Symptoms:
 - Fever, night sweats, chills & weight loss
 - Pain, burning with urination
 - Blood in urine
 - Weak flow of urine; frequency
 - Constant back, hip &/or pelvis pain

Treatment

(Prostate Cancer Institute & National Cancer Institute)

Surgical

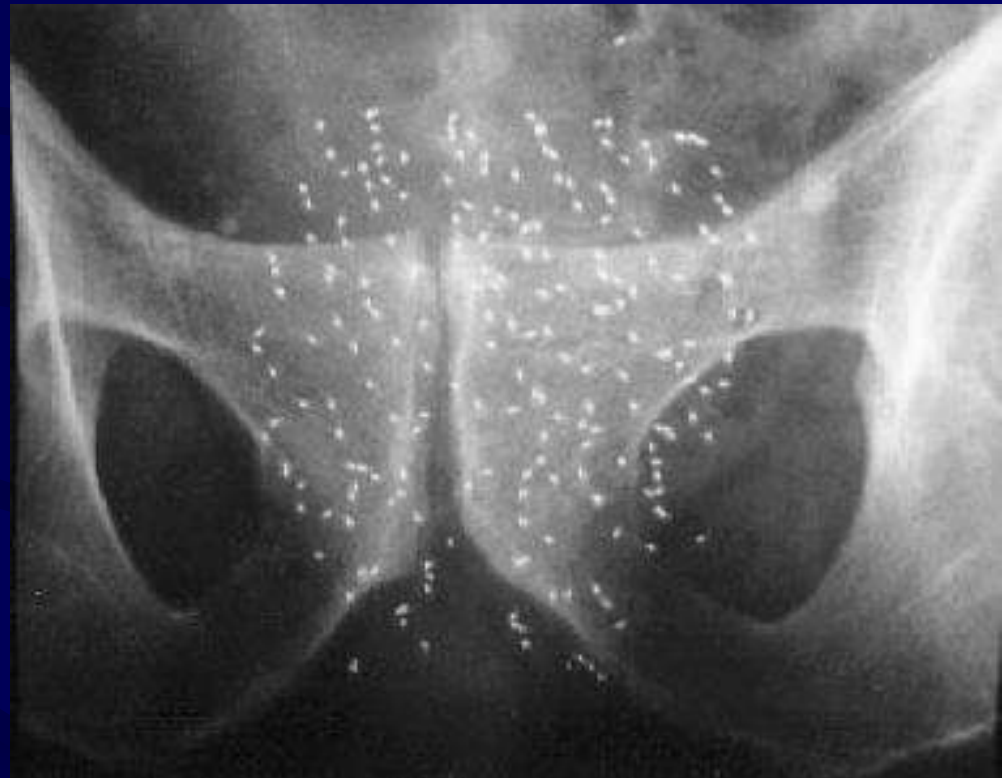
- Radical prostatectomy
- Robotic laparoscopic prostatectomy
 - 5 small abdominal incisions
 - Ex. Da Vinci Robotic Prostatectomy (Texas)-
www.video.google.com

Treatment

- Radiation-brachytherapy (radiation seeds)
- Hormone therapy- decreased testosterone by LHRH
- Chemotherapy

Radiation Seed Implantation

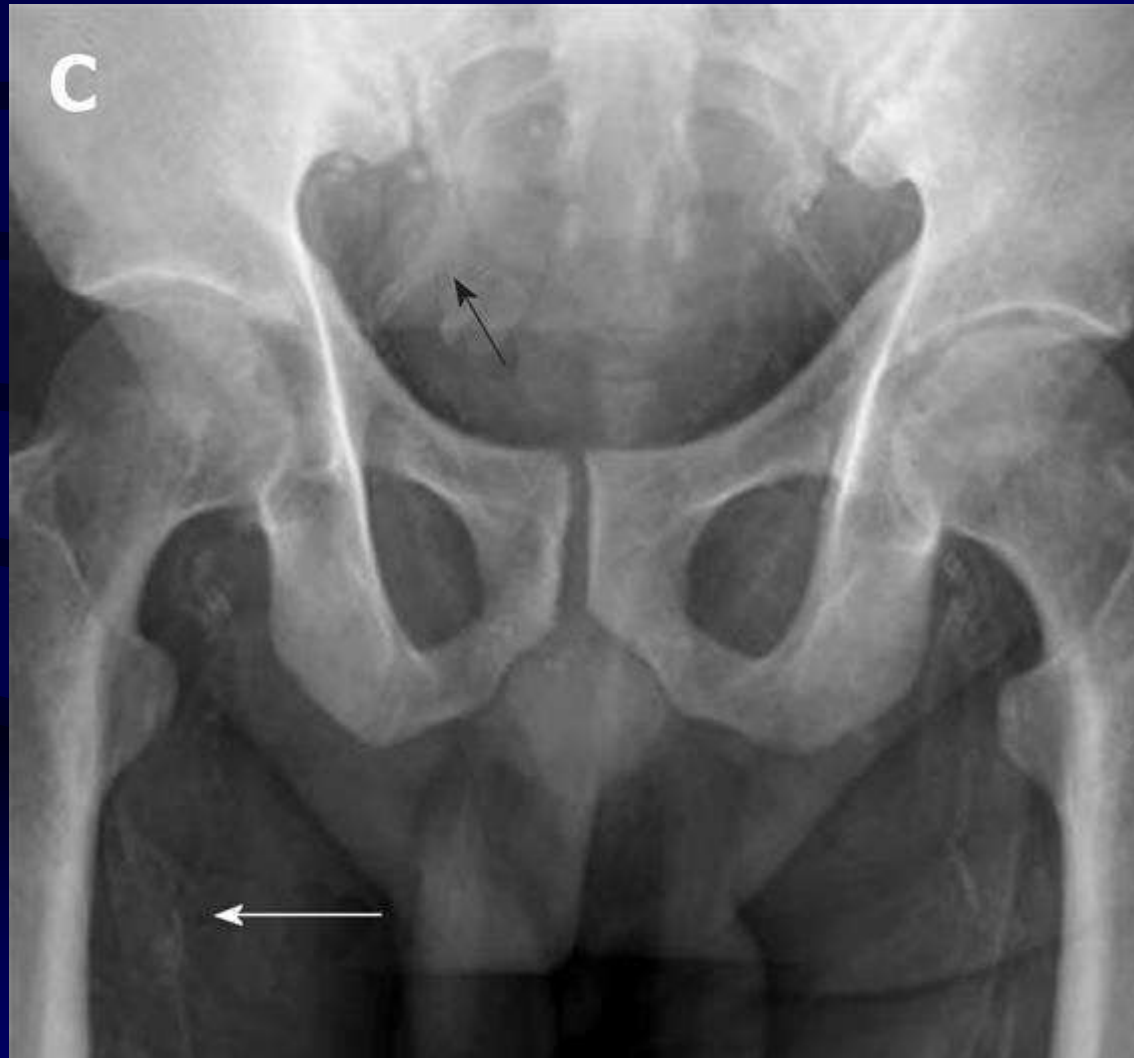
- Multiple metallic specks overlying the symphysis pubis are radiation seeds within the prostate.
 - Normal: prostate overlies the symphysis pubis on the AP view of the pelvis



Case 3: Pelvis

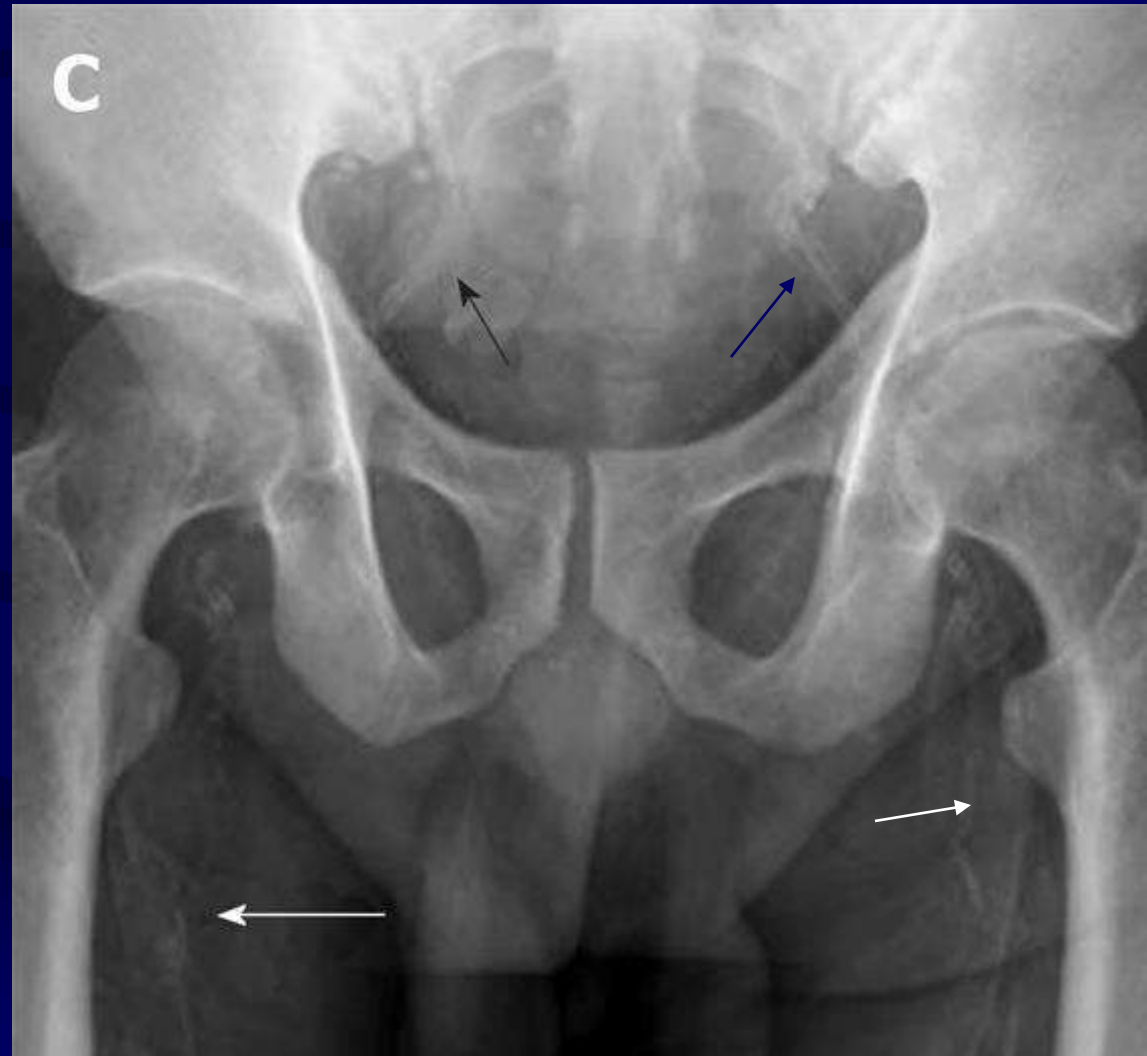
- Mild low back and bilateral hip pain.

Pelvis



Findings

- Vascular calcification of the bilateral iliac arteries (black arrows)
- Vascular calcification of the bilateral femoral arteries (white arrows)



Diagnosis

- Atherosclerosis of the bilateral iliac and femoral arteries.
- Patient is likely on hypertension medication
- Referral: primary physician if patient has not discussed vascular disease with their primary doctor.

Case 4: Pelvis

- History: Mild low back pain.

AP Lumbopelvic





Findings

- Tubular calcification in a V-formation within the central portion of the pelvic basin

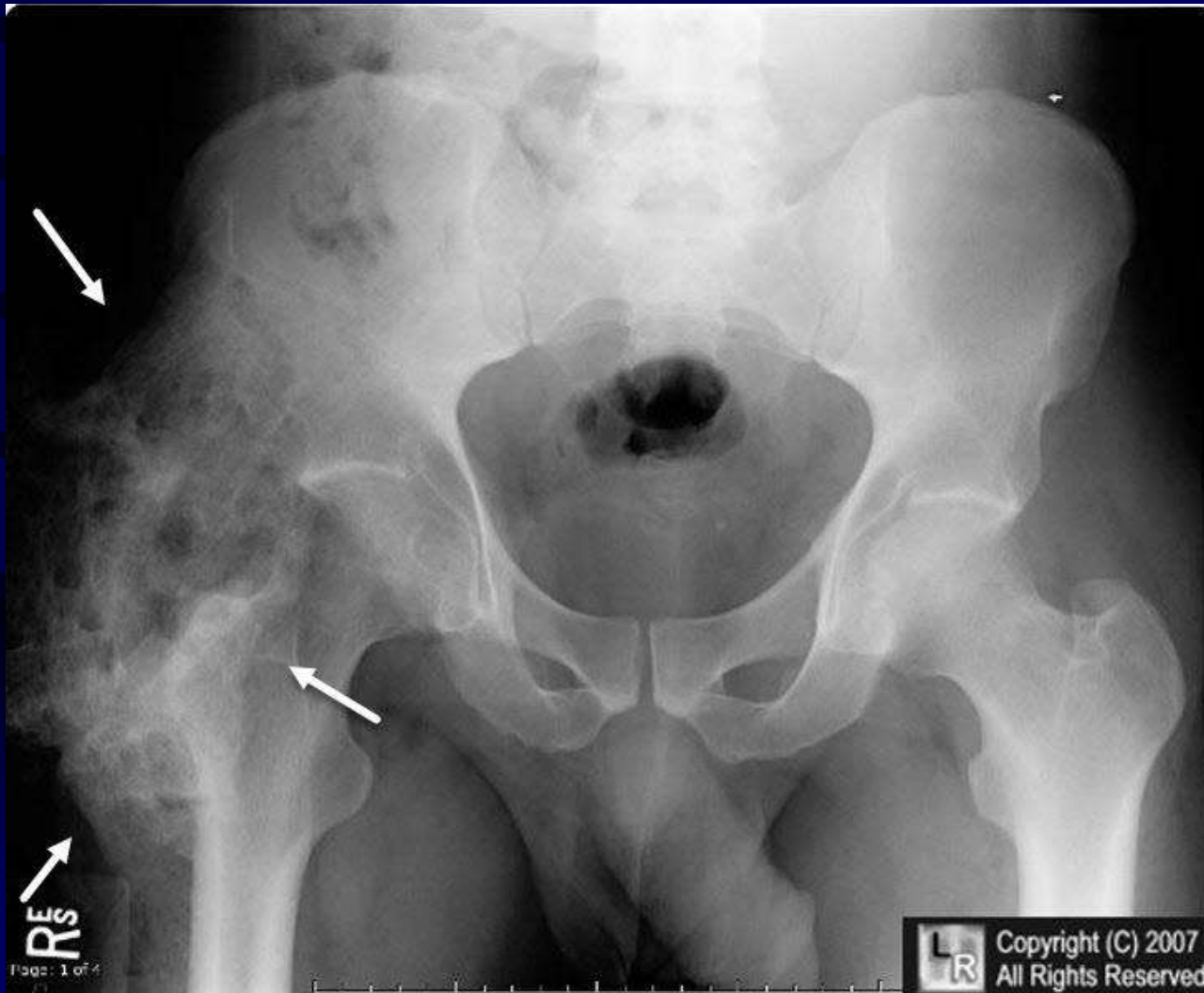
Diagnosis

- Calcification of the vas deferens
- Clinical Significance:
 - Diabetes mellitus,
 - Normal ageing,
 - Or due to infection

Case 5: Pelvis

- Young patient with spinal cord trauma several months ago.

AP Pelvis



Findings

- Abnormal bone formation within the extra-skeletal soft tissues surrounding the right hip.

Diagnosis

- Heterotopic Ossification known as myositis ossificans.

Follow-up

- Standard advanced imaging is triple phase bone scan with Tc 99M MDP
 - early detection early as two weeks after injury.
- Biopsy leads to false positive diagnosis of osteosarcoma
- CT can detect calcifications within the soft tissue earlier than xrays.
- MRI is not helpful
- MSK Ultrasound can be performed.

Causes of Heterotopic Ossification

- Trauma to the spinal cord
- Blunt trauma
- Burn victims
- Post surgical changes of the same region

Treatment

- Surgical resection: It may reoccur.
- Radiation therapy with external beam, or non-steroidal inflammatory

Case 6: Pelvis

- Mild low back pain. Doctor performed AP pelvis radiograph to further evaluate the left hip, after identifying calcific mass on the left on the AP radiograph of the lumbar spine.

AP Pelvis



Findings

- Multilobulated, periarticular densely calcified mass is overlying the left hip and hemipelvis.
- There are no osseous erosions.

Diagnosis

- Tumoral Calcinosis
 - Hereditary metabolic dysfunction of phosphate regulation
 - Most commonly painless
- Most common locations (in descending order of frequency):
 - hip (most common), shoulder, elbow, and foot (least common).

Follow-up

- Family history
- CT and MRI
- Laboratory studies

Other possible differentials

- Hyperparathyroidism
- Calcium pyrophosphate deposition disease (pseudogout)
- Dermatomyositis
- Myositis ossificans
- Hypervitaminosis D
- Calcinosis of chronic renal failure
- Synovial sarcoma
- Calcific tendinitis

THE END

THANK YOU 😊

Additional References

- Brant W, Helms C. Fundamentals of Diagnostic Radiology, 3rd ed. 2007.
- Karaman K, et al. Endovascular Stent Graft Treatment in a Patient with Splenic Artery Aneurysm. *Diag Inter Radiology*, 2005; 11:119-21.
- Pride Y, MD et al. Splenic Artery Aneurysm: An Endovascular Approach to Therapy. *Vascular Disease Management*, Sept 2007; 4(5).
- Mahaderan S, MD. Plain Film Diagnoses You Cannot Afford To Miss. *Academic Emergency Medicine*. June 2007; Vol.7, No.6

Additional References

- Halpert R. Gastrointestinal Imaging, 3rd ed. The Requisites. 2006; 172.
- www.uterine-fibroid.org
- World Journal of Nephrology; April 06, 2012; 1 (2): 43-53.
- www.learningradiology.com

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marcusstrutzdc@gmail.com

[707.972.0047](tel:707.972.0047)

