Pathology with CT Sectional Anatomy Correlation, Part I

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Objectives

Upon completion of the course, the participant will be able to:

1. State pathologies that commonly require a CT study.
2. Display understanding of the signal characteristics displayed by abnormal tissues during various CT imaging modes in illustrating pathological processes.
3. Describe basic pathological processes demonstrated by CT.
4. Identify the nature and courses of various pathologies within the head, spine, neck, chest, abdomen, pelvis and musculoskeletal areas.

Pathology of the Brain

Neoplasm

Acoustic Neuroma

- Description
  - Also known as a vestibular schwannoma
  - Benign fibrous tumor
  - Arises from Schwann cells (myelin-forming cells) covering XIII cranial nerve (auditory nerve)
  - Well encapsulated
  - Compress, but don’t invade nerve
  - Approximately 80-85% of all CPA tumors

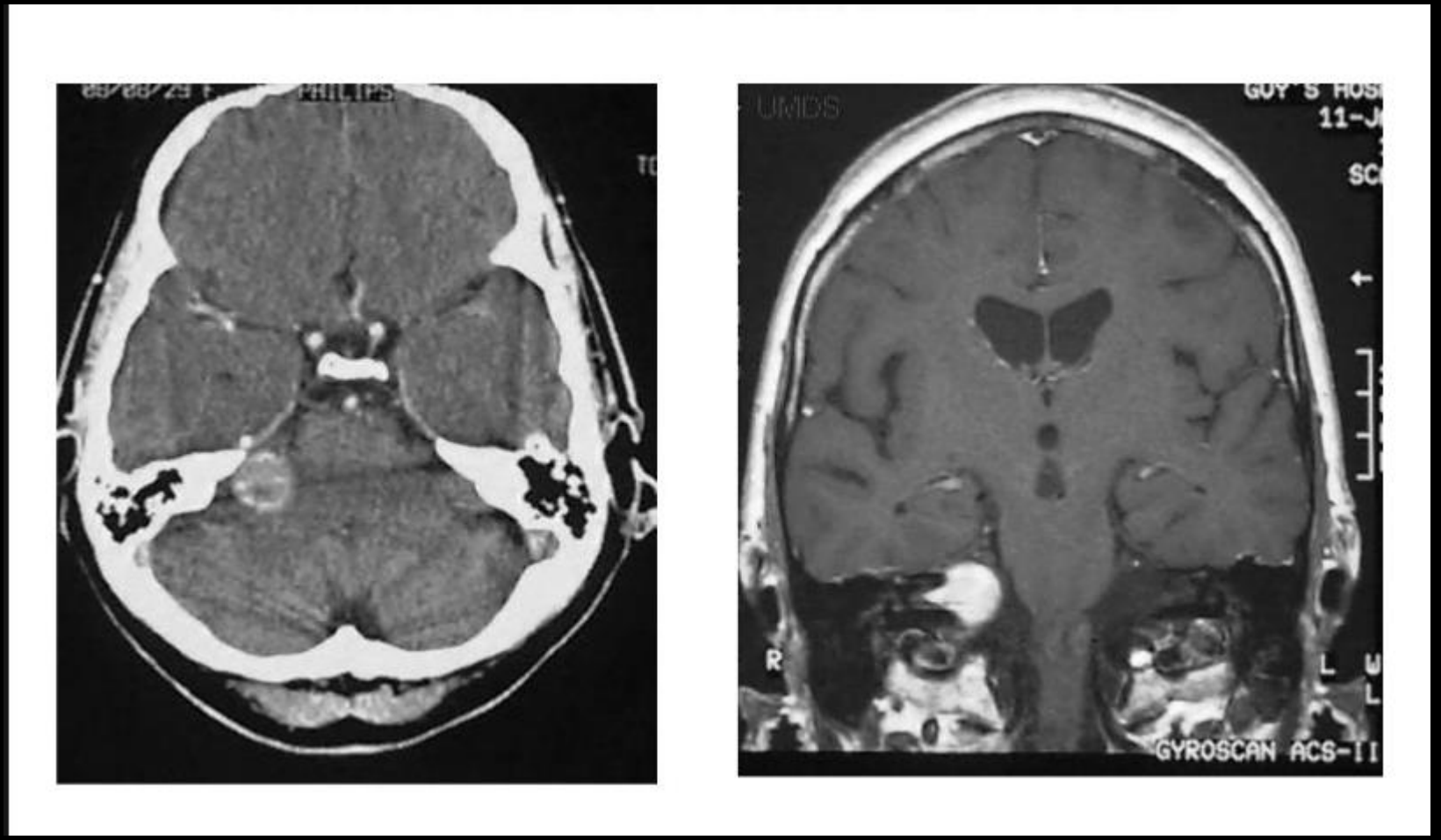
Acoustic Neuroma cont.

- Etiology
  - No known cause
  - Bilateral schwannomas are pathognomonic* for neurofibromatosis
  - *means diagnostic for a particular disease.
- Signs / symptoms
  - Hearing loss
  - Tinnitus
  - Vertigo

Acoustic Neuroma cont.

- Imaging characteristics
  - Well rounded hypodense on non-contrast study
  - Hyperdense with contrast enhancement
- Prognosis
  - Depending on size of lesion, usually curative, post surgical intervention.

Acoustic Neuroma cont.



https://www.google.com/search?q=cisterns+brain&espv=2&biw=1627&bih=886&tbm=isch&imgil=1yPCgC8MLP0XUM%253A%253Bg0qceMbwb6m3aM%253Bhttp%25253A%25252F%25252Fwww.slideshare.net%25252Fananthatiger%

Brain Metastasis

- Description
  - Metastatic spread of cancer from a distant site or organ
- Etiology
  - Primarily occurs through hematogenous spread *

*spread via the blood vascular system

Brain Metastasis cont.

- Epidemiology
  - Accounts for 15-25 percent of all intracranial tumors
  - May involve supratentorial and infratentorial parenchyma, meninges and calvaria:
  - Parenchyma – lung, breast, GI, kidney and melanoma primaries
  - Meninges - bone or breast primaries
  - Calvaria – breast and prostate primaries

Brain Metastasis cont.

- Signs / symptoms
  - Seizures
  - Signs of intracranial pressure:
    - HA
    - Nausea, vomiting
    - Ocular palsies, papilledema
    - Loss of consciousness
  - Loss in sensory / motor function

Brain Metastasis cont.

- Imaging characteristics
  - May demonstrate multiple discrete lesions with varying intensity along the gray-white matter interface.
  - Show marked peripheral edema surrounding large lesions
  - Post-contrast demonstrate ring-like enhancement.

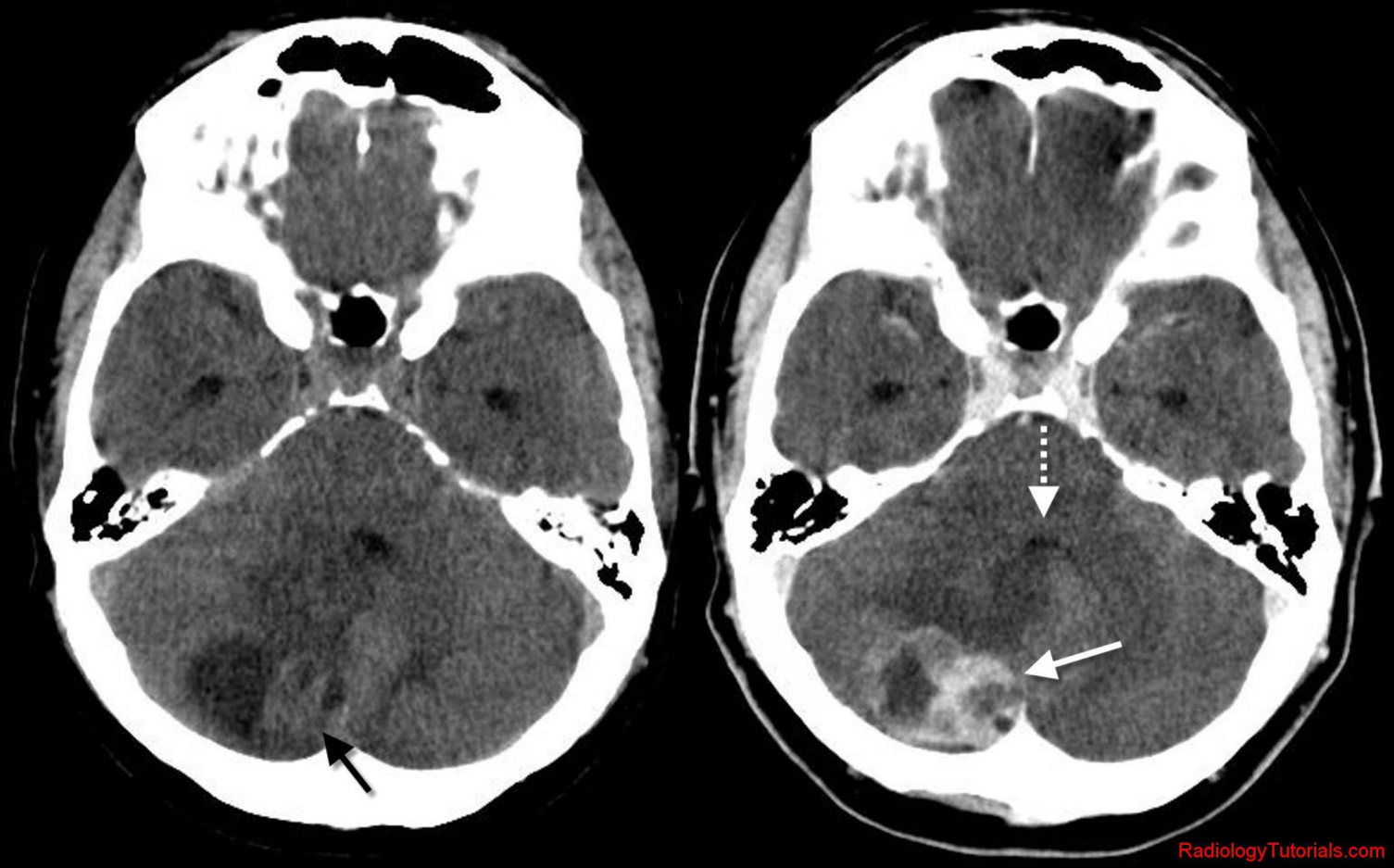
- Treatment

  - Patients with a single met may undergo surgery, with follow-up rad therapy
  - Patients with multiple mets may undergo rad therapy

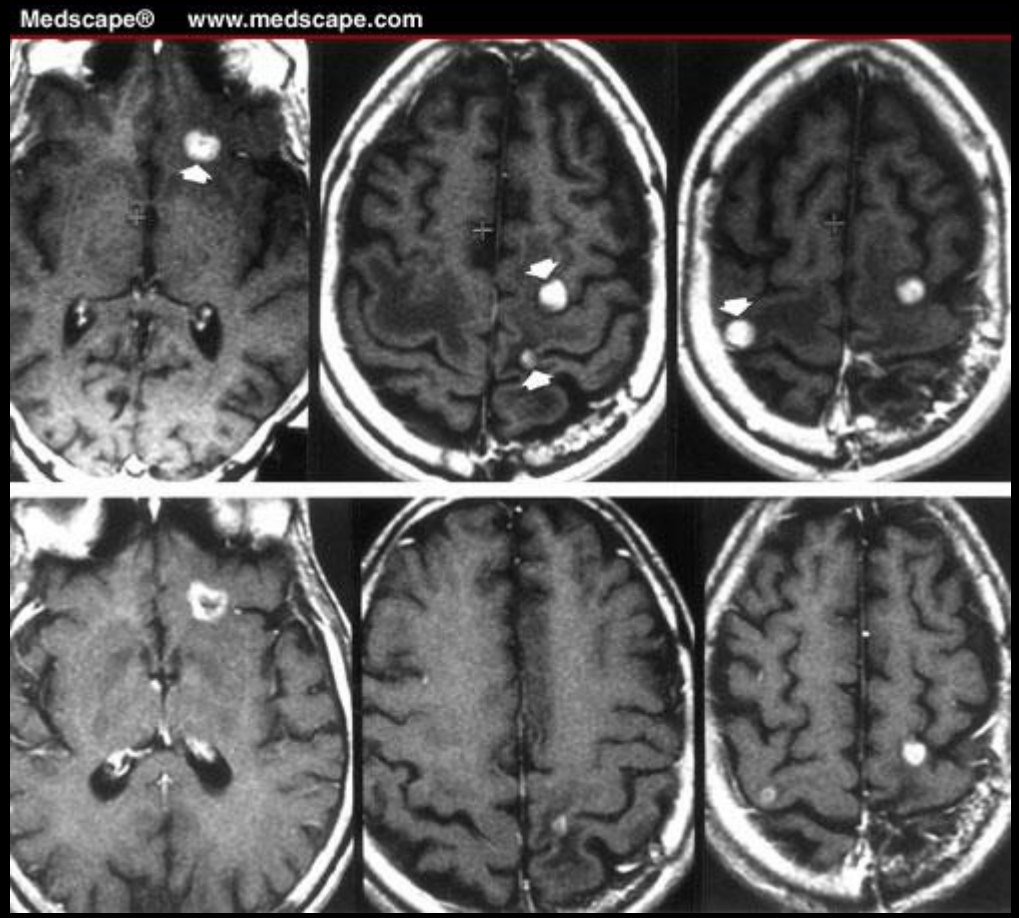
Brain Metastasis cont.

- Prognosis
  - Depends on number and size extent of mets in the brain

Brain Metastasis cont.



Brain Metastasis cont.



http://www.medscape.com/content/2000/00/40/56/405630/art-nf0902.04.fig2.jpg

Craniopharyngioma

- Description
  - Benign epithelial tumors
  - Almost always located in the suprasellar or intrasellar region
- Etiology
  - Arise from squamous epithelial cells along the infundibulum of the hypophysis

Craniopharyngioma cont.

- Epidemiology
  - Have a bimodal age distribution:
    - More than half occur in children / young adults, while the second peak in the fifth / sixth decade
  - 40% occur in children between 8-12 years of age
  - Males / females affected equally

Craniopharyngioma cont.

- Signs / symptoms
  - Visual symptoms
  - Obstructive hydrocephalus
  - Endocrine dysfunction

- Imaging characteristics
  - Small tumors usually well-circumscribed, lobulated masses
  - Large tumors may be multicystic and invade the sella
  - 90% may present with calcifications
  - 90% enhance with contrast
  - 85% are cystic
  - 75% measure between 2-6cm

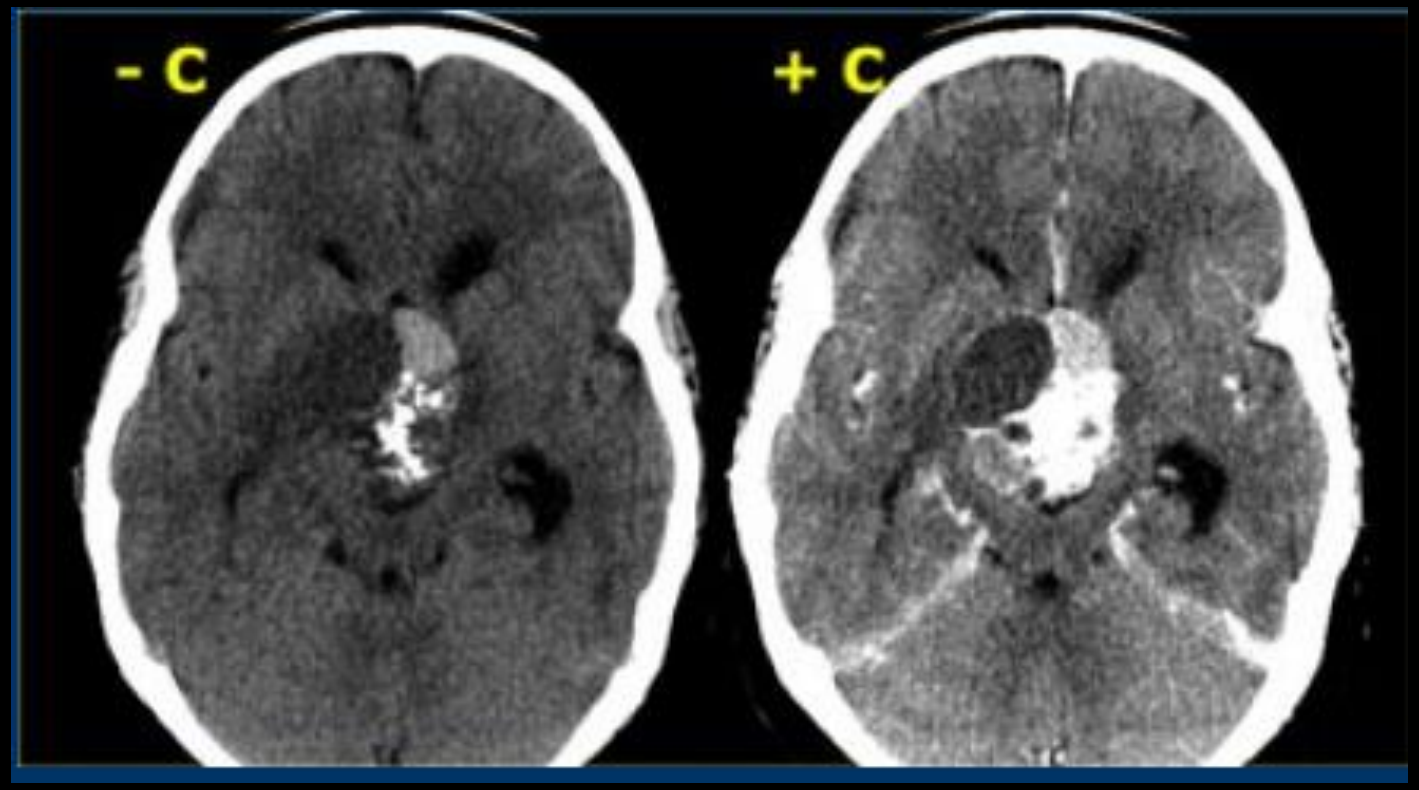
Craniopharyngioma cont.

- Imaging characteristics cont.
  - Solid and cystic suprasellar mass; lobulated
  - Calcification seen in 90% of pediatric cases; 30%-40% in adults
- Treatment
  - Surgery most common
  - Rad Tx may be used to shrink tumor
  - Recurrence is common

Craniopharyngioma cont.

- Prognosis
  - 10 year survival rate of 78%, post surgical resection, followed by rad Tx

Craniopharyngioma cont.



http://www.radiologyassistant.nl/en/p485d7745cc720/sella-turcica-and-parasellar-region.html

Glioblastoma Multiforme

- Description

  - Also known as astrocytoma grade IV tumor
  - Rapid growing, highly malignant
  - Predominantly located within the cerebral hemispheres
  - May occur in the brainstem, cerebellum or spinal cord, also
  - Spread by direct extension, and can cross the corpus callosum

Glioblastoma Multiforme cont.

- Etiology
  - Unknown
- Epidemiology
  - Most common primary intracranial tumor
  - Typically appears between 45 and 60 years of age
  - Males slightly more affected than females

Glioblastoma Multiforme cont.

- Signs / symptoms
  - HA
  - Nausea / vomiting
  - Papilledema
  - Change in mental status
  - Seizures
  - Speech and sensory disturbances

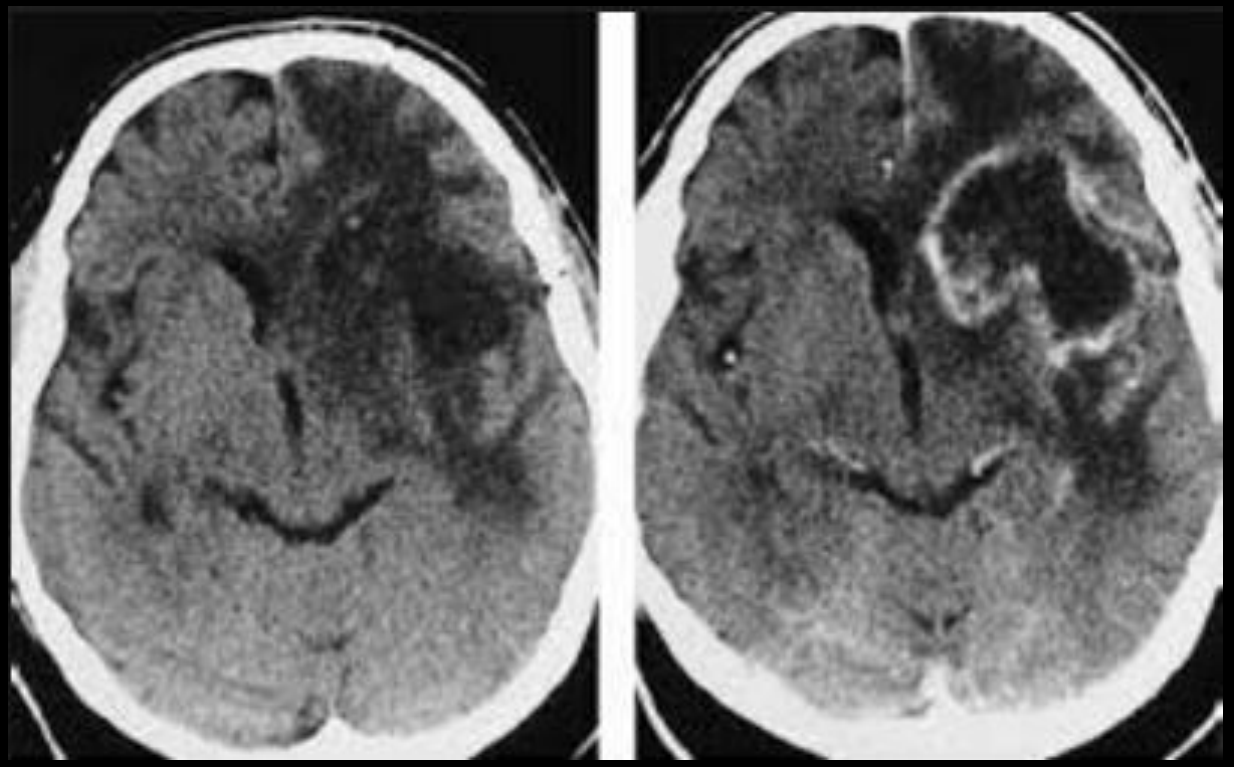
Glioblastoma Multiforme cont.

- Imaging characteristics
  - Located in white matter
  - Appear heterogeneous, with surrounding edema and mass effect
  - Post contrast enhanced images demonstrate tumor rim enhancement, with hypointense edema and a necrotic center

Glioblastoma Multiforme cont.

- Treatment
  - Surgical resection
  - Rad Tx
  - Chemo Tx
- Prognosis
  - Poor
  - Currently, survival rate is 50% at 1 year, 15% at 2 years

Glioblastoma Multiforme cont.



https://www.google.com/search?q=ct+craniopharyngioma&espv=2&biw=1137&bih=886&source=lnms&tbm=isch&sa=X&ved=0ahUKEwj33aznqODQAhWKv1QKHZjSBw4Q_AUIBigB#tbm=isch&q=glioblastoma+multiforme+ct+images&imgrc=Antt07sS5XQwzM%3A

Lipoma

- Description
  - Benign, fatty tumor
- Etiology
  - Unknown

Lipoma cont.

- Epidemiology
  - Incidence is less than 1% of primary intracranial lesions
  - Can appear at any age
  - 80% to 90% located in the midline
- Sign / symptoms
  - Usually none
  - Normally incidental finding
  - Does not increase in size

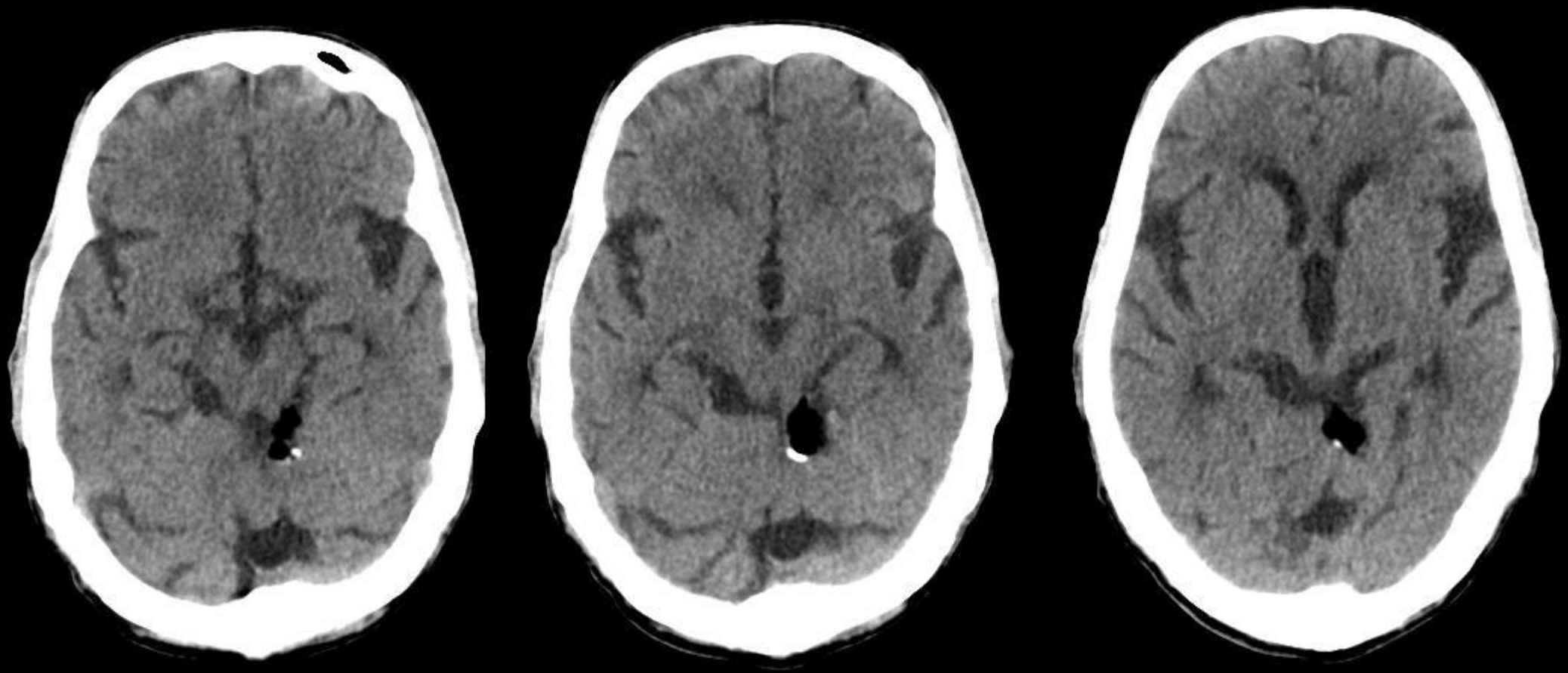
Lipoma cont.

- Imaging characteristics
  - Hypodense appearance
  - Does not enhance with contrast
- Treatment
  - None usually required

Lipoma cont.

- Prognosis
  - Unless positioned in a location that is life threatening, prognosis is unaffected

Lipoma cont.



http://www.neuroradiologycases.com/2011/08/mri-cant-replace-ct-completely.html

Medulloblastoma

- Description
  - Rapid growing
  - Highly malignant
  - Arise in the posterior medullary velum
- Etiology
  - Arise from embryonal cell rests in germinative zone of posterior medullary velum

Medulloblastoma cont.

- Epidemiology
  - Most common posterior fossa neoplasm in pediatric patients
  - Account for 20% of primary brain tumors in children
  - Bimodal incidence:
    - Peak between 5 and 8 years of age
    - Second smaller peak between 20 and 30 years of age
  - Incidence in males 2X females

Medulloblastoma cont.

- Signs / symptoms
  - Increased intracranial pressure
  - Ataxia
  - Nystagmus
  - Neck stiffness, if cerebellar herniation occurs

Medulloblastoma cont.

- Imaging characteristics
  - Hyperdense lesion displacing the 4th ventricle in the non-contrast study
  - Enhances with IV contrast

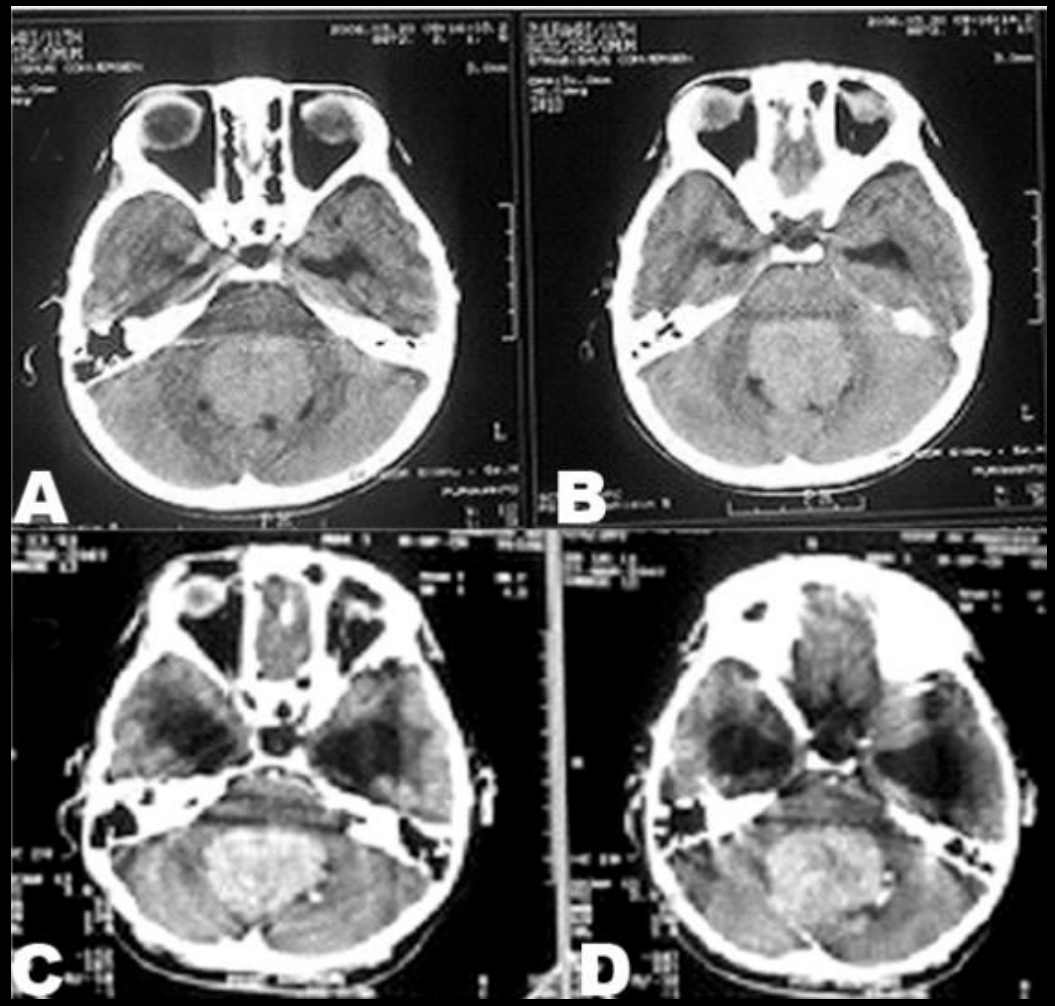
- Treatment

  - Surgical resection
  - Rad Tx
  - Multiagent Chemo Tx

Medulloblastoma cont.

- Prognosis
  - Depends on patient's age, tumor location and amount of tumor surgically resected
  - Favorable, if:
    - Age greater than 2 years
    - Greater than 75% of tumor resected
    - Lack of spread

Medulloblastoma cont.



http://www.ijcasereportsandimages.com/archive/2013/001-2013-ijcri/018-01-2013-amran/figure1.gif

Meningioma

- Description
  - Most common benign intracranial neoplasm
  - Second most common primary CNS tumor
  - Slow growing, highly vascular tumors
  - Occur along meningeal vessels and the superior sagittal sinus
  - Invade the dura and the skull, leading to erosion

Meningioma cont.

- Etiology
  - Arise from the meninges
- Epidemiology
  - Primarily adult tumors
  - 20% of all primary brain tumors
  - Peak between 40 and 60 years of age
  - Female prevalence 3:2 ratio
  - 90% intracranial, with 90% of these supratentorial

Meningioma cont.

- Signs / symptoms
  - Depends on location, but may include:
    - HA
    - Seizure
    - Nausea / vomiting
    - Change in mental status

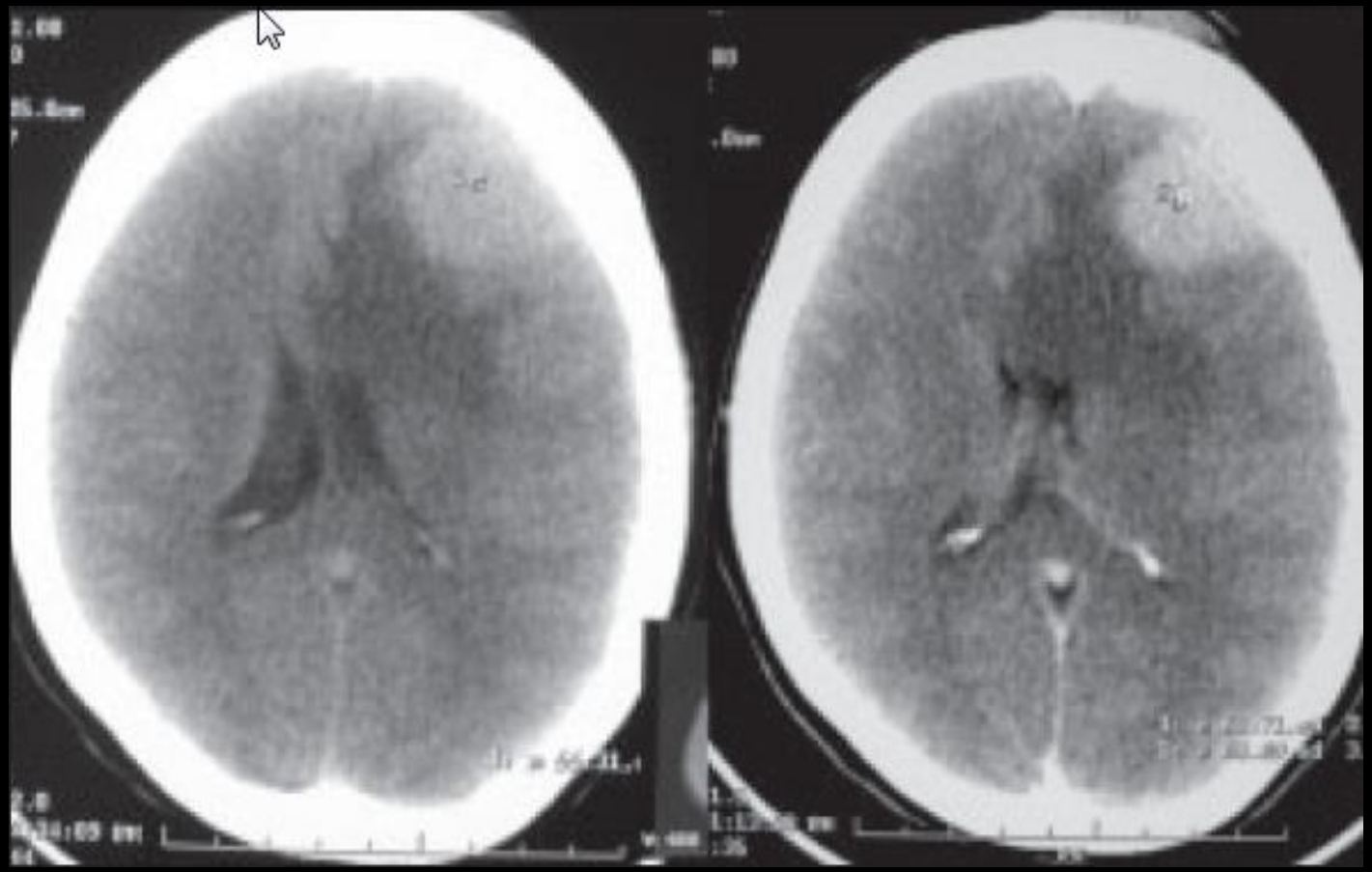
Meningioma cont.

- Imaging characteristics
  - Non-contrast images demonstrate a Hyperdense extra-axial mass
  - Calcification seen in 20% to 25% of cases.
  - IV contrast demonstrates marked enhancement
- Treatment
  - Surgical resection
  - Rad Tx, if surgery not possible, or if tumor recurs

Meningioma cont.

- Prognosis
  - 10 year survival rate of 80% to 90%, if tumor completely resected

Meningioma cont.



https://www.google.com/search?q=ct+craniopharyngioma&espv=2&biw=1137&bih=886&source=lnms&tbm=isch&sa=X&ved=0ahUKEwj33aznqODQAhWKv1QKHZjSBw4Q_AUIBigB#tbm=isch&q=CT+Brain+meningioma&imgrc=soyPikPESZE2UM%3A

Pituitary Adenoma

- Description
  - Classified as either functioning or nonfunctioning, depending upon their ability to secret hormones
- Etiology
  - Exact cause unknown
  - Predisposition that pituitary tumors are inherited through an autosomal dominant trait

Pituitary Adenoma cont.

- Epidemiology
  - Constitute 10% of all intracranial neoplasm
  - Most common primary neoplasm in the sellar region
  - Occur 30-50 years of age
  - Male and female affected equally

Pituitary Adenoma cont.

- Signs / symptoms
  - Frontal HA
  - Visual symptoms
  - Increased intracranial pressure
  - Personality changes
  - Seizures
  - Pituitary apoplexy*, secondary to hemorrhagic infarction of the adenoma

*bleeding into the pituitary

Pituitary Adenoma cont.

- Imaging characteristics
  - Microadenomas – measure less than 10mm
  - Macroadenomas – measure greater than 10mm

Pituitary Adenoma cont.

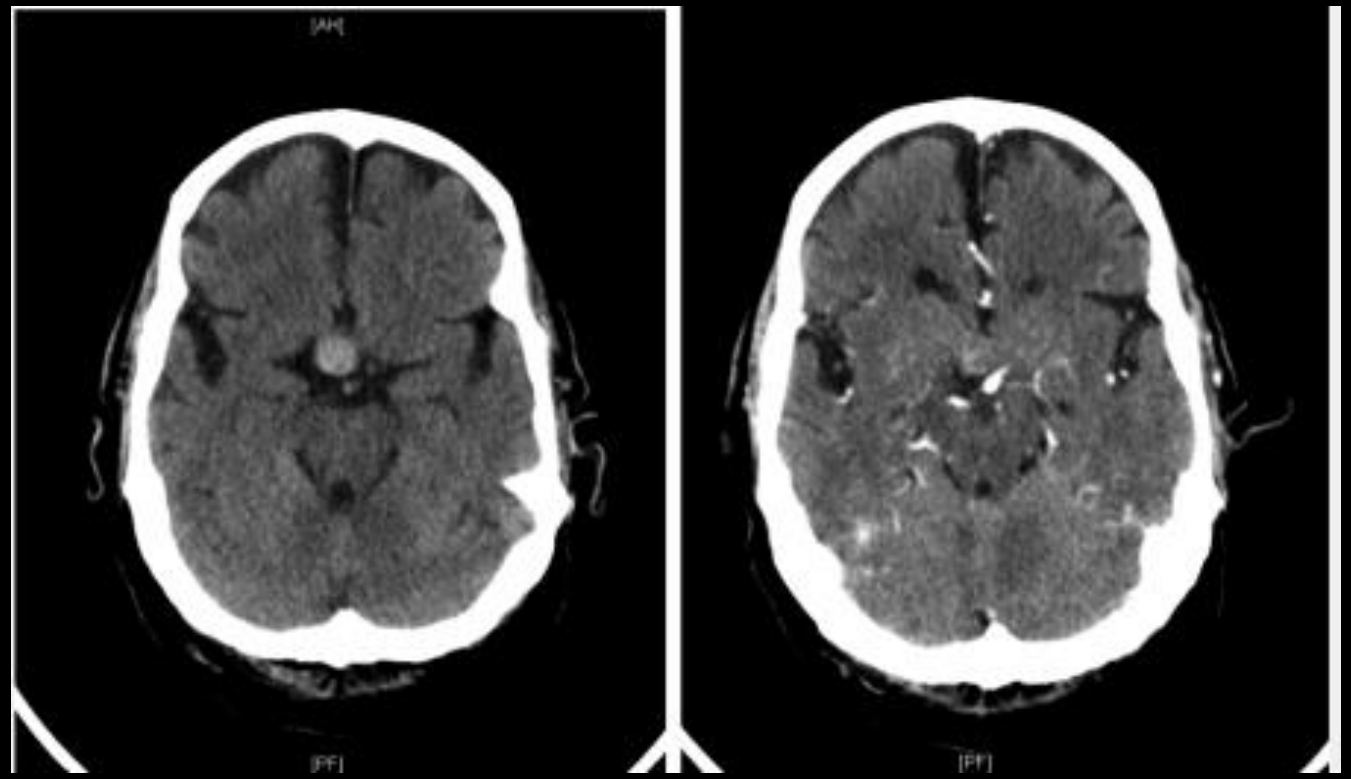
- Imaging characteristics cont.
  - Focal hypodensity within the gland
  - IV contrast enhances the tumor to appear isodense with the normal pituitary gland
- Treatment
  - Surgical resection
  - Rad Tx
  - Bromocriptine*

*treatment of symptoms of hyperprolactinemia

Pituitary Adenoma cont.

- Prognosis
  - Good, depending on extent of spread outside sellar area

Pituitary Adenoma cont.



https://openi.nlm.nih.gov/detailedresult.php?img=PMC2994350_SHORTS-10-007302&req=4

Pathology of the Brain

Congenital

Agenesis of the Corpus Callosum

- Description
  - Partial or complete absence
- Etiology
  - Ebryological insult prior to 10^{th} week of gestation

Agenesis of the Corpus Callosum cont.

- Epidemiology
  - Occur between 10 and 18 weeks of gestation
  - Equally affects males / females
- Signs / symptoms
  - May be asymptomatic
  - May be developmental abnormalities

Agenesis of the Corpus Callosum cont.

- Imaging characteristics
  - Elevated 3rd ventricle
  - Lateral ventricles separated
  - Partial / complete absence of corpus callosum
  - Cerebellar dysplasia

Agenesis of the Corpus Callosum cont.

- Treatment
  - none
- Prognosis
  - Depends on other developmental abnormalities

Agenesis of the Corpus Callosum cont.

https://radiopaedia.org/articles/dysgenesis-of-the-corpus-callosum

Agenesis of the Corpus Callosum cont.

http://www.uhrad.com/mriarc/mri080a2.jpg

Hydrocephalus

- Description
  - Enlargement of the ventricular system of the brain
  - 2 types of hydrocephalus:
    - Noncommunicating
    - Communicating
  - Noncommunicating – CSF is obstructed by a lesion, congenital narrowing of the cerebral aqueduct, or associated with a meningomyelocele
  - Communicating – overproduction of CSF, or inadequate reabsorption of the CSF

Hydrocephalus cont.

- Etiology
  - May result from:
    - Excessive CSF production
    - Inadequate reabsorption of CSF
    - Obstruction of CSF outflow from one or more ventricles
- Epidemiology
  - May also be associated with history of meningomyelocele

Hydrocephalus cont.

- Signs / symptoms
  - Increase in size of head
  - Behavioral changes
  - Seizures
  - vomiting / change in appetite

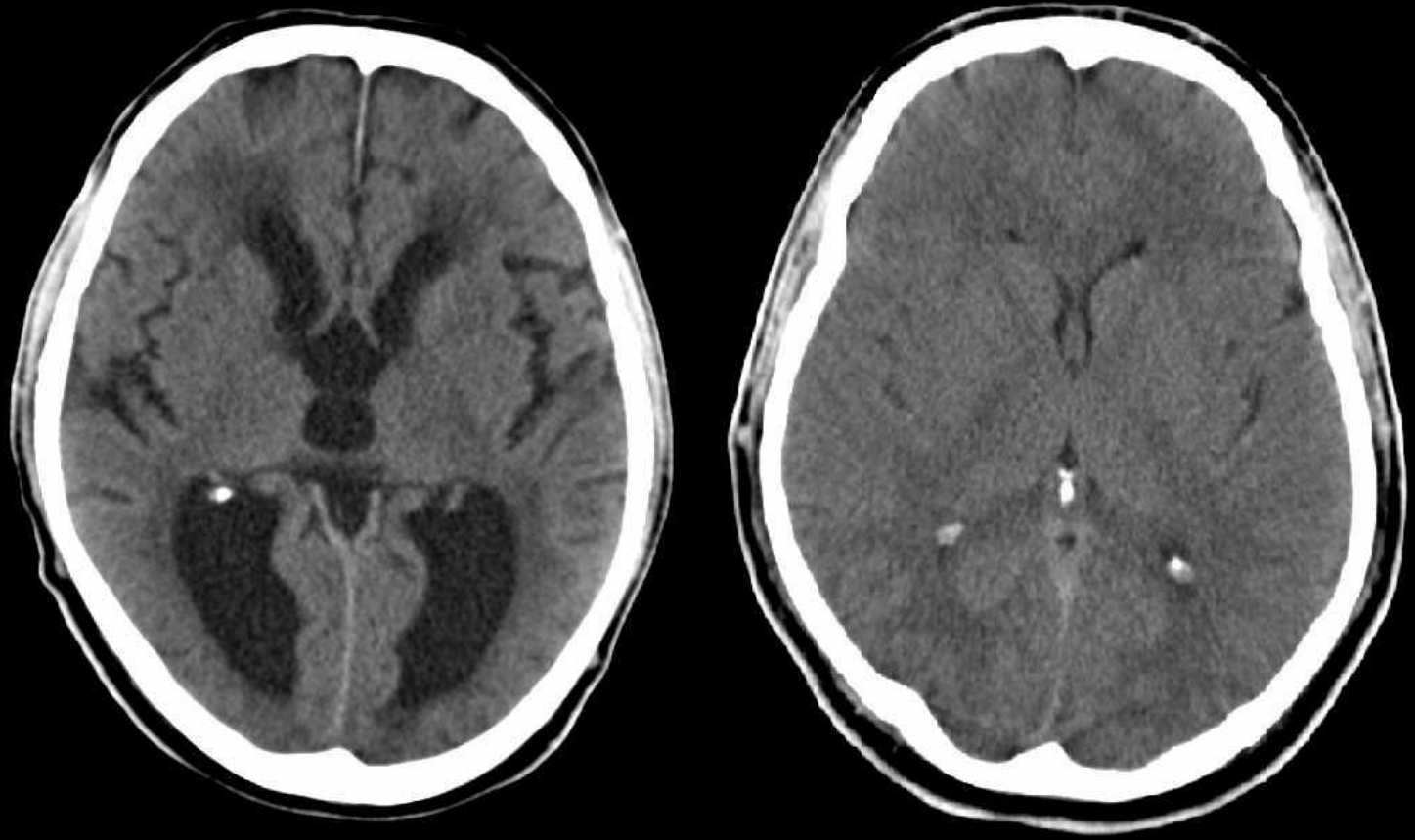
Hydrocephalus cont.

- Imaging characteristics
  - Enlarged ventricles and cisterns within the brain
  - Again, non-communicating hydrocephalus usually occurs in the region of the cerebral aqueduct, causing an enlargement of the third ventricle and the lateral ventricles

Hydrocephalus cont.

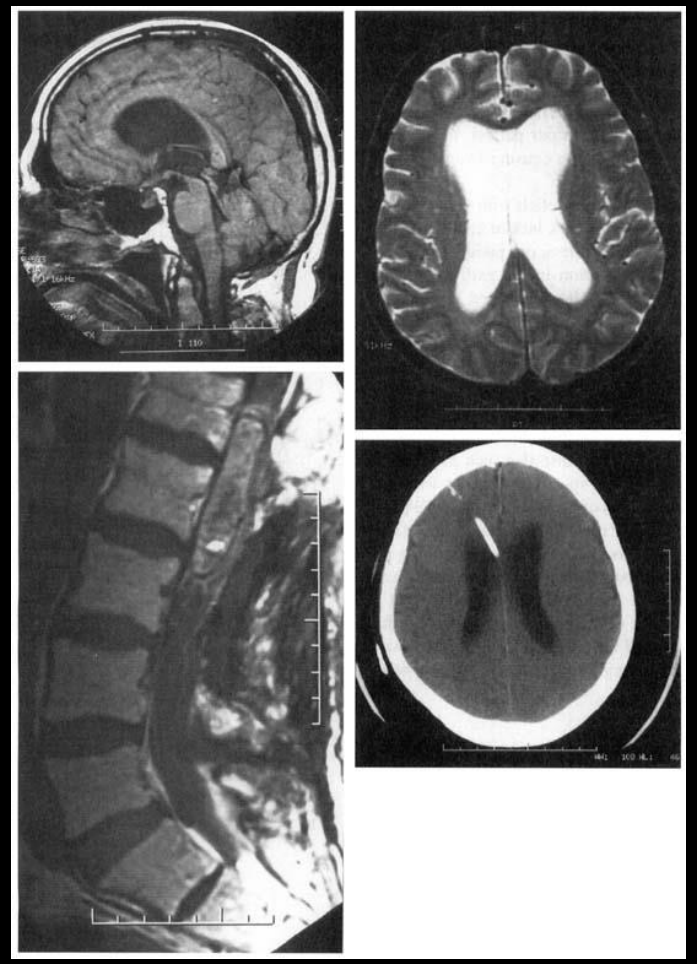
- Treatment
  - Shunting of CSF to right atrium or peritoneum
- Prognosis
  - Good, following shunting

Hydrocephalus cont.



http://upload.wikimedia.org/wikipedia/commons/a/ab/MBq_Hydrocephalus.jpg

Hydrocephalus cont.



http://www.mayoclinicproceedings.com/images/7508/7508cr3-fig1.jpg

Pathology of the Brain

Vascular Disease

Arteriovenous Malformation

- Description
  - Most common vascular malformation
  - Characterized by direct artery to vein communication without an intervening capillary bed
- Etiology
  - Congenital lesion
  - Result of abnormal fetal development at 3 weeks gestation

Arteriovenous Malformation cont.

- Epidemiology
  - Males present during middle age, generally
  - Males slightly more affected than females
  - 80% to 90% located in cerebrum
  - 10% to 20% located in posterior fossa

Arteriovenous Malformation cont.

- Signs / symptoms
  - Clinical presentation depends on location / size of AVM
  - Most present between age 20-40
  - By age 50, 80% to 90% are symptomatic
  - Hemorrhage will present in approximately half of the cases!
  - Seizures and HA are other symptoms

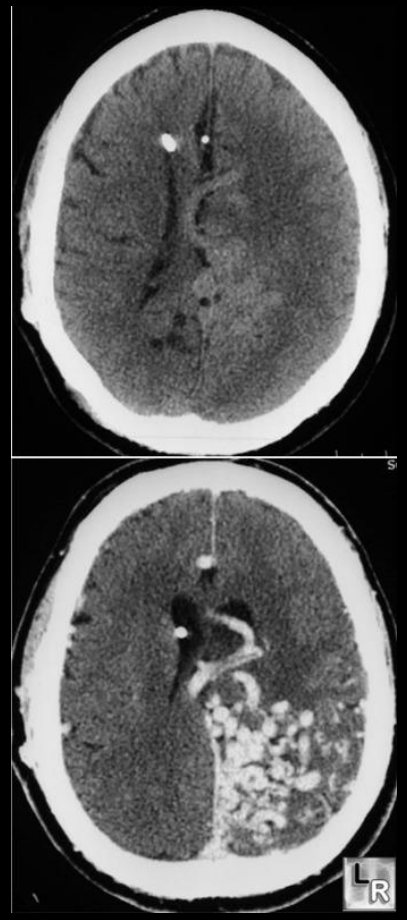
Arteriovenous Malformation cont.

- Imaging characteristics
  - Isodense to slightly Hyperdense without IV contrast
  - Calcification in 25% to 30%
  - Hyperdense “worm-like” appearing vessels with IV contrast enhancement

Arteriovenous Malformation cont.

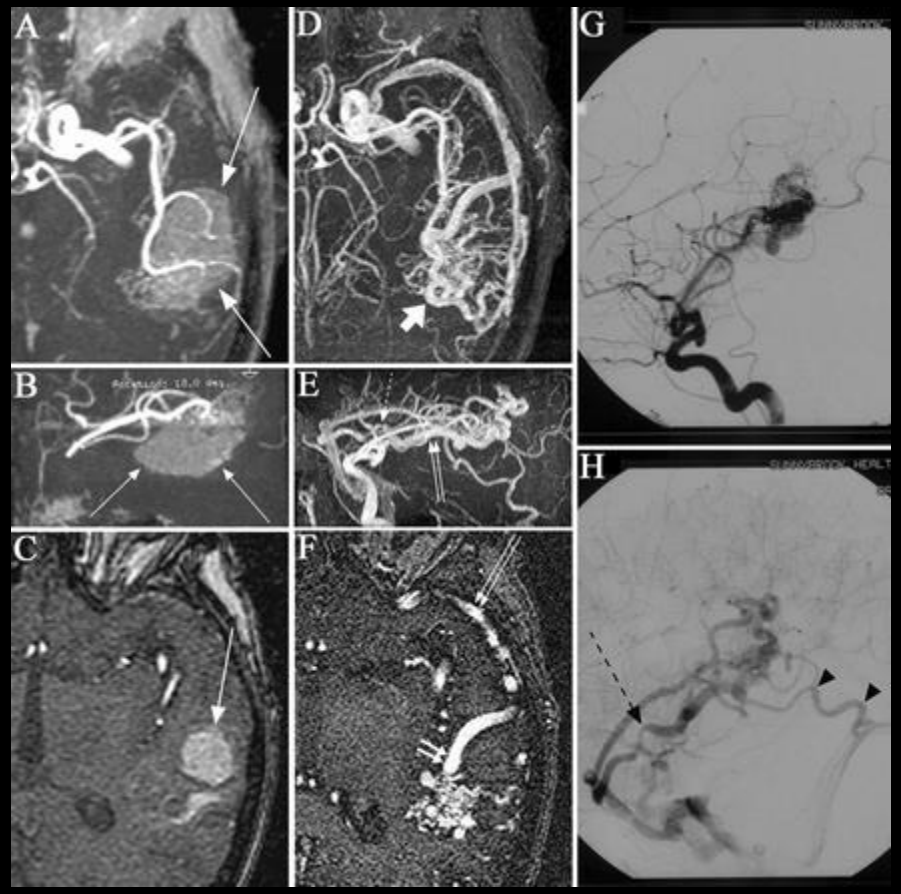
- Treatment
  - Depends on age and health of patient
  - Treatment may include:
    - Surgical intervention
    - Endovascular embolization
    - Stereotactic Rad Tx
- Prognosis
  - 10% mortality rate, when hemorrhage is present

Arteriovenous Malformation cont.



http://www.learningradiology.com/archives04/COW%20119-AVM%20of%20Brain/avmcorrect.htm

Arteriovenous Malformation cont.



http://radiology.rsnajnls.org/cgi/content/figsonly/220/1/244

Intracranial Aneurysm

- Description
  - Localized dilation of a cerebral artery
  - Berry aneurysm most common
  - Sac-like out pouching from an arterial junction within the circle of Willis
  - Often rupture, causing SAH

Intracranial Aneurysm cont.

- Etiology
  - Weakening may result from hemodynamic stresses:
    - Hypertension
    - Atherosclerosis
  - Increased incidence with:
    - Polycystic kidney disease
    - Aortic coarctation
    - Family hx

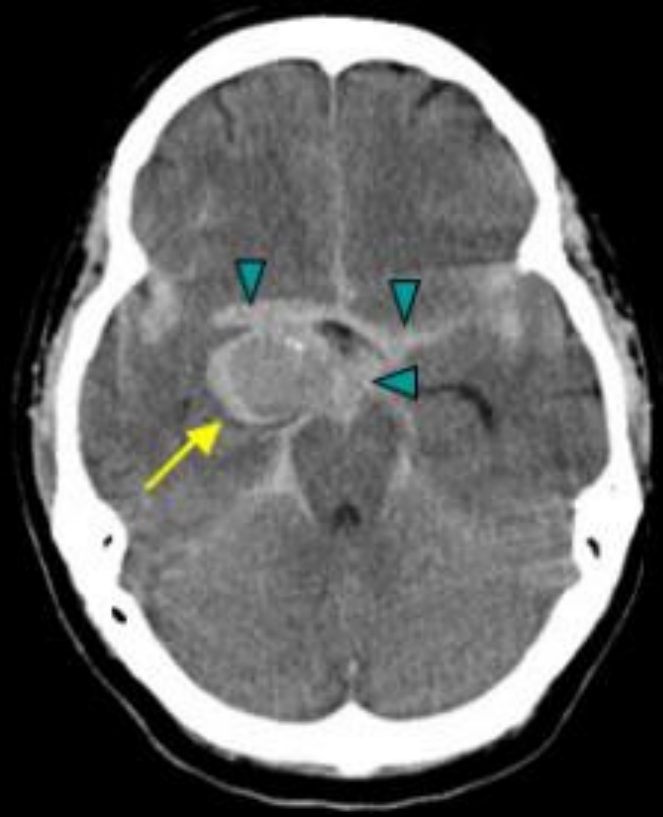
Intracranial Aneurysm cont.

- Epidemiology
  - Incidence slightly higher female vs. male
  - Peak occurrence 40 – 60 years of age
  - Anterior circulation affected 90%, with vertebro-basilar circulation other 10%

Intracranial Aneurysm cont.

- Imaging characteristics
    - With rupture, subarachnoid hemorrhage is generally noted within the basilar cisterns (approximately 95% of cases)
- Treatment
    - Surgical intervention
    - Neuro-radiologic intervention
- Prognosis
    - If rupture occurs, depends on severity of hemorrhage, rebleeding, and vasospasm

Intracranial Aneurysm cont.

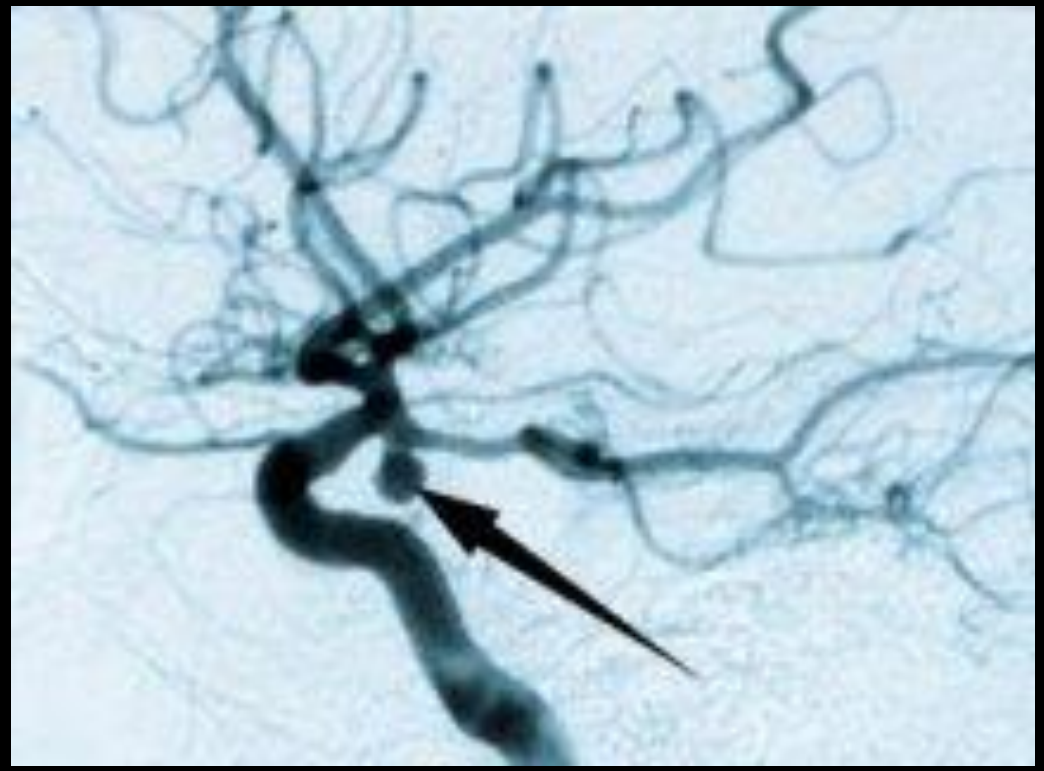


http://drarunlnaik.com/cerebral_aneurrysm/

Intracranial Aneurysm cont.

http://ofpaperandponies.tumblr.com/post/4842381566/cerebral-aneurysm

Intracranial Aneurysm cont.



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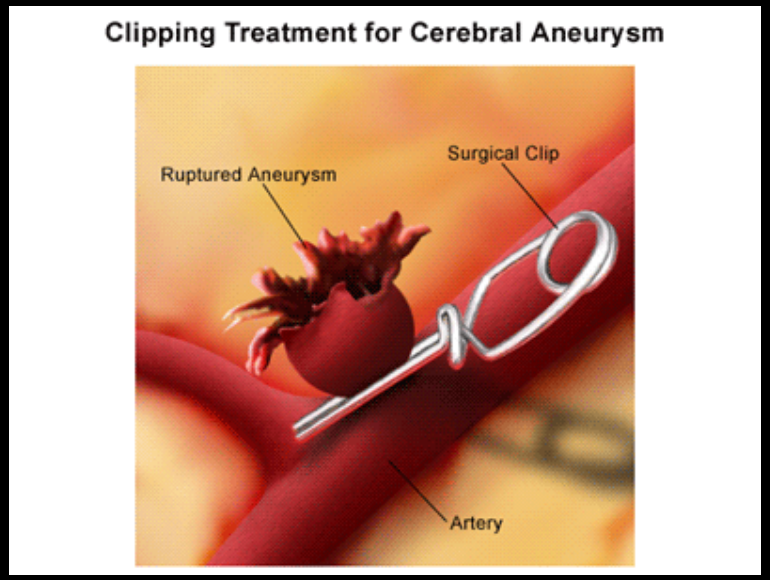
Intracranial Aneurysm cont.



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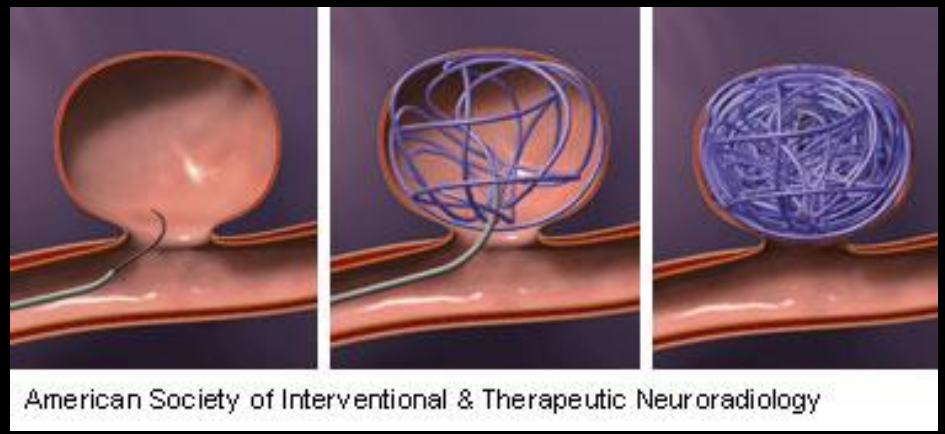


http://www.lvh.org/assets/your_lvh/healthy_you/2007-05/brain-377.jpg

Ischemic Stroke (CVA)

- Description
  - CVA can be hemorrhagic or ischemic
  - Ischemia is a result of a reduction of blood flow to the brain, either within a specific region, or globally

Ischemic Stroke (CVA) cont.

- Etiology
  - Primary cause is atherosclerosis causing thromboembolic disease
  - Source of emboli may be from:
    - Arterial stenosis
    - Atherosclerotic debris
    - Cardiac source (15% to 20% causation)

Ischemic Stroke (CVA) cont.

- Epidemiology
  - 80% to 85% of all strokes are ischemic
  - Third leading cause of death in Americans
  - Males affected three times more than females
  - People over 65 at greater risk
  - Black men 1.5X higher risk than white men

Ischemic Stroke (CVA) cont.

- Signs / symptoms
  - Depends on etiology, location of the ischemia and extent of damage

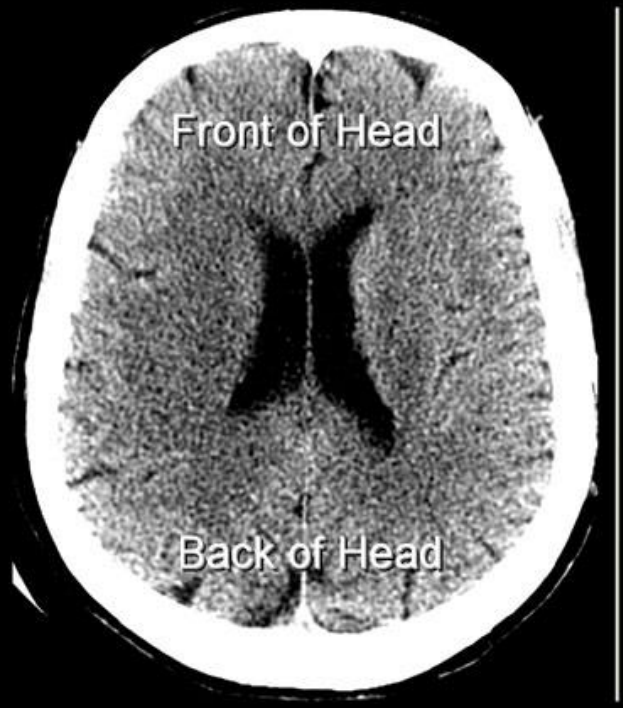
Ischemic Stroke (CVA) cont.

- Imaging characteristics
  - Usually remain unseen on CT for first 24-48 hours
  - MRI is the preferred modality for Ischemic stroke evaluation
  - 80% of strokes identified in first 24 hours, with MRI
  - DWI is more sensitive to demonstrating infarct within a few hours as increased signal
  - Acute infarct hypointense on ADC mapping

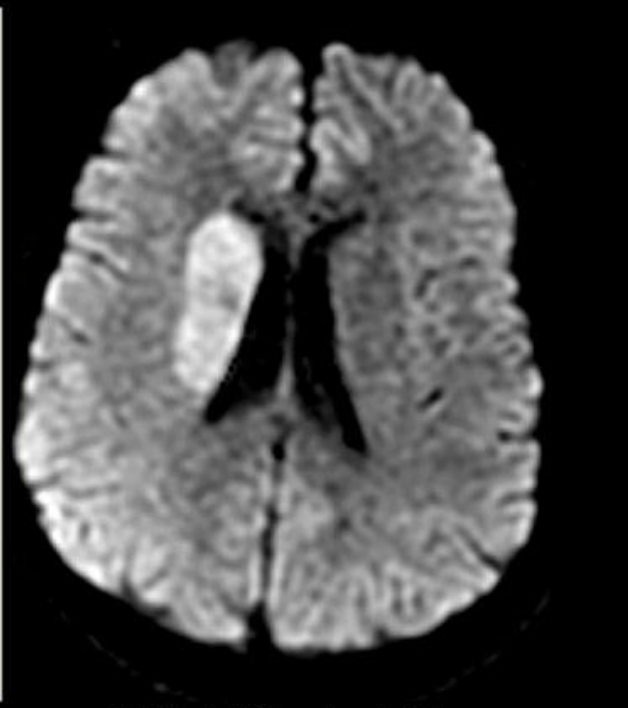
Ischemic Stroke (CVA) cont.

- Treatment
  - Thrombolytic Tx can be useful in within first 3 hours of onset
  - Anticoagulation Tx can be helpful in cases where onset is unable to be determined
- Prognosis
  - Depends on severity
  - 50% mortality rate within first 24 hours of onset
  - Posterior circulation CVA has higher mortality rate, but also recover better than hemispheric stroke

Ischemic Stroke (CVA) cont.



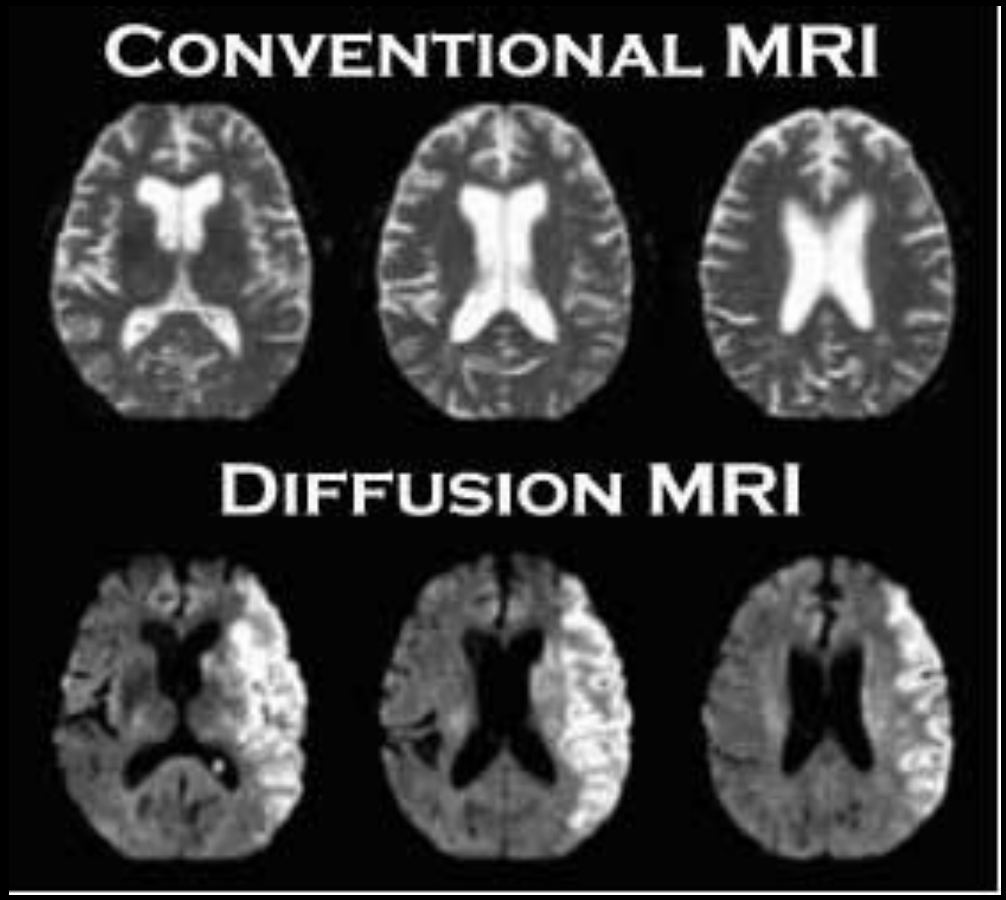
CT Scan Slice of Brain
(taken just before MRI at right)



MRI (diffusion) Scan
(can show stroke much
earlier than CT scan)

http://uwmedicine.washington.edu/NR/rdonlyres/38F4AB0D-C7AB-452B-9021-9641313CF30C/0/CTMRIvsIschemic.jpg

Ischemic Stroke (CVA) cont.



http://images.google.com/imgres?imgurl=http://www.eastportlandneurology.com/images/mri_stroke.jpg&imgrefurl=http://www.eastportlandneurology.com/mri.html&usg

Pathology of the Brain

Infection

Abscess

- Description
  - Free or encapsulated collection of pus
  - Usually located in frontal, temporal or parietal lobes
- Etiology
  - Secondary to other infections, such as:
    - Otitis media
    - Sinusitis
    - Dental abscess
    - Mastoiditis

Abscess cont.

- Etiology cont.
  - Other causes:
    - Subdural empyema
    - Bacterial endocarditis
    - HIV
    - Bacteremia
    - Pulmonary infection
    - Abdominal/pelvic infections
    - Open head injuries

Abscess cont.

- Epidemiology
  - Males 2X more likely to be affected than females
  - Can occur at any age
  - Median age between 30 and 40

Abscess cont.

- Signs / symptoms
  - HA
  - Nausea/vomiting
  - Change in mental status
  - Afebrile or low grade fever
  - Seizures
  - papilledema

Abscess cont.

- Imaging characteristics
  - Hypodense to isodense on non-contrast images
    - Ring-like enhancement with IV contrast
    - Edema surrounding abscess
- Treatment
  - Antibiotics
  - Possible surgical intervention

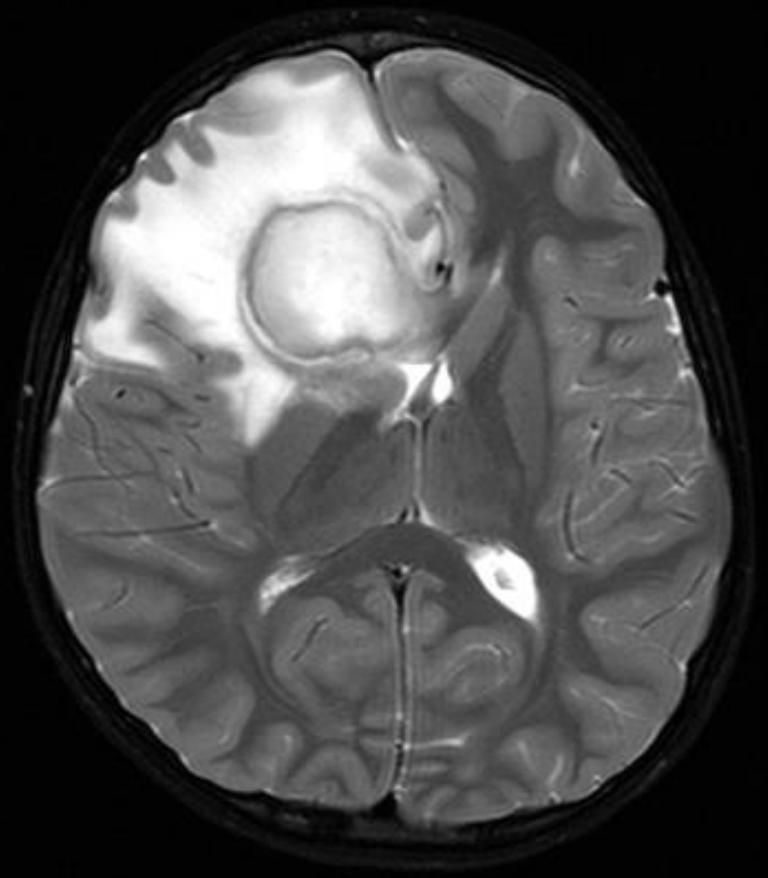
Abscess cont.

- Prognosis
  - 80% survival rate, or greater, when diagnosed early

Abscess cont.

http://www.drthindhomeopathy.com/diseases/brain-abscess-cerebral-abscess/

Abscess cont.



http://www.neuropathologyweb.org/chapter5/images5/5-abscessmri.jpg

Pathology of the Spine

Congenital

Syringomyelia / Hydromyelia

- Description
  - Any fluid-filled cavity within the spinal cord
    - Central canal dilatation – hydromyelia
    - Eccentric cavity – syrinx
    - Difficult to differentiate

Syringomyelia / Hydromyelia cont.

- Etiology
  - About 50% congenital
  - Acquired cases secondary to:
    - Intramedullary tumors
    - Trauma
    - Infarction
    - hemorrhage

Syringomyelia / Hydromyelia cont.

- Epidemiology
  - 90% occur with Arnold-Chiari type I
  - May also be seen in cases of:
    - Myelomeningocele
    - Basilar skull impression
    - Atresia of the median aperture
    - Dandy-Walker cyst

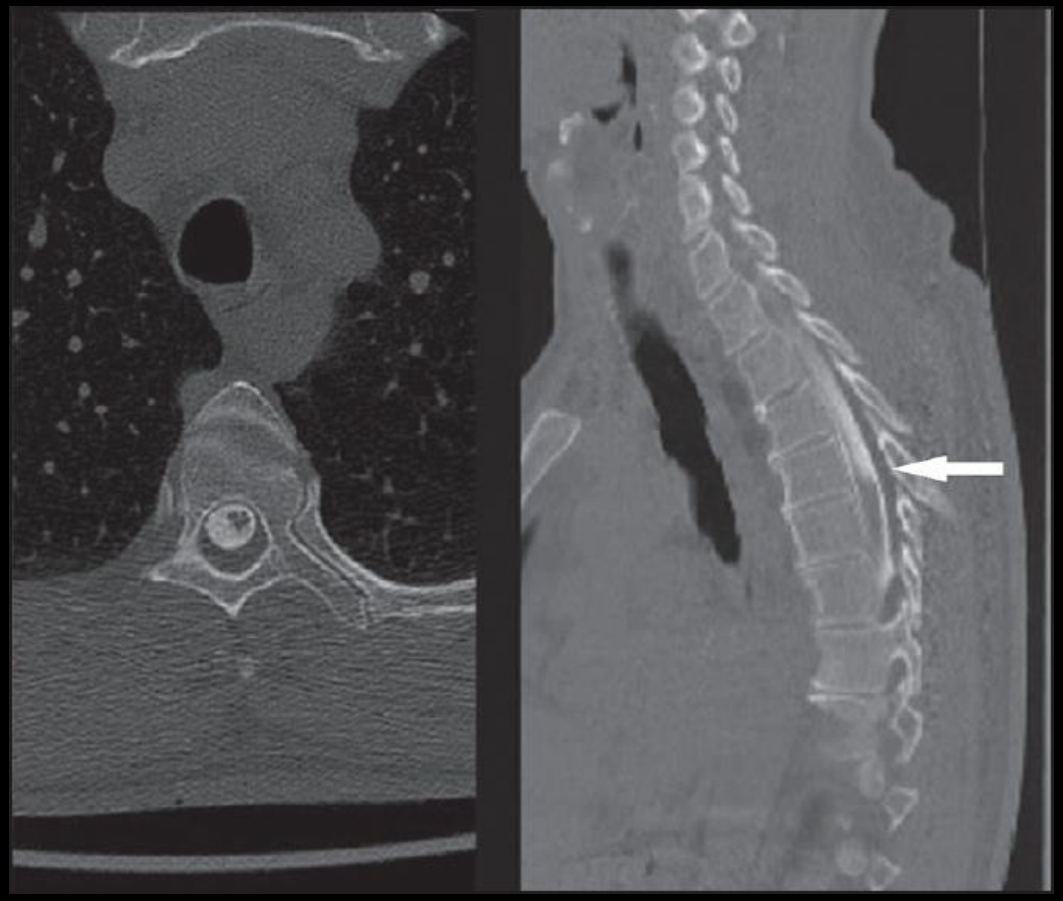
Syringomyelia / Hydromyelia cont.

- Signs / symptoms
  - Depends on extent
  - May experience:
    - Sensory loss – loss of pain and temperature
    - Muscle atrophy – lower neck, shoulders, arms and hands
    - Thoracic scoliosis

Syringomyelia / Hydromyelia cont.

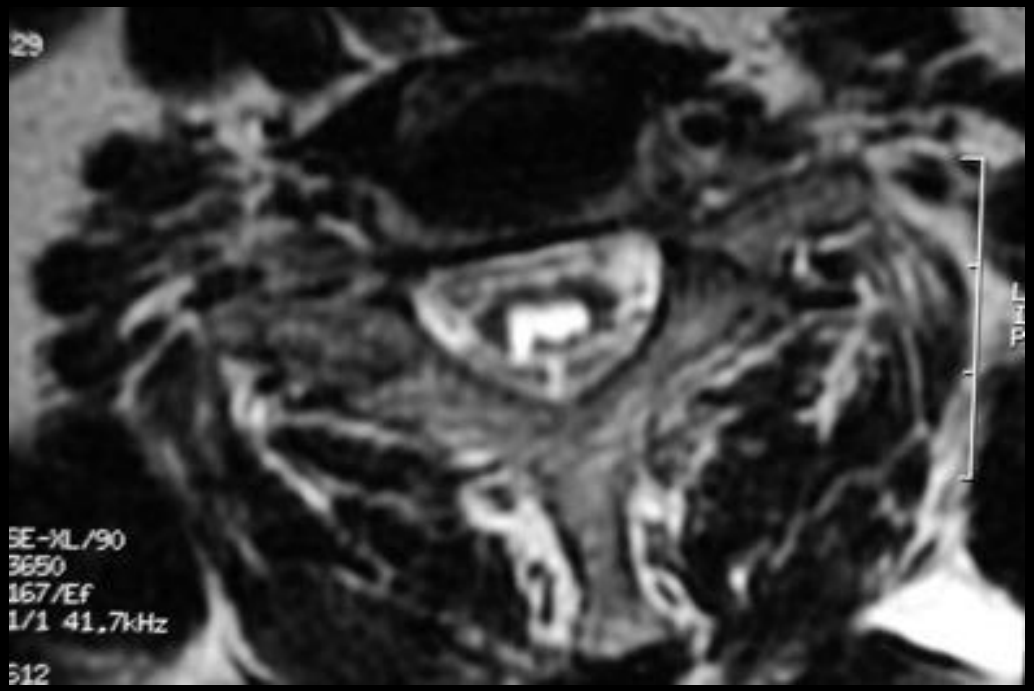
- Imaging characteristics
  - Post myelogram CT demonstrates a contrast filled syrinx, surrounded by hypodense spinal cord
- Treatment
  - Surgical drainage suggestive
- Prognosis
  - Variable, depending on extent

Syringomyelia / Hydromyelia cont.



http://www.jcvjs.com/article.asp?issn=0974-8237;year=2016;volume=7;issue=2;spage=101;epage=104;aulast=Sayal

Syringomyelia / Hydromyelia cont.



http://www.chiaritimes.com/ChiariTimes/Blog/Entries/2007/11/29_38_years_with_Chiari_&_Syringomyelia_files/DSC_0023.jpg

Syringomyelia / Hydromyelia cont.

http://upload.wikimedia.org/wikipedia/commons/thumb/2/2d/Syringomyelia.jpg/180px-Syringomyelia.jpg

Pathology of the Spine

Degenerative

Herniated disc

- Description
  - Also referred to as ruptured or protruded.
  - Occurs when part, or all, of the nucleus pulposus is forced through the weakened annulus fibrosus.
  - May impinge on spinal nerve roots as they exit from the spinal canal, or on the cord itself.

Herniated disc cont.

- Etiology
  - Severe trauma or strain
  - Degenerative disc disease
- Epidemiology
  - 90 % occur in the lumbar region, with majority at L5-S1 junction. The rest usually between L3-L4 and L4-L5 levels.
  - Cervical disc herniations occur, most often, at C5-C6 and C6-C7 levels
  - Only 1% to 2% occur in the thoracic region

Herniated disc cont.

- Signs / symptoms
  - Lumbar region may include:
    - Low back pain
    - Pain radiating to buttocks, legs, feet
    - Weakness, atrophy of muscles
  - Cervical region may include:
    - Neck pain
    - Pain radiating to upper extremities
    - Muscle weakness, spasms, numbness, tingling

Herniated disc cont.

- Imaging characteristics
  - HNP usually lateralized to one side, compressing nerve root and thecal sac
  - Free fragments may migrate superiorly or inferiorly

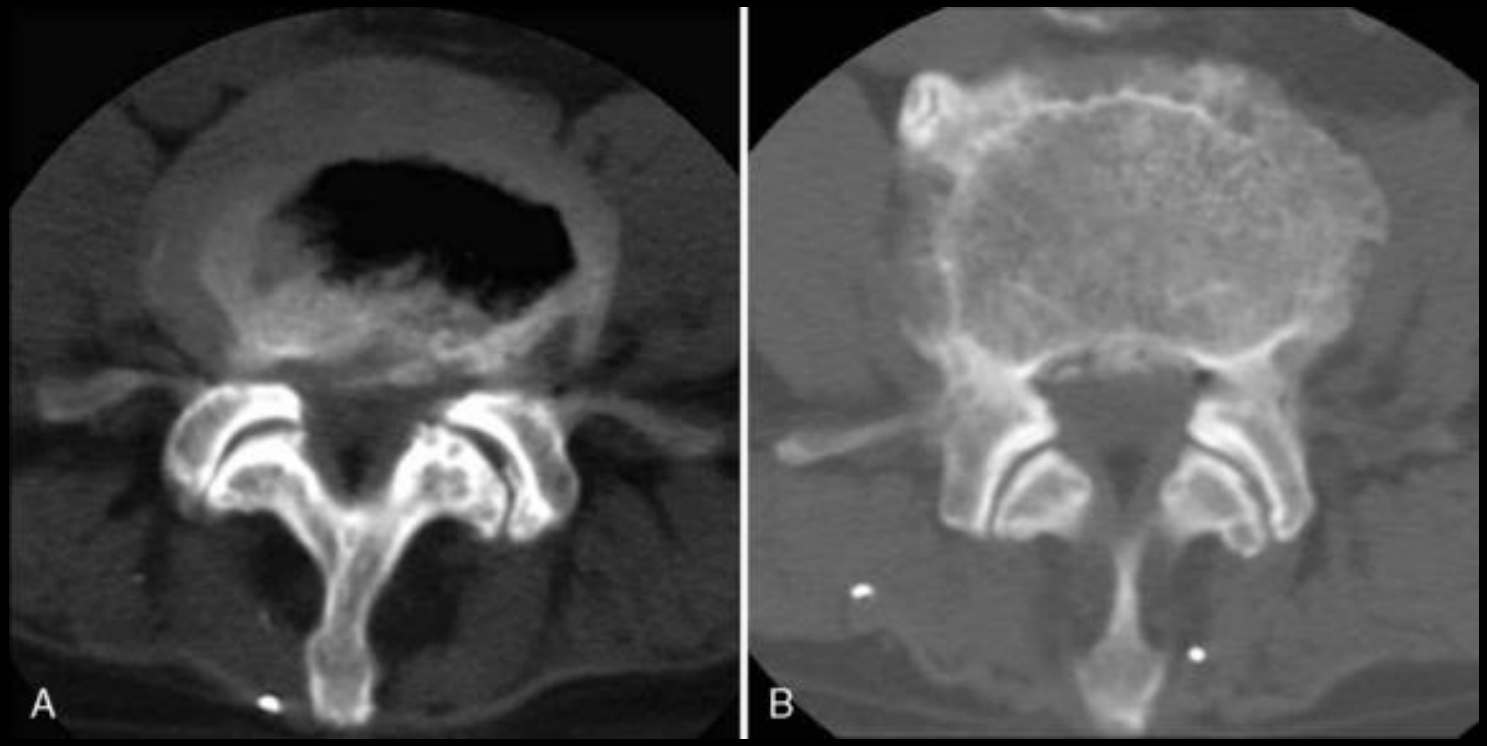
Herniated disc cont.

- Treatment
  - Conservative TX
    - Bed rest
    - Heat
    - Exercise
    - Medication – anti-inflammatory Rx to muscle relaxants
  - Surgery

Herniated disc cont.

- Prognosis
  - Mixed, depending upon:
    - Severity
    - Age, size, weight of patient
    - Lifestyle
    - Skill of surgeon!

Herniated disc cont.



http://clinicalgate.com/imaging-diagnosis-of-the-degenerative-spine/

Herniated disc cont.

http://www.ispub.com/xml/journals/ijns/vol3n1/disc-fig1.jpg

Spondylolisthesis

- Description
  - Displacement or slippage of a vertebra over an inferior vertebra, either anteriorly or posteriorly, causing a misalignment of the vertebral column
  - Most often occurs at L5-S1, or L4-L5

Spondylolisthesis cont.

- Description cont.
  - Four categories:
    - Type I – 25% vertebral displacement
    - Type II – 50% displacement
    - Type III – 75% displacement
    - Type IV – greater than 75% displacement

Spondylolisthesis cont.

- Etiology
  - May result from:
    - Acute trauma
    - Congenital or acquired fibrous defects in the pars interarticularis (spondylolysis)
    - Spinal instability from degenerative changes involving the disc and facet joints

Spondylolisthesis cont.

- Epidemiology
  - Occurs in 60% of patients with spondylolysis, which occurs in approx. 5% of population
  - L5-S1 interspace accounts for 90% of cases, with majority of those being anterior displacement of the L5 vertebra
  - Cervical spondylolisthesis less than 1% of all cases

Spondylolisthesis cont.

- Signs / symptoms
  - Low back pain
  - Stiffness
  - Loss of function
  - Contraction of hamstrings, causing unusual gate

Spondylolisthesis cont.

- Imaging characteristics
  - Sagittal reformatted images show shift of one vertebra on another
  - Pars defects visualized
- Treatment
  - Conservative to surgical intervention
- Prognosis
  - Depends on type and other findings

Spondylolisthesis cont.

http://orthodoc.aaos.org/hebela/gallery.cfm

Pathology of the Spine

Tumor

Spinal Hemangioma

- Description
  - Vertebral hemangioma most common benign lesion incidentally found
  - Slow growing vascular tumors
  - Do not usually cause symptoms
  - Rarely cause compression or expansion of the vertebral body

Spinal Hemangioma cont.

- Etiology
  - Unknown
- Epidemiology
  - Present in more than 10% of all patients
  - Females affected 2:1 over males
  - Most commonly located in the thoracic spine

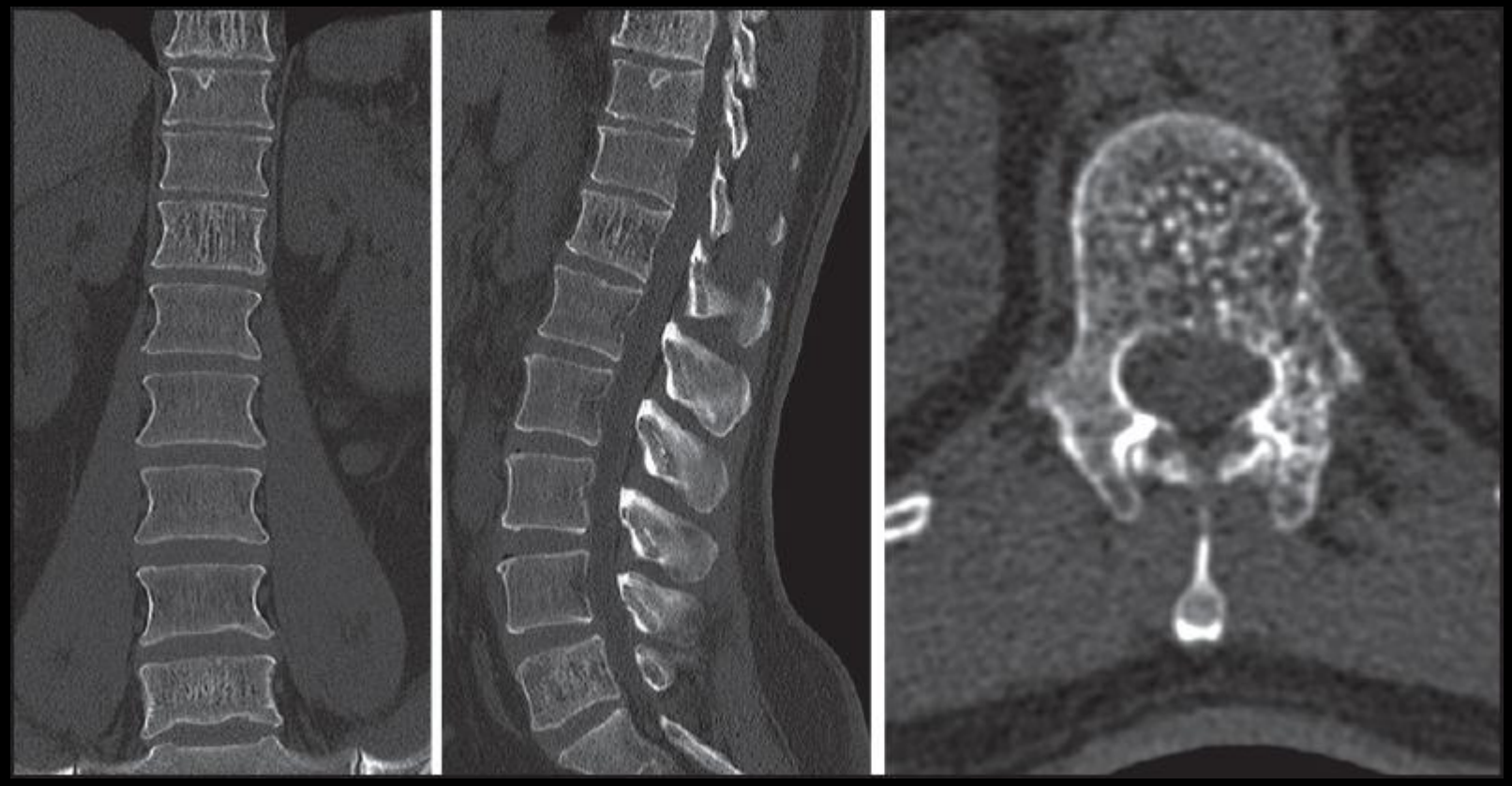
Spinal Hemangioma cont.

- Sign / symptoms
  - Incidental findings
  - Usually asymptomatic

Spinal Hemangioma cont.

- Imaging characteristics
  - Bony striations giving a “corduroy” appearance (due to thickened trabeculae)
  - Hypodense area
- Treatment
  - Only if becomes symptomatic
- Prognosis
  - Excellent

Spinal Hemangioma cont.



http://jnsbm.org/article.asp?issn=0976-9668;year=2015;volume=6;issue=2;spage=439;epage=442;aulast=Mahajan;type=3

Spinal Hemangioma cont.

http://rad.usuhs.mil/medpix/tachy_pics/thumb/synpic34044.jpg

Spinal metastases

- Description
  - Complication of disseminated cancer
- Etiology
  - Occur from hematogenous spread from a primary tumor

Spinal metastases cont.

- Epidemiology
  - Breast and lung primaries most common cause
  - Approx. 20-35% of cancer patients develop symptoms associated with spinal mets
  - Approx. 5% of affected pts. Develop symptoms related to compression of the spinal cord, caused by vertebral collapse or epidural tumor spread
  - Regions involved:
    - Cervical – 10%
    - Thoracic – 70%
    - Lumbar – 20%

Spinal metastases cont.

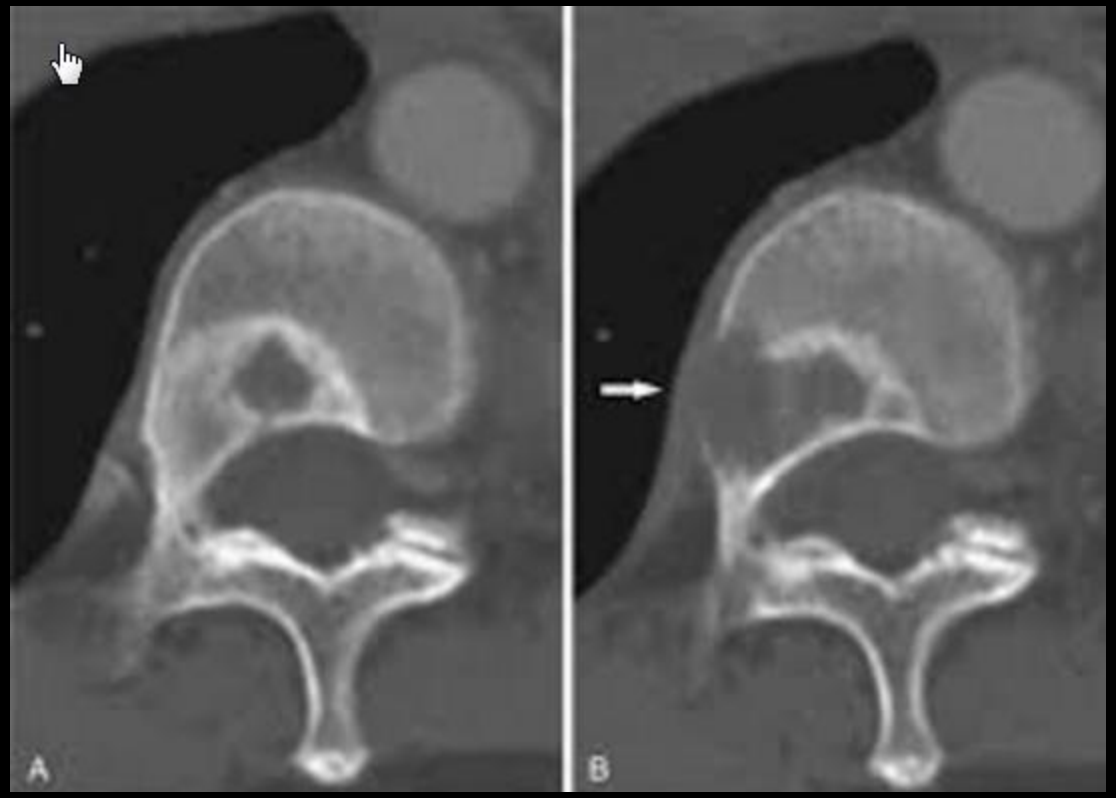
- Signs / symptoms
  - Back pain
  - Sensory / motor function loss

  *Spinal cord compression requires emergent neurosurgical evaluation!

Spinal metastases cont.

- Imaging characteristics
  - Good for evaluation of bone destruction
  - Demonstrates osteolytic or osteoblastic bony lesion
- Treatment
  - Rad Tx or surgical intervention, especially if cord compression present
- Prognosis
  - Poor

Spinal metastases cont.



https://www.google.com/search?q=ct+craniopharyngioma&espv=2&biw=1137&bih=886&source=lnms&tbm=isch&sa=X&ved=0ahUKEwj33aznqODQAhWKv1QKHZjSBw4Q_AUIBigB#tbm=isch&q=ct+scan+spinal+metastasis&imgrc=yLQAng7Qr5dobM%3A

Pathology of the Spine

Trauma

Vertebral Compression fracture

- Description
  - Occur as a result of a combination of flexion and axial loading of the vertebrae
- Etiology
  - Occur as a result of:
    - Trauma
    - Metastatic disease
    - Osteoporosis

Vertebral Compression fracture cont.

- Epidemiology
  - Common in aging / geriatric patients with osteoporosis
- Imaging characteristics
  - Demonstrates bony anatomy / fractures
  - Shows displaced fragments

Vertebral Compression fracture cont.

- Treatment
  - Kyphoplasty, in some cases
  - Bracing – usually stable because of the bony posterior elements and longitudinal ligament being intact
- Prognosis
  - Depends on extent of injury / status of cord

Vertebral Compression fracture cont.

https://www.google.com/search?q=ct+craniopharyngioma&espv=2&biw=1137&bih=886&source=lnms&tbm=isch&sa=X&ved=0ahUKEwj33aznqODQAhWKv1QKHZjSBw4Q_AUIBigB#tbm=isch&q=ct+scan+vertebral+trauma&imgrc=hVdUP3--JxKIxM%3A