Cerebral Venous Thrombosis

- Cerebral venous thrombosis (CVT) includes both infectious and more commonly, non-infectious causes.
- Cerebral venous thrombosis is closely associated with pregnancy and the use of oral contraceptives.
- Cerebral venous thrombosis can be caused by hematologic diseases, such as coagulation disorders, red blood disorders, and platelet derangements.
- Cerebral venous thrombosis is often associated with malignancies, severe dehydration, cardiac causes, connective tissue disorders, sarcoidosis, or homocystinuria.
- MRI and MR Venography are now the procedures of choice for evaluation of suspected CVT.
- MR can show both flow and lack of flow in venous structures.
- MRI is far more capable than CT in detecting changes in brain parenchyma.
- MR is very sensitive to evolution of hemoglobin blood products.
- MR Venography is an easy, accurate, and non-invasive way to verify or disprove the presence of thrombus.
- MRI is far more sensitive than CT for detecting thrombus within the vessels because of its sensitivity to flow phenomena.
- MR has totally replaced CT and angiography for evaluation of suspected cerebral venous thrombosis.
- Accuracy of MR in detecting cerebral venous thrombosis in dural sinus approaches 100%.
- Newer MR techniques, such as diffusion weighted imaging, allow detection of thrombosis in small cortical veins.

The Physics of MRA

- MRI can obtain high quality angiographic images without the need for contrast injections.
- Depending on the type of image sequence used, blood can be made to appear very bright or very dark.
- 2D Time of Flight (TOF) sequences produce images with bright blood and dark backgrounds, comprised of fairly thin slices (1.5mm).
- Angiographic images are then created via a post-processing method called Maximum Intensity Projection (MIP), which combines a stack of MRI slices with display of the brightest value pixels on any slice, to simulate a projection angiogram.
- 3D TOF acquires a large slab instead of multiple thin slices which is then divided into many much thinner slices (0.8mm). 3D TOF provides better spatial resolution than 2D, however 2D covers larger area and maintains higher contrast.
- Common methods to improve blood/tissue contrast using 3D TOF:
  - Magnetization Transfer Contrast (MTC), which reduces signal from background tissue - particularly useful for small vessel visualization.
  - Combining MTC with Ramped RF Pulse improves background suppression.
  - MOTSA or Multiple Overlapping Thin Slab Angiography combines the best of 2D and 3D TOF MRA to provide higher signal.
- Adding gadolinium contrast to the exam can produce significantly superior results in much less time than without contrast, and allows superb background suppression.
- 3D contrast-enhanced MRA sequence can acquire a complete set of data in one breath-hold (18-24 seconds).
SPECIALTY MRI EXAMS PERFORMED AT DIS

IAC
- MRI of the internal auditory canals (IACs).
- Along with CT of the internal auditory canals is considered the standard of care with respect to imaging crucial structures that are involved with hearing and balance.

CIRCLE OF WILLIS
- MRA of the head (Circle of Willis or COW) is a relatively quick (approximately 20 minutes) exam.
- Extremely accurate and noninvasive, getting a close look at the arteries in the head.

MRCP
- Magnetic resonance cholangiopancreatography (MRCP) for detailed images of the hepatobiliary and pancreatic systems.
- Imaging includes the liver, gallbladder, bile ducts, pancreas and pancreatic duct.

ENTEROGRAPHY
- Magnetic resonance enterography is a diagnostic tool for evaluating small bowel disorders.
- Considered more appropriate than CT for performing multiple studies in a single patient, eliminating ionizing radiation exposure.

FBI/T-SLIP
- Non-contrast MRA of the peripheral and renal arteries, for patients with renal insufficiency.
- Clearer visualization of the portal vein by separating flow from the mesenteric veins and splenic veins.

DaTscan (beginning late spring 2014)
- SPECT brain imaging to assist in the evaluation of adult patients with suspected parkinsonian syndromes.
- DaTscan may be used to help differentiate ET from tremor due to PS (idiopathic Parkinson’s disease, multiple system atrophy, and progressive supranuclear palsy).

HOSPITAL IMAGING VERSUS FREESTANDING OUTPATIENT IMAGING
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