

NERVOUS SYSTEM IMAGING

Structures Imaged

- brain-spinal cord
- gray matter
- white matter
- CSF spaces
- blood vessels
- dura
- vault-skull, vertebral bodies

Techniques

- Radiogram - visualize only bone, air, and all other soft tissue spine skull
- Contrast angiography
- myelography
- isotope brain scan
- Anatomical Imaging
 - CT
 - MRI
- Physiological Imaging
 - PET
 - SPECT
- Biochemical Imaging
 - MRS
 - functional
- Vascular Imaging
 - carotid ultrasound
 - transcranial dopler
 - MRA
 - conventional catheter angiography
- Electrical imaging
 - CNS
 - EEG
 - EP
 - peripheral nervous system
 - EMG
 - NCV
- CSF Analysis
 - lumbar puncture
 - cellular content
 - protein
 - sugar

CASE #1

50 year-old hypertensive, diabetic, obese, hyper-cholesterolemic, smoker reports the following: Five minute episode of left arm tingling, which then spreads to the face, mouth, and tongue. This subsequently resolves. The identical episode recurs the following day. These episodes occurred 2 weeks after he fell and struck the right temporal-parietal skull region. He was unconscious for 10 minutes and has 30-minute periods of amnesia. When seen by his PCP his neurological examination is normal but he has left carotid bruit and BP is 190/100 mmHg.

- a. What is the most likely location of the lesion to cause these symptoms?
- b. What are the potential mechanisms?
- c. What diagnostic information would these studies provide?
 - CT
 - MRI
 - Skull radiogram
 - EEG
 - Vascular imaging
 - Carotid duplex ultrasound
 - Transcranial Doppler
 - Magnetic resonance angiography
 - Conventional catheter angiography
 - SPECT
 - PET

CASE #2

48 year-old normotensive ectomorphic woman reports the following symptoms: Fifteen minute episode of sudden onset of right sided arm weakness and inability to speak. This resolves completely. When seen by her PCP, her exam is entirely normal.

- a. What is the most likely location of neurological condition to cause these symptoms?
- b. What are potential mechanisms?
- c. What would be the role of the diagnostic studies listed below?
 - CT
 - MRI
 - Skull radiogram
 - EEG
 - Vascular imaging
 - Carotid duplex ultrasound
 - Transcranial Doppler
 - Magnetic resonance angiography
 - Conventional catheter angiography
 - SPECT
 - PET

CASE #3

20 year-old woman reports that two-weeks after a flu-like illness she notes pain and visual blurring in her right eye. Both symptoms resolve in one month. One year later after an episode of "bronchitis", she reports her legs become weak but then she fully recovers.

One year later, she fails a vision test of color perception and is referred to an eye doctor.

Findings include:

- 20/20
- normal visual field
- normal fundi
- right afferent papillary defect, scissoring gait, increased let tone, reduced vibration sensation to mid-calf bilateral ,Babinski & sustained ankle clonus
- a. What is the localization of lesion (s) most likely to cause these symptoms and signs?
- b. What are potential mechanisms?
- c. What is the role of the following diagnostic studies? CSF
- Evoked potentials (visual, somatosensory, auditory)
- MRI

CASE #4

40 Year-old man is involved in a minor "fender-bender" MVA. For two days his back is stiff. This resolves following use of Ibuprofen. One month later he develops difficulty walking and trips over his feet. Two days later he has trouble with his hands and can not open his jars. Also he can not arise from a chair without difficulty.

Examination findings:

- flaccid quadriplegia
- absent reflexes
- plantar flexor response
- reduced sensation in toes
- a. What is the localization of the lesion, which would cause these symptoms and signs?
- b. What are potential mechanisms?
- c. What is the role of these diagnostic tests?
 - EMG
 - NCV
 - CSF examination
 - Spinal Myelogram