The Role of Neuroimaging in Acute Stroke

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Patient CR

- 62 yo F w/ 2 wk h/o altered mental status
- Presents to ED w/ confusion following a fall 1 day prior
- New onset left facial droop while in ED
Acute Stroke

Critical questions for neuroimaging

• Rule out stroke mimics:
  – tumor, encephalitis, subdural, epidural, SAH
• Is there ICH?
• What is infarcted vs. tissue at risk?
• Underlying pathogenesis
Imaging determines treatment

- If ICH present:
  - no thrombolytics, control hypertension

- If no ICH - consider thrombolytics:
  - < 3 hours: IV rtPA
  - < 6 hours: IA urokinase
  - < 24 hours & in posterior circulation: IV rtPA
  - < 6 Hours: IR clot retrieval
The 1\textsuperscript{st} step - Noncontrast CT

Sensitive for rtPA contraindications

- Intraparenchymal hemorrhage
- Subarachnoid hemorrhage
- Stroke mimics

CT signs of ischemic stroke

- Hyperdense MCA sign
- Loss of gray-white differentiation
- Loss of insular ribbon
- Cortical sulcal effacement
- Focal parenchymal hypoattenuation
Noncontrast CT of Patient “CR”....
Patient CR
Patient CR
Patient CR
Patient CR
Patient CR
Companion Patient #1: Intracerebral hemorrhage and midline shift

Image courtesy MGH radiology
CT signs of ischemic stroke

- Hyperdense MCA sign
- Loss of gray-white differentiation
- Loss of insular ribbon
- Cortical sulcal effacement
- Focal parenchymal hypoattenuation
Middle cerebral artery (arrow)
Companion Patient #2:
Hyperdense MCA &
Sulcal Effacement
MRI in stroke

- FLAIR - T2 signal with black CSF
- DWI - image areas of slow diffusion, earliest sign of infarction
- ADC - eliminates T2 “shine-through” of DWI
- PWI - perfusion weighted imaging
- MRA - image vessel occlusions
Patient “CR”:
MRI reveals infarcts at different stages....
Patient “CR”: MRI reveals infarcts at different stages

FLAIR  DWI  ADC

Patient CR  BIDMC radiology
Patient “CR”:
MRI reveals infarcts at different stages

FLAIR  DWI  ADC

Patient CR  BIDMC radiology
Patient “CR”:
MRA - occlusion in right MCA

Courtesy BIDMC radiology
MCA embolus blocking lenticulostriate artery origin
Summary & Future Directions

• CT is 1st step in imaging for acute stroke
• Initial studies suggest MRI is equally effective in detecting ICH, but it is less available & less widely accepted
• More criteria needed for selecting pts for rtPA
• DWI vs. PWI might aid in selecting patients for thrombolysis in the future
References


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