It’s Always a Stroke; Except For When It’s Not…..

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Disclosures

- No Relevant Disclosures
Objectives

- Discuss variables of differential diagnosis for stroke
- Review when to TPA and when not to TPA

Disclaimer

- “I never say never, and I always avoid always”
Stroke and TIA

- A Stroke occurs when there is lack of blood flow to an area of the brain that causes damage to the brain tissue
  - MRI will be positive
  - If MRI negative, symptoms persist for greater than 24 hours and can be explained by a focal lesion
- A TIA is caused by lack of blood flow to the brain for a short period of time causing transient symptoms.
  - No damage is done to the brain
- A TIA is NOT A MINI-STROKE!
  - "mini" means small
  - No damage is done to the brain so they did not have a 'small stroke' they had a WARNING sign for a stroke

Stroke Symptoms

- Sudden onset
  - Focal Weakness
  - Focal Numbness
  - Slurred speech
  - Unsteady gait
  - Aphasia
  - Confusion
  - Facial droop
  - Vertigo
Hippocrates, the father of medicine, first recognized stroke over 2,400 years ago.

- First CT scan was in 1972
- First MRI scan of a human body in 1977
- Called apoplexy, which means "struck down by violence" in Greek.
- We often don’t need imaging and workup and test after test after test to determine if you had a stroke.
Mimics and Chameleons

- **Mimics**
  - Patient with abrupt onset of a neurological deficit, however their final diagnosis is not a cerebrovascular event.

- **Chameleons**
  - Syndromes that do not appear to be a stroke on initial presentation but are later found to represent an acute stroke
  - Often overlap between the two

Stroke Mimics

- 30% of patients evaluated by stroke teams have diagnosis of stroke mimic on discharge
- Up to 15% of those given TPA have final diagnosis of a stroke mimic
- Due to the timing needed for TPA, it is often difficult to discriminate between Acute Ischemic Stroke (AIS) and a Stroke Mimic (SM) prior to the need to give the drug
Stroke Mimics

- Migraine
  - Often has POSITIVE symptoms
    - Visual auras, flashing lights, zig zags
    - Pain
    - Often followed by negative symptoms in the same location and modality
  - Aura typically progresses slowly and often sequentially
  - History of migraines
  - Can be acephalgic

Stroke Mimics

- Seizure
  - Initial positive symptoms
  - Followed by ‘Todd’s Paralysis’ of one side
  - Deficits can be unilateral and ‘negative’
  - Can last for hours
- Tumor
  - Generally progressive symptoms
  - Can have a ‘straw that break the camels back’ with edema
Mimics

- Multiple Sclerosis
  - History should be present, or could be presenting symptoms
  - Demographics often different without typical AIS risk factors

Stroke Mimics

- Peripheral nerve injuries
  - Often unilateral
  - "My arm got numb"
    - Further questioning reveals it is actually only certain areas of the arm or hand
- Delirium
  - Confusion can be misinterpreted as aphasia
- Conversion disorder
  - Often with neurologic manifestations of stress/anxiety
  - "Mind over Matter"
Stroke Mimics

- Dizziness
  - “Light headed floaty” versus “room spinning”
    - One is a volume issue ↑, the other is cerebellar or most likely inner ear ↑
    - 2006 study showed 3.2% of 1666 ‘dizziness’ admissions had final dx of TIA or AIS
      - 0.7% of those had AIS with isolated dizziness
    - 2015 study of 41,794 patients DC from ER with dx of peripheral vestibular disorder
      - 0.18% had strokes within 30 days of DC
    - Sustained versus changing with position

TIA Mimics

- Vast majority of TIA’s last well under an hour
  - Usually less than 30 minutes
- There is no ‘test’ to prove a TIA
  - All based on history and interpretation
- Features to inquire about
  - Demographics
  - Positive versus negative symptoms
  - Onset and progression
  - Duration
  - Precipitating factors
  - Associated symptoms
Sympathetic nervous system dysfunction

TIA Mimics

- **Syncope**
  - Loss of consciousness is extremely rare in TIA’s
    - Thalami or brainstem - extremely rare to be transient
  - Presyncopal symptoms
  - Seconds to less than a minute
  - Rarely have focal symptoms
  - What’s common is common
    - Vasovagal, postural, carotid sinus hypersensitivity
TIA Mimics

- Transient Global Amnesia (TGA)
  - Temporary loss of anterograde episodic memory
  - Procedural memory intact, repetitive questions common
  - Risk of future stroke is NOT increased!
- Amyloid ‘spells’
  - Recurrent, transient paresthesias, numb or weak with spreading onset over seconds to minutes and resolve in a similar period
  - In those with Cerebral Amyloid Angiopathy
  - Increased future risk of symptomatic ICH after these events

TIA Mimics

- Paroxysmal symptoms due to demyelination
  - Dysarthria
  - Tonic spasms
- Functional/Anxiety
  - As high as 7%
  - Accompanied by panic, pain, injury
  - Facial and lip tingling without associated weakness or unilateral numbness
Altered Mental Status (AMS)

- One study showed 6% of consults for isolated AMS had AIS
- Confusion
  - Thalamus
  - Non-dominant parietal lobe
  - Caudate nucleus
- Abulia
  - Anterior cerebral artery
- Positive Predictive Value of AIS with admission dx of AMS was 6.9%
- PPV is an indicator of likelihood of an acute stroke given the diagnosis studied
**Stroke Chameleons**

- **Syncope**
  - Highly unlikely transient loss of consciousness is cerebrovascular event
  - Pontine
  - Bilateral thalamic
  - PPV was 4.4%
  - In elderly men with comorbid HTN and CAD likelihood was increased

**Stroke Chameleons**

- **Hypertensive Emergency**
  - Difficult to differentiate in the acute phase
  - Strokes can cause HTN and vice versa
  - PPV was 8%
  - One study found that the most common types of end organ damage related to HTN emergencies were
    - Stroke 24%
    - Encephalopathy 16%
    - ICH 4.5%
Stroke Chameleons

- Systemic Infection
  - PPV was 1% for AIS
  - Infection can lead to hypercoagulable state and has been shown to be an antecedent to AIS
- ACS
  - PPV 1%
- Aphasia vs. Confusion
  - Confusion- Generalized, altered behavior and sensorium
  - Aphasia- expressive or receptive specific deficits

How Can We Tell?

- Strongest predictor of SM were a LACK of history of HTN, HPL, A-fib, DM, or CAD
- Patient with SM were also significantly younger than those with AIS
- Simple neuroanatomical knowledge remains the most essential tool in stroke diagnosis
- SM have better clinical outcome than AIS
- Those with higher initial SBP (158 vs 143) were correlated with AIS
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<thead>
<tr>
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<th>Favors AIS</th>
<th>Favors SM</th>
<th>Inconclusive</th>
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<tbody>
<tr>
<td>Epidemiology</td>
<td>None</td>
<td>Epilepsy</td>
<td>Gender</td>
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<td></td>
<td>Migraine</td>
<td>Age</td>
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<td></td>
<td>Cognitive Imp.</td>
<td>HTN</td>
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<td>HPL</td>
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<td>DM</td>
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<td>Presenting complaint</td>
<td>Focal Weakness</td>
<td>Loss of consciousness</td>
<td>CAD</td>
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<td>Dysarthria</td>
<td>Global aphasia w/out hemipar.</td>
<td>A-fib</td>
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<td>Hemiparesis</td>
<td>Chest Pain</td>
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<td>Eye deviation</td>
<td>Facial palsy</td>
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Should I give TPA??

- If I know it is a stroke mimic should I give TPA
  - NO!!!!!
- However, often we don’t know and we do not have the time to differentiate prior to giving the TPA.
- “Do No Harm”
- Risk versus Benefits
IV TPA

- IV TPA for acute ischemic stroke
  - Symptomatic ICH
    - Increase in NIH of 4 or more with neuroimaging showing ICH
    - 6% chance initial trial

TPA to Mimics?

- Numerous studies have been done to solve this potential problem
- One study which included 75 SM given TPA
  - Rates of symptomatic ICH were ≤0.5%
  - 9 out of 10 had a favorable functional outcome at hospital
# TPA Complications for SM

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<tr>
<th>SM Diagnosis</th>
<th>Hem. Conversion</th>
<th>Other Complications</th>
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<td>Seizure</td>
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# Better Safe Than Sorry

- Overall, it is safe to give TPA to a stroke mimic, however if clinical concern is not high enough for AIS TPA should be withheld.
Except For When Its Not

- Stroke and TIA are often not clinically obvious
- Differential diagnosis is broad, but there are many clinical and objective tools to help diagnosis
- TPA is relatively safe when given for stroke mimic
- QUESTIONS??