Stroke Mimics & Stroke Ciphers

Hormozd Bozorgchami, MD
Clinical Instructor, Vascular Neurology
Oregon Health & Science University
Disclosures/Disclaimers

- Disclosures: I have no Disclosures

- Disclaimer: Keep in mind that one should treat all patients with stroke symptoms with the urgency of a stroke until proven otherwise
Outline

• Introduction
• Definitions
• Difficulties Diagnosing TIA
• Key Points of History Taking
• Is it a Stroke? Case Examples
• Review of Common Mimics
• Summary
Definitions

- **Stroke**: A clinical syndrome characterized by the sudden onset of focal neurological deficit presumed to be of vascular etiology lasting more than 24 hours or leading to death.

- **Transient Ischemic Attack (TIA)**: A clinical syndrome characterized by an acute loss of focal cerebral function presumed to be of vascular etiology with symptoms lasting less than 24 hours.

- TIAs are not “mini strokes” but are “brief strokes”
Why is it difficult to diagnose a TIA?

- The diagnosis is made on history alone
  - Cannot confirm history with a physical exam
- Don’t take what you are told by the patient for granted
  - The best tool in diagnosis is not a Head CT, but a Telephone. (Confirm history with a witness)
- Words such as: “Dizzy,” “numb,” “heavy,” & “weak” all mean different things to different people
- Always have a differential diagnosis in the back of head
  - What else could this be?
"It was inevitable."
Conditions Misdiagnosed as TIA

- Migraine aura
- Syncope, postural hypotension
- Seizure
- Vertigo
- Transient Global Amnesia
- Anxiety/Hyperventilation
- Confusion
- Unexplained fall
- Peripheral nerve palsy
- Metabolic abnormalities (Hypoglycemia)
What do non-Neurologists think are Strokes?

- **Diagnosis**
  - Seizure/post-ictal: 19%
  - Migraine: 15%
  - Functional disorder: 14%
  - Metabolic disturbance: 8%
  - Syncope/pre-syncope: 6%
  - Infection: 6%
  - Cerebral mass: 5%
  - Peripheral Vestibular: 3%
  - MS related: 3%
  - Spinal/PNS: 3%
  - Miscellaneous: 12%

- **29% of referrals in the ER seen by a stroke team were felt to be NOT stroke/TIA**

Wier NU and Buchan AM. JNNP 2005; 76:863-865.
History is Key

- Was it a Vascular event or not?
  - Patient or Eye-Witness Account
  - Important to clarify what patients mean when they describe symptoms, i.e. does “dizzy” mean faintness, lightheadedness or vertigo?
  - When did it happen? When were they last normal?
  - What were they doing when the symptoms began?
What do you need to know?

- Was it **Sudden** versus **Gradual** onset?
- Modalities involved: Motor, Vision, Speech...etc
- Anatomical area involved: Face/Arm/Leg? Both arms?
- History of seizures, migraines, stroke risk factors, etc

**Remember: Strokes don’t Hurt**
Focal vs. Generalized Symptoms

- True localized cerebral ischemia causes focal symptoms.
- Non-focal symptoms such as faintness, “dizziness,” or generalized weakness are rarely due to focal cerebral ischemia.
- The exception sometimes can be a basilar artery stroke: “Top of the Basilar Syndrome”
Focal Neurological Symptoms

- **Motor**: Weakness, Clumsiness, Ataxia* – On one side of body
- **Speech/Language**: Difficulty speaking or expressing (a true language deficit), slurred speech*
- **Sensory symptoms**: Abnormal feeling in specific anatomy
- **Visual Change**: Is it monocular, binocular? Any Diplopia?*
- **Vestibular**: Vertigo?*

*In isolation usually not a stroke*
Non-Focal Neurological Symptoms

- Generalized weakness and/or sensory disturbance
- Light-headedness
- Faintness
- Blackouts
- Incontinence of urine or feces
- Confusion
- Tinnitus
"If you're stumped, why not write an illegible prescription and hope the pharmacist comes up with something?"
Remember This

- Stroke is a “Brain Attack”
- Brain Attack is an Emergency
- “Time is Brain”

- Getting a good history is key
- Always think of your differential diagnosis
- Don’t delay potential stroke treatment because you are worried it could be a mimic
Is it a Stroke?

Real-life experiences of a Neurology Resident/Fellow on-call
Case 1: Left-sided weakness

- 52 yo Male with h/o CAD, HTN, DM2, previous strokes
- He was at church and during sermon had left-sided weakness, headache and dysarthria
- He went to a local hospital, was evaluated by a neurologist, who documented left face/arm/leg paresis and gave him IV tPA then transferred for higher level of care
- At OHSU, he still had some headache, some subtle weakness
Case 1: Left-sided weakness

• Is it a Stroke?
Case 1: Left-sided weakness

- Example of a MRI Sequence
- Diffusion-Weighted Imaging (DWI)
  - Based on the movement of water
- Bright spots are areas where water doesn’t move
  - Can represent areas of stroke
Case 1: Left-sided weakness

- Final Diagnosis:
  - Complicated Migraine

- Patient’s weakness resolved completely by the next day

- Sent home with a Calcium-Channel Blocker
Migraines

- Migraine with aura: positive symptoms of focal cerebral dysfunction that develop gradually over 5-20 minutes
- Visual disturbance most common
- Paresthesias, “heaviness”, may also occur
- Marching – spread of tingling from hand to arm, to face over several minutes
- Aura can be any focal neurologic deficit
Migraine aura without headache

- More common with increasing age
- May not have history of migraines, but typically do
- Usually a slow onset and spread and intensification of symptoms
- Can be hereditary: Familial Hemiplegic Migraine syndrome (FHM)
- Patients with h/o of focal neuro deficits should NOT take vasoconstrictive abortive therapies such as triptans or ergots (although still under investigation)
Case 2: Dazed and Confused

- 45 year old homeless male, unknown past medical history was found down on the street

- On exam:
  - Sleepy, confused, not really following commands.
  - He had bruising around his eyes
  - His eyes were looking to the left
  - His left face had some twitching
  - He wouldn’t move his left arm or leg

- What is the most likely diagnosis?
Case 2: Dazed and Confused

- Example CT Scan
  - Structural lesions should be ruled out in unprovoked seizures

Estimating age of Blood on CT

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<th>Stage</th>
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<th>Age</th>
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<td>Isodense</td>
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Seizures and Post-Ictal States

- Partial Seizures can mimic TIAs
- Typically have Positive Symptoms: tingling, twitching, jerking...
- Can spread within a minute or so (Jacksonian March)
- Recurrent, Stereotyped Episodes
- Often have amnesia for the event
- Occur usually without warning (from patient perspective)
Another Seizure Example

- 64 year old woman with 20 attacks of pins and needles in her right arm and leg over 6 weeks
- Sensation started in foot and over 1 minute spread “like water running up her leg.”
- Each attack was the same
- On workup, her MRI showed a glioma in the left parietal lobe
- EEG was abnormal, but could potentially be normal
- Diagnosis: Simple Partial Seizure
Seizures and Post-Ictal States

- Rare to have negative symptoms (loss of function) during the episodes
- **After** an episode can have excessive sleepiness or loss of function = “Todd’s Paralysis”
- Patients can be found after an episode, and may mimic a stroke
- Look for tongue biting or urinary incontinence
- After a big tonic-clonic seizure, if the patient isn’t recovering after 30min-1 hour, consider “Non-convulsive Status Epilepticus”
Eye Deviation: Large Stroke vs. Seizure

- Can range from mild (gaze preference) to severe (forced gaze deviation)
Case 3: “Confusion” & Transient Hemiplegia

- 50 yo male with no known past medical history presented to outside ER with “mental slowness”
- Patient was last normal more than 3 hours PTA. He went to walk his dog, and when he returned, he appeared confused and didn’t have his dog.
- 1 hour after presentation to ER, the patient had acute right gaze deviation, left sided plegia
- Stroke team was then called
Case 3: “Confusion” & Transient Hemiplegia

On my Neuro Exam:
- Patient is awake, oriented x 3, but withdrawn. Doesn’t seem to be worried about his symptoms
- PERRL, had right gaze deviation, couldn’t count fingers on left side, left facial weakness
- Mild drift in left extremities, but would be moving all extremities spontaneously and almost hyperactive
- Had profound neglect of the left side. Didn’t recognize his own arm
- Is this a stroke?
Case 3: “Confusion” & Transient Hemiplegia
Case 4: Confused in the ICU

- 58 yo male with CHF, and a known apical thrombus who was in Cardiac ICU developed acute-onset ALOC and could not move any of their extremities to pain.
- The Primary Team got a head CT then called the stroke team.
- What else would you think to check?
- Could this be a stroke?
Case 4: Confused in the ICU

- What do you see in this picture?
- Could this explain the symptoms?
- What else could it be?
Case 4: Confused in the ICU

- I asked the team to check a blood sugar
- Blood sugar was 34
- 1 Amp of D50 “cured” patient’s symptoms and his blood sugar on recheck was 112
Metabolic/Toxic Disorders

- Hypoglycemia: Can cause transient and permanent focal or generalized symptoms. Usually on medications or Insulin.
- Can often be stereotyped in an individual
- Can occur without the adrenergic symptoms: i.e. diaphoresis, tachycardia etc.
- Must check glucose and vital signs in any Stroke/TIA patient
- Can sometimes “re-express” previous stroke symptoms
Metabolic/Toxic Disorders

- Other common types:
  - Hyperglycemia
  - Hypo/Hypernatremia: Alerted LOC, focal symptoms rare. Can have simply reduced level of attention
  - Hypercalcemia: usually causes encephalopathy
  - Acid/Base dyscrasias can alter LOC
  - Can check Urine Tox screen or even a comprehensive drug screen
Wernicke’s Encephalopathy

- Caused by Thiamine Deficiency
- Symptoms typically: Diplopia, Ataxia, Confusion
- Mainly seen in alcoholics and malnourished people, in particular elderly or people who live off “Top Ramen”
- Thiamine typically not in TPN, so make sure to provide it as a supplement
- Very Treatable with high dose thiamine
- Never give glucose before Thiamine in suspected patients
Case 5: Hypoglycemia

- 82 yo F with h/o Afib, DM2, HTN who was off her coumadin for the last few weeks.
- She was found down by family and was brought to ER.
- Patient was very somnolent and had a Left hemiplegia, Right gaze deviation
- Blood Sugar was 30 at home and family tried feeding her OJ at home. In ER it was 70. Gave 1 amp of D50 and BS improved to 170
- Patient was more awake, but had persistent symptoms

What do you do now?
Case 5: Hypoglycemia

- Patient was given IV tPA then transferred to OHSU
- On Angiogram, patient had R MCA clot
Case 5: Hypoglycemia

- After multiple attempts of clot retrieval, the vessel was mostly open
- On 30 day f/u patient had very minimal residual symptoms
Case 6: Arm Weakness

- 55 year old obese male with h/o OSA, HTN, was watching TV in his chair when he fell asleep in the afternoon.
- Upon awakening, he notes numbness/tingling and weakness in his LUE.
- He had no problems speaking or walking and didn’t notice a facial droop
- On examination he had trouble extending his arm and his wrist. He also had trouble opening his hand well. He had no problems with hand grip. Also has areas of patchy numbness
- Should we give him IV tPA?
Compression Mononeuropathy

- Damage to a peripheral nerve
- Causes weakness and/or sensory changes within dermatomes or muscles that the nerve innervates
- Often have paresthesias = “Pins and Needles”
- Examples include Carpal Tunnel Syndrome, Radial Nerve Palsy (AKA “Saturday Night Palsy”)
- Usually can resolve merely by avoid compression.
- Also consider Radiculopathy, Plexus Injury
"How long have you been having these blackouts?"
Syncope/Pre-Syncope

- Loss of Consciousness is rarely due to a TIA or Stroke.
  - A neurologic cause of loss of consciousness:
    - Seizure
    - Bilateral Hemispheric hypoperfusion
    - Hypoperfusion within Basilar artery
- Syncope usually is Non-Focal
- Often are Pale, Sweaty during the event
Syncope/Pre-Syncope

- History is Key: Lightheaded? What were they doing? Dimming of Vision
- Precipitants?
- Should exclude Cardiac Cause
- Evaluate for hypovolemia. Orthostatic by history or by exam?
- Hypertensive patients can still be Orthostatic
- Sometimes may only need IV Fluids and Compression Stockings
Transient Global Amnesia

- Sudden disorder of Memory (Often associated with stressful event or significant physical exertion)
- Tends to be reported as “Confusion”
- Anterograde Amnesia (lose ability to create new memories)
- Can have some degree of retrograde amnesia
- Often repetitively ask the same questions
- After the attack, the anterograde memory ok
- No increased risk for stroke, etiology mostly unknown
Summary

- History taking is important. TIA is often a historical diagnosis.
- Never skip the Details
- Describe what the patient/witnesses said. Not what you think is happening
- Nature of Symptoms: Focal versus Non-Focal
- Quality of Symptoms: Negative vs. Positive
- Time Course: Last seen normal? Sudden onset? Gradual? Migratory pattern?
Summary

- Associated Symptoms: Lapse of Consciousness? Headache? Physical Signs?
- Imaging is an important tool. Use it in conjunction with your patient encounter, NOT BEFORE
- Frequency of Attacks? Are they stereotyped?
- Remember: “Time is Brain”
- Treat all patients with stroke symptoms with the urgency of a stroke until proven otherwise
Thank You