Practical Management of Acute Stroke

Emergency Department Case Studies: Challenging Exams

October 2, 2020
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Case 1: HPI

- 52yo male
- Hx of HTN
- c/o severe headache while roofing so started to go down (< 10 ft high) 10 min PTA
- Unable to stand due to weakness, more on left
- Limited history
- Triage walk-in

Additional History

- PMH: HTN; Migraines
  - no known hx of seizure or CVA
- Meds: noncompliant
- Social Hx: +ETOH, + cocaine, + Cigarettes

Exam

- VS: T 97 P 88 RR 18 BP 137/94 Pox 97% RA
- General:Ill appearing male, appears somewhat confused.
- HEENT: Normocephalic, atraumatic. PERRL, no conjunctival injection. No facial contusion/ecchymosis, MMM
- Neck: nontender midline, no stepoff
- CV: Regular rate and rhythm
- Resp: Clear to auscultation bilaterally
- Abd: soft, nontender to palpation, no distention
- Skin: no laceration. No jaundice
- Musc: no leg edema/pallor/cyanosis

Neurologic Exam/NIHSS

- LOC 0
- LOC Questions 0
- LOC Commands 0
- LOC Normal gaze 2
- Visual Fields 0
- Facial Palsy 2
- Motor LA 3
- Motor RA 0
- Motor LL 2
- Motor RL 0
- Limb Ataxia 0
- Sensory 0
- Language 0
- Dysarthria 1
- Extinction/Neglect 1

- TOTAL NIHSS - 11

ED Events

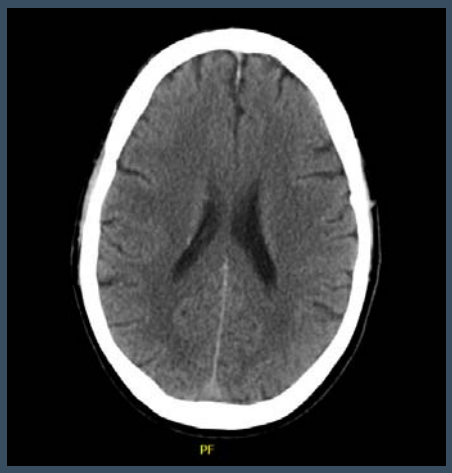
- 0000 – presented by private car to triage
- 0003 -- Immediate notification of physician
  - Decision to go direct to CT from Triage
  - Stroke Alert Called
  - Glucose – 114
- 0013 – Telestroke in CT, consult initiated

Concerns and Challenges

- Limited history
- Concern for fall → ? Trauma?
- Some unusual shakes and posturing?
  - Consideration for traumatic head injury, seizures
  - Alcohol withdrawal
  - Substance intoxication

Telestroke Assessment

- NIHSS – 9
- Collaborative discussion of risks/benefits for alteplase with patient/agreed to medication



Alteplase

- Door to alteplase 27 min
- Neuro eval to alteplase 18 min
- LKW to alteplase 47 min

CTA Head/Neck

- Identified Large Vessel Occlusion Right Cervical and Intracranial ICA extending up to right M1 and proximal Right M2 inferior division segments; R A2 segments

- Plan : Endovascular Therapy
- Autolaunch to Main Campus

EVT

- 6 Passes: direct aspiration x 1
    - Stent retriever x 4 to Rt MCA
    - Stent retriever x 1 to Right ACA

- Outcome: TICI 2b

Outcome

- Dysphagia – needed soft diet/supplementation with Corpak
- Discharge to Rehab and then home

Questions?

Matthew Lashutka, MD

Case 1

- 34 year-old male.
- EMS call for cardiac arrest

Case 1

- Lifting weights at the rec center

Case 1

- Slumped over in the seat
- No bystander CPR
- EMS response time was about 3 minutes

Case 1

- Intubated in the field, IV per EMS
- 3 doses of IV epinephrine, last dose 2 minutes ago
- 1 dose of IV atropine
- Initial rhythm was slow PEA (50's), arrives with a HR 70's
- Total estimated downtime is 15 minutes

Case 1

- First pulse check on arrival to ED, the patient has ROSC
- Vitals 165/80, 72, rectal temp 98.8, bagged via #8 ETT that is 24 cm at lip, 100% POx

Case 1

- Lungs CTA, good capnography
- Heart RRR, great pulses and equal
- Abdomen is soft and non-distended
- Non-traumatic, no extremity swelling
- PERRL, normal corneal reflexes, diminished gag, plantar reflexes equivocal, no response to noxious stimulation

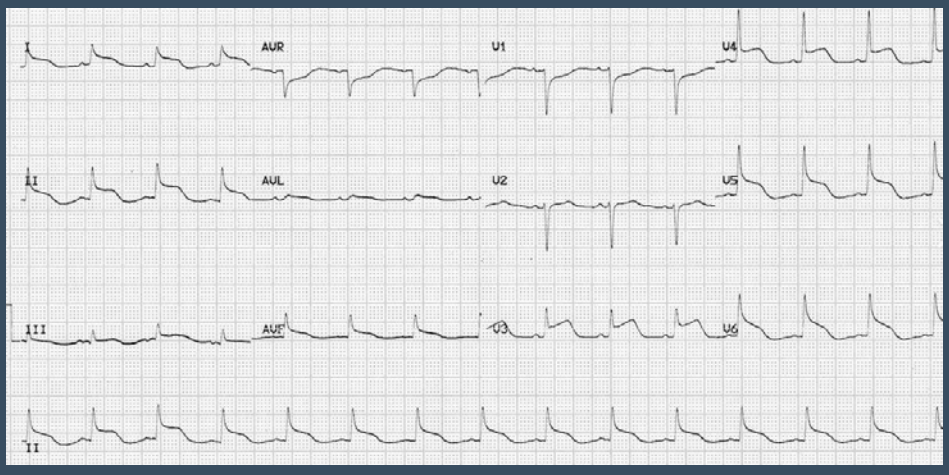
Case 1

- What next?
  - Any bedside tests
  - Review medical records
  - Hypothermia
  - Any other interventions

Case 1

- Glucose 102
- No medical problems, no previous surgeries, no medications, no allergies, no significant family history

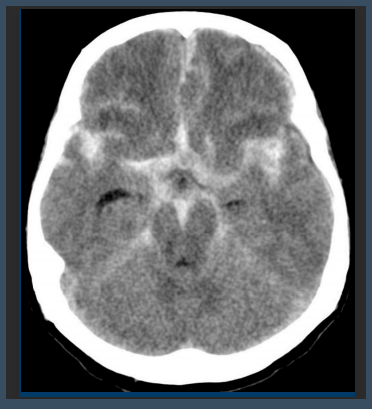
Case 1



Case 1

- What next?
  - Begin therapeutic hypothermia
  - STEMI activation – emergent cardiology consult. Treat with ASA, heparin, ticagrelor – send to cath lab
  - Admit to MICU and trend trop levels
  - Any other testing

Case 1

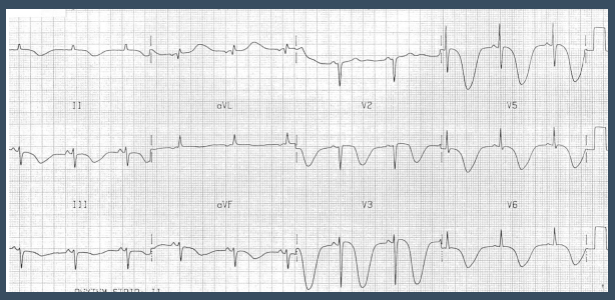


Case 1

- Increase in ICP can cause:
  - Widespread T wave inversions, “cerebral T waves”
  - QT prolongation
  - ST elevation, ST depression
  - Increased U wave amplitude

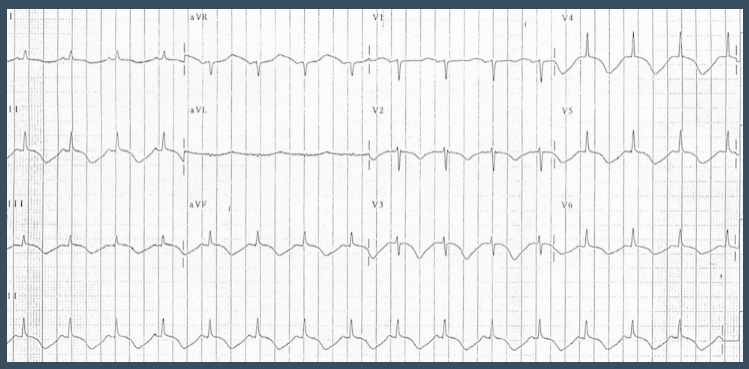
Case 1

- Cerebral T waves



Case 1

- QT prolongation



Case 1

- Neurosurgery consultation – clipping/coiling, consult for seizure prophylaxis (controversial)
- Target SBP < 140. Labetalol, nicardipine, enalapril. Avoid NTG and nitroprusside (increase ICP by increasing cerebral blood volume)
- Nimodipine to prevent vasospasm
- Reverse anticoagulants
- Maintain euvolemia

Case 1

- Cleveland Clinic ESI
  - Cardiac arrest with ROSC and STE who remain unresponsive, these patients get emergent head CT before cath lab

Questions?

Amy Raubenolt MD, MPH

Cleveland Clinic
Akron General

Case 1

- 65 year old female patient
- Slurred speech, difficulty with balance
- Episode since last night, resolved
- Ringing in ears
- Constant since this am (unclear time)

Triage

- VS: BP 172/78, P 72
- PMH: Hypertension, anxiety
- SH: non-smoker

Physician Documentation

- Patient presents with dizziness
- Describes things spinning around her
- Stops when she closes her eyes
- No nausea, no tinnitus, no change in speech or vision, no numbness or weakness
- “Patient concerned with possibility of stroke”

Physical Exam

- Lateral nystagmus
- Speech/cranial nerves intact
- Finger to nose cerebellar intact
- Strength/sensation intact/symmetric all extremities
- Reflexes symmetric

Work-up

- EKG, CT head, BMP, CBC
- EKG no abnormalities
- Labs: Glucose 155, otherwise WNL
- CT Head: extensive paranasal sinus disease, may be acute on chronic. No acute findings.

Treatment/disposition

- Given meclizine in ED
- Discharged with Rx for meclizine and Compazine
- Discharge BP 155/69
- Dx: Vertigo

MDM

- “Patient has isolated dizziness with feeling of unsteadiness present related to the vertigo. No focal neurologic deficit or indication of central source. Negative CT and ECG as well as lab. Patient discharged with Antivert and Compazine. Discussed impression and treatment with patient and significant other.”

ED Visit #2 36 hours later

- EMS brings unresponsive patient
- GCS 5, responsive to pain
- BP 167/72, P 45

HPI

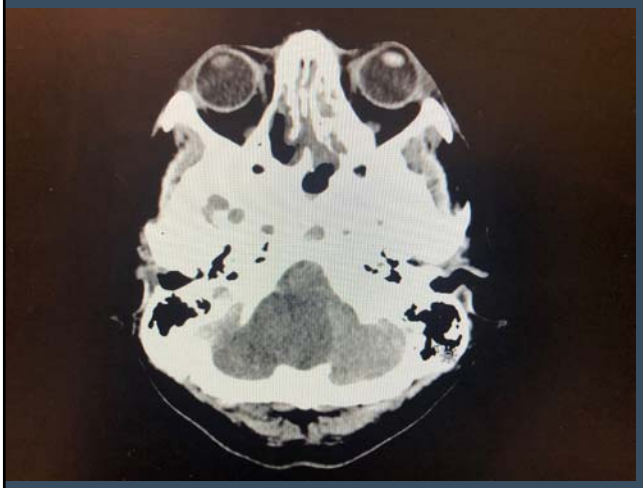
- Severe dizziness, room spinning, and vomiting since 11 am yesterday
- Never normal after they arrived home, thought she was tired
- Continued to vomit after arriving home
- Could not wake her up this morning

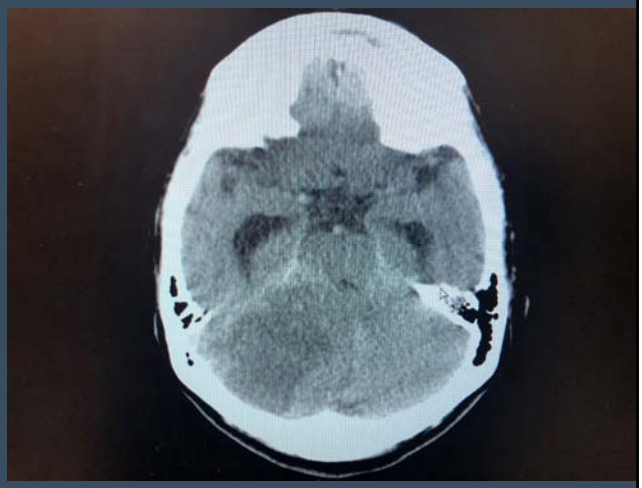
Exam

- Pupils: R 3->1mm, briskly reactive; L 3->2mm, sluggish
- Will squeeze hands, only command she will follow
- Incomprehensible sounds
- Rhonchorous airway
- BP: 178/68, P 48

ED Course

- Stroke Team activated
- Patient straight to CT/CTA





Rads read

- Acute to subacute ischemic insult involving the right cerebellum
- Mass effect with effacement of the inferior fourth ventricle resulting in obstructive hydrocephalus, as well as tonsillar herniation.
- Most likely PICA territory insult

ED Course

- Intubated for airway protection
- Given mannitol/keppra
- NIHSS 27

Hospital course

- Flown to CCAG
- R suboccipital craniotomy with EVD placement
- Self-extubated later that evening
- Next day cleared for full liquids
- POD#3 cleared for up to chair
- PT eval: sit to stand with min assist

Hospital Course

- Episodes of paroxysmal afib
- POD#6, ambulating with wheeled walker
- EVD removed
- Transferred to floor
- Discharged to rehab 11 days after surgery

Key Takeaways

- Beware the “dizzy” patient!
- Review nursing documentation!
- Observe patient ambulate and DOCUMENT!

Questions?

Michelle Echevarria, MD, MBA, FACEP

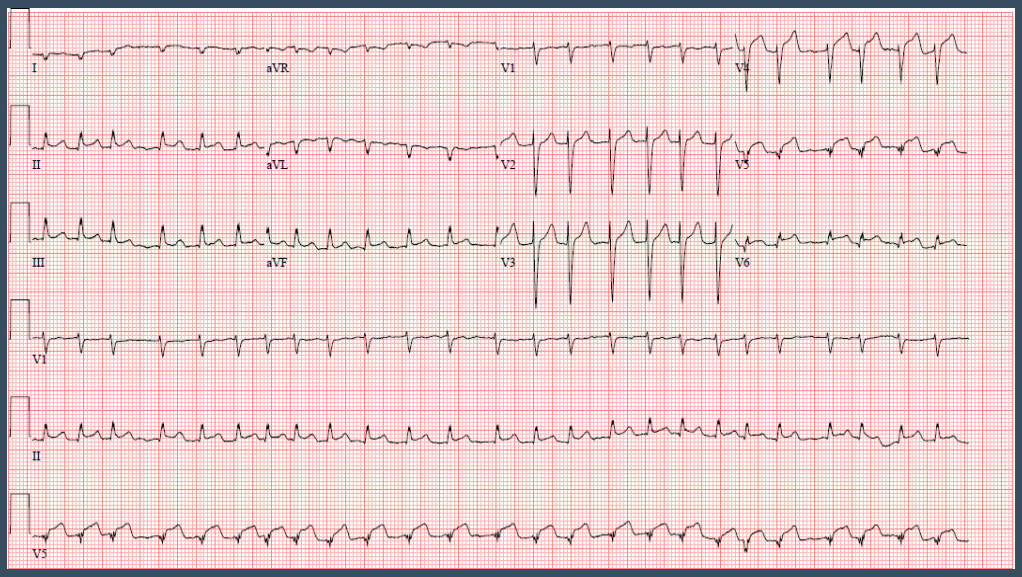
Case 2: HPI

- From SNF
- CC: Atrial fibrillation with RVR
- Symptoms of lightheadedness
- Hx: Afib on Coumadin, HTN, Hyperlipidemia, newly diagnosed lung mass/non-small cell Lung CA, pleural effusion s/p thoracentesis

Physical Exam

- BP 93/57 | Pulse 115 | Temp (Src) 99.1 (Oral) | Resp 20 | Ht 5' 9" (1.75m) | Wt 179 lb (81.2kg) | SpO2 96%
- General: normal appearance, no acute distress
- HEENT: NCAT, OP clear, EOMI, PERRL, Conjunctiva normal
- CV: Tachycardia, irregularly irregular
- Resp: CTAB
- Abd: soft, NT/ND
- M/S: bilateral LE edema
- Neuro: alert and oriented x 3, no facial asymmetry, speech normal, no focal motor deficit

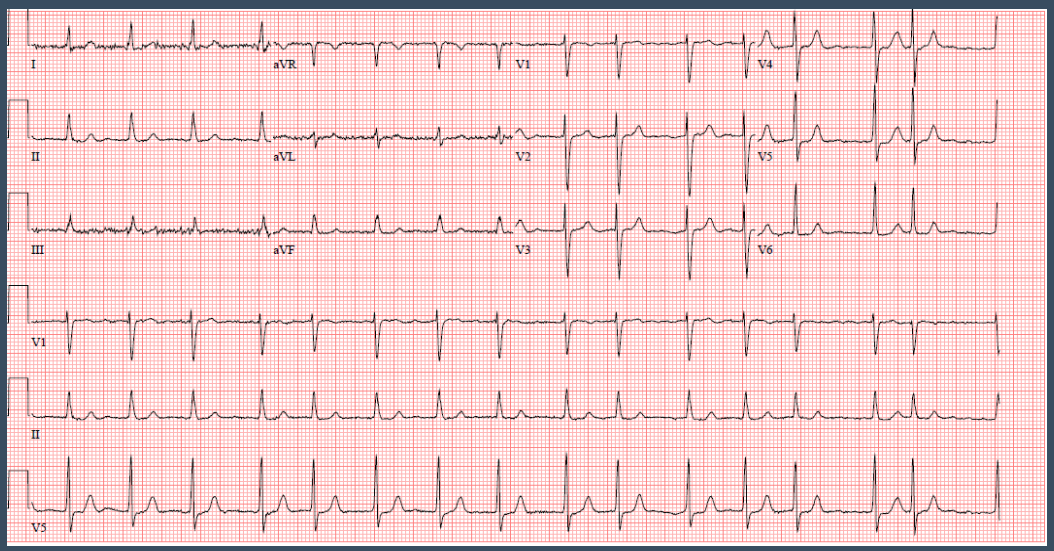
EKG



Events

- ED physician: d/w Cardiology Fellow, Autolaunch for suspicion of STEMI
- ED treatment: Cardizem for Afib RVR, ASA, Heparin
- Exam upon arrival to receiving facility:
  - Left arm weakness
  - Left facial droop

Old EKG



Neuro Events

- 2 CLOT activated
- CT Head
  - Negative for ICH
- CTA head and neck:
  - The proximal ACAs and MCAs are patent. A1 segments are codominant. There is abrupt occlusion of an M3 segment of the right MCA in the right sylvian fissure compatible with acute intraluminal thrombus. There is also incomplete filling of the overlying ascending frontal branches and focal luminal narrowing of the origin of the inferior division of the right MCA suggesting additional intraluminal thrombus. Focal moderate stenosis is noted the origin of the superior division of the left MCA but there is otherwise no evidence of focal significant stenosis, intraluminal filling defect or abrupt vessel occlusion in the ACAs or left MCA.

EVT

- **FINDINGS:**
- Right M2 occlusion
- Successful TICI 2B recanalization with aspiration thrombectomy

Outcome

- Poor prognosis
- Hospital course complicated by cardiogenic shock (EF 20%)
- Limited cardiac interventions given acute stroke
- Code change to DNR CC and pt expired

Questions?

Matthew Lashutka, MD

Case 2

- 65 year-old female.
- EMS call for right-sided weakness and slurred speech.

Case 2

- On arrival,
  - BP 182/90, HR 85, RR 16, Temp 97.9, Pox 98% RA.
  - POC glucose 176.
  - EMS reports witnessed onset of right sided weakness and aphasia 30 minutes PTA. Patient was awake when it occurred, family witnessed and called EMS, family is coming. No trauma.

Case 2

- Quick exam:
  - Alert but aphasic, can't provide any history
  - Severe aphasia but easily protecting her airway
  - Lungs CTA, heart RRR, abd NTTP
  - Right hemiparesis, facial droop, visual field deficit with NIHSS 22

Case 2

- What now?

Case 2

- Brain attack/Stroke alert, send to CT emergently
- tPA
- CTA

Case 2

- What else do you want to know?
  - Family just arrived

Case 2

- Past history: DM, HTN
- Meds: atenolol and glucophage
- Social history: reformed smoker, no EtOH/drugs
- Past surgical history: appendectomy 20 years ago.

- Anything else?

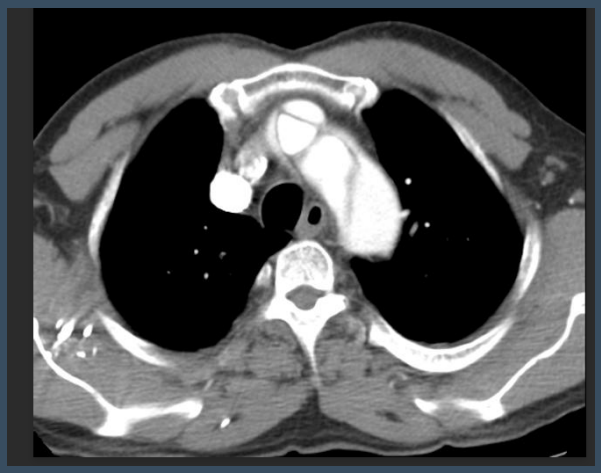
Case 2

- HPI: Witnessed onset 30 minutes PTA, the patient had some chest discomfort and then began having right sided weakness and trouble speaking.

Case 2

- What next?
  - Consent family for tPA
  - EKG
  - Other tests

Case 2



Case 2

- Aortic dissection up through left ICA

Case 2

- Emergent surgical consultation, neurology consultation
- Blood pressure and heart rate management, ideal goals of HR 60 and SBP 100-120. Esmolol, labetalol, nicardipine. Possibly followed by nitroprusside.
- Reverse anticoagulants
- Medical versus surgical management (type A versus B)
- Possible interventional procedure by neurology

Case 2

- Chest pain/back pain plus neurologic symptoms is dissection
- Try to obtain complete history, including EMS and family

Questions?

Amy Raubenolt MD, MPH

Cleveland Clinic
Akron General

Case #2

- HPI: 65 yo M
- R arm/hand weakness starting at 1600. Went to bed at 2200. Awoke at 0115 unable to walk, wife noticed slurred speech. Was improving by 0230.
- By arrival at ER 0310, only complaining of loss of dexterity in R hand.
- VS: P76, BP 155/92, R16, 96%RA

- PMH: GERD, hyperlipidemia, bladder cancer
- SH: 75 pack year smoking hisotry
- R hand dominant

- As going to CT, mild slurred speech with R arm and leg weakness
- Symptoms mostly resolved by time returned from CT with NIH of 1

- CT Head: No abnormalities
- CTA:
  - Complete occlusion of R internal carotid artery at origin with collaterals supplying inner cranial circulation.
  - Small caliber L internal carotid artery with “sluggishness” of flow

- CTA Addendum:
  - Occlusion of the distal L internal carotid artery. This may be secondary to an underlying embolism.
  - L MCA and ACA obtain flow from anterior and posterior communicating arteries

- Transfer arranged to Akron General, admitted to neuro floor.

Neuro Recs

- Stat MRI brain with perfusion imaging to look for cerebral reserve
- Maximize cerebral blood flow with IVFs, permissive hypertension for now, starting NS@ 75/h given that he has been running in 130s systolic
- ASA daily

Neuro Recs

- Will review imaging with radiology to discuss if left ICA luminal defect represents a thrombus, may need to consider anticoagulation in that setting
- May need cerebral angiogram to evaluate flow and collateral status better, decision on timing based on MRI results

Neuro Recs

- Check lipids, HbA1c, TTE
- Low threshold for NSICU transfer should he develop any new symptoms
- Tobacco cessation strongly encouraged, nicotine patch for

Hospital Course

- 1610 - called into room, pt reporting feeling weaker on rt side arm and leg, also rt eye rt lower visual field deficit.
- Neuro notified and in room by 16:15
- PT got Bolus of 1L fluid symptoms improved
- NIH 3 (Right face, arm, leg weakness)

Hospital Course

- MRI: patchy LMCA punctate ischemia (particularly in watershed distribution)
- Augment blood pressure
- NIL consult
- To NIL

NIL

- Left internal carotid artery injection demonstrated interval significant progression of the clot previously seen. With trickle of contrast opacifying partially the left middle cerebral artery, there has been interval occlusion of the posterior communicating artery by the large clot.

NIL

- Removal of large clot from the supraclinoid left internal carotid artery followed by stenting of the supraclinoid left internal carotid artery
- Persistent occlusion of small M3 division of the left middle cerebral artery.

Hospital Course

- Worsening neuro exam next morning 0600
- Aphasic and hemiplegic
- Concern for re-clotting
- CT Head with evolving L MCA stroke
- Back to NIL
- “Almost total occlusion of supraclinoid LICA”

Dispo

- Discharged to rehab with significant expressive aphasia and R sided weakness

Teaching points

- The bilateral ICA occlusion got lost in the shuffle and patient admitted to floor due to low NIH
- Probably should have been admitted to Neuro ICU due to high risk of worsening
- May have benefitted from earlier thrombectomy
- Permissive hypertension needed in this patient

Questions?

Every life deserves world class care.