Simulation 1: RMCA Stroke and BP Dependent Exam

Clinical Objectives:
At the completion of the Simulation, participants will be able to:

- Recognize an acute R MCA syndrome.
- Implement acute stroke pathway, including CT and CTA
- Identify eligibility criteria for IV tPA
- Demonstrate appropriate BP management before thrombolysis
- Identify criteria to involve endovascular team
- Recognize and demonstrate appropriate management for acute worsening after tPA: Hemorrhage vs. Blood Pressure Dependent Exam

Environment and Persons:
Environment: "ED" room
Persons: Patient and Family Member

Room Setup:

- Medical Record will be printed out
- Patient will already have IV access
- Patient is not hooked up to the monitor
- Drugs needed: tPA, hydralazine or labetalol or nicardipine
- Images needed:
    - Normal Head CT, RMCA cut off CTA, CTP for RMCA

Patient Demographics/PMH :

Age	80	Allergies	None	Social	Retired, history of smoking
Gender	M			PMH	HTN DM HLD Alcohol use disorder, in remission H/o cirrhosis
Height/Weight		Ethnicity		Medication	Lisinopril Carvedilol ASA Simvastatin Lantus Metformin
Labs	None	X-ray		Other History	

CASE SCENARIO:

Case begins with resident being paged:
"**ED CONSULT STAT:** 66 yo M with acute confusion and dysarthria, history of liver disease, please eval"

PART ONE: H&P
Daughter at bedside relays pass off

HISTORY
Daughter (frantic): "Oh, I'm so glad someone is here that might be able figure out what's going on!! When I left for the store this morning, he was totally normal. But when I came home, he was on the ground and couldn't find his glasses, which were literally right beside him. I couldn't get him up! So, I had to call EMS. Occasionally he'd be like this when he was drinking but I don't think he's had alcohol in over a year!! But the doctor told me that because of his liver he might be at risk for confusion – do you think that's what's wrong with him??

NEUROLOGY RESIDENT BEHAVIOR CHECKLIST:
- Recognize a R MCA syndrome
- Confirm LSW time
- Collect history: review vital signs, review PMH, review medications
- Ask for fingerstick glucose

Patient (drowsy): I don't know why I couldn't get up. Nothing's wrong with me. I just fell. I don't think I hit my head.

[Resident should inquire more about patient's history]

Daughter: "Dad has high blood pressure, and he's a diabetic – but he only takes insulin at night though, he's got high cholesterol, and used to drink heavily although stopped drinking a year ago. He's taking something for blood pressure and high cholesterol, an aspirin, metformin and lantus. Maybe he forgot to take his blood pressure medication!! Sometimes he's really confused if he has high blood pressure!"

[if resident asks about LSW] He's been like this since 9 AM, that's two hours ago!

[if resident asks about blood sugar] "I checked his blood sugar at home and it was 138."

[if resident asks about blood thinners] "Like something stronger than aspirin? No, he only takes a baby aspirin"

[if resident asks about any medications for liver disease]: "No, they had thought that maybe he'd need medications but then he stopped drinking and has been doing so well for the last year, so he's not on any medications for his liver."

[resident asks about surgical history, history of past strokes, recent bleeding or hospitalizations or MI]: "He had his appendix removed, but gosh that was when he was young, like many years ago! He had knee surgery last year."

[if residents seem not to see the R-MCA syndrome]: "I've noticed that he won't even look over at me when I'm on his left side."

PHYSICAL:
Vitals: HR 90 *IRREGULAR*, BP 198/87, Afebrile

GEN EXAM:
- No evidence of jaundice
- *Irregular heart rate*

NEURO EXAM:
MS: If resident stands on the left side the patient will not respond or look at them. Drowsy, agnostic to deficits. Can name and repeat. Speech is dysarthric.

CN:
- Does not count fingers on the left, does not describe the left side of the NIHSS picture
- Pupils round and reactive
- Gaze preference to the right, has to be heavily coached to look left
- Minor facial weakness, with delayed activation
- Dysarthric

Motor:
- Left arm and left leg drift, arm is weaker than leg

Sensory
- Will appreciate touch on the left, but with double stimuli extinguishes left side

NIHSS:
- Drowsy
- Can answer month and age
- Follows commands
- 1 - partial gaze palsy
  - The patient will require oculocephalic testing to confirm that they pass midline and do not have a forced gazed (score 2) deviation
- 1- partial hemianopia
  - Patient does not count fingers on the left
- 1- minor facial weakness
- 1- left arm drift
- 1- left leg drift
- No ataxia, patient will not attend to participate on the left
- 1- mild sensory loss
  - Patient will report being touched sometimes
- Language – follows commands, reads, describes only the Right side of the picture.
- 2- inattention to multiple modalities
- NIHSS 8

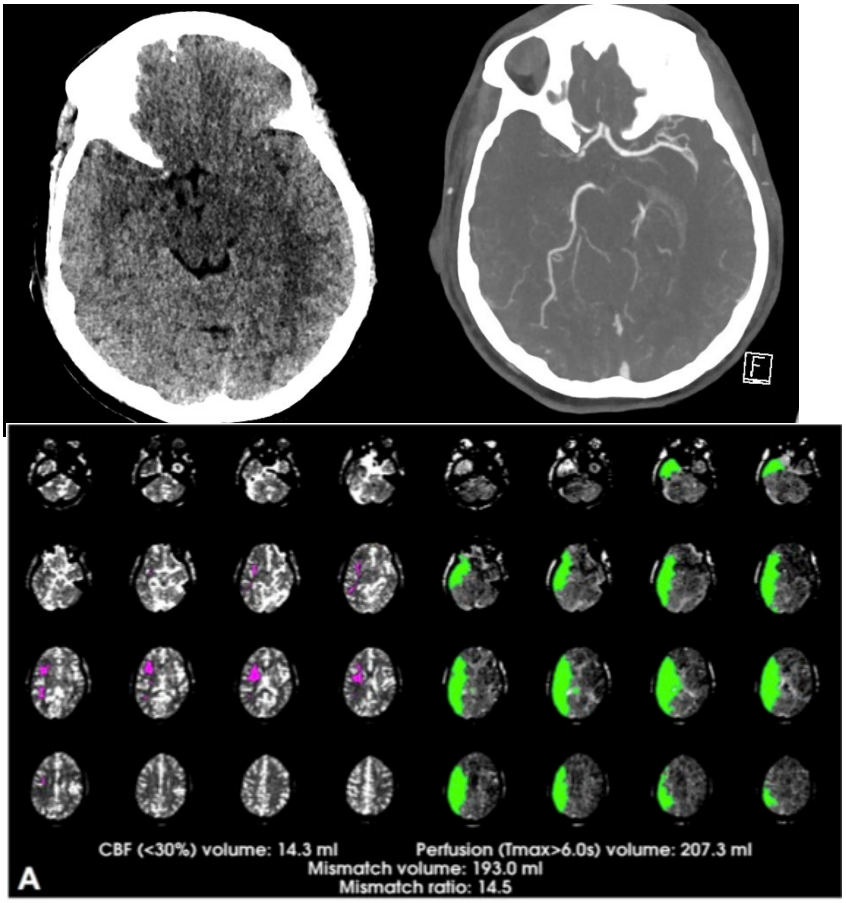
PART TWO: MANAGEMENT OF ACUTE STROKE
1. **Daughter:** If the Neuro Resident doesn't recognize an acute stroke, draw attention to the left side. "OMG, why isn't the left side strong? He is normally not like this!"
2. **Patient:** Continues to be agnostic to deficits

NEUROLOGY RESIDENT BEHAVIOR CHECKLIST:
- Recognize an acute R-MCA syndrome
- Use NIHSS cards to document a full NIHSS scale (totals 8)
  - 1 - partial gaze palsy
    - The patient will require oculocephalic testing to confirm that they pass midline and do not have a forced gazed (score 2) deviation
  - 1- partial hemianopia
    - Extinguishes to double simultaneous stimuli

- 1- minor facial weakness
- 1- left arm drift
- 1- left leg drift
- 1- mild sensory loss
- 2- inattention

If not already established – document LSW and confirm not on a/c
Activate an acute stroke alert
Confirm glucose if hasn't been done already
Send CBC, Coags, BMP, troponins STAT
Ask that the patient be hooked up to the monitor
Note that BP > 185/110
Start antihypertensive for goal BP< 185/110
Note irregular HR, if not noted before
Requests and reviews NCHCT.
Orders a CTA H&N

1. Data to be given as resident meets behavioral objectives:
    a. **TPA SCREENING:**
        i. Daughter will answer no to all tPA screening questions
    b. **LAB DATA:**
        i. Not back initially. Glucose is 117. High Sensitivity Trop is 24 (normal)
    c. **CT SCAN DATA:**



1. **LAB DATA:**
    a. BMP WNL
    b. CBC with PLTs of 276,000
    c. INR 1.1
2. **PATIENT DATA:** SBP will still be greater than >185 despite whatever medication is initially given.

NEUROLOGY RESIDENT BEHAVIOR CHECKLIST:

- Recognize there is no bleed on CT scan
- Recognize acute R M1 cut off on CTA
- Recognize mismatch on CTP
- Continue to give anti-hypertensives until BP<185/110
- Confirm still within the window for tPA
- Dose tPA (0.9mg/kg with 10% of the dose given over 1 min and the rest infused over an hour; max dose 90kg)
- Correctly instruct the nurse on how frequently to measure BP (every 15 mins for the first 2 hours)
- Correctly instruct the nurse for the target BP (<180/105)
- Activate the NIR for acute LVO endovascular team

PART THREE: MANAGEMENT OF WORSENING SYMPTOMS AFTER TPA

1. Daughter:
    1. Notice that her father isn't moving the left side at all, create panic about this
2. Patient:
    a. Will develop left arm plegia and complete neglect of the left with a forced rightward gaze deviation.
    b. VITALS: HR: 86, **BP: 95/75**, SpO2 99%
    c. If resident had chosen to give nicardipine, then shutting off the drip results in significant improvement of exam as BP climbs >140.
    d. If resident doesn't notice blood pressure, it will continue to drop

NEUROLOGY RESIDENT BEHAVIOR CHECKLIST:

- Consider the differential for a rapidly worsening neurologic exam after tPA – tPA associated hemorrhage vs. blood pressure dependent exam
- Halt tPA infusion while cause of neurologic worsening is being evaluated
- Resident preforms repeat Neuro exam
- Requests a new STAT Head CT, which will be the same.
- Request or review CBC, PT (INR), aPTT, fibrinogen level, and type and cross-match for possible tPA related bleed
- Confirms no hemorrhagic transformation on repeat Head CT
- Recognize low BP
    0. Turn off nicardipine
    1. Or give 1L bolus of fluid
    2. Or start a pressor (after bleed is exonerated)

Case ends with correction of BP, or if not corrected after the patient is rescanned the Endovascular fellow will arrive and ask for pass-off of the case.

Case 1 – Blood Pressure Dependent Exam

Critical Actions:

ACUTE STROKE EVAL	
Obtain Last Known Normal Time	Y / N
Perform NIHSS completely	Y / N
Localize lesion to R MCA	Y / N
Orders a non-con head CT	Y / N
Orders a CTA Head and Neck (may also get a CTP)	Y / N
ADMINISTERING TPA	
Reviews CT and determines a lack of acute hemorrhage	Y / N
Lower BP (<185/110) with labetalol or nicardipine prior to tPA	Y / N
R/o contra-indications to tPA as able (must ask about family)	Y / N
Administer IV tPA (dosed correctly) without reassurance from consultant	Y / N
LVO EVALUATION	
Determine ASPECT score	Y / N
Reviews CTA and either determines an acute cutoff or may call radiology to ask for the read	Y / N
Alert Neuro IR to likely LVO without prompting at appropriate time	Y / N
RECOGNITION OF WORSENING AFTER TPA	
Re-examine after deterioration (CNs, motor exam)	Y / N
Document blood pressure at time of worsening	Y / N
Stop tPA infusion as soon as worsening noticed	Y / N
Order STAT labs including coags/fibrinogen (must include fibrinogen)	Y / N
Repeats non con head CT	Y / N
TREATMENT OF BLOOD PRESSURE DEPENDENT EXAM	
Confirms no acute hemorrhage on the repeat CT	Y / N
Recognizes lower blood pressure as a reason for neurologic worsening	Y / N
Performs 1 maneuver to increase cerebral perfusion which may including: lowering head of bed, administer a fluid bolus or starting a vasopressor	Y / N