



KANSAS INITIATIVE FOR
STROKE SURVIVAL
A PROJECT BY AND FOR KANSANS

Phone (913) 588-1554 • Fax (913) 945-8892

Beyond the NIHSS: Extended Neurological Exam in Stroke

“First Tuesdays” Lecture Series
Sabreena Slavin, MD

Introduction and Goal of “First Tuesdays”

- Didactic lecture series as part of the Kansas Initiative for Stroke Survival (KISS)
- Updates in Practice and FAQ’s on Acute Stroke Care
- 20 minute didactic, 10 minutes for questions/discussion

Origin of the NIHSS

- Developed as a standardized tool for use in stroke treatment trials
 - Neurological exam converted into scale with points assigned
 - Found to have high test-retest reliability and interrater reliability
 - Field tested in a study with 65 patients
 - Correlated scores with other stroke scales used at the time, CT measurement of infarct volume, and 3-month clinical outcome

1.a. Level of Consciousness	Alert Drowsy Stuporous Coma	0 1 2 3	
1.b. LOC Questions	Answers both correctly Answers one correctly Incorrect	0 1 2	
1.c. LOC Commands	Obeys both correctly Obeys one correctly Incorrect	0 1 2	
2. Pupillary Response	Both reactive One reactive Neither reactive	0 1 2	
3. Best Gaze	Normal Partial gaze palsy Forced deviation	0 1 2	
4. Best Visual	No visual loss Partial hemianopia Complete hemianopia	0 1 2	
5. Facial Palsy	Normal Minor Partial Complete	0 1 2 3	
6. Best Motor Arm	No drift Drift Can't resist gravity No effort against gravity	0 1 2 3	
7. Best Motor Leg	No drift Drift Can't resist gravity No effort against gravity	0 1 2 3	
8. Plantar Reflex	Normal Equivocal Extensor Bilateral extensor	0 1 2 3	
9. Limb Ataxia	Absent Present in upper or lower Present in both	0 1 2	
10. Sensory	Normal Partial loss Dense loss	0 1 2	
11. Neglect	No neglect Partial neglect Complete neglect	0 1 2	
12. Dysarthria	Normal articulation Mild to moderate dysarthria Near unintelligible or worse	0 1 2	
13. Best Language	No aphasia Mild to moderate aphasia Severe aphasia Mute	0 1 2 3	
14. Change from Previous Exam	Same Better Worse	S B W	
15. Change from Baseline	Same Better Worse	S B W	

FIGURE 1. *Item-by-item testing procedure and grading are defined in stroke scale glossary, which is available upon written request.*

Caveats with NIHSS

- Most representative of anterior circulation and dominant sided strokes (eg: L MCA strokes)
- Less representative of non-dominant sided strokes (eg: R MCA strokes)
- Least representative of posterior circulation strokes

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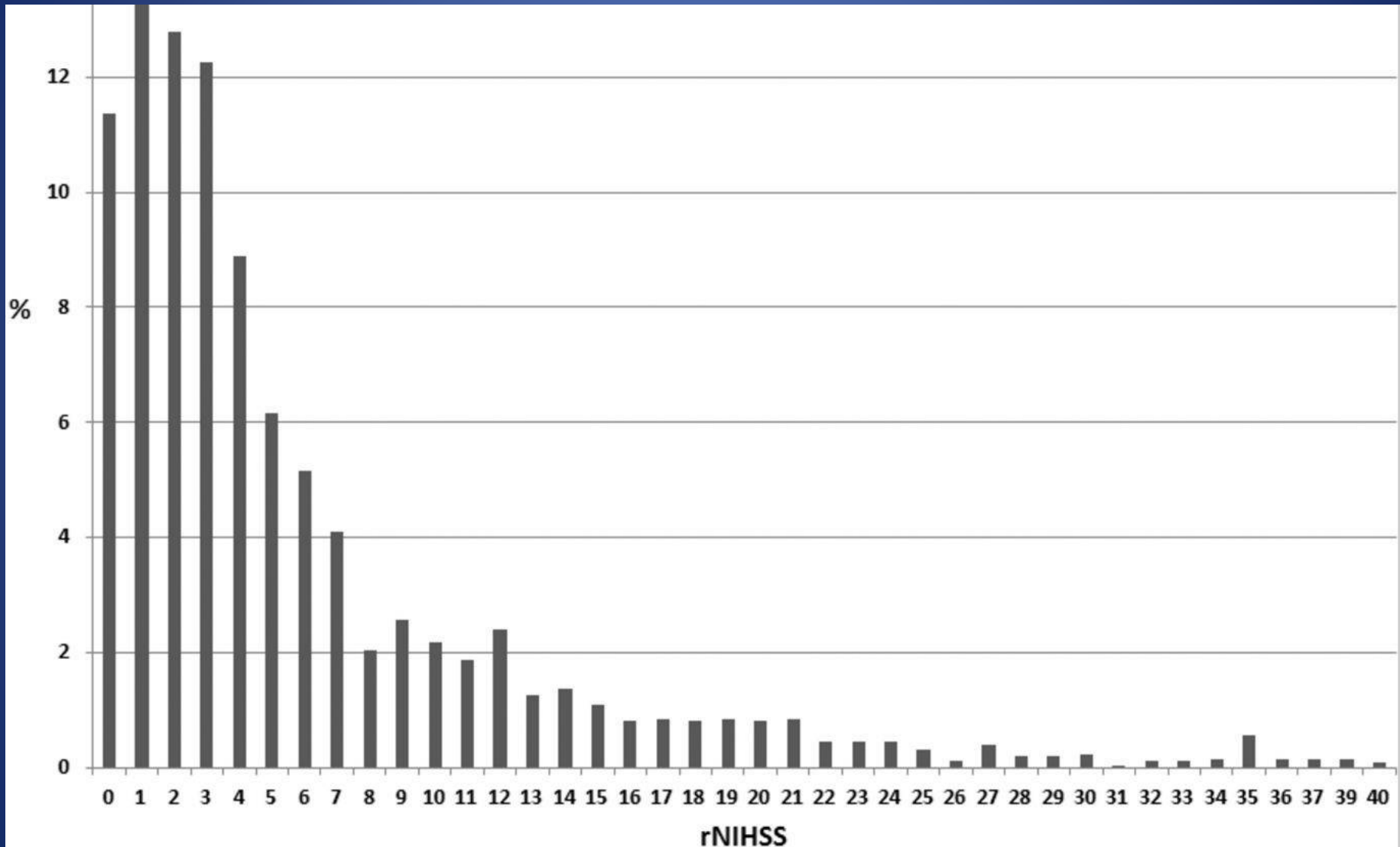
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Beyond the NIHSS

- Remember to state focality when giving NIHSS on the phone.
- Need additional neurological exam depending on patient presentation.
- Mild exam with low NIHSS?
- Severe exam with high NIHSS?
- Posterior circulation exam

Majority of strokes have lower NIHSS –

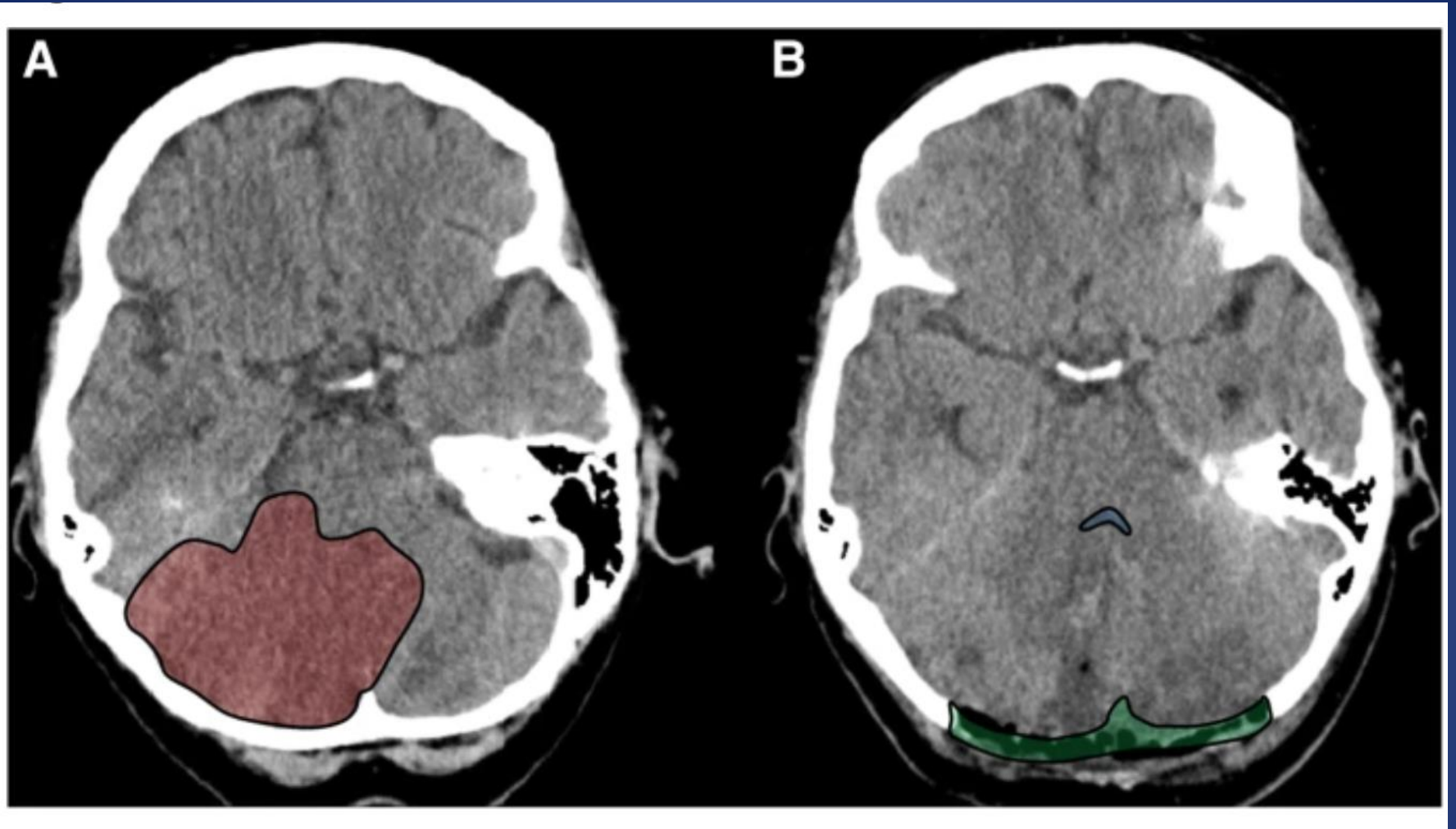


Mild stroke: is it disabling?

- **Stroke guidelines:** LOE A, COR I indicating that benefit of IV alteplase is well established of adult patients with **disabling** stroke symptoms regardless of age and stroke severity.¹
 - Hemianopsia in patient who drives/works (NIHSS 2)
 - Moderate-severe aphasia (NIHSS 2)
 - Weakness affecting ability to work (NIHSS 0 and up)
 - Vertigo affecting gait (NIHSS 0)

Exam features for mild stroke

- Strength exam in all muscle groups: 0-5 out of 5
 - 0 = no movement at all
 - 1 = flicker
 - 2 = movement in horizontal plane/not antigravity
 - 3 = antigravity but cannot resist
 - 4 = provides some resistance
 - 5 = full strength
 - Functional: can they hold a cup? Hold a pen?
- Gait exam:
 - Can they walk unassisted? Severe ataxia or vertigo that is impacting their ability to sit or stand?



Severe exam

- Patients who are obtunded/comatose on arrival may have large vessel occlusions.
- Check for gaze deviation
- Check for facial asymmetry
- Check for withdrawal to sensory stimuli in all four extremities

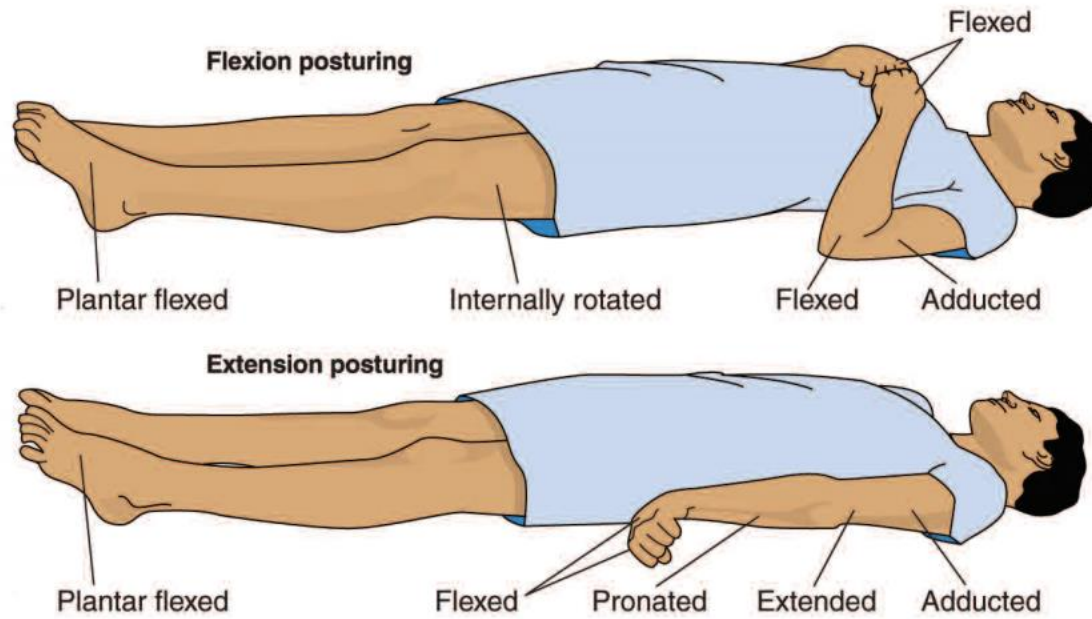
Basilar artery occlusions

- Often have bilateral symptoms, fluctuating mental status, cranial nerve abnormalities.
- Current LVO scales (FAST-ED, RACE, LA-motor scale, C-STAT) are only designed for anterior circulation large vessel occlusions.
- Early identification is key with CTA head/neck.
- Meta-analysis showed similar incidences of successful recanalization (80%) as anterior circulation strokes. However, has lower occurrence of good outcome (mRS 2 or less) of 42.8% and higher pooled mortality of 29.4%.

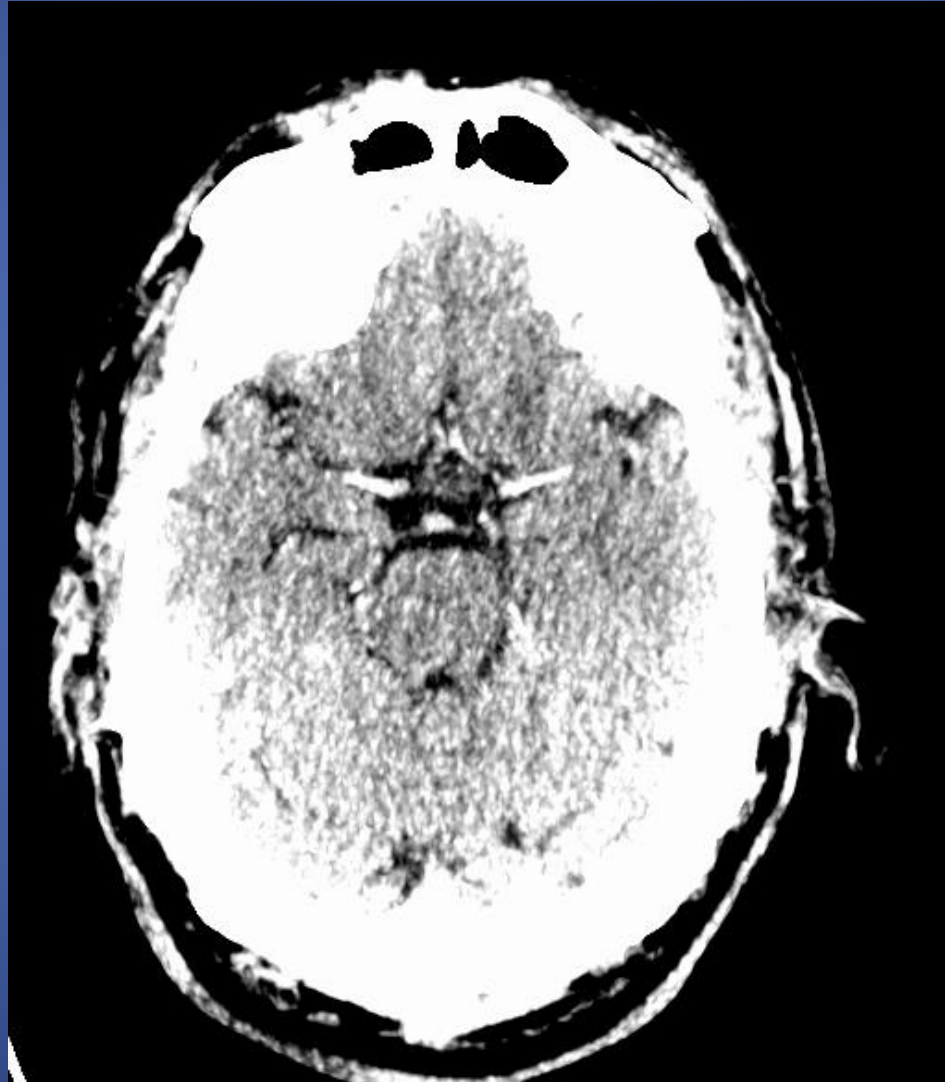
Basilar artery occlusion exam features

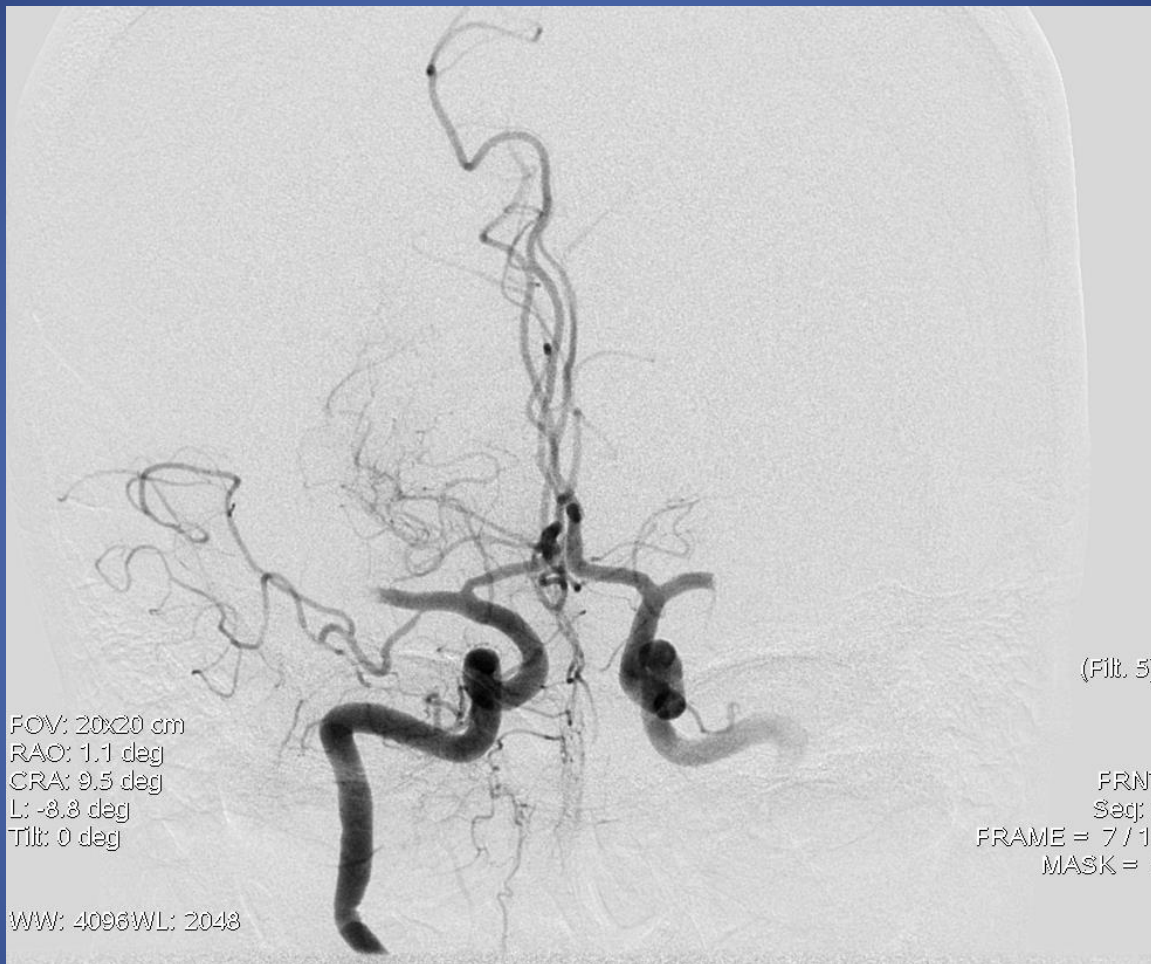
- Lethargic, obtunded, or comatose
- Eye movement abnormalities: may have no lateral gaze with "Doll's eye"; may have "ocular bobbing"
- Severe dysarthria/anarthria; moaning/groaning
- Posturing in extremities

Abnormal posture response to stimuli



What is going on?





Differentiate posterior circulation strokes vs peripheral etiology

- HINTS Exam: ONLY helpful in patients who have continuous (at least several hours) vertigo and spontaneous nystagmus.
 - Head impulse test
 - Direction changing nystagmus
 - Skew deviation

Head Impulse Test

- Patient looks at your nose. Then slowly turn head to one direction and then perform rapid horizontal head rotation towards the other direction.
- Normal = able to fixate on your nose without a corrective saccade.
- Abnormal = patient requires a corrective saccade to fixate on nose.
- **Normal impulse test = more likely central process, but can also include migraine and Meniere's disease**

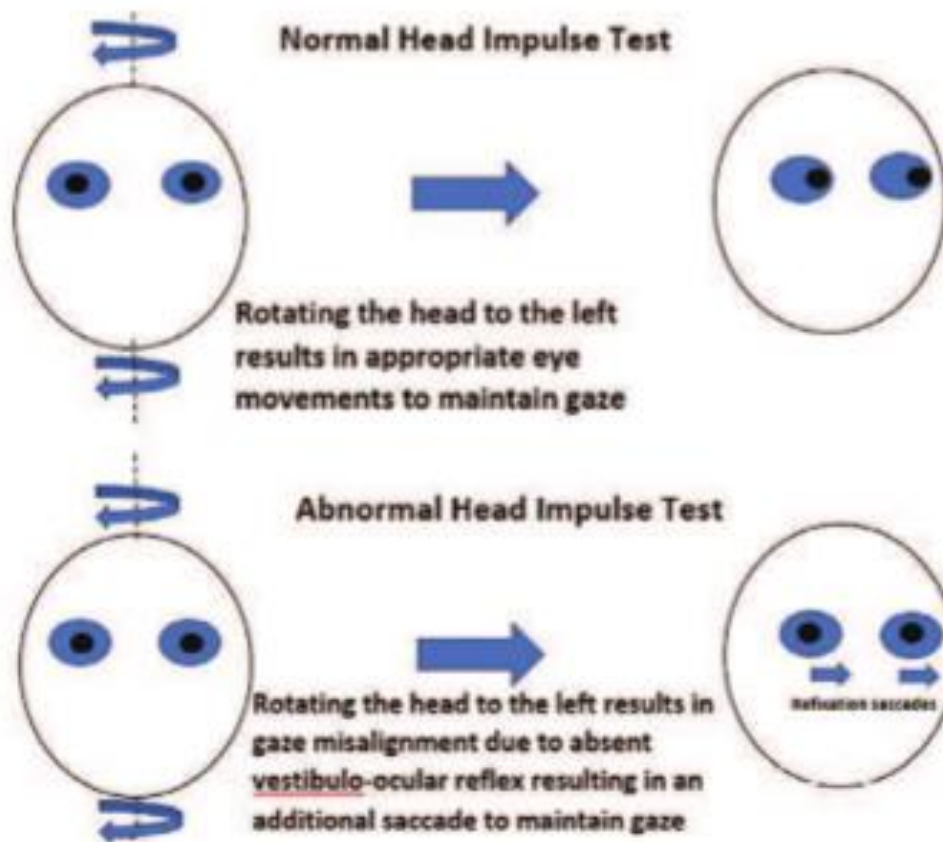


Figure 3 Head impulse test. The patient is asked to maintain gaze on a fixed target, invariably the examiner's nose. In the first figure, fixation is maintained during the rotation of the head to the left. If there is a right vestibulopathy, turning the head to the left would result in a refixation saccade in order to maintain fixation on the target.

Nystagmus

- Look for **direction changing nystagmus** on bidirectional lateral gaze for central process.
- Unidirectional nystagmus may be peripheral.

Skew Deviation

- Have patient focus on a target (your finger) while covering and uncovering each eye.
- **Abnormal = vertical adjustment of eye when uncovering**

Summary

- Milder stroke: need detailed strength exam, get them up to walk
- Severe stroke: look for gaze deviation or ocular bobbing, withdrawal to stimuli, posturing
- Unknown stroke vs peripheral process: consider HINTS exam

Questions?

- Call for help anytime!
- <http://www.kissnetwork.us/>
- email at sslavin2@kumc.edu