

Effectively Managing Emergency Department Stroke Patients

E. Bradshaw Bunney, MD, FACEP



E. Bradshaw Bunney, MD

Associate Professor
Department of Emergency Medicine
University of Illinois at Chicago
Our Lady of the Resurrection Medical Center
Chicago, IL

E. Bradshaw Bunney, MD, FACEP



Objectives

- Improve stroke outcome
- Know how to quickly evaluate stroke pts
- Know how to use protocols
- Provide rational therapy in the ED
- Improve disposition and documentation
- Improve Emergency Medicine practice

E. Bradshaw Bunney, MD, FACEP



A Clinical Case

E. Bradshaw Bunney, MD, FACEP



Clinical History

A 62 year old female acutely developed aphasia and right sided weakness while in a store. The store clerk immediately called 911. Paramedics on the scene within 9 minutes, at 6:43 pm. She arrived in the ED at 7:05 pm... completed her head CT at 7:25 pm... and a neurology consult was obtained at 7:35 pm (approximately one hour after the onset of her symptoms).

E. Bradshaw Bunney, MD, FACEP



ED Presentation

VS: 98 F, 90, 16, 116/63, 98% RA, Wt = 50 kg
The patient appeared alert, and was able to slowly respond to simple commands. The patient had a patent airway, no carotid bruits, clear lungs, and a regular cardiac rate and rhythm. The pupils were midpoint and reactive, and there was neglect of the R visual field. There was facial weakness of the R mouth, and R upper and lower extremity motor paralysis. DTRs were 2/2 on the L and 0/2 on the R.

E. Bradshaw Bunney, MD, FACEP



Critical Questions

- How is the NIHSS used?
- How can an ED NIHSS be estimated?
- How can the ED neurological exam be systematically performed & documented?
- What must be documented when considering tPA use in the ED?
- How should elevated blood pressure be handled in ischemic stroke?

E. Bradshaw Bunney, MD, FACEP



Stroke

- 3rd most common cause of death
- Leading cause of dependence
- Most expensive disease overall
- Over \$50 billion per year

E. Bradshaw Bunney, MD, FACEP



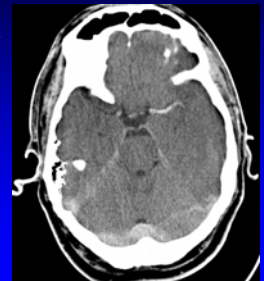
CT: What are we looking for?

E. Bradshaw Bunney, MD, FACEP



The hyperdense MCA sign

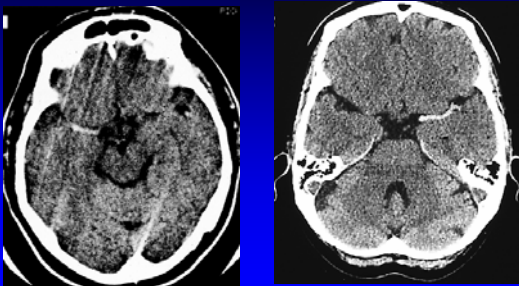
- 40-60% in angiographically proven occlusion
- 17% in unselected stroke patients



E. Bradshaw Bunney, MD, FACEP



The hyperdense MCA sign

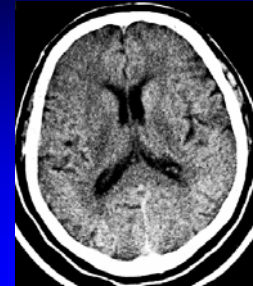


E. Bradshaw Bunney, MD, FACEP



Sulcal Effacement

- Sulcal Effacement due to focal swelling
- Loss of grey/white differentiation

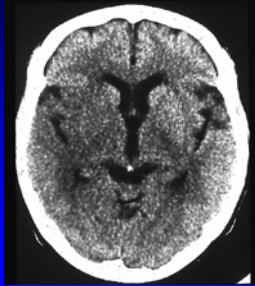


E. Bradshaw Bunney, MD, FACEP



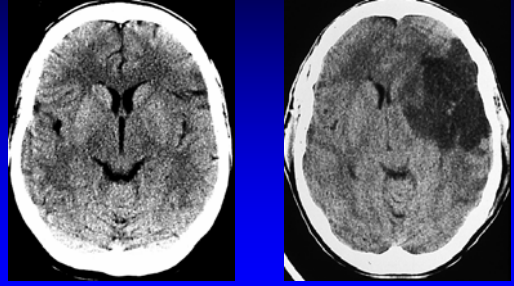
Loss of the Insular Ribbon and Basal Ganglia Hypoattenuation

- Obscuration of the right basal ganglia
- Loss of demarcation of the insular cortex



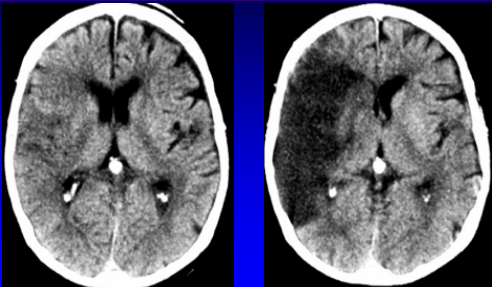
E. Bradshaw Bunney, MD, FACEP 

Early Infarct Signs and follow up



E. Bradshaw Bunney, MD, FACEP 

Early Signs of a large infarction (> 1/3 MCA sign)



E. Bradshaw Bunney, MD, FACEP 

NINDS: Are Early CT signs relevant?

- Analysis of all baseline CTs: 616/624 NINDS patients
- Incidence of Early CT Signs: 31%
- Significant Association: Initial NIHSS + Time Window
- No Association: Outcome, Infarct size, sICH Rate
- Conclusion: Early CT signs do not influence the effect of rt-PA (within 3h time window !!!)
- Problem: „One-Third-MCA-territory“ criterion not tested

Patel et al, JAMA 2001

E. Bradshaw Bunney, MD, FACEP 

NIHSS Estimation: The Procedure

E. Bradshaw Bunney, MD, FACEP 

NIHSS: Driving Principles

- NIHSS: anatomic neurologic examination
- Quantification directs therapies
- Estimation helps to categorize patients
 - Low NIHSS, thrombolysis less indicated
 - Mid-range NIHSS, thrombolysis indicated
 - High NIHSS, thrombolysis less indicated
- NIHSS 10-20 optimal for thrombolysis?

E. Bradshaw Bunney, MD, FACEP 

NIHSS Estimation

- Perform a systematic neurological exam

E. Bradshaw Bunney, MD, FACEP



NIHSS Estimation

- Perform a systematic neurological exam
- Focus on four areas of deficit:
 - Unilateral motor deficit
 - Speech and language deficit
 - CN and visual field deficit / neglect
 - Depressed level of consciousness

E. Bradshaw Bunney, MD, FACEP



NIHSS Estimation

- Perform a systematic neurological exam
- Focus on four areas of deficit:
 - Unilateral motor deficit
 - Speech and language deficit
 - CN, neglect and visual field deficit
 - Depressed level of consciousness
- Grade/add: mild (2), mod (4), severe (8)

E. Bradshaw Bunney, MD, FACEP



NIH Stroke Scale

- 13 item scoring system, 7 minute exam
- Integrates neurologic exam components
- CN (visual), motor, sensory, cerebellar, inattention, language, LOC
- Maximum scale score is 42
- Maximum ischemic stroke score is 31
- Minimum score is 0, a normal exam
- Scores > 15-20: severe stroke

E. Bradshaw Bunney, MD, FACEP



NIHSS & Outcome

- Does the baseline NIHSS predict outcome?
- Yes.

Adams HP Neurology 1999;53:126-131
Baseline NIH Stroke Scale score strongly predicts outcome after stroke (TOAST)

E. Bradshaw Bunney, MD, FACEP



NIHSS & Outcome

- NIHSS < 12-14: 80% good, excellent outcome
- NIHSS > 20-26: < 20% good, excellent outcome
- Lacunar infarct patients: best outcomes.

Adams HP Neurology 1999;53:126-131

Baseline NIH Stroke Scale score strongly predicts outcome after stroke (TOAST)

E. Bradshaw Bunney, MD, FACEP



NIHSS Composite

- CN (visual): 8
- Unilateral motor: 8
- LOC: 7
- Language: 5
- Ataxia: 2
- Sensory: 2
- Inattention: 2

E. Bradshaw Bunney, MD, FACEP



Four Main NIHSS Areas

- CN/Visual: Facial, gaze palsy
Visual field deficit
- Unilateral motor: Hemiparesis
- LOC: Depressed LOC, AMS
- Language: Aphasia, dysarthria
- 28 total points

E. Bradshaw Bunney, MD, FACEP



NIHSS ED Estimate

- CN/Vision/Neglect: 8
- Unilateral motor: 8
- LOC: 8
- Language: 8
- Mild: 2, Moderate: 4, Severe: 8

E. Bradshaw Bunney, MD, FACEP



NIHSS: Driving Principles

- NIHSS: anatomic neurologic examination
- Quantification directs therapies
- Estimation helps to categorize patients
 - Low NIHSS, thrombolysis less indicated
 - Mid-range NIHSS, thrombolysis indicated
 - High NIHSS, thrombolysis less indicated
- NIHSS 10-20 optimal for thrombolysis?

E. Bradshaw Bunney, MD, FACEP



Case NIHSS Estimate

- CN/Vision/Neglect:
R vision loss & neglect, no fixed gaze 4
- Unilateral motor: complete hemiparesis 8
- LOC: mild decrease in LOC 2
- Language: expressive aphasia 4
- Approx 18 points total
- Mod-severe stroke range, worse if MS impaired

E. Bradshaw Bunney, MD, FACEP



Elevated BP Therapy: The Procedure

E. Bradshaw Bunney, MD, FACEP



BP Rx: Key Principles

- Identify hypertensive emergency situation
- Be aware of chronic HTN, systolic HTN
- Use BP meds that can be titrated
- Goal BP < 185 / 110
- Be more aggressive with ICH, elevated ICP
- Do not lower BP to a MAP < 110 mmHg
- Remember CPP = MAP- ICP

E. Bradshaw Bunney, MD, FACEP



First Things First: Verify BP

- Recheck the patient's blood pressure
- Perform it yourself
- Measure after supine, arm rested
- Validate with a manual cuff
- Measure in both arms
- Recheck a second time after 10 minutes

E. Bradshaw Bunney, MD, FACEP



Elevated BP Rx Procedure

- Establish HTN emergency: BP 230/140

E. Bradshaw Bunney, MD, FACEP



Elevated BP Rx Procedure

- Establish HTN emergency: BP 230/140
- IV bolus medications
 - Labetalol 10-40 mg IVP
 - Hydralazine 10-20 mg IVP
 - Enalapril 0.625-1.25 IVP

E. Bradshaw Bunney, MD, FACEP



Elevated BP Rx Procedure

- Establish HTN emergency: BP 230/140
- IV bolus medications
 - Labetalol 10-40 mg IVP
 - Hydralazine 10-20 mg IVP
 - Enalapril 0.625-1.25 IVP
- Continuous IV infusions
 - Esmolol 500 µg IV load, 50 µg/kg/min
 - Nitroprusside 0.5-10 µg/kg/min

E. Bradshaw Bunney, MD, FACEP



Elevated BP Rx Procedure

- Consider NTG in cardiac ischemia pts
- Calcium channel blockers also useful
- Goal CPP >70 mmHg, SBP > 90 mmHg
- If hypotensive, consider NS and pressors
 - Dopamine 2-20 µg/kg/min
 - Norepinephrine 0.05-2 µg/kg/min
 - Phenylephrine 2-10 µg/kg/min

E. Bradshaw Bunney, MD, FACEP



ED tPA Documentation

- Patient was explained risks and benefits of tPA use and was able to understand and provide verbal consent (as able), and signature with L hand.
- Risk/benefit favored tPA given clear onset time, young patient with no significant morbidities or factors that would preclude tPA use, and approx NIHSS that suggests OK use.
- Rapid CT obtained, neurology aware of pt status, agreed with expedited tPA use, to follow.

E. Bradshaw Bunney, MD, FACEP



ED tPA Documentation

- Just as important
- “The patient is NOT a candidate for tPA because...”

E. Bradshaw Bunney, MD, FACEP



ED Stroke Patient Dx & Rx

- Rapid diagnosis is critical
- NIHSS estimation guides therapies
- BP management procedure defined
- tPA use can appropriately occur and be documented
- Stroke pt outcome can be optimized

E. Bradshaw Bunney, MD, FACEP



Questions?

www.ferne.org
ferne@ferne.org

E. Bradshaw Bunney, MD, FACEP

