
**ED Ischemic Stroke
Patient Management:**
*What must we be able to do in
order to provide tPA in the ED?
Is there a standard of care?*

Edward P. Sloan, MD, MPH



**IEME/FERNE
Case Conference:
Legal Issues in the ED
Management of Acute
Ischemic Stroke Patients**

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**IEME
“Current Concepts in
Emergency Care”**

**Maui, HI
December 5, 2007**

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Disclosures

- ACEP Clinical Policies Committee
- ACEP Scientific Review Committee
- Executive Board, Foundation for Education and Research in Neurologic Emergencies

- No individual financial disclosures

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Ischemic Stroke Patient Case Presentation

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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).


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ED Clinical Exam


- VS: 98 F, 90, 16, 116/63, 98% RA, 50 kg
- The pt was alert, was able to slowly respond to simple commands. The pt had a patent airway, no carotid bruits, clear lungs, and a regular cardiac exam. PERRL. There was neglect of the R visual field. There was facial weakness of the R mouth, and R upper and lower extremity flaccid paralysis. DTRs were 2/2 on the L and 0/2 on the R.

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Intravenous tPA Research and Clinical Data

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NINDS Clinical Trials Data

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NINDS Trial Results

% Favorable Outcome, Complications

	t-PA	Placebo
No. of patients: 312	157	145
Modified Rankin Scale	40%	28%
Glasgow Outcome Scale	43%	32%
NIHSS	34%	20%
Symptomatic ICH (within 36 hr)	6.4%	0.6%
Death (by 90 days)	17%	21%

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IV tPA NINDS Data

- 14% absolute increase for the best clinical outcomes as measured by an NIHSS of 0-1.
- Benefit = Need to treat 8 patients with t-PA in order to have one additional patient with this best outcome.

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IV tPA NINDS Data

- 6% absolute symptomatic ICH increase.
- Harm = Will have one symptomatic ICH for every 16 patients treated with t-PA.

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IV tPA NINDS Data

- Conclusion: 2 patients will have minimal or no deficit for every 1 patient who has a symptomatic ICH

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Phase IV Data

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Phase IV t-PA trials

Author	Eligible patients	Patients receiving tPA(%)	Mean Rx time	Median NIHSS score	Favorable outcome	% ICH	% Symptomatic ICH	% Protocol deviation
NINDS		312	90-180 m	14	31-54%	10.9%	6.4%	
Chiu	1035	30(2.9%)	2'37"	14	63%	10%	6.6%	
Tanne		189	>2'	11-15		9%	5.8%	30%
Wang	900	57(6.3%)	2'28"	15	44-54%	9%	5%	9%
Buchan	1540	68(4.4%)		15	95%	31%	9%	16%
Albers		389	2'44"	13	35-43%	11.5%	3.3%	33%
Katzan	3948	70(1.8%)		12		22%	15.7%	50%
Chapman	2556	46(1.8%)	2'45"	14	30-48%	9%	2.2%	17%
Grotta	1689	269(16%)	2'17"	14	33%		4.5%	13%
Bravata		63		15		17%	6%	67%
Total	12,282	928(5.8%)	2'25"	10-15	33-95%	9.6%	5.2%	13-67%

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Phase IV Study Data

- NINDS results can be duplicated
- Must follow protocol exactly
- Must avoid protocol violations
- Must understand risk and benefit
- Education is essential

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NINDS Data Reanalysis

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Reanalysis Conclusions

- The independent reanalysis of the NINDS t-PA clinical trial confirms the results from the initial *NEJM* publication
- Good outcome odds ratio in reanalysis is better (2.1) than original result (1.7)
- Data support the use of t-PA in stroke patients within three hours of symptom onset

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Reanalysis Conclusions

- Number needed to treat calculation based on this reanalysis confirms that approximately 8-10 patients need to be treated with t-PA in order to cause one extra patient to have the best clinical outcome.
- About two patients will improve for every one that develops a symptomatic ICH.
- (Same 2:1 ratio)

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tPA ICH Risk Factors

Risk Factors for ICH (from the NINDS studies):

- Baseline NIHSS > 20
- Age > 70 years
- Ischemic changes present on initial CT
- Glucose > 300 mg/dl (16.7 mmol/L)

# of Risk Factors	# of patients treated with t-PA (n=310)	# Symptomatic ICHs (# of placebo patients with ICH)	Percentage (%)
0	114	2 (1)	1.8
1	144	7 (1)	4.9
> 1	52	11	21.2

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Reanalysis Conclusions

- We can identify patients at high risk for ICH: age > 70, NIHSS > 20, ischemic changes on CT, poorly controlled DM (glucose > 300)
- Who bleeds? Diabetic vasculopath who sustain a severe stroke
- Those with none of the four risk factors only have a 1 in 50 ICH risk
- Benefit to harm now becomes 6 to 1 ratio, an influential fact for all

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Emergency Medicine Practitioner Requisite Stroke Care Skill Set

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Key Clinical Questions

- You are obliged to treat ischemic stroke patients and be able to give tPA...
- In order to do this...
- What diagnostic skills?
- What use of stroke scales?
- What CT interpretation skills?
- What IV tPA use skills?

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Diagnostic Skills

- Identify a stroke
- Start with the Cincinnati stroke scale
- Identify speech and language deficit
- Identify hemiparesis
- Identify CN deficits c/w stroke
- Consider mental status changes

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Diagnostic Skills

- Exclude toxic/metabolic causes
- Exclude seizure syndromes
- Exclude TIAs
- Is the deficit significantly improving during the time that you are preparing to give IV tPA?

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Stroke Scales Use

- Estimate the severity of the stroke
- Know what patients were treated in the NINDS clinical trials
- Be able to identify significant or moderate stroke
- Consider use in elderly pts with severe stroke (NIHSS > 20) and AFib

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NIHSS: LOC

- LOC overall 0-3 pts
- LOC questions 0-2 pts
- LOC commands 0-2 pts

- LOC: 7 points total

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NIHSS: Cranial Nerves

- Gaze palsy 0-2 pts
- Visual field deficit 0-3 pts
- Facial motor 0-3 pts

- Gaze/Vision/
Cranial nerves: 8 points total

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NIHSS: Motor

- Each arm 0-4 pts
- Each leg 0-4 pts

- Motor: 8 points total
(8 right, 8 left)

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NIHSS: Cerebellar

- Limb ataxia 0-2 pts

- Cerebellar: 2 points total

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NIHSS: Sensory

- Pain, noxious stimuli 0-2 pts

- Sensory: 2 points total

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NIHSS: Language

- Aphasia 0-3 pts
- Dysarthria 0-2 pts

- Language: 5 points total

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NIHSS: Inattention

- Inattention 0-2 pts

- Inattention: 2 points total

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NIHSS Composite

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

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Four Main NIHSS Areas

- **CN/Visual:** Facial palsy, gaze palsy, visual field deficit
- **Unilateral motor:** Hemiparesis
- **LOC:** Depressed LOC, poorly responsive
- **Language:** Aphasia, dysarthria, neglect
- **28 total points**

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NIHSS ED Estimate

- **CN (visual):** 8
- **Unilateral motor:** 8
- **LOC:** 8
- **Language/Neglect:** 8
- **Mild: 2, Moderate: 4, Severe: 8**
- **+/- Incorporates other elements**

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NIHSS Patient Estimate

- **CN/Visual: R vision loss, no fixed gaze** 4
- **Unilateral motor: hemiparesis** 8
- **LOC: mild decreased LOC** 2
- **Language: speech def, neglect** 4
- **Approx 18 points total**
- **Moderate to severe stroke range**

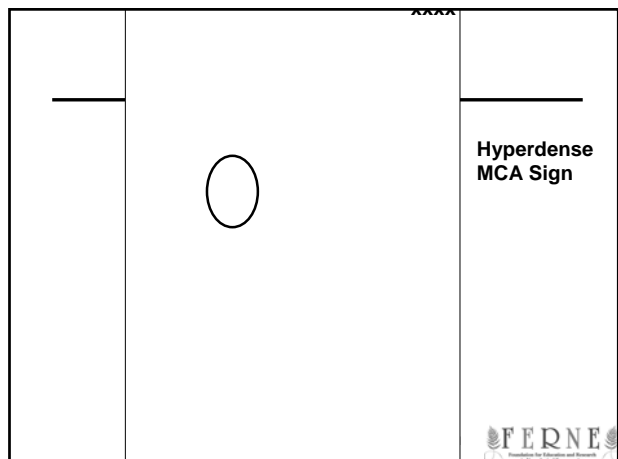
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CT Interpretation Skills

- **No insular ribbon or MCA sign**
- **No detailed assessment**
- **Identify asymmetry and edema**
- **Identify blood, mass lesion**
- **Identify any area of hypodensity consistent with a recent stroke of many hours duration that precludes IV tPA use**

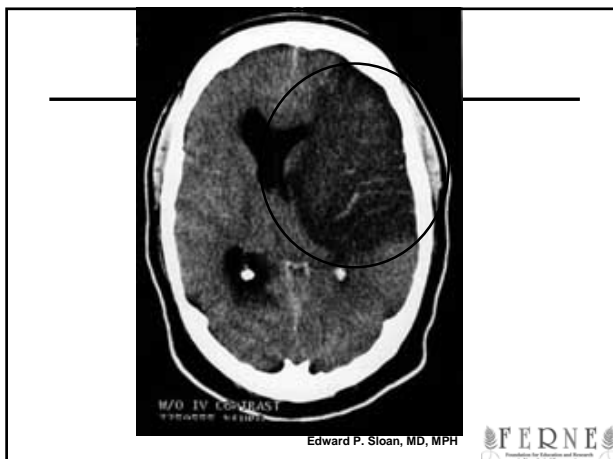
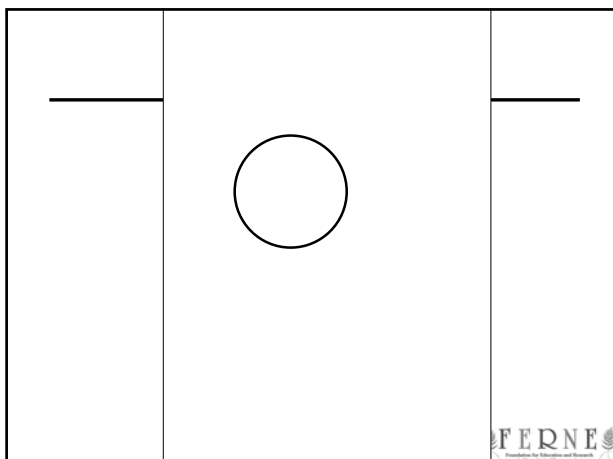
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Hyperdense
MCA Sign



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IV tPA Use Skills

- Identify indications, contraindications
- Quickly get the tests and consults
- Communicate with the neurologist
- Obtain consent with family and know what statistics are relevant
- Maintain BP below 185/110 range
- Follow the NINDS protocol closely
- Document the interaction

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ED tPA Documentation

- With tPA, there is a 30% greater chance of a good outcome at 3 months
- With tPA use, there is 10x greater risk of a symptomatic ICH (severe bleeding stroke)
- Mortality rates at 3 months are the same regardless of whether tPA is used
- What was the rationale, risk/benefit assessment for using or not using tPA?
- What was done to expedite Rx, consult neurology and radiology early on?

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ED Ischemic Stroke Patient Outcome

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Questions?

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1/1/2008 3:23 PM

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