Lehigh Valley Health Network LVHN Scholarly Works

Neurology Update for the Non-Neurologist

2013 Neurology Update for the Non-Neurologist

Feb 21st, 7:00 PM - 7:30 PM

Current Standards for Treatment of Stroke: Management of Acute Ischemic Stroke

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Current Standards for Treatment of Stroke

Management of Acute Ischemic Stroke

Dr. John Castaldo, MD

Professor and Chief of Neurology

A PASSION FOR BETTER MEDICINE."



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Acute Ischemic Stroke

How big and how bad a problem is it? How good are the treatment options? • Why don't we use them more often? What are the risks of good therapies? Who should receive these therapies? How should we move forward to obtain best practice for our communities?

Cerebrovascular Disease: Pathogenesis

Ischemic Stroke (83%)

Hemorrhagic Stroke (17%)

Atherothrombotic Cerebrovascular Disease (30%)

Cardio embolic (30%)

Intracerebral Hemorrhage (70%)

Image(s) have been omitted

Lacunar (25%) (small vessel disease)

Other (vasculitis, Subarachnoid Hemorrhage (30%) dissection, hypercoagulable, Etc. (10%)

Cryptogenic (5%)

How Big and How Bad a Problem is Acute Ischemic Stroke?

Stroke is Very Big and Very Bad

- Happens a lot
- Kills many
- Disables most
- Costs a ton
- Happens fast

Window of RX small

- 800,000/year
- 1 every 3 minutes
- Leading US cause
- \$50,000,000,000/year
- 2 million neurons
- 14 billion synapses
- 7.5 miles of axons/ min
- Under 4.5 hours/onset

How Good are the Treatment Options?

Preventive and Acute Intervention Therapies Work Well (But)

- Antihypertensive RX
- Blood glucose control
- Afib anticoagulation
- Antiplatelet Rx
- Anti hyperlipidemia Rx
- Life Style Change
- Smoking Cessation
- tPA

- Costs
- Commitment
- Time
- Effort
- Reimbursement
- Compliance
- Culture
- Not fun

Why Don't More AIS Patients Receive Early Restorative Treatment?

Patients Arrive Late

- Mean 155 minutes
- Mean 380 minutes
- **40%**
- **66%**
- **5%**
- Only 25%

- If using 911
- If first call PCP
- Arrive within 90min
- Arrive within 4hrs
- Actually get tPA
- Know stroke signs

Stroke Specialists are Rare

- Neurologists / USA
- Vascular boarded
- Hospitals USA
- Total Beds
- JC Primary Stroke Centers
- BAC Comprehensive
- Telestroke spoke.hub
- tPA administration

- **13,400**
- **345**
- **5795**
- **944,000**
- 800
- 200 anticipated
- Vascular neuro only
- Rare by ED physician

Tissue Plasminogen Activator (tPA)

Image(s) have been omitted

How Safe and How Effective is tPA Anyway?

How good is tPA in Stroke ?

- Roughly 50% of patients who receive tPA within time window leave hospital with minimal disability (ranking 0-1)
- Roughly 85% of patients who don't receive tPA are disabled, 15% are dead

Comparison 90 Day Outcomes tPA Treated LVH to NINDS Study Modified Rankin Scale @ 90 Days



IV tPA - Is Safe and It Works

- If E
- Pt recognizes signs
- Pt calls 911
- Arrives at a PCS
- Stroke team in place
- Neurologist on scene

But

- Few do
- Many call PCP
- Ambulance don't divert
- 24/7 hard to muster

Using tPA in Routine Clinical Practice

- Overall only about 3%-4% of stroke patients receive tPA—mostly due to time delays
- Efficacy similar to NINDS trial at most centers
- Rate of ICH: 4%-6%
- Risk of ICH increases with protocol violations
 - Time > 4.5 hours
 - Poor blood pressure control
 - INR > 1.7
 - Recent prior stroke
 - Wrong dose
 - 0.9 mg/kg
 - Maximum dose: 90 mg
 - Elevated age and blood sugar also increases risk

Time is Brain: Benefits of IV tPA Diminish Rapidly



Influence of Interval Response to tPA: Odds Ratio for Favorable Outcomes

Time (min)	Odds Ratio
<90	2.81
91–180	1.55
181–270	1.40
>270	1.15

Acute Carotid Stroke





Post Stent and tPA ICA Stenosis





Who Should Receive tPA?

Questions to Ask Before Initiating Thrombolytic Therapy

- Did the stroke start within the last 3 hours?
- Any recent illness associated with bleeding risk?
- Is patient taking anticoagulants?
- Are the baseline coagulation tests normal?
- Any medical contraindication for treatment?
- Any neurologic contraindication for treatment?
- What are the findings on CT?
- Are patient and family aware of risks for bleeding?
- What is the blood pressure?

ACCP 2008 Recommendations: Thrombolytic Therapy in AIS

- For eligible patients, we recommend IV tPA 0.9 mg/kg (maximum of 90 mg), provided that treatment is initiated within 3 hours of clearly defined symptom onset (Grade 1A)
 - For patients with extensive (greater than 1/3 of the MCA territory) and clearly identifiable hypo density on CT, we recommend <u>against</u> thrombolytic therapy (Grade 1B)

Treatment of Hypertension During and Following Administration of IV tPA

SBP 180–230 mm Hg or DBP 105–120 mm Hg

- Labetalol—10 mg IV over 1–2 min
 - Repeat every 10–20 min; maximum dose 300 mg; or
- Labetalol—10 mg IV followed by infusion 2–8 mg/min

SBP >230 mm Hg or DBP 121–140 mm Hg

- Labetalol as above; or
- Nicardipine—IV infusion at 5 mg/hr
 - Titrate up to desired effect by 2.5 mg/hr every 5 min; maximum rate 15 mg/hr
- DBP >140 mm Hg
 - Nitroprusside infusion 0.5 μg/kg/min; titrate to desired effect

Goals of Antihypertensive Treatment (in search of the Goldilocks BP)

- Too high is bad and may cause bleeding
- Too low may decompensate collaterals and extend infarct size
- Lowering too fast is worse than not lowering blood pressure at all (unless considering tPA)
- In general target 140-180/90-105
- Start with Nicardipene for best results

What Does Best Practice for AIS Look Like in the Age of tPA?

AIS Treatment: Other Options

- IA administration
- Mechanical thrombolysis
- IA and IV administration
- New thrombolytic agents
- Combination with other antithrombotic agents
- Combination with neuroprotective agents

Thrombolysis: IV or IA Approach?

An IA approach to recanalization allows for titrated and potentially more effective recanalization vs. IV alone

- But takes longer and time is brain
- Requires Neuro Interventionalist with experience
- Delays or eliminates window for IV tPA which may be fleeting
- Complications

90-Day Modified Rankin Score Revascularized vs. Unrevascularized



Antiplatelet Therapy

- ACCP 2008 Guidelines for Use of Antiplatelet Therapy in Ischemic Stroke
 - In patients not eligible for thrombolytic therapy, early Aspirin therapy (160–325 mg/day) is recommended (Grade 1A)
 - Delay Aspirin for at least 24 hours after tPA
 - Aspirin can be used safely in combination with low doses of subcutaneous Heparin

Early Anticoagulation

- Urgent anticoagulation is not recommended
 - Does more harm than good in all studies
- Should not be given at all unless imaging has excluded hemorrhage
- Requires slow initial administration and continuous monitoring of anticoagulation and adjustments in dose

Case Presentation (BM)

- 36yo man found down in a pile of mulch
- LVH ED 30 minutes out from discovery
- Stroke Alert : Flaccid quadriplegia, sluggish pupils, absent gag, respiratory arrest
- Toes Up going bilaterally

BM Found down unresponsive



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Distal Basilar Artery Occlusion



Distal Basilar Artery Occlusion



Interventional Catheter Clot Penetration of Basilar Clot



Basilar Clot Extracted with Penumbra Device:

Image(s) have been omitted

Basilar Occlusion After TPA and Reopro



Re-cannalization after tPA Cath in SCA



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Basilar Artery: Final Interventional Results



MRI Day 2 Stroke Alert



MRA Day 2

Outcome

NIHSS 0

- Walking the hospital floor unaware of any neurological deficits
- Discharged home

NETWORK

TCD Bubble Study with Valsalva (BM)

Viasys WinTCD Monitoring Report Created on 1/29/2009 at 10:29:19 AM Page 1 of 2

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On Follow-up

- TEE showed small PFO
- TCD showed aggressive bubble emboli
- Randomized to RESPECT
- Amplatzer device deployed
- Patient has remained free of neurological deficits for 2 years

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In a typical acute ischemic stroke, every minute the brain loses

- 1.9 million neurons
- 14 billion synapses

Image(s) have been omitted

 7.5 miles myelinated fibers

-- Saver, Stroke 2006

Summary AIS Optimal Medical Management 2013

- Rapid diagnosis and treatment is crucial to outcome: Time is Brain!
- Different strategies are necessary for different time windows for IV and IA tPA
- Neuroimaging is opening better understanding of tissue at risk/therapeutic outcome with aggressive therapy
- Early Risk Factor Modification and Stroke Unit improves outcomes substantially