INTERVENTIONAL MANAGEMENT OF ACUTE ISCHEMIC STROKE: THE EXCITING 1ST DAY

Hormozd Bozorgchami, M.D.
Assistant Professor
Department of Neurology
Dotter Interventional Institute
Oregon Health and Science University

Disclosures

Neuravi: I am on Executive Committee for ARISE2 Trial studying the EmboTrap Device

I also am involved with or Primary Investigator for several Industry-Sponsored Trials:
Janssen
Medtronic
Microvention
Stryker
Biogen
Daiichi Sankyo

Objectives

Introduction/Fun Facts
Epidemiology
IV tPA Indications/Challenges
Will review sequences of events involved in acute stroke treatments
Data on large vessel occlusions
Mechanical Thrombectomy
Telestroke
New Trials

Stroke Facts

• Fifth leading cause of death in the US
  • Moved down from fourth place
  • 130,000 Americans/year (1 out of every 20 deaths in USA)

Leading Causes of Death in the US 2013
1. Heart disease
2. Cancer
3. Chronic lower respiratory disease
4. Unintentional Injuries (includes med errors)
5. Stroke

• Leading cause of adult disability
• 795,000 strokes per year
• ~25% are recurrent stroke
• Stroke Costs the United States $34 Billion/Year

CDC.gov, AHA
Stroke Risk Factors

Non-modifiable
• Age
• Sex
• Race/Ethnicity
• Genetic
• Migraine

Modifiable
• High blood pressure
• Tobacco Use
• Diabetes
• High cholesterol
• Heart disease and Atrial Fibrillation
• Lack of exercise
• Heavy alcohol use
• Drug Use
• Cheetos

Does Porn Cause Stroke?
Pathophysiology – Ischemic

- Large Artery Atherosclerosis: 30%
- Small Vessel: 20%
- Ischemic (87% of total strokes US): 5%
- Cryptogenic: 25%
- Cardioembolic: 20%

When to suspect stroke?

- Timing
- Focal deficits (unilateral weakness, numbness, facial droop etc.)
- Speech impairment (aphasia, dysarthria)
- Vision impairment (field cut, diplopia)
- Ataxia, especially if unilateral
- Vertigo...
- Loss of, or decreased level of consciousness?

Ischemic stroke location

MAY CAUSE VARYING SYMPTOMS

Left Hemisphere*
- Speech Impairment or Lack of Speech*
- Lack of Comprehension*
- Left Gaze*
- Right Facial Droop*
- Right Sided Weakness*

Right Hemisphere *
- Slurred Speech*
- Right Gaze*
- Left Facial Droop*
- Left Sided Weakness*
- Left Sided Neglect*

Brainstem *
- Abnormal Eye Movements*
- Nausea, Vomiting or Vertigo*
- Difficulty Speaking*
- Difficulty Swallowing*
- Decreased Consciousness*
- Crossed Signs (ex: left side facial droop right side weakness)*

Common Stroke Mimics

Stroke Mimics*
- Alcohol Intoxication*
- Cerebral Infections*
- Drug Overdose*
- Epidural Hematoma*
- Hypoglycemia*
- Metabolic Disorders*
- Migraines*
- Neuropathies (Bell’s Palsy)*
- Seizure and post seizure*
- Tumors*
- Todd’s Paralysis*

ACUTE STROKE: Case

74 yo awakens with stroke symptoms.
Last normal at 9PM; found by son at 7:30 AM unable talk, on bathroom floor.

PMH: HTN, HLD, asthma
MEDS: aspirin, statin, inhalers
PE: NIHSS 20 (=Bad)
global aphasia, left gaze deviation, right hemiplegia, right homonymous hemianopsia.

Non-con head CT nl. BP 180s/90s. CBC, Chem 7, coags nl.

ACUTE STROKE: Imaging

QUICK GUIDE TO CT FINDINGS IN ACUTE STROKE

- Often normal
- Hyperdense vessels or dot sign
- Insular ribbon sign
- Sulcal effacement
- Loss of grey-white differentiation
- Hypodensity
- CTA: large vessel occlusion

Which one of these is an Acute Stroke?
Non-Contrast Head CT

ASPECTS Score:

Hypodensity on CT: 10 = normal
0=all areas hypodense

+Thrombectomy trial favorable outcomes w/ ASPECTS 5-6/10 or >

ASPECTS: Normal vs. ASPECTS 4

ACUTE STROKE: Perfusion Imaging

MTT and TTP: prolonged $\rightarrow$ slow transit of blood
CBV: incr $\rightarrow$ appropriate vasodilation; decr $\rightarrow$ dead brain
CBF=CBV/MTT; <20 $\rightarrow$ ischemia; <12 $\rightarrow$ cell death

Upside
- Quick
- Pacemaker safe
- CBF/CBV gives some indication of tissue at risk versus irreversible infarction

Downside
- Tech dependent
- Requires 18g AC IV
- Can take time to reconstruct
- Heavy dye load
- MRI DWI more reliable for irreversible infarction
ACUTE STROKE: Perfusion Imaging

**MR PERFUSION**

(pink = DWI = dead; green = area to save)

**Upside**
- DWI (dead tissue) extremely accurate/easy to read
- Tissue at risk may be better defined

**Downside**
- Must lie still
- Takes a long time
- Monitoring in MRI scanner difficult
- Post-processing
- Scanner availability

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**Case Example**

- On exam: NIHSS 20. Had global aphasia, left gaze deviation, and dense Right hemiplegia
- Patient not an IV tPA candidate given last known normal time of 9pm
- Family wanted us to be aggressive so patient was transferred to OHSU for a Perfusion MRI Brain Study and potential mechanical thrombectomy

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**Back to Case Example**

- 74 yo F with h/o HTN, HLD who was last normal 9pm the evening PTA
- Found down in her apartment by her son at 7:30am
- Appeared that breakfast may have been prepared that AM
- Patient with to Outside Hospital, Telestroke consult activated

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**ACUTE STROKE: Case**

- DWI
- ADC
- PWI: TTP
- MRA
ACUTE STROKE: Case

Initial Angiogram

MERCI used (Older Device)

Clot in Hand
Pre vs. Post-Thrombectomy Angiogram

MRI Brain pre- & 24hrs post-

Case Conclusion

- 24 hrs after procedure: No aphasia, 4/5 strength in Right hemibody, ambulatory, NIHSS: 3
- Was found to have Afib
- Discharged Home POD3
- 90-day follow up NIHSS: 1 for facial weakness

Stroke Therapy Timeline

- Prayer: Until 1996
- IV tPA: 1996
- IA tPA (off-label): 1999
- MERCI/Penumbra: 2004/2008
- Solitaire/TREVO: 2012
Disclosure: TPA Spectrum of Opinion

**tPA Zealots**
- Many ER MDs
- "Very Safe"
  - Treat Late
  - Treat Mild
  - Treat likely mimics
  - Treat All

**Me**
- "Very Dangerous"
  - NINDs not Enough
  - Needs more Study
  - Doesn’t Work
  - Treat None

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**NINDS IV tPA Trial for Acute Ischemic Stroke**

- 2 Part Trial:
  - Part 1 (n = 291) looked to see if tPA improved NIHSS by at least 4 points or resolution of neuro deficit within 24hrs
  - Part 2 (n = 333) used multiple assessments to look at outcome at 3 months (mRS, Barthel, NIHSS GOS)

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**NINDS IV tPA Trial for Acute Ischemic Stroke**

- Inclusion Criteria/Exclusion Criteria:
  - Measurable Deficit on NIHSS
  - Negative CT Head for Hemorrhage
  - No Stroke/serious head trauma within 3 months
  - No surgery within 14 days
  - History of Brain Hemorrhage
  - BP >185/110
  - Rapid improving or mild symptoms
  - H/o GI or GU bleed within 21 days
  - Arterial puncture at noncompressible site within 7 days
  - Seizure at onset
  - Anticoagulant use with heparin within 48hrs
  - INR >1.7
  - Platelets <100k
  - Glucose <50 or >400
  - Symptoms concerning for SAH

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**How well does IV tPA Work?**

<table>
<thead>
<tr>
<th>tPA (%)</th>
<th>Placebo (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Favorable outcome at 3 mos</td>
<td></td>
</tr>
<tr>
<td>Rankin</td>
<td>45</td>
</tr>
<tr>
<td>NIHSS</td>
<td>34</td>
</tr>
<tr>
<td>Symptomatic hemorrhage</td>
<td>6.4</td>
</tr>
<tr>
<td>Mortality</td>
<td>17</td>
</tr>
</tbody>
</table>

Number need to treat with IV tPA to have a good outcome in one person:
- At 0-90 minutes: 4
- At 91-180 minutes: 8

In Part 1, no significant difference at 24hrs, but those patients had diff a 3mo
FDA Approved for Stroke <3 hrs

- With following criteria:
  - Measurable Deficit on NIHSS
  - Negative CT Head for Hemorrhage
  - No Stroke/serious head trauma within 3 months
  - No surgery within 14 days
  - History of Brain Hemorrhage
  - BP >185/110
  - Rapid improving or mild symptoms (NIHSS >3)
  - H/o GI or GU bleed within 21 days
  - Arterial puncture at noncompressible site within 7 days
  - Seizure at onset
  - Anticoagulant use with heparin within 48hrs
  - INR >1.7
  - Platelets <100k
  - Glucose <50 or >400
  - Symptoms concerning for SAH
  - Exclude if NIHSS >22

2015 Update on FDA Approval

- Measurable Deficit on NIHSS
- Negative CT Head for Hemorrhage
- No serious head trauma within 3 months (Previous Ischemic Stroke Removed)
- No surgery within 14 days
- History of Brain Hemorrhage (Now a warning and precaution)
- BP >185/110 (Changed to “Severe Uncontrolled Hypertension”)
- Rapid improving or mild symptoms (removed)
- H/o GI or GU bleed within 21 days
- Arterial puncture at noncompressible site within 7 days
- Seizure at onset (Removed)
- Anticoagulant use with heparin within 48hrs
- INR >1.7
- Platelets <100k
- Glucose <50 or >400 (now a warning)
- Symptoms concerning for SAH
- Severe Stroke (NIHSS >22) (Removed)

AHA Guidelines add a little

- 2013 AHA Guidelines re: Severe HTN:
  - IV tPA reasonable if BP can be lowered (<185/110) (I follow this)
  - But Optimum BP range likely individual

- 2013 AHA Guidelines re: Coagulation
  - Consider Platelets, PT, INR, PTT in all
  - Unless suspect abnormality in values, would not delay IV tPA
    - Can always stop infusion if lab comes back abnormal
  - Novel Anticoagulants still poorly understood
    - At OHSU and other academic centers, excluded if used within 48hrs

AHA Guidelines add a little

- Seizure Rule:
  - Only consider IV tPA if truly no hemorrhage and strong suspicion of stroke

- 2013 AHA Guidelines re: Blood Glucose
  - AHA states Blood Glucose <50 relative exclusion
    - I reverse with D50, and if no progressive improvement, then would pursue tPA.
    - If still concern, and suspect large vessel, can get CTA to confirm
  - Although hyperglycemia removed, it does correlate with higher rates of ICH and poorer outcomes overall
AHA Guidelines add a little

- Treatment of mild or resolving strokes
- Removed exclusion from FDA
- Relative Exclusion according to AHA
- My take, unless its aphasia or appears debilitating, would exclude NIHSS <4

- Early Signs of Infarct
  - AHA 2013 guidelines say higher risk for sICH
  - But good outcome still overall more likely (I question this)

- Age > 77 associated with increased bleeding
  - Efficacy greatly reduced but overall favorable

Stroke, January 2013

IV tPA beyond 3 Hours?

- AHA Guidelines recommend IV tPA in 3-4.5 hr time window unless patient has one of the following (Class 2B, Level of Evidence C):
  - Age >80
  - On oral anticoagulant, regardless of INR
  - Baseline NIHSS >25
  - History of BOTH previous stroke and Diabetes

- FDA reviewed same data, and REJECTED extending it beyond 3 hours
  - No randomized trial in United States showed benefit

- My take, I consider case by case basis and discuss this with the patient/family

ECASS III STUDY: IV 3-4.5

Werner Hacke, ECASS III study group
NEJM Sept 2008

- 3-4.5 hour window
- Near identical I/E to NINDS and ATLANTIS
- Exclusion > 1/3 MCA on CT
- Drug company sponsored and analyzed
- 821 patients; 130 sites in Europe

ECASS III Results

<table>
<thead>
<tr>
<th>90 Day %</th>
<th>Placebo</th>
<th>rt-PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline NIHSS</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Rankin 0,1</td>
<td>45</td>
<td>52 (7% Abs improve)</td>
</tr>
<tr>
<td>NIHSS 0,1</td>
<td>43</td>
<td>50</td>
</tr>
<tr>
<td>Barthel ≥ 95</td>
<td>58</td>
<td>63</td>
</tr>
<tr>
<td>Death day 90</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Symp ICH</td>
<td>4%</td>
<td>8%</td>
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</table>
ECASS III STUDY: Additional

Werner Hacke, ECASS III study group
NEJM Sept 2008

- Baseline milder strokes in TPA group led to a type II (false positive) trial.
- No US patients in trial - limits generalizability to our local population
- “Placebo” appears to be a very effective treatment in this study (ie these were mild stroke patients) (45% favorable outcome)

ATLANTIS US STUDY: IV 3-5

Wayne Clark, Atlantis study group
JAMA Dec 1999

- 3-5 hour window
- NIHSS ≥ 4
- Exclusion > 1/3 MCA on CT
- Drug company sponsored and analyzed (+ bias!)
- 550 patients; 140 US sites; OHSU 15% patients

ATLANTIS Part B Results

<table>
<thead>
<tr>
<th>90 Day %</th>
<th>Placebo</th>
<th>rt-PA</th>
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</thead>
<tbody>
<tr>
<td>BL NIHSS</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Rankin 0,1</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>NIHSS 0,1</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>Barthel ≥ 95</td>
<td>53</td>
<td>53</td>
</tr>
<tr>
<td>Death day 90</td>
<td>7.0%</td>
<td>10.8%</td>
</tr>
<tr>
<td>Symp ICH</td>
<td>0.7%</td>
<td>7.2%</td>
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</table>
ATLANTIS STUDY: Additional

◆ Every endpoint negative; very well matched at baseline.
◆ Started as 3-6 hours; shorten to 5 hours after 15% SICH in 5-6 hour group.
◆ 82 patients (15%) of entire trial enrolled here in Oregon- therefore these results represent “our” type of patient we would be treating in our local ERs.

IST-3 Results: 0-6 window N = 3035

<table>
<thead>
<tr>
<th></th>
<th>Placebo</th>
<th>rt-PA</th>
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</thead>
<tbody>
<tr>
<td>Baseline NIH</td>
<td>11.6</td>
<td>11.6</td>
</tr>
<tr>
<td>OHS 0,1,2</td>
<td>35%</td>
<td>37%</td>
</tr>
<tr>
<td>Symp ICH</td>
<td>1%</td>
<td>7%</td>
</tr>
</tbody>
</table>

(2% Abs improve)

TPA use in the elderly

Only 42 patients in randomized NINDS trial > 80
VISTA Archive: 1200 patients ≥ 80  Outcome 3 Mo
Good recovery (MR 0-2) TPA 23% Plac 20% (0.02)
(i.e. tx 33 patient to improve outcome in one) 😊
Cost: heli $20K  TPA + Hospital (ICU) $50K+; MDs $3,000 so up to $75,000 extra per case (My estimate)

Just because you could treat doesn’t mean you should treat.

tPA in Mild Strokes

• Control groups in Citicoline and Cerevene
  Neuroprotective trials in the 1990s found that patients with < 8 points on the NIHSS had a 80% chance of an excellent recovery at three months. (BI, MR)

• So is the cost and risk of TPA worth it if they have an 80% chance of an excellent recovery anyway?
tPA in Mild Strokes

- On Contrary:
  - From Austrian Stroke Unit Registry
  - N = 890 patients treated with vs without tPA (retrospective)
  - NIHSS < 6

So should I give IV tPA to these patients??

PRISMS study

- Double-Blinded, randomized, Multi-Center Study
- NIHSS < 6, and not clearly disabling
- IV tPA plus ASA 325 mg vs. Placebo + ASA 325 mg

- Study is still actively recruiting

LARGE VESSEL STROKES
**Large vessel occlusions**

**SCOPE OF THE PROBLEM**

- Common: 40-50% of all ischemic stroke
- Severe: 5x higher mortality, 3-fold reduction in good outcome
- Respond poorly to intravenous thrombolytic (tPA)
- Successful opening of occlusion by Intravenous tPA:
  - Middle Cerebral Artery: 35%
  - Carotid Terminus: Less than 10%
- **Successful opening of the artery associated with improved outcome**

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**Successful opening of artery and good outcome**

- 138 Patients
- Acute MCA occlusion
- All treated with IV-tPA

**GOOD OUTCOME AT HOSPITAL DISCHARGE**

- 8% Good Outcome If Artery Did Not Open
- 66% Good Outcome If Artery Did Open

![Graph showing successful opening and good outcomes](image)


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**Impact of clot burden**

- 138 Patients
- Acute MCA occ
- All treated with IV-tPA

- Clots < 5 mm long are very likely to open with intravenous tPA.
- Clots > 7 mm long never opened with intravenous tPA.

![Graph showing successful opening and clot burden](image)


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**Time is brain**

**Probability of good clinical outcome over time to technically successful angiographic reperfusion**

- The typical LVO patient loses 2 million neurons/min in the territory at risk

![Graph showing time to successful angiographic reperfusion](image)

Khatri P et al. Neurology 2009
Saver J. Stroke 2006


Time is brain

• For Every 5-minute Delay in Endovascular Reperfusion:
  • 1 of 100 patients has a worse disability outcome

The Solitaire Device

• SWIFT Trial: Randomized between Solitaire vs. MERCI within 8 hours of onset (N=113)
  • Overall successful recanalization without ICH seen in 60% in Solitaire versus 24% in MERCI (P <0.0001)
  • Good outcome (mRS 0-2) seen in 58% vs. 38% (P=0.017)
  • 90-Day Mortality 17% vs. 38% (P=0.02)
  • ICH seen in 2% vs. 11% (P=0.05)
  • Not a Placebo-Controlled Study

The Trevo Device

• Trevo 2 Trial
• Compared Trevo Device (Stryker) vs Merci Device
• Treatment within 8 hours of last known well
• TICI 2-3 revascularization in 86% vs. 60%

Early Randomized clinical trials

NEW ENGLAND JOURNAL OF MEDICINE, FEBRUARY 2013
Three clinical trials did NOT show benefit of endovascular stroke treatment compared to intravenous tPA treatment.

Why?
1. Poor patient selection.
   Not selected with CT angiography.
   20% of patients randomized to IA had no thrombus
2. First generation mechanical devices did not work better than intravenous tPA.
   Devices successful 30-45% of the time.
   IV tPA successful 30-40% of the time.

Saver et al, ISC 2012

Lancet 2012

Modern Randomized clinical trials
NEW ENGLAND JOURNAL OF MEDICINE, 2014-2015

Improved Outcomes
- Better study design
- Faster times
- Careful selection
- Improved Outcomes
- Newer devices

New Randomized Clinical Trials of Endovascular Therapy
- Stent-retriever + IV tPA vs. IV tPA alone
- Fast endovascular treatment (< 6 hrs)
- Large vessel occlusions (ICA / MCA M1)
- Moderate/Severe deficits (NIHSS 17)
- High rates of reperfusion (TICI 2b/3 of 59-88%)
- NEJM publications (all 5)

MR CLEAN
- Multi-Center Dutch Study
- All Anterior Ischemic Stroke Patients within 6 hours
- Randomized patients between medical therapy vs. Intra-arterial Therapy
- N = 500
- Almost 90% in each group got IV tPA
- Very similar demographics between the 2 groups

Secondary Clinical Outcomes: NIHSS

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIHSS at 24hrs</td>
<td>2.3 (1.0 to 3.5)</td>
</tr>
<tr>
<td>NIHSS 1 Week</td>
<td>2.9 (1.5 to 4.3)</td>
</tr>
</tbody>
</table>

**Presented by Dr. Dippel, Erasmus University at World Stroke Congress 2014**
**MR CLEAN Rankin Shift Analysis**

![Graph showing the Rankin shift analysis for intervention and control groups.](image)

- **Intervention (N=233):**
  - 0%: 16%
  - 1%: 19%
  - 2%: 21%
  - 3%: 22%
  - 4%: 6%
  - 5%: 21%
  - 6%: 5%

- **Control (N=267):**
  - 0%: 13%
  - 1%: 30%
  - 2%: 12%
  - 3%: 22%
  - 4%: 22%
  - 5%: 21%
  - 6%: 6%

**Presented by Dr. Dippel, Erasmus University at World Stroke Congress 2014**

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**New Randomized Clinical Trials of Endovascular Therapy**

![Graph showing good outcome rankings.](image)

- **Endovascular:***
  - MR CLEAN P<0.05 CT: 33%
  - REVASCAT P<0.05 ASPECTS: 44%
  - ESCAPE P<0.001 Collaterals: 53%
  - SWIFT PRIME P<0.001 RAPID 80%: 60%
  - SWIFT PRIME P<0.001 RAPID 100%: 71%

- **Control:**
  - 19%
  - 28%
  - 29%
  - 36%
  - 40%

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**Number Needed to treat**

- **In order to have one additional stroke patient be independent at 90 days:**
  - **MR CLEAN**
  - **ESCAPE**
  - **EXTEND-IA**
  - **SWIFT-PRIME**

- **Primary PCI vs. Thrombolysis for STEMI: Prevention of MI/Stroke/Death**

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**New AHA Guidelines 2015**

**Endovascular therapy with a stent retriever is recommended (Class 1 Level A)**

- Proximal MCA or ICA occlusion
- Within 6 hours of symptom onset

We have a New Standard of Care for Stroke!
The Referral Pattern – Current State U.S.

Patient has a stroke

EMS takes patient to:

- Comprehensive Stroke Center (CSC) ~600
  - Neurology and Interventionists agree upon intervention

- Primary Stroke Center (PSC) ~1100
  - Neurologist determines if IV t-PA is given or whether more action must be taken

- Community Hospital ~5000
  - May or may not have Neurologist/basic stroke treatment knowledge
  - No referrals for stroke care

“Drip and Ship”

If Neurologist deems that the patient is eligible, EMS takes patient to CSC

OHSU: Telestroke

OHSU Telemedicine Map

The OHSU Telemedicine Network

OHSU Telemedicine Map

Telestroke: Use in Clinical Care

Stroke onset 8:15; OSH 140 miles from OHSU

Patient examined 10:15 via telestroke; labs reviewed

INR explained and consent obtained from his wife 10:45.

Case and ETA reviewed with lifeflight- left 10:55

Arrived OHSU 11:40; exam repeated Clot removed 11:50 (3' 35" post onset)
OHSU Telestroke Consults

Neuravi Solution: **EmboTrap**

- Outer Cage inlet openings & leaflets
- Dedicated inner flow channel
- Embolization protection (DE & NTE)

**Caution:** Investigational device. Limited by Federal law to investigational use.

Secure Capture with Flow & Protection

- Maximize grip & Minimize compression
- Pre-morbid mRS 0-1
- Age 18-85

**New Device in Trial: Embotrap**

- Patients with NIHSS 6-25
- Treatment within 8 hours
- Large Vessel Occlusion confirmed (MCA, ICA, VA, BA)

**Caution:** Investigational device. Limited by Federal law to investigational use.

- OHSU is Top Enroller in this International Study
Recent Case Example

- 65 yo F, acute onset ALOC with bilateral upper extremity weakness with vertigo at 8:30am.
- Went to Outside ER, Telestroke activated
- NIHSS was 15
- IV tPA given ~11:00 am
- Worsened somnolence prior to transfer, requiring intubation
- Transferred to OHSU directly to CT

Transferred to OHSU

- NIHSS on arrival 19X (can't assess dysarthria, so gets X)
- Delay in imaging due to lack of functioning IV

Angiography
Post-Thrombectomy Run

- TICI3 Revascularization (Complete) at 5 hours from onset
- After Extubation, NIHSS 1 for dysarthria
- 48 hours post, was NIHSS 0

New Trial to Extend Time Windows

- DEFUSE 3 Trial
  - Testing to see if can extend time window up to 16 hours with imaging
  - For Middle Cerebral Artery (M1) or Internal Carotid Artery strokes
- Endovascular Therapy vs. Medical therapy following a Brain Perfusion Study

Acute Stroke: Conclusions

- In Acute Stroke Therapy, priority is typically IV tPA
  - However in Large Vessel Occlusions, IV tPA likely to fail
  - Time is Brain, every single minute counts
  - Don’t worry about mimics, overall much worse to delay stroke care
- CTA/MRA is done in a package with Perfusion imaging
- Perfusion imaging should be done at institution where patient is receiving IR therapy
- MRI Brain often done to confirm diagnosis if it is in question

CTH 24hr-Post Procedure

- TICI3 Revascularization (Complete) at 5 hours from onset
- After Extubation, NIHSS 1 for dysarthria
- 48 hours post, was NIHSS 0
Acute Stroke: Conclusions

• Final thoughts:

  • Typical time windows:
    • IV tPA: 0-3 hrs, can consider up to 4.5hr (not FDA approved)
    • IA tPA: 6hr (not FDA approved nor favored by most Interventionalists)
    • Mechanical
      • Anterior circ: 8hr (may be able to extend more)
      • Basilar: 24-48hr
  • May be able to extend time windows with advanced stroke imaging (MRI/MR perfusion, CT/CTP)
  • Always check blood sugars and vitals first
  • Also a Minimum 20 Gauge IV in Antecubital will save a lot of time (18 preferred) as required for perfusion imaging/CTA

Thank You

The OHSU Stroke Center
24/7 365 Days a Year
503-494-7000

Wayne Clark, MD
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