Stroke And Acute Patient Evaluation in The Endovascular Era.

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USA Stroke Epidemiology

- Estimated 700,000 strokes per year.
- Every 45 seconds, someone in the USA has a stroke.
- Stroke is fourth leading cause of death in the USA.
- Stroke is the leading cause of long-term disability.
- 5 million Americans currently living with the effects of stroke.
- AHA stroke calculated US costs at $58 billion in 2006.
- Stroke costs likely to double by 2030.

The aging US population:

Projected number of strokes in US: 2002 - 2025

Familiar faces of stroke:

South Dakota Stroke Data:

americashealthrankings.org
**Stroke types: Ischemic**

Ischemic stroke

- Small Vessel
- Large Vessel

**Stroke types: Hemorrhagic**

- SAH
- ICH

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**Warning signs of stroke:**

- Face drooping
- Arm weakness
- Speech difficulties
- Time to call 911

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**Pathophysiology of Acute Stroke:**

CBF:
- 55cc/100 gm/min = NL Cerebral Flow
- 25cc/100 gm/min = Reversible Ischemia/Sx's
- <10cc/100 gm/min = Irreversible Damage

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**STROKE PATHOPHYSIOLOGY (REVERSIBLE INJURY):**

- Hemodynamic derangement → low O2 to neurons
- Failure of aerobic respiration and Na/K pump dysfunction
- Cytotoxic edema - Na and H2O flow into cell (cell dysfunction, not destruction)
**STROKE PATHOPHYSIOLOGY (IRREVERSIBLE INJURY)**
- Ca into cell (Beginning of irreversible injury)
- Self-destructive lysosomal enzymes, and apoptotic mechanisms
- 3-4 hrs post ischemia, BBB compromised and plasma proteins released into extracellular spaces
- Vasogenic edema
- Cytokines and increased expression of adhesion molecules
- Pyrexia and anemia (new infarct tissue)

**Ischemic Penumbra:**
- Described in 1981
- Ischemic tissue potentially destined for infarction but not yet irreversibly injured and the target of acute therapies.

**Purpose of Acute Stroke Therapy?**
- Restore uniform CBF
- Salvage Penumbra
- Avoid Disaster!!!

**Time and pathophysiology:**
- **Duration of Ischemia** — “Time is Brain.”
- **Collateral Blood Flow Availability:**
- **Extent and timing of blood flow restriction:**

**Things That Matter!**
- % Pts w/ Penumbra
- Time in Hours

**Ischemic Penumbra:**
- Diffusion
- Perfusion
- Metabolism

**Purpose of Acute Stroke Therapy?**
- Restore uniform CBF
- Salvage Penumbra
- Avoid Disaster!!!
Time and Treatment Decisions:

- FDA approval 1995 for a 3 hr window.
- FDA extends window from 3 to 4.5 hrs for selected individuals 2009.
- Now considered standard of care for ischemic stroke treatment in appropriately selected patients.
- If given within 90 mins, Odds ratio for improvement is OR = 4.43 (patient is 4 times more likely to improve).
- 2015 JACHO revises acute ED treatment guidelines.

rTPA for IV Thrombolytic Therapy:

- Contraindications for use:
  - Current ICH
  - Subarachnoid Hemorrhage
  - Recent (w/in 3 mo) Serious Head Trauma, Intracranial/Intraspinal Surgery
  - Presence or intracranial conditions that may increase risk of bleeding
    - Tumor, Aneurysm, AVM
  - Current Severe Uncontrolled HTN
  - Bleeding Diathesis
  - Other changes:
    - 3 – 4.5 hr window — > 80 yrs. Use of AC, NIHSS > 22, H/O CVA & DM. Now also considered relative pending physician clinical judgment.
    - Last known Well and the stuttering TIA vs CVA

Golden Hour Acute Stroke Rx:

- 2015 Joint Commission mandates the following:
  - DTN time < 60 min for at least 75% of patients.
  - DTN time < 45 min for at least 50% of patients.

New Evidence Based Guidelines for Endovascular Therapy - 2015

- Patients eligible for IV rTPA should receive it even if endovascular therapy is being considered (class I).
- Endovascular therapy w/stent retriever is indicated if: MRS = 0-1, IV TPA given in <4.5 hrs, 18 y.o. or older, ICA or proximal MCA occluded, NIHSS 6 or >. Groin puncture within 6 hrs from LKW.
- Repertusion (TICI 2b/3 grade) should be in < 6 hrs LKW to improve outcome (class I).
- Stent retriever in anterior circ beneficial in patients not candidates for IV rTPA if done w/in 6 hrs LKW (class IIa).
Acute Imaging Guidelines:
- Emergency neuro imaging is needed to assess patients for acute stroke therapy. In most cases noncontrast CT Head is satisfactory for initial imaging (class I).
- If endovascular therapy is anticipated, noninvasive intracranial vascular imaging is advised but should not delay onset of IV rt-PA treatment (class I).


Acute Stroke Case:
- 55 yo male w/ HTN, Hyperlipidemia.
- Recently he has had some irregular heart beats.
- Develops abrupt onset of dense Rt. Hemiparesis, Dysarthria/Dysphasia.
- ED Eval NIHSS = 19, CT Head Done – NO BLEED
- Unknown onset. Last known well 4 hrs.
- OPTIONS for Treatment???

Thank You for Your Attention!