Interventional Management of Acute Ischemic Stroke

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Ischemic stroke is the leading cause of disability and fifth leading cause of mortality in the US
- Approximately 800,000 strokes occur in the US each year - roughly one stroke every 40 seconds
- Estimated direct and indirect cost of stroke care is over $100 billion a year
- Despite the magnitude of problem there was therapeutic nihilism for patients with acute ischemic stroke for centuries

Program Faculty Disclosures
I have no relevant financial relationships to disclose
I will not discuss products in my presentation
First major breakthrough in treatment of acute ischemic stroke (AIS) came in 1996 when the FDA approved intravenous tissue plasminogen activator (IV-tPA) for use within 3 hours of symptom onset - created paradigm shift in management of acute ischemic stroke.

Approval came following completion of a NINDS trial showing tPA improved functional outcome at 90 days in AIS when administered within 3 hours of symptom onset.

Since the approval of IV-tPA there have been multiple randomized controlled trials, including ECASS III, demonstrating efficacy of IV-tPA up to 4.5 hours from symptom onset.

Limitations of IV-tPA include limited treatment window (within 4.5 hours) and low recanalization rates for large-vessel occlusions (M1, carotid terminus, cervical ICA).

The major drivers for the development of endovascular stroke therapy were the desire to expand the 3-hour treatment window and the relatively low recanalization rates for large-vessel occlusions with IV-tPA (which often caused the most severe strokes).

The evolution of endovascular procedures for AIS started with use of a plethora of techniques including intra-arterial (IA) thrombolysis, mechanical manipulation of clot with microwires and microcatheters, and percutaneous angioplasty/stents.
In early 2000, physicians at UCLA developed and patented a corkscrew-like retrieval device designed to retrieve lost endovascular coils accidentally released into the cerebral vasculature. Soon became apparent that the device could be used for removal of endoluminal thrombi.

In 2004, the Mechanical Embolus Removal in Cerebral Ischemia (MERCI) retriever became the first device approved for clot removal in acute ischemic stroke, unfortunately, limited recanalization rates.

Second-generation devices include the stentrievers, Solitaire, and Trevo, and aspiration catheters. These newer generation devices have been shown to have significantly better, ≥90%, recanalization rates compared with the MERCI retriever.
Endovascular Therapy

Aspiration catheters and suction devices

So… Does endovascular therapy work?

YES!!
Beginning in December 2014, a series of pivotal trials were published demonstrating that endovascular thrombectomy (EVT) was highly effective:

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  - ESCAPE Trial Investigators. Randomized Assessment of Rapid Endovascular Treatment of Ischemic Stroke (ESCAPE) Trial Investigators.
  - SWIFT PRIME Investigators. Stent-retriever thrombectomy after intravenous t-PA versus t-PA alone in ischemic stroke (SWIFT PRIME) Trial Investigators.
  - THRACE Investigators. Mechanical thrombectomy after intravenous alteplase versus alteplase alone after stroke (THRACE) Trial Investigators.

- More recent studies have shown safety and benefit of mechanical thrombectomy up to 24 hours after symptom onset - DAWN / DEFUSE trials.
Thank You

Questions?

References


