Endovascular Therapy: The New Standard of Care for Acute Stroke

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Disclosures

• Lori Massaro – Genentech speakers bureau
• Jean Luciano – Genentech speakers bureau
• Robin D’Ambrosio - none
Objectives

- Discuss the research related to endovascular therapy, understand the process for the decision to utilize endovascular therapy and discuss the post endovascular procedure nursing monitoring

Nice to know vocabulary!

**TICI Score**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No perfusion</td>
</tr>
<tr>
<td>1</td>
<td>Penetration with minimal perfusion</td>
</tr>
<tr>
<td>2</td>
<td>Partial perfusion</td>
</tr>
<tr>
<td>2a</td>
<td>Only partial filling (2/3) of the entire vascular territory is visualized</td>
</tr>
<tr>
<td>2b</td>
<td>Complete filling of all of the expected vascular territory is visualized, but the filling is slower than normal</td>
</tr>
<tr>
<td>3</td>
<td>Complete perfusion</td>
</tr>
</tbody>
</table>
Vocabulary: Aspects Score

- Alberta Stroke Program Early CT score (ASPECTS) is a 10-point quantitative topographic CT scan score
- ASPECTS was developed to offer the reliability and utility of a standard CT examination with a reproducible grading system to assess early ischemic changes on pretreatment CT studies in patients with acute ischemic stroke of the anterior circulation
- ASPECTS CT score is simple and reliable

Vocabulary: Vessels

The MCA is divided into four segments:
- **M1**: from the origin to bifurcation/trifurcation; also known as horizontal or sphenoidal segment
- **M2**: also known as insular segment, from bi(tri)furation to circular sulcus of insula where it makes hairpin bend to continue as M3
- **M3**: opercular branches (those within the Sylvian fissure); also known as opercular segment.
- **M4**: branches emerging from the Sylvian fissure onto the convex surface of the hemisphere; also known as cortical segment
### Endovascular Trial Summary

<table>
<thead>
<tr>
<th>Trial</th>
<th>Imaging Required to Confirm Occlusion Prior to Randomization?</th>
<th>Device(s) Used in Intervention Arm</th>
<th>TICI 2b/3 Revascularization Rate in the Intervention Arm</th>
<th>mRS 0-2</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMS III</td>
<td>No</td>
<td>IA Lytic (138), Merci Retriever® (95), EKOS (22), Penumbra (54), Solitaire FR (5)</td>
<td>38% ICA 44% M1 44% M2 23% multi M2</td>
<td>40.8% (N=415) 38.7% (N=214)</td>
<td>0.02 (-0.06 to 0.09)</td>
</tr>
<tr>
<td>MR RESCUE</td>
<td>No</td>
<td>Merci Retriever®, EKOS, IA Lytic, Penumbra</td>
<td>24% pen (n=34) 27% nonp (n=30)</td>
<td>21% pen (n=34) 17% nonp (n=30)</td>
<td>26% pen (n=34) 10% nonp (n=20)</td>
</tr>
<tr>
<td>MR CLEAN</td>
<td>Yes</td>
<td>97% Stent Retrievers, 2% other Mechanical</td>
<td>58.7% (N=196) 33% (N=233) 19% (N=267)</td>
<td>2.16 (1.39-3.38)</td>
<td></td>
</tr>
<tr>
<td>ESCAPE</td>
<td>Yes</td>
<td>86% Stent Retriever</td>
<td>72.4% (n=156) 53.0% (n=164) 29.3% (n=147)</td>
<td>1.8 (1.4-2.4)</td>
<td></td>
</tr>
<tr>
<td>SWIFT PRIME</td>
<td>Yes</td>
<td>100% Stent Retriever</td>
<td>88.0% (n=83) 60.2% (n=98) 35.5% (n=93)</td>
<td>2.75 (1.53-4.95)</td>
<td></td>
</tr>
<tr>
<td>EXTEND-IA</td>
<td>Yes</td>
<td>100% Stent Retriever</td>
<td>86.2% (n=29) 71% (n=35) 40% (n=35)</td>
<td>4.2 (1.3-13)</td>
<td></td>
</tr>
</tbody>
</table>
Devices: Solataire

Devices: Penumbra
1. Patients eligible for intravenous r-tPA should receive intravenous r-tPA even if endovascular treatments are being considered (Class I; Level of Evidence A). (Unchanged from the 2013 guideline)

2. Patients should receive endovascular therapy with a stent retriever if they meet the following criteria (Class I; Level of Evidence A). (New recommendation):
   a. Prestroke mRS score 0 to 1,
   b. Acute ischemic stroke receiving intravenous r-tPA within 4.5 hours of onset according to guidelines from professional medical societies,
   c. Causative occlusion of the ICA or proximal MCA (M1),
   d. Age ≥18 years,
   e. NIHSS score of ≥6,
   f. ASPECTS of ≥6, and
   g. Treatment can be initiated (groin puncture) within 6 hours of symptom onset
3. Patients should be transported rapidly to the closest available certified primary stroke center or comprehensive stroke center or, if no such centers exist, the most appropriate institution that provides emergency stroke care.

4. Regional systems of stroke care should be developed. These should consist of the following:
   a. Healthcare facilities that provide initial emergency care, including administration of intravenous-tPA, such as primary stroke centers, comprehensive stroke centers, and other facilities, and
   b. Centers capable of performing endovascular stroke treatment with comprehensive periprocedural care, including comprehensive stroke centers and other healthcare facilities, to which rapid transport can be arranged when appropriate (Class I; Level of Evidence A).

Endovascular Decision
Endovascular Decision

**Acute Management**
Per protocol
May consider CTA if able to complete and obtain an urgent reading, otherwise transfer and the patient can be transferred with plan to go direct to CTA on arrival.
**Intravenous Alteplase should never be delayed to obtain additional imaging after a non-contrast head CT. Start the Alteplase first, then pursue additional imaging.**

- Issues: “Over-triage” versus “Under-triage”

Target Population for consideration of transfer for endovascular therapy

Additional Considerations
- Patients with any exclusion to systemic Alteplase, including but not limited to patients:
  1. On warfarin with elevated INR
  2. On direct thrombin inhibitors or Factor X inhibitors.
  3. Post-operative.
  4. Stroke onset beyond 4.5 hours
- Patients with a NIHSS > or <6 with any cortical symptoms (aphasia, neglect, or field cut).
  Any patient with a basilar thrombosis.
- **Note: Endovascular therapy may be indicated for patients in addition to or in the absence of systemic Alteplase.**
Post endovascular procedure care

- Vital signs and neuro checks consistent with post IV t-PA monitoring with the addition of groin check and peripheral-vascular check.
- Factors to consider: Is the sheath left in?
  - Post t-PA then to endovascular, how to document vital signs?
  - Intubation?
  - Standard stroke care issues.

Quality Improvement

- EMS decision - Diversion?
- Time – At PSC without endovascular option until transfer to CSC or endovascular capable PSC.
- Onset to groin time.
- Door to groin time.
- Onset to reperfusion time.
- Door to reperfusion time.
Treatment of Acute Ischemic Stroke with Endovascular Therapy

Patient Presentation
- 57 y/o M on Lovenox who presented to _______ with acute L MCA syndrome.
- Trf. to HUP for endovascular thrombectomy
- On arrival at HUP; NIHSS 16; right UE paresis, global aphasia

Imaging Findings
- CTA with occluded left M1 (Figure A)
- Angiogram confirmed occluded left M1 (Figure B)

Intervention
- Successful embolectomy with Trevo stent retriever and Penumbra aspiration
- LMCA fully reopened (Figure C)

Outcome
- Post op CT, no bleed
- Discharged home 2 days later

THANK YOU FOR MAKING A DIFFERENCE IN THIS PATIENT’S LIFE!

HUP Interventional Neuroradiology: Robert Hurst, MD – Director. David Kang, MD; Bryan Pukunas, MD; Michelle J. Smith, MD.

HUP Stroke Neurology: Scott Kaiser MD - Director, Steve Neser MD.
References


