ENDOVASCULAR MECHANICAL THROMBECTOMY IN PATIENTS WITH ACUTE ISCHEMIC STROKE

HHS Stroke Annual Review
March 7 and March 8, 2018
Objectives

- To review the stroke endovascular mechanical thrombectomy evidence and the Canadian Best Practice Hyperacute Recommendations related to Mechanical Thrombectomy.

- To review the emerging Stroke Mechanical Thrombectomy evidence.

- To review the Stroke Mechanical Thrombectomy Inclusion Criteria, Patient Flow Algorithm and Post Procedural Care and Management.
Hyperacute Ischemic Stroke Management Goals

- To limit irreversible ischemic damage during an acute ischemic stroke caused by an arterial occlusion.
- To restore blood flow to the artery by either IV tPA or Stroke Mechanical Thrombectomy to promote reperfusion of viable brain tissue.
- 1,900,000 brain cells die each minute blood supply is cut off to the brain.
- Each minute that blood supply is cut off to the brain equates to 1 week of healthy life lost.
Large Vessel Occlusion (LVO)

- Large Vessel Occlusions (LVO) are the most serious kinds of ischemic stroke.

- 20% of all ischemic stroke cases.

- Occlusion of:
  - Proximal internal carotid artery
  - Middle cerebral artery (M1)
  - Anterior cerebral arteries (A1)
  - Vertebral or basilar arteries

- Restrict blood supply to large portions of the brain causing significant stroke deficits and severe morbidity and mortality.
2015 Endovascular Therapy for Large Vessel Acute Ischemic Strokes

- All of the trials have demonstrated statistically significant differences in:
  - Rate of functional independence in the endovascular stroke clot retrieval group versus the intravenous thrombolysis.
  - NNT ranging from 2.5 – 7.
  - Decrease in mortality in the endovascular stroke clot retrieval group versus intravenous thrombolysis.
  - No difference in symptomatic intracerebral hemorrhage.

Three additional RCT’s have found similar results as these landmark trials.
Hermes Collaboration Analysis of 5 Endovascular Research Trials

1287 patients from 5 EVT RCTs were analysed found benefit for Endovascular Therapy, NNT 2.6 and no differences in ICH or mortality at 90 days.

Found Benefit for Endovascular Therapy

- Men and Women Equally
- All ages
- All Anterior Large Artery occlusions
- All stroke severities
- Whether patient got tPA or had contraindications for tPA
Mechanical Thrombectomy in 2015

A small thin tube, called a sheath, is inserted in the femoral artery (groin area).

A guide wire and catheter are inserted through the sheath into the femoral artery and passed to the artery with the clot in the brain.

The guide wire is removed and a compressed mesh stent is inserted through the catheter to the clot.

The catheter is then removed causing the mesh stent to expand through the clot. Once the clot is “trapped” in the stent, the clot can be safely removed with the stent.

https://www.youtube.com/watch?v=7gn96se6j00
Who is Eligible for EVT Treatment?

• 20% of ischemic stroke patients.
• Those eligible and those ineligible for tPA.
• Disabling Stroke.
• Stroke Symptoms within 6 hours of time last seen normal.
• Large blood vessel blockage with a reachable clot.
• Brain tissue that is still alive (ASPECTS $\geq 6$)
Thrombectomy 6 to 24 Hours after Stroke with a Mismatch between Deficit and Infarct


Thrombectomy for Stroke at 6 to 16 Hours with Selection by Perfusion Imaging

### Baseline Characteristics & Outcomes between Late EVT Trials in the Intervention Group

<table>
<thead>
<tr>
<th></th>
<th>DAWN (6 to 24 hours)</th>
<th>DEFUSE 3 (6 to 16 hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time from Last Known Well to Randomization</td>
<td>12.2 hours (10.2 – 16.3)</td>
<td>10:29 hours (8.09 – 11:40)</td>
</tr>
<tr>
<td>Witnessed Onset of Stroke</td>
<td>10%</td>
<td>34%</td>
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<tr>
<td>Wake Up Stroke</td>
<td>63%</td>
<td>53%</td>
</tr>
<tr>
<td>Median NIHSS</td>
<td>17 (14 – 21)</td>
<td>16 (10 – 20)</td>
</tr>
<tr>
<td>Infarct Volume on CT Perfusion</td>
<td>7.6 (2.0 – 18.0)</td>
<td>19.4 (2.3 – 25.6)</td>
</tr>
<tr>
<td>Improved Functional Independence</td>
<td>35%</td>
<td>28%</td>
</tr>
</tbody>
</table>
Who May be Eligible for Treatment Based on New Evidence?

- 20% of ischemic stroke patients.
- Those eligible and those ineligible for tPA.
- Disabling Stroke (NIHSS ≥ 6).
- Stroke Symptoms last seen well within 6 hours.
- May consider up to 16 hours from last seen well.
- Large blood vessel blockage with a reachable clot.
- Brain tissue that is still alive (ASPECTS ≥ 6).
## Current Endovascular Centres

<table>
<thead>
<tr>
<th>With 24/7 Coverage</th>
<th>Without 24/7 Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hamilton Health Sciences</td>
<td>1. Thunder Bay Regional Hospital</td>
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<tr>
<td>2. London Health Sciences</td>
<td>2. Windsor Regional Hospital</td>
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<tr>
<td>3. Ottawa Hospital</td>
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<tr>
<td>4. St. Michael’s Hospital</td>
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<tr>
<td>5. Sunnybrook Health Centre</td>
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<tr>
<td>6. Toronto Western Hospital</td>
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<tr>
<td>7. Trillium Health Partners</td>
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<td>8. Kingston General Hospital</td>
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</table>
Central South Stroke Network
Stroke Thrombolysis Providers
## Access to Endovascular Therapy

### Stroke Protocols and Flow Processes

<table>
<thead>
<tr>
<th>Emergency Medical Services (EMS)</th>
<th>Emergency Department</th>
<th>Stroke Neurology</th>
<th>Neurointerventional MD</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provincial Paramedic Prompt Card to identify stroke in the field</td>
<td>• Rapid ED Triage in ED</td>
<td>• Review of Imaging and Laboratory Results</td>
<td>• Determine eligibility for Mechanical Thrombectomy</td>
</tr>
<tr>
<td>• EMS Patch to ED to inform ED that a Code Stroke Patient is on route</td>
<td>• Rapid Access to CT to rule out hemorrhage and to mCTA to identify large vessel occlusion</td>
<td>• Neurological Assessment (NIHSS)</td>
<td>• Activate Neurointerventional team (IR Nurse and Tech, Clot Retrieval Nurse)</td>
</tr>
<tr>
<td>• ED to notify the Stroke Team with EMS Patch</td>
<td>• Laboratory Test</td>
<td>• Determine Eligibility for tPA and EVT</td>
<td>• Consent for procedure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Consult Neurointerventional MD if Large Vessel Occlusion</td>
<td></td>
</tr>
</tbody>
</table>
Patient presents with functionally disabling stroke within 6.0 hours of onset of symptoms at Local Stroke Thrombolysis Centre – Initiate Acute Stroke Protocol

CT/mCTA

Local Site Determine Eligibility for tPA

If eligible for tPA - Administer tPA without Delay

Goal – Door to Needle less than 30 minutes

CTA Shows Large Proximal Artery Occlusion
Consult Telestroke MD
Telestroke Neurologist determines Patient is an Endovascular Mechanical Thrombectomy Case

Telestroke Neurologists consults HHS Neurologist and NeuroInterventional Physician via phone and reviews images via ENITS to arrange transfer to HGH for Mechanical Thrombectomy

HHS Neurologist accepts transfer to HGH
HHS Neurologist arranges a 7 WSDU/ICU Bed for patient
Sending Site arranges Code 4 Transfer with a Nurse to HGH – DI – Pod 2

Patient transferred directly to HGH Diagnostic Imaging Department for CT Head and Evaluation for Mechanical Thrombectomy

Patient transferred to DI NeuroInterventional Suite for Mechanical Thrombectomy
Goal; Door to Puncture: 60 minutes

Transferred to Neurosurgical Stepdown Unit post procedure and Stroke Unit within 24 hours - If stable & SDU demand – minimum SDU time 4 hours
Repatriate to local Stroke Unit within 24 hours
Post Procedural Care of Stroke Mechanical Thrombectomy Patient

- Sheath Site Complications:
  - May occur within first 24 – 48 hours post sheath removal
  - Monitor site for:
    - Bruising
    - Pseudo-aneurysm
    - Retroperitoneal Bleed
    - Excessive Bleeding
  - Peripheral Pulses first 24 – 48 hours
Post Procedural Care of Stroke
Mechanical Thrombectomy Patient

• Monitor Kidney Function:
  – Patient has received CT contrast for CTA & during procedure so monitor kidney function post procedure
  – IV to flush contrast from kidneys

• Monitor for Fluid Overload/CHF
  – Watch for fluid overload especially in patients with cardiac co-morbidities

• Monitor for Cardiac Arrhythmias
  – Atrial Fibrillation
  – Daily ECG X3
Acute Stroke Management

• Blood Pressure:
  – After Mechanical Thrombectomy, BP will normally fall 20 mmHg
  – Maintain 140 and less than 180 depending on patient’s previous norm

• Antithrombotic Therapy
  – Generally wait 24 hours post IV tPA/Mechanical Thrombectomy before starting antithrombotic therapy - Wait until 24 hours post CT is completed to rule out bleeding

• VTE Prophylaxis
  – Generally wait 24 hours post IV tPA/Mechanical Thrombectomy before starting pharmacological VTE – Wait until 24 hours post CT is completed to rule of bleeding
  – Mechanical Prophylaxis using Intermittent Pneumatic Compression Devices (SCD) may be considered. Do not apply SCD in leg with femoral sheath or for 8 hours post sheath removal.

• Monitor for post TPA Complications if received IV tPA
• Repatriation back to local Stroke Unit if regional case
• Implement Acute Ischemic Stroke Best Practices


