Endovascular Nursing Care

It’s more than just Vital Signs!

Annette Clements MSN RN
Quality Nurse UPMC Mercy
Objectives

• Provide an overview of endovascular therapy for stroke treatment.
• Summarize the nursing care provided to a patient undergoing endovascular reperfusion therapy.
• Outline the elements of care required peri/post procedure.
• Discuss complications the nurse must be able to identify and treat.
Endovascular Reperfusion Therapy

**Endovascular what?**

Reperfusion therapy defined by the American Heart Association Encyclopedia

- techniques that restore blood flow to part of the heart muscle damaged during a heart attack, or part of the brain injured during a stroke. It may include clot-dissolving drugs (thrombolysis), balloon angioplasty or surgery

Endovascular defined

- Intravascular
- Surgical procedure in which a catheter containing medication or miniature instruments are inserted through the skin and into a blood vessels for treatment of vascular disease
Thrombectomy

Catheter aspiration thrombectomy
Blood clot is removed using suction

Mechanical thrombectomy
Blood clot is broken up into small pieces and removed

http://www.stroke.org/understand-stroke/what-stroke

Noteworthy

• Stroke leading cause of preventable disability in the United States
• Goals of treatment are to reduce mortality and reduce disability
• AHA/ASA 2018 Guidelines released new high level recommendations
• **Expanded time windows**- 6-16 hrs and 6-24 hrs for select patients
• Guidelines updated from evidence, two recently published studies, *DAWN/DEFUSE 3*
Large Vessels of the Brain

- Main Vessels Treated with Thrombectomy
  - MCA – M1 & M2
  - ACA (A1)
  - ICA
  - Basilar
  - PCA
Endovascular Treatment - Stroke

- In combination with IV alteplase treatment of acute onset stroke

- Utilize endovascular therapy for patients with criteria excluded from systemic t-PA
  - Stroke onset beyond 4.5 hours
  - Post-operative patients
  - On warfarin with elevated INR
  - On direct thrombin inhibitors or Factor X inhibitors

- In select population can extend the treatment window beyond 6 hours
<table>
<thead>
<tr>
<th>Level 1 Class A</th>
<th>Level IIB Class B-R, C-EO</th>
<th>Thrombectomy Eligibility</th>
<th>New Level I Class Level IIa B-R DAWN</th>
<th>A DEFUSE-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 18 years</td>
<td>Age</td>
<td>≥18 years</td>
<td>18-90 years</td>
<td></td>
</tr>
<tr>
<td>Groin puncture w/In 6 hours LSW</td>
<td>Time window</td>
<td>6-24 hours since LKW</td>
<td>6-16 hours since LKW</td>
<td></td>
</tr>
<tr>
<td>NIHSS &gt; 6</td>
<td>NIHSS &lt; 6</td>
<td>Stroke severity</td>
<td>NIHSS score ≥10</td>
<td>NIHSS score ≥6</td>
</tr>
<tr>
<td>MCA M1 Internal Carotid Artery</td>
<td>Occlusion location</td>
<td>MCA M1 or Intracranial Internal Carotid Artery Occlusion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-mRS 0-1</td>
<td>Pre- mRS &gt;1</td>
<td>Baseline functional status</td>
<td>Pre-mRS 0-1</td>
<td>Pre-mRS 0-2</td>
</tr>
<tr>
<td>ASPECTS &gt; 6</td>
<td>ASPECTS &lt; 6</td>
<td>Infarct burden</td>
<td>Infarct core &lt;51 ml</td>
<td>Infarct core &lt;70 ml</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Clinical Core mismatch</td>
<td>Target mismatch on perfusion imaging</td>
</tr>
</tbody>
</table>
ASPECTS

Alberta Stroke Program Early CT Score
10 point quantitative topographic CT scan grading system
Assess early ischemic changes on pretreatment studies on patients with anterior circulation acute ischemic stroke
Patient Case

55 y/o female with a h/o HTN, COPD on home O2, A fib on Coumadin
LSW 11:30 PM before bed on 3/28
Pts son woke up and checked on her at 5:20 AM 3/29 and found her with left sided weakness and she was drooling. Son thought she was having a stroke an called EMS

NIHSS=14 per OSH ED. L sided facial droop, slurred garbled speech, L side flaccid, decreased sensation L...right MCA syndrome with right MCA occlusion
CT which showed no hemorrhage and CTA head/neck that was c/f Right MCA occlusion
Pt was not a candidate for IV tPA given time LSW

Pt was transferred to comprehensive center for possible intra- arterial intervention. 3/29

NIHSS on arrival ED  21 - 3/29 9am.  Pt underwent STAT MRI that showed a right CR/BG infarct, with GRE sequences showing blooming artifact in right M1 consistent with known thrombus.  BP 120-130/60-70
Given small infarct with large tissue at risk pt was taken Emergently to angio suite 9:36 am where she underwent groin access 09:45 am -manual thrombectomy R M1with TICI2B reperfusion 9:59am 3/29
Admitted to ICU post thrombectomy care
Impression: Right MCA syndrome from Right MCA occlusion s/p mechanical thrombectomy with TICI2B reperfusion
Thrombectomy

https://vascular.org/patient-resources/vascular-tests/angiogram
Pre-Procedure Nursing

Non-Interventional Hospital
• IV t-PA if indicated
• BP Management
• Frequent Neuro
• IV maintained
• Dysphagia screen
• Communication
• Quick turn around to interventional center: goal <60 minutes

Interventional Hospital
• IV t-PA if indicated
• BP Management
• Frequent Neuro
• IV maintained
• Dysphagia screen
• Eliminate unnecessary steps
• Communication
• Intervention by 60 minutes from arrival

Case: BP monitored, no treatments. Frequent neuro assessment. Two IV from OSH maintained. Noted worsening exam on arrival to Interventional Hospital. – ED to int 36 minutes
Neuro-interventional Nursing

In suite:
- Neuro exam
- Neurovascular assessment prior to groin puncture - right and left dorsalis pedis, posterior tibial
- Blood pressure pre procedure <185/105 prior

During Procedure:
- Neuro assessment
- POCT
- Document key times
- Emergency Roles

Post procedure:
- Immediate post procedure neuro exam
- NIHSS
- Groin site assessment
- Blood pressure maintain <180/105
Endovascular Nursing Care

• Neuro IR
  ▪ Specially trained, NIHSS certifications, ability perform detailed neurologic exam
  ▪ Conscious sedation w/anesthesia or RN
  ▪ Detailed documentation- time of groin puncture, clot retrieval, reperfusion score
  ▪ Post procedural neurological assessment, groin site and vitals signs
  ▪ Anticipation of neurologic emergencies
  ▪ NIHSS / neurovascular assessments just prior to intervention and immediately post
  ▪ Sheath removal, manual compression 20-30 minutes or vascular closure device
  ▪ Consideration: tPA given
## TICI Score
Thrombolysis in cerebral infarction perfusion grade scale

<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>

In neuro-interventional radiology it is used for patients post endovascular revascularization. Predicts prognosis.

**Case: TICI 2b reperfusion**

https://pbrainmd.wordpress.com/tag/neuro/page/22
Peri-Procedure Complications

- Air Embolism
- Vessel perforation
  - ICH
- Increase ICP
- Device related complications
- Dissection arteries
- Embolism to different territory

- Nursing roles:
  - Anticipate needed equipment /meds
  - Assessment documentation
  - Obtain equipment
  - Prep equipment
Pre Intervention

Post intervention

Removed Thrombus
Thrombectomy
Endovascular Nursing Care

• Neuro Hand off
  – Communication is essential to patient safety
  – Dual neurological exam as exam can be subjective
  – Pertinent history and specific events of the day
    • LSW, pre and post NIHSS, allergies, meds given, treatments, complications, code status, family contact
  – Structured tools

Case: LSW 23:00 3/28, found 5am 3/29. Coumadin therapy, NIHSS arrival 21, thrombectomy for R m1 occlusion, post NIHSS 21, sheath out 10:02...groin protocol started, ext warm w/palpable pulses, sensation/movement
Dual Assessments: NIHSS 21 – VS: hr 70 130/74 6% 4L nc, rr19
Post Endovascular Nursing Care

• Post intervention patient admit to ICU
• Neurological assessment
  – NIHSS Prior and post procedure
  – Continue **focused** Neuro assessments
• Neurovascular assessment
  – Puncture site
  – Distal Pulses
  – Pre and post focused assessment
• Vital Signs
  – Pre, during, post focused assessment
Endovascular Nursing Care- ICU

- Close neurological monitoring
- Blood Pressure control cap 180/105
- Hemodynamic
- Focused post IR protocol assessments
- tPA protocol
- Anticipation and identification of Neurological emergencies
- Standard stroke care- dysphagia assessment, glucose monitoring, education, rehabilitation, secondary prevention, etiology determination
What are we looking for?
Potential Complications

• Neuro changes- change in LOC, Increase in NIHSS, pupillary changes
  – re occlusion, hemorrhagic conversion, edema
• Vascular changes- pulse quality, temperature of limb
  – hematoma, occlusion
• Vitals-Blood pressure, HR
  – changes indicative of hemorrhage
Groin Site Management

- Head of the bed may be raised to 30 degrees
- Avoid flexing or hyperextending the affected extremity for 12 to 24 hours
- Transparent dressing

Document:
- Puncture site status, extremity sensation, color, pulses, edema, temperature, and movement.

Case: angioseal closure, transparent drsg, Palpable dorsalis pedis, intact sensation/movement, warm
Groin Site Assessment

What's normal?

• Mild tenderness
• No active oozing
• Site soft
• Extremity warm
• Pulses palpable and comparable to opposite leg
• No change in pulses from pre procedure
Groin Site Assessment

- Closure device vs Manual compression closure
- Transparent dressing or pressure dressing

**Mynx**
Balloon, extravascular
Sealant system

**Angio Seal**
Suture/collagen
Anchor system
Groin Site Assessment

Not normal?

- Bulging mass
- Pulsatality, bruit
- Hardening around site
- Significant tenderness in the inguinal area
- Red/purple skin discoloration

**5 P’s =** Pulseless/Pain/Pallor/Paresthesia/Paralysis
Femoral Access - Complications

- Hematoma
- Retroperitoneal hemorrhage
- Pseudoaneurysm
- Arteriovenous fistula
- Arterial occlusion
- Femoral neuropathy
- Infection

CAUTION!
Facility specific protocol

- **Identify** or suspect Hematoma
  - Visible swelling around puncture
  - Palpable hardening under skin
  - Pain w movement or rest in groin

- **Notify** Neuro IR Team and Stroke MD STAT
  - Active bleeding- hold direct pressure at least 20 min right above puncture

- **Monitor** q15 min assessments Vitals +NV +Neuro
  - Mark the area

- **Expect** STAT labs....H&H, type & screen, STAT IV fluids

- **Anticipate** intervention if severe
Retroperitoneal Bleed

- **Identify or suspect**
  - Patient restlessness
  - Hypotension/tachycardia
  - Moderate – severe back pain
  - Ipsilateral flank pain
  - Ecchymosis (late)

- **Notify Neuro IR Team + Stroke Team STAT**

- **Diagnostic**
  - CT scan or Ultrasound

- **Treatment**
  - Hydration
  - Prolong bedrest
  - Stop anticoag/antiplt
  - Sever- blood transfusion or surgical intervention

Patient Case

- **Impression**: Right MCA syndrome from Right MCA occlusion s/p mechanical thrombectomy with TICI2B reperfusion
- **Mechanism**: suspect cardioembolic from A fib with subtherapeutic (INR 1.3 admit)
- No complications of Endovascular therapy.
- Failed dysphagia screen
- Plan to restart coumadin

- NIHSS Arrival - 24
- NIHSS 24 hrs- 13
- NIHSS Discharge- 7 (gaze, facial, left UE/LE drift, dysarthria)
- Transfer to Inpatient Rehabilitation
- LOS 6 days
Neuro-interventional Radiology Procedures

- Thrombectomy
  - Acute Large Vessel Occlusion
- Carotid artery procedures
  - Acute/elective
- Aneurysm management
  - Acute/elective: ruptured/unruptured
- Management of vasospasm r/t SAH
- Diagnostic catheter angiography
Carotid Procedure

- Carotid Artery Stent
  - High grade stenosis
- Symptomatic or asymptomatic
- Acute intervention or planned procedure
- Post op nursing care: site integrity, neuro assessments, NV
Carotid Stenting
Internal Carotid Artery
Aneurysm Management

Ruptured
- Secure within 24 hours
- Embolization
  - Coiling
  - Pipeline stent
  - Onyx
- Nursing- NIHSS, Neuro, the story
- Blood pressure

Un-Ruptured
- Known aneurysm being monitored
- Decision to treat
- Coiling, pipeline stent, Embolization, combo
- Nursing – pre and post neuro, any symptoms prior
- Blood pressure
Basilar tip Aneurysm
Right Ophthalmic Artery Aneurysm

Pre procedure

Post coiling
Alternative Access

• Radial
  – Unable to access groin
  – Less restriction post diagnostic angio
  – Can sit up and eat drink
  – NWB x24 hours to right
  – Similar assessment post, thumb pulse ox, ext temperature, deflating balloon slowing over time and removal.

• Direct carotid
  – rare
  – Emergent situations
• Thank you!

• Questions?
REFERENCES


• Hill et al.; Recommendation for endovascular care of stroke patients. *Interventional Neurology* 2018; 7:65-69


• https://vascular.org/patient-resources/vascular-tests/angiogram