Timing of Carotid Bifurcation Repair after Symptoms: How Does It Affect Stroke risk?

D. Chris Metzger, MD
Ballad Health CVA Heart & Vascular
Kingsport, TN, USA
Disclosures

• Symposia Honoraria & Proctor Fees:
  • Abbott, Endologix/ TriVascular

• Symposia Honoraria:
  • Boston Scientific, Bard, Gore, CSI, Medtronic

• VIVA Board Member

• National PI/Co-PI: Confidence, SAPPHIRE WW, CANOPY

• Research Grants, Stocks, Equity
  • None
Revascularization after TIA/ Stroke

• Patient’s who present with a true TIA or stroke have “declared themselves” as a high risk patient for future neurologic events

• Risk of subsequent stroke is HIGH EARLY after initial presentation

• All patients with clear-cut TIA/ stroke presentations should be admitted, and have aggressive evaluation and treatment
Optimal Revascularization Timing

The ideal timing of revascularization after TIA/stroke- an *individualized* risk/benefit assessment of:

- the patient’s risk of further neuro events while awaiting treatment *vs.*
- that patient’s risk of cerebral bleeding/ hyperperfusion syndrome with early intervention
After STROKE, ↑ Risk, ↓ Benefit of Early CEA/CAS if:

- Persistent large neurologic deficits after stroke
- Large MRI stroke (> 5cm; > 1/3 of ipsilateral MCA territory)
- Component of MRI hemorrhagic stroke
- Least benefits/ highest risks in patients with large MRI or neuro deficits and less severe carotid stenosis (< 70%)
Early Intervention Indicated When:

- Patient’s neuro status normalizes or has small persistent deficit
- Small MRI deficit with little/no bleeding
- Severe carotid stenosis
- Recurrent TIA symptoms

*EARLY intervention: favorable risk/benefit ratio with small neuro deficit and significant stenosis*
**Revascularisation should be deferred in patients with 50-99% stenoses who suffer a disabling stroke (MRS≥3), whose area of infarction exceeds one third of the ipsilateral MCA territory, or who have altered consciousness/drowsiness, to minimise the risks of post-op parenchymal haemorrhage.**

<table>
<thead>
<tr>
<th>Recommendation 42</th>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revascularisation should be deferred in patients with 50-99% stenoses who suffer a disabling stroke (MRS≥3), whose area of infarction exceeds one third of the ipsilateral MCA territory, or who have altered consciousness/drowsiness, to minimise the risks of post-op parenchymal haemorrhage</td>
<td>I</td>
<td>C</td>
</tr>
</tbody>
</table>
Management of Atherosclerotic Carotid and Vertebral Artery Disease: 2017 Clinical Practice Guidelines of the European Society for Vascular Surgery (ESVS)

Recommendation 43

<table>
<thead>
<tr>
<th>Recommendation 43</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients with 50-99% stenoses who present with stroke in evolution or crescendo TIA and should be considered for urgent carotid endarterectomy, preferably &lt;24 hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIa</td>
<td>C</td>
</tr>
</tbody>
</table>
stroke after TIA (50-99% stenosis)

<table>
<thead>
<tr>
<th>Study</th>
<th>48h</th>
<th>72h</th>
<th>7d</th>
<th>14d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fairhead Neurology 2005</td>
<td></td>
<td></td>
<td></td>
<td>20%</td>
</tr>
<tr>
<td>Purroy Stroke 2007</td>
<td></td>
<td></td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Ois Stroke 2009</td>
<td></td>
<td>17%</td>
<td>22%</td>
<td>25%</td>
</tr>
<tr>
<td>Bonifati Stroke 2011</td>
<td>8%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Johansson Int J Stroke 2013</td>
<td>5%</td>
<td>8%</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Mono J Neurosurg 2013</td>
<td></td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Merwick Stroke 2013</td>
<td></td>
<td>8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marnane Stroke 2014</td>
<td>5%</td>
<td>9%</td>
<td>9%</td>
<td>16%</td>
</tr>
</tbody>
</table>
Recommendation 40

When revascularisation is considered appropriate in symptomatic patients with 50-99% stenoses, it is recommended that this be performed as soon as possible, preferably within 14 days of symptom onset.

Class I
Level A
strokes prevented per 1000 CEAs at 5 years

combined data from ECST, NASCET & VA

Delay to surgery

Carotid Endarterectomy Trialists Collaboration 2003
Revascularization: CEA vs. CAS?

• As always, this is an *individualized* risk/benefit ratio considering the patient’s carotid and neck anatomy, medical condition, and the experience and skillsets of your operators.

• With recent symptoms, there may be an increased thrombotic component to lesion, with potential advantages for CEA in appropriate patients.

• We have a large, favorable experience for CAS in appropriate patients who do not have thrombus.
Our Approach to the TIA/Stroke Patient

• Admission of ALL patients (telemetry, neuro bed)
• CTA Head and Neck (CDU if contraindicated)
• MRI if possible in most; otherwise head CT (with CTA)
• Selective use of CT Perfusion imaging
• Internal Medicine, Neurology, Vascular Interventionist early consultations; NIHSS
• Dual anti-platelet loading, ‘statins, BP control
• Evaluate CTA and patient: CEA or CAS? When?
CAS in Patients with Recent Neuro Symptoms

- These are HIGHER risk patients: Consider CEA for many
- Unless emergent with no CEA option: NO CAS if thrombus!
- Must have adequate pre-loading of DAPT
- METICULOUS BP control during *and after* CAS!
  - Avoid hyperperfusion syndromes
- Almost exclusively proximal protection, dual protection, or TCAR
- Modify CAS techniques
- Only by experienced operators; only after considering CEA
Case Presentation 1: TIA’s

- 81 yo male with severe CAD, prior CABG, all SVG’s occluded, moderate disease LIMA → LAD distal anastomosis
- Aortic stenosis with AVA 0.9 cm²; mean AV gradient 42 mm Hg
- COPD with O₂, Htn, NIDDM, dyslipidemia, cervical disc Dz
- Admitted with NSTEMI; plan for cath/PCI and staged TAVR
- Had R hemispheric TIA with L arm and leg weakness x 20”; history of 3 recent TIA’S; recovery to baseline
- CDU: R PSV 452 cm/sec, EDV 153 cm/sec; ICA/CCA 7.3
- MRI: Tiny non-hemorrhagic R frontal subacute stroke
- CTA: Deeply ulcerated RICA > 80%
Type 2-3 Arch

LICA OK
RICA: lateral 90°
(Ulcerated)

R AP Cerebrals: No P. Comm.
Wiring RICA lesion with proximal protection
Deploying distal embolic protection

PTA 4X30 NC with dual protection
Deploying XACT 10X8X40 stent
PTA 5 X 20 NC within stent
XACT 8X8X20 stent in heavy ulcerated area
Aspiration of MoMa (X5) AND Export aspiration
After aspirations/export, removing dEPD with proximal protection
ECA balloon down FIRST, *then*..

CCA balloon down 2nd
Cerebral angios AND neuro checks with MoMa in place
Case 2: Stroke AND STEMI after TIA’s

• 68 yo male with heavy tobacco, no medical follow up, history of “severe neck blockages” 2 years ago at a VA hospital
• Presents 7PM with expressive aphasia and right hemi-paresis, ALSO with ST elevation and inferior STEMI
• Neuro symptoms and chest pain resolve with Heparin, Brilinta, aspirin, therapy, and good luck
• CDU: RICA 100%, LICA 99% (PSV 39); Head CT ~normal
• Right arm weakness 1 am X 30 minutes, resolved
• 5am Large L hemispheric stroke (NIHSS 20) and STEMI : CM
5/16/2015  EXAM DESCRIPTION  CHEST  5/16/2015 9:28 PM

CLINICAL INFORMATION: weakness no acute radiographic process  TECHNIQUE: Portable supine view of the chest  FINDINGS: Diaphragms are flat. Probably chronic interstitial changes are present. Heart shadow is prominent with mild cardiac enlargement. EKG wires overlie the chest.

5/16/2015  IMPRESSION: No acute radiographic process. Report dictation location: 10.2.24.185

Assessment:

1. Extremely large left hemispheric stroke. He had “Stuttering symptoms” for the last 12 hr, and now has dense huge neurologic deficits and NIH stroke scale well over 20. He has occluded right internal carotid artery, and had 99% narrowing of his left internal carotid artery. DCI for the complete risk of stroke recurrence.
2. Acute inferior posterior lateral myocardial infarction, occurring at the same time of his presentation was stroke. This has resolved. His troponin is 23. He is hemodynamically stable.
3. History of heavy-tobacco use
4. History of hypertension
5. History of dyslipidemia, not on statin therapy
6. History of medical noncompliance and very little medical regular care.

Recommendations:

1. He was already “loaded” with Brilinta and aspirin, and was on heparin drip at the time of his major stroke this morning.
2. Later, he will be treated with high-dose statin therapy, risk factor modification was smoking cessation, etc.
3. Clearly will need extensive rehabilitation, physical therapy, speech therapy, etc.
4. He has an extremely high risk challenging clinical scenario. He has had a neurologic deficits and is likely outside of the window of systemic t-PA, and has definite 99% narrowing in the left internal carotid artery, an occluded right carotid artery. This also occurs in the setting of a concomitant inferior posterior lateral myocardial infarction. I believe that the natural history of medical therapy alone would be that of huge neurologic deficits and/or death in this previously active and independent gentleman. I believe that t-PA systemically would have uncertainties an would likely increase risk of cerebral bleed. I believe that the overall risk/benefit ratio favors emergent carotid angiography and potential revascularization. We will consider carotid stenting utilizing a modified proximal embolic protection. We would also consider intervention of the intercerebral vessels if he had major vascular “Plugging” of his MCA. This will certainly have a significant risk including hyperperfusion, but I believe gives and the best chance of recovery and survival, and that the risk of this procedure is less than the risk of his other options.
5. I have very carefully reviewed the risks, benefits, and imponderables of carotid angiography and potential stenting with embolic protection as well as intracranial intervention in great detail with the patient’s 2 daughters, with diagrams provided. Risks discussed include but are not limited to vascular complications, bleeding complications, contrast reaction, extension of his stroke, intra cerebral bleed, hyperperfusion syndrome, worsened embolization, seizures, and death. Included in these discussions were his markedly increased relative risk with a huge ongoing stroke, possible embolic event which is artery occurred to his intercerebral vessels, contralateral, concomitant myocardial infarction, etc. They understand that he has a very guarded prognosis and that this is extremely high risk situation. They also understand and I am and interventional cardiologist to does high volume carotid work and does some intracranial work as well, received training for this, and that there are no other options available locally. All discussions were and careful layman’s terms. They voiced their understanding, appear to understand, and would like to proceed, and prefer this approach over other options which were clearly discussed. They also believe that the patient would definitely try to have every chance of having a neurologic recovery and remaining active.
6. I have also spoke with Dr. Ken Smith of neurosurgery, was graciously agreed to provide backup support and his help and expertise.
RICA Occluded

Minimal R cerebral flow
SEVERE LICA Disease, LECA Occluded
Poor cerebral flow to the LEFT hemisphere also...

*Oh, and the L MCA is out too...*
“MO” going up over vert/SupraCore

Guide through MO
Wiring LICA w/ proximal protection
Export Aspiration Thrombectomy
PTA LICA
Xact 10 X 8 X 40 stent
More aspiration thrombectomy w/in stent
Left cerebral flow
Ostial RCA disease and distal RCA thrombus
Final RCA angios
Conclusions

• In general, early revascularization is best after TIA/stroke provided patient does not have a large disabling stroke or is at a high bleeding risk

• An individualized approach to the appropriateness, timing, and type of revascularization needed by an experienced, collaborative approach is paramount for best patient outcomes
Thank You for Your (Kaola-ty) Attention!
Attend the conference live from your computer!

November 3-7, 2019
at Wynn Las Vegas, Nevada, USA