Stroke Prevention and Intervention Update

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Disclosures

› None
› …But wish I could disclose that I own lots of Apple Stock
Overview

- Introduction
- Stroke Prevention: Optimizing Risk Factors
  - Hypertension
  - Hyperlipidemia
  - Diabetes
  - Antiplatelet Medications
  - Cardioembolic Etiologies
- Stroke Intervention
  - Carotid Stenosis
  - Intracranial Stenosis
  - Acute Stroke Therapies: IV tPA, Stentriever
- Break Time

Classifications

![Stroke Classification Diagram](image)

NINDS Data Bank (1983–1986)
Epidemiology

- Stroke rates in the United States are relatively low compared to other countries
- Currently stroke rate in USA is 42 per 100,000 which is the third lowest in world.
- Worldwide, the median stroke mortality rate is 108 per 100,000 (double the United States)
- 780,000 strokes in USA/year, roughly 180,000/year die
- Total cost of stroke to be approximately $140,000–$200,000 per patient
- The estimated direct & indirect cost of stroke in US is $65.6 Billion

Risk Factor Control: Hypertension

- Hypertension is felt to be the most significant stroke risk factor
  - It is the most prevalent (25–40% of Gen pop)
- Primary Stroke Prevention:
  - British Regional Heart Study
    - SBP 160–180 = RR ~4, compared to SBP <160.
    - SBP >180 = RR ~6

Risk Factor Control: Hypertension

After a Stroke:
- Permissive Hypertension for approximately 1 week

SCAST Trial:
- 2029 patients after stroke (<30 hrs) randomized to receive ARB vs. placebo for 7 days
- ARB group had lower blood pressures during that acute period
- ARB group had worse functional outcome at 6 months, and had high risk for MI, Stroke or Death
- We typically have goal SBP<160 by discharge

Secondary Prevention
- Aggressive Blood Pressure control very important after acute period

Overall treatment effect of anti-hypertensive medications:
- Relative RR: 24%
- Absolute RR 4–5%
- Dose response: More BP control = decreased risk of recurrent stroke
- Goal SBP <140 except in Diabetics, goal SBP <130
Stroke Prevention: Hypertension

› Consider avoiding Beta–Blockers (ACE–I?)

<table>
<thead>
<tr>
<th>Stroke</th>
<th>β blocker n/N</th>
<th>Other drug n/N</th>
<th>RR 95% CI</th>
<th>RR 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASCOT-BPLA</td>
<td>42296/48</td>
<td>32963/39</td>
<td>1.29 (1.12–1.50)</td>
<td>0.87 (0.68–1.12)</td>
</tr>
<tr>
<td>CONVINCE</td>
<td>138/1357</td>
<td>139/1377</td>
<td>1.58 (1.05–2.36)</td>
<td>1.49 (0.84–2.64)</td>
</tr>
<tr>
<td>ELIAC</td>
<td>4129/3297</td>
<td>4132/3272</td>
<td>0.71 (0.49–1.06)</td>
<td>1.14 (0.87–1.50)</td>
</tr>
<tr>
<td>HAFNAY</td>
<td>2011/3297</td>
<td>17711/367</td>
<td>1.34 (1.13–1.58)</td>
<td>1.33 (1.12–1.60)</td>
</tr>
<tr>
<td>INVEST</td>
<td>5594/508</td>
<td>4754/501</td>
<td>1.22 (0.83–1.79)</td>
<td>1.22 (0.79–1.86)</td>
</tr>
<tr>
<td>LIP (2)</td>
<td>561/1102</td>
<td>491/1031</td>
<td>1.11 (0.76–1.63)</td>
<td>0.90 (0.49–1.75)</td>
</tr>
<tr>
<td>MRC 3</td>
<td>236/2471</td>
<td>195/2481</td>
<td>0.56 (0.21–1.48)</td>
<td>2.28 (1.31–3.95)</td>
</tr>
<tr>
<td>NORDIL</td>
<td>121/238</td>
<td>194/231</td>
<td>1.16 (0.64–2.10)</td>
<td></td>
</tr>
<tr>
<td>STIP-2</td>
<td>4234/481</td>
<td>159/4382</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Test for heterogeneity: χ² = 22.29 (p = 0.02)

Stroke Prevention: Hyperlipidemia

› Elevated total Cholesterol (>240mg/dl) seen in approximately 6–40% of people
› Increases relative risk for stroke 1.8–2.6
› Large study known as “SPARCL”
  ◦ RCT of Atorvastatin 80mg/day vs. placebo
  ◦ Patients had a stroke (or TIA) + LDL >100 and no DM or CAD.  N= 4731
  ◦ Saw a 16% RRR; 2.4 ARR in recurrent stroke at 5 years
    * (roughly equivalent benefit to ASA)
Stroke Prevention: Hyperlipidemia

- Unfortunately further analysis showed slight increased risk for ICH
  - Would avoid if amyloid angiopathy demonstrated on MRI or if has previous hemorrhage
- Much debate currently on how to manage statin therapies. Practiced differently in different places
  - Many people give Atorvastatin 80mg to all stroke patients with LDL >100
  - Others treat based on LDL value and with goal of LDL <100 or < 70 in higher risk groups (significant large vessel or intracranial stenosis)

- RR for Stroke 1.5–3.0
- Framingham study found that the increased risk is independent of other co-morbid conditions.
- No study has shown that DM control has not been shown to prevent stroke.
- **ACT NOW Trial**: Prediabetics followed 3 years taking pioglitazone vs. placebo: DM2 seen in 2% vs. 8%
- **Insulin Resistance In Stroke (IRIS) Trial**: Prediabetics randomized to pioglitazone vs. placebo, followed for 5 years
  - Endpoints: Stroke, MI, developing DM2
Antiplatelet Medications for Secondary Stroke Prevention

- **Aspirin 81mg–325mg PO Daily**
  - Not dose dependent
  - 23% RRR versus Placebo
  - Total cost to prevent one stroke: $1,000
- **Clopidogrel (Plavix) 75mg PO Daily**
  - 10% RRR versus ASA in CAPRIE study (but wasn’t statistically significant)
  - CAPRIE did show that it is more effective than ASA in reducing combined risk of stroke, MI or vascular death with similar safety.
- **Aspirin+Dipyridamole (Aggrenox) 25mg/200mg PO BID**
  - Overall 1% per year absolute risk reduction over ASA in ESPRIT
  - Causes headaches in 30% of patients, temporary

- **PROFESS Trial: RCT with 2 x 2 Factorial Design:**
  - Clopidogrel versus ASA+Dipyridamole
  - Each antiplatelet arm: Telmesartan +/-
  - All patients either had TIA or Stroke
  - N = 20,333
  - No significant difference in stroke prevention
    - Strokes in 8.8% pts on clopidogrel versus 9% on ASA+Dipyridamole
    - Slight increase in major bleeding in ASA+Dipyridamole group (3.6% vs. 4.1%)
    - No effect of ARB beyond BP control
  - Cost to prevent one more stroke than ASA:~$100,000*

*PROFESS Study Group, NEJM 2008
Aspirin + Plavix Combo?

- MATCH Trial 2004
  - Plavix+ASA 75mg vs. Plavix+placebo
  - 7,599 Patients (post stroke/TIA) followed 18 mo
  - No significant difference in major vascular events
  - Increased life-threatening bleeding (2.6% vs. 1.3%)

- SPS3 (2012): Subcortical Stroke Patients (lacunar)
  - ASA 325mg+Plavix vs. ASA 325mg+Placebo
  - Stopped prematurely by DSMB due to:
    - Increased risk of bleeding and death in combo group
    - Small probability of benefit (2.1%/yr vs. 2.4%/yr ischemic strokes, Not significant)
Aspirin + Plavix Combo?

- POINT Trial:
  - ASA+Plavix vs. ASA+Placebo within 24 hours of small stroke or TIA
  - 3 months duration of dual therapy
  - Still recruiting

- Based on SAMMPRIS Results, we may also start 3 months of ASA+Plavix for symptomatic intracranial stenosis

Antiplatelet Medications

- Cilostazol 100mg PO BID approved in US for claudication, but has been shown to reduce risk of stroke. Now in guidelines as 4th line medication

- Other alternative antiplatelet medications not studied in stroke
  - Prasugrel: Increased risk of ICH in pivotal trial
  - Ticagrelor: no Increased risk of ICH
Stroke Prevention: Cardioembolic

- Cardioembolic stroke suspected with:
  - Symptoms (chest pain, palpitations, fatigue…)
  - Recent MI
  - Abnormal cardiac history
  - Young age
  - Lapse of consciousness at onset
  - Valsalva then symptoms (suggests PFO)
  - Stroke in multiple vascular territories (often bilateral) on CT or MRI

Stroke Prevention: Cardioembolic

- Diagnosis of atrial fibrillation:
  - Admission EKG: 67–75% of AF
  - Monitor x 48hr (Telemetry or Holter): add’l 4.6%
  - Continuous event recorders for up to 30 days have shown additional screening benefit

- Identification of source of stroke on echo:
  - TTE can’t visualize: valves, aortic appendage, ascending aorta
  - Therefore, sensitivity of TTE in stroke is as little as 25% relative to TEE in some studies
Stroke Prevention: Cardioembolic

- **AF Risk Stratification:**

<table>
<thead>
<tr>
<th>Risk Scheme</th>
<th>Risk stratification</th>
<th>Stroke Risk</th>
<th>Risk Scheme</th>
<th>Stroke Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHADS₂</td>
<td></td>
<td></td>
<td>NICE</td>
<td></td>
</tr>
<tr>
<td>Score 1 point:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- CHF (recent)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- HTN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Age &gt;75</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score 2 points:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Stroke or TIA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low risk 1 point</td>
<td>Low risk</td>
<td>1.9%</td>
<td>Low Risk</td>
<td>1%</td>
</tr>
<tr>
<td>Intermediate Risk 2 points</td>
<td>Intermediate Risk</td>
<td>2.8%</td>
<td>Age&lt;65 with no history of embolism, hypertension, diabetes, or other clinical risk factors</td>
<td>4%</td>
</tr>
<tr>
<td>3 points</td>
<td></td>
<td>4.0%</td>
<td>Age &gt;65 with no high risk factors</td>
<td></td>
</tr>
<tr>
<td>4 points</td>
<td></td>
<td>5.9%</td>
<td>Age &lt;75 with HTN, DM, or vascular disease</td>
<td></td>
</tr>
<tr>
<td>High Risk 5 points</td>
<td>High Risk</td>
<td>8.5%</td>
<td>Previous stroke, TIA, or thromboembolic event</td>
<td>8-12%</td>
</tr>
<tr>
<td>6 points</td>
<td></td>
<td>18.2%</td>
<td>Age &gt;75 with HTN, DM, or vascular disease</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Clinical evidence of valve disease or heart failure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Impaired LV function on echo</td>
<td></td>
</tr>
</tbody>
</table>

- CHADS₂–VASc adds females aged 65–74 as an additional risk factor

Lip GY et al. Chest 2010

Stroke Prevention: Cardioembolic

- **Coumadin for AF:** one of the most successful interventions for stroke prevention
  - Overall risk decreased from 4.5%/year to 1.4%/year
  - RRR 68% (similar for all risk categories) versus aspirin which provides RRR ~20%
  - **Underused:** mainly due to fall risk, perception of increased bleeding risk, and difficulty of achieving therapeutic INR (2–2.5)
  - Fall Risk: One study estimates 295 falls necessary in moderate risk patient to outweigh the benefit of anticoagulation*

*Bond, AJ et al. Thrombosis Journal, 2005
New Anticoagulants

- **Direct Thrombin Inhibitors**
  - RE-LY Trial: Dabigatran 150mg BID
  - More efficacious than warfarin for prevention of systemic embolism.
  - Stroke rate 1.1% vs. 1.7% per year. (n = 18,113 followed for mean 2 years)
  - Equivalent risk of major hemorrhage
  - No bridging necessary. Therapeutic at 2 hours
  - No blood draws necessary
  - Problems: no way to measure effect or compliance, unclear guidelines in reversing in cases of bleeds, needs renal dosing

RE-LY investigators, NEJM 2009

- **Factor Xa Inhibitors:**
  - ROCKET AF trial: Rivaroxaban 20mg PO Daily
  - N = 14,264
  - Showed non-inferiority to warfarin for prevention of stroke or systemic embolism (1.7% vs. 2.2%/year)
  - No difference in major bleeding
  - Problems: no way to measure effect or compliance, unclear guidelines in reversing in cases of bleeds
  - Also data suggests possible increased risk of stroke with cessation

Rocket AF Investigators, NEJM 2011
New Anticoagulants

- Factor Xa Inhibitors: Apixaban 5mg PO BID
  - ARISTOTLE Trial: n = 18,201, mean follow up 1.8yrs
  - Met Endpoint 1.27%/yr in apixaban vs. 1.6%/yr in warfarin
  - Major systemic bleeding 2.13%/yr in apixaban vs. 3.1%/yr in warfarin
  - ICH 0.24%/yr in apixaban vs. 0.47%/yr
  - Death from any cause was 3.52% vs. 3.94%
  - Problems: no way to measure effect or compliance, unclear guidelines in reversing in cases of bleeds

- Still awaiting FDA approval for Afib and DVTs

ARISTOTLE Study Group, NEJM 2011
Carotid Stenosis

- When to treat carotids??
  - Symptomatic vs. Asymptomatic
  - Degree of stenosis qualifying as “severe”

- Best evidence for symptomatic carotid stenosis
  - Carotid Endarterectomy (CEA) vs. Carotid Artery Stenting (CAS)

<table>
<thead>
<tr>
<th>Angio confirmed; % ipsilateral CVA</th>
<th>ASA</th>
<th>CEA</th>
<th>NNT</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>70–99%</td>
<td>24%</td>
<td>7%</td>
<td>8</td>
<td>0.0005</td>
</tr>
<tr>
<td>50–70%</td>
<td>22%</td>
<td>16%</td>
<td>15</td>
<td>0.045</td>
</tr>
</tbody>
</table>

- < 50% CEA not better than ASA
- Major complication rate for CEA 6.7%
- > 50% TX indicated Urgently

Carotid Stenosis: NASCET 1991

- Randomized controlled trial of symptomatic carotid stenosis (n=659): Aspirin vs. CEA
- Cumulative risk of ipsilateral stroke was 26% in the medical patients vs. 9% in the surgical patients

**NEJM 325: 445-453**
Stroke Intervention: Large Vessel

Early Intervention is more beneficial:

Pooled data from the symptomatic European and American CEA trials

ARR: combined endpoint of 5 yr ipsilateral stroke risk + 30 day operative complications (any stroke + death)

Asymptomatic Carotid Stenosis

ACAS: 1662 pts with asymptomatic carotid stenosis of 60% or greater enrolled

CEA versus Aspirin

Risk over 5 years for stroke or death was 5% in CEA group versus 10% in medical treatment

Only “1% year difference” vs. “surgery twice as good”

Caveat: This study was done when other stroke risk factors weren’t addressed
Asymptomatic Carotid Stenosis

- Tend to treat medically in older patients
- Consider CEA/CAS in younger patients with >70% stenosis

- Will be starting new study “CREST 2”
  - Aggressive Medical Management versus Procedure

Carotid Artery Stenting

[Diagram of carotid artery stenting]
Carotid Artery Stenting

- At least 13 randomized trials: CEA vs. CAS
- Each with its limitations

<table>
<thead>
<tr>
<th>Trial</th>
<th>No. of patients</th>
<th>Cerebral protective devices, %</th>
<th>Mean age (year)</th>
<th>% asymptomatic</th>
<th>Degree of stenosis, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naylor, 1998^1</td>
<td>23</td>
<td>0</td>
<td>67.2</td>
<td>0</td>
<td>&gt;70</td>
</tr>
<tr>
<td>Alberts, 2001^4</td>
<td>219</td>
<td>0</td>
<td>68.3</td>
<td>0</td>
<td>&gt;60</td>
</tr>
<tr>
<td>Brooks, 2001^5</td>
<td>104</td>
<td>0</td>
<td>68.0</td>
<td>0</td>
<td>&gt;70</td>
</tr>
<tr>
<td>CAVATAS, 2001^3</td>
<td>504</td>
<td>0</td>
<td>67.0</td>
<td>3</td>
<td>NR</td>
</tr>
<tr>
<td>Brooks, 2004^6</td>
<td>85</td>
<td>0</td>
<td>68.2</td>
<td>100</td>
<td>&gt;80</td>
</tr>
<tr>
<td>Yadav, 2004^7</td>
<td>334</td>
<td>96</td>
<td>72.6</td>
<td>71</td>
<td>&gt;50; &gt;80</td>
</tr>
<tr>
<td>Mas, 2004^9</td>
<td>527</td>
<td>92</td>
<td>69.7</td>
<td>0</td>
<td>&gt;60</td>
</tr>
<tr>
<td>The SPACE Group, 2006^28</td>
<td>1200</td>
<td>NR (mixed)</td>
<td>67.9</td>
<td>0</td>
<td>&gt;70</td>
</tr>
<tr>
<td>Ling, 2000^18</td>
<td>166</td>
<td>100</td>
<td>63</td>
<td>Mixed, % unclear</td>
<td>&gt;50; &gt;70</td>
</tr>
<tr>
<td>Hofmam, 2006^17</td>
<td>20</td>
<td>NR</td>
<td>69</td>
<td>0</td>
<td>&gt;70</td>
</tr>
<tr>
<td>Steinbauer et al^12</td>
<td>87</td>
<td>0</td>
<td>69</td>
<td>47</td>
<td>&gt;50 (angio)</td>
</tr>
<tr>
<td>CREST, 2010^9</td>
<td>2502</td>
<td>96</td>
<td>69</td>
<td>&gt;70 (US)</td>
<td>&gt;70 (CTA/MRI)</td>
</tr>
<tr>
<td>ICSS, 2010^7</td>
<td>1713</td>
<td>72</td>
<td>70</td>
<td>0</td>
<td>&gt;50</td>
</tr>
</tbody>
</table>

Angiography; CTA, computed tomography angiography; MRA, magnetic resonance imaging; NR, not reported; US, ultrasound.
All angioplasties were performed with stenting except in Carotid and Vertebral Artery Transluminal Angioplasty Study (CAVATAS, only 26%).
Stenosis in symptomatic patients was >50% and in asymptomatic patients was >80%.
Stenosis in symptomatic patients was >50% and in asymptomatic patients was >70%.

Carotid Revascularization Endarterectomy vs. Stenting Trial (CREST)

- Prospective, multicenter RCT comparing CEA and CAS in participants with symptomatic and asymptomatic stenosis
  - n = 2502 patients
  - Endpoints: MI, Stroke, or Death
  - Eligibility criteria
    - **Symptomatic**: Stenosis >50% on angiography, or >70% on Carotid Doppler. If US was 50–69%, then need CTA/MRA >70%
    - **Asymptomatic**: Stenosis >60% on angiography, or >70% on Carotid Doppler. If US was 50–69%, need 80% on CTA/MRA

CREST NEJM 2010
CREST Results

- **Primary Endpoint <4 years** (Stroke, MI, Death)
  - 7.2% in CAS vs. 6.8% in CEA, \( P=0.51 \) (NS)

- **Ipsilateral Stroke after Periprocedural Period**
  - 2.0% in CAS vs. 2.4% CEA, \( P=0.85 \) (NS)

- When looking at symptomatic patients periprocedurally:
  - Patients with CEA had slightly higher rate of MI \( (2.3\% \text{ vs. } 1\%) \)
  - Patients with CAS had slightly higher rate of CVA \( (5.5\% \text{ vs. } 3.2\%) \)

- Minor stroke 4% CAS vs. 2% CEA
- Overall, no difference major strokes (1.9% in CAS vs. 3% in CEA [NS]) and they occur early
- No difference in restenosis rates (>70%) at 2 years
- Angio predictors of CAS strokes: distal tortuosity, sequential lesions, length > 20mm
**CREST Results**

- Subgroup analysis suggests stenting favored in younger patients while endarterectomy favored in older patients.

![Graph showing hazard ratio for primary end point with CAS](CREST NEJM 2010)

**CREST Conclusions**

- At experienced centers both CEA and CAS appear to have low perioperative complications and excellent longer-term results.
- Both CEA and CAS appear to be useful tools for preventing stroke.
- 1/26/11 FDA approved Acculink/CAS for low risk patients to prevent stroke: 50% stenosis in symptomatic & 60% in asymptomatic.
Intracranial Stenosis

- **SAMMPRIS Trial**
  - Intracranial Stenting vs. Aggressive Medical Management
  - Med Tx. = SBP <140, LDL <70, ASA/Plavix x 3 mo
  - Stopped after 451 patients enrolled by DSMB
  - 30 Day stroke/Death: 14% in stented group versus 6% in Medical group (P <0.002)
  - 30% of strokes in stent group were ICH
  - Long term follow up in progress

SAMMPRIS NEJM 2011
Intracranial Stenosis

- Looked at patients who failed antithrombotic therapy at time of enrollment
  - 63% of all SAMMPRIS patients had their qualifying event on antithrombotic therapy
  - Most of these were on antiplatelet (95%)
  - Of these patients who were randomized: 12.1% of patients on med therapy had events vs. 21.5% in stented group
  - Conclusion: Similar results even if failed antithrombotic before enrolling in trial
- Will still consider stenting in select cases
IV Thrombolysis (IV tPA)

- NINDS tPA Study, NEJM 1995
  - IV tPA within 3 hours of symptom onset
  - Dose: 0.9mg/kg (max dose 90mg) 10% given over 1–2min with remaining dose infused over 1 hr.
  - Ages 18–79, BP <185/110
  - CT Head without e/o Hemorrhage

![Modified Rankin Scale](https://example.com/modrankinscale.png)

- Improved the odds of a good outcome (complete recovery or minimal deficit but able to fully resume all prior activities) from 25% to 45% at 3 months.
- Risk of ICH ~6%, with severe results in 3%
- Overall, IV tPA does not change risk for death after stroke
Intra-Arterial Thrombolysis

- PROACT II, JAMA Dec 1999
  - 6 Hour Window: Angio confirmed MCA Occlusion
  - N = 180
  - IA ProUrokinase 9mg over 2 hours

**PROACT II Results**

<table>
<thead>
<tr>
<th></th>
<th>ProUrokinase</th>
<th>Placebo</th>
<th>P–Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>mRS 0, 1, 2</td>
<td>40%</td>
<td>25%</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>SICH</td>
<td>10.2%</td>
<td>1.8%</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Death</td>
<td>24%</td>
<td>27%</td>
<td>0.80</td>
</tr>
</tbody>
</table>
Mechanical Clot Retrieval

- The MERCI Device (Concentric)

The MERCI Trial

- Prospective, open-label trial
- Can use on vertebral artery, basilar artery, ICA, MCA (M1 & M2) within 8 hours
- 27% with 90-day MRS <= 2
  - 46% in recanalized group vs. 10% in failed recanalization group
- Revascularization significantly associated with good outcome
- Became FDA approved to recanalize vessels
The Penumbra System

Penumbra Trial Results N=125

<table>
<thead>
<tr>
<th></th>
<th>% Recanalized</th>
<th>ICH</th>
<th>mRS 2 or less</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>18%</td>
<td>2%</td>
<td>25%</td>
</tr>
<tr>
<td>Penumbra</td>
<td>82%</td>
<td>11%*</td>
<td>23%</td>
</tr>
</tbody>
</table>

* 29% (4/14) were Subarachnoid Hemorrhages
Stentreivers: The Next Generation
Solitaire Device (EV3)

- SWIFT Trial: Randomized between Solitaire vs. MERCI within 8 hours of onset (N=113)
  - Overall successful recanalization without ICH seen in 60% in Solitaire versus 24% in MERCI (P < 0.0001)
  - Good outcome (mRS 0–2) seen in 58% vs. 38% (P=0.017)
  - 90-Day Mortality 17% vs. 38% (P=0.02)
  - ICH seen in 2% vs. 11% (P=0.05)

Solitaire Device (EV3)

- FDA approved March 3, 2012
Future Devices

- Concentric: TREVO Device (Completed Enrollment)
- Reverse Medical: RESTORE (Currently Enrolling)
- Codman: ReVive (Will Enroll Soon)

Stroke Prevention Summary

- **Work-up:**
  - Fasting lipids, fasting glucose, HgbA1C
  - Imaging of vessels from arch to brain
  - EKG, consider Holter or event monitor to eval AFib
  - Echocardiogram, consider TEE

- **Treatment:**
  - Antiplatelet for non-cardioembolic
  - Anticoagulation for AF and mechanical valves
  - Antihypertensive:
    - Permissive HTN (1 week)
    - (SBP<120 in most patients, but at least SBP<140)
  - Hyperlipidemia
    - Goal LDL <100 in most patients, Goal <70 in intracranial stenosis, significant large vessel stenosis or high-risk patients
Stroke Prevention Summary

- Large vessel Stenosis
  - Symptomatic Carotid Stenosis >50%: Early CEA/CAS
  - Asymptomatic Carotid Stenosis >~70%: Consider CEA/CAS

- Intracranial Stenosis:
  - Vast majority: dual antiplatelet (ASA+Plavix x 3 months), LDL<70, SBP<140 unless has DM2 then SBP<130
  - If continues to fail maximum medical therapy or disabling orthostatic symptoms: consider angioplasty and/or stenting

Acute Stroke Therapy Summary

- IV tPA
  - Effective when given within 3 hours of last normal
  - Can be used within 4.5 hours in select groups
  - Need labs, CT Head, EKG
  - Review exclusion criteria

- Intra-Arterial Therapies (tPA & Mechanical)
  - Can benefit from treatment after 3 hours
  - Highly specialized therapies often requiring transfers
  - Can be very effective in the appropriate population
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Thank You

Remember “Time is Brain”

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