Medical Management and Risk Stratification after Stroke and TIA

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Vascular Neurologist

Disclosures

• None

Learning objectives

• Review the appropriate workup for patients with stroke or TIA
• Identify patients at high risk of deterioration
• Discuss risk stratification schemes to determine risk of future strokes/TIA
Stroke Recurrence

- First 30 days: 1.7-4%
- First Year: 6-13%
- 2-5 years: 5-8%
- >5 years: 19-42%
- Other studies show lower recurrent stroke risks…

Recurrent Stroke Risks… A familiar list

- Age
- Male sex
- Clinical stroke syndrome
- History of TIA
- HTN, initially elevated BP or low BP
- Cigarettes
- EtOH abuse
- DM, Inc blood sugar
- CAD, Afib, other cardiac disease
- Abnormal findings on CT
- Dementia post stroke

Early Predictors….

- Ischemic stroke subtype
  - Large vessel athero with recurrence
  - Extracranial worse than intracranial at 2 ½ weeks
  - Cardioembolic low, likely d/t antiocoagulants
    - Although Afib still a major risk factor (RR 4)
  - Blood pressure
    - 10 mm increase = 4.2% increased risk
    - LOW BP <120
  - Alcohol use
  - Hyperlipidemia
Late Predictors

- Age
- Cardioembolic source
  - Afib
- Alcohol use – heavy ETOH
- Cardiac disease (OR 8)
- Hypertension
  - Risk reduced when DBP < 80
- Diabetes

TIA risk stratification -- ABCD²

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Points</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ≥ 80 years</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Blood pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic BP ≥ 140 mm Hg, Or Diastolic BP ≥ 90 mm Hg</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Clinical features of TIA, (select one)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unilateral weakness with or without speech impairment OR Speech impairment without unilateral weakness</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Duration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIA duration ≤ 60 minutes</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>TIA duration 10-99 minutes</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total ABCD² score</td>
<td>6-7</td>
<td></td>
</tr>
</tbody>
</table>

Medical Management

- Antiplatelet Management
  - Aspirin
  - Clopidogrel (Plavix)
  - Dipyridamole plus aspirin (Aggrenox)

- When should this be started?
  - ASAP!
  - CAST (Chinese Acute Stroke Trial)
    - 14% reduction in mortality at 4 weeks
  - IST (International Stroke Trial)
    - Fewer recurrent ischemic strokes within 14 days (2.8% vs 3.9%)

What do the guidelines say?

Aspirin (50 mg/d to 325 mg/d) monotherapy (Class I: Level of Evidence A), the combination of aspirin 25 mg and extended-release dipyridamole 200 mg twice daily (Class I: Level of Evidence B), and clopidogrel 75 mg monotherapy (Class IIa; Level of Evidence B) are all acceptable options for initial therapy. The selection of an antiplatelet agent should be individualized on the basis of patient risk factor profiles, cost, tolerance, and other clinical characteristics.
When do you choose Plavix or Aggrenox over Aspirin?

• Great question!
• “Aspirin Failure”

For patients who have an ischemic stroke while taking aspirin, there is no evidence that increasing the dose of aspirin provides additional benefit. Although alternative antiplatelet agents are often considered, no single agent or combination has been studied in patients who have had an event while receiving aspirin (Class III: Level of Evidence C).

Atrial Fibrillation

• CHADS<sub>2</sub> Scoring System
  – Heart Failure - 1
  – Hypertension 1
  – Age >75 – 1
  – Diabetes – 1
  – Prior Stroke/TIA – 2

CHADS<sub>2</sub>

<table>
<thead>
<tr>
<th>CHADS&lt;sub&gt;2&lt;/sub&gt; Score</th>
<th>Adjusted Stroke Rate (%/yr)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.9 (1.2-3.0)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2.8 (2.0-3.8)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4.0 (3.1-5.1)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>5.9 (4.6-7.3)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>8.5 (6.3-11.1)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>12.5 (8.2-17.5)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>18.5 (10.5-27.5)</td>
<td></td>
</tr>
</tbody>
</table>
• 74 year old RH female experiences sudden onset weakness and numbness of the right arm lasting 10-15 minutes
• PMHX: Diabetes (on insulin), hypertension, hyperlipidemia, skin cancer
• Exam: Normal

Carotids are clean
No fetal PCA on MRA
19
• Prolonged cardiac monitoring?
• Flint 2012: SMART Registry
  – 1:9 found to have paroxysmal afib
  – Most asymptomatic

20
• Goal LDL <100 if not diabetic
• Goal LDL <70 if diabetic

21
<table>
<thead>
<tr>
<th>Statin</th>
<th>%LDL-C decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atorva</td>
<td></td>
</tr>
<tr>
<td>40 mg</td>
<td>10 mg</td>
</tr>
<tr>
<td>10 mg</td>
<td>20 mg</td>
</tr>
<tr>
<td>20 mg</td>
<td>40 mg</td>
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<td>40 mg</td>
<td>80 mg</td>
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<td>80 mg</td>
<td>10 mg</td>
</tr>
<tr>
<td>40 mg</td>
<td>20 mg</td>
</tr>
<tr>
<td>80 mg</td>
<td>40 mg</td>
</tr>
<tr>
<td>40 mg</td>
<td>63%</td>
</tr>
</tbody>
</table>

**Cryptogenic Stroke**

- Prolonged cardiac monitoring?
- Flint 2012: SMART Registry
  - 1:9 found to have paroxysmal afib
  - Most asymptomatic
Statins

Blood Pressure

- Initial permissive hypertension
  - Caution with holding beta-blockers
  - When to restart?
- Normotensive is best for all patients
- Diuretics (thiazide) +/- ACE Inhibitor
  - Individualize the choice from patient to patient

Diabetes

- 80% with DM will demonstrate/die from microvascular disease
- HTN is present in 60% of diabetics
- Glucose intolerance, diabetes, glycosuria or BG >150 – independent contributor to stroke in incidence in old women.
Diabetes

- Increased risk in:
  - <55 y/o AAs
  - >65 y/o whites
- More likely to have (than non-diabetics)
  - Hypertension
  - MI
  - High cholesterol
- Impaired glucose tolerance nearly doubles stroke risk

- Goal A1c <7

Risk 2 fold higher for ischemic stroke
Risk 3 fold higher for subarachnoid hemorrhage
Stroke deaths attributable to smoking
  - 17,800-21,400 annually
  - Contributes to 12-14% of all stroke deaths
- Quitting – risk approximates non-smokers after 2-5 years
Age Adjusted Relative Risks of Stroke (Fatal and nonfatal Combined), by Daily Number of Cigarettes among Current Smokers

<table>
<thead>
<tr>
<th>Event</th>
<th>Never Smoker</th>
<th>Former Smoker</th>
<th>Current Smoker</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number Smoked per Day among Current Smokers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1-14 15-24 25-34 &gt;35</td>
</tr>
<tr>
<td>Total Stroke</td>
<td>1.00</td>
<td>1.35</td>
<td>2.75 2.92 3.54 3.68 4.48</td>
</tr>
<tr>
<td>SAH</td>
<td>1.00</td>
<td>2.26</td>
<td>4.05 4.28 4.02 7.85 10.22</td>
</tr>
<tr>
<td>Ischemic Stroke</td>
<td>1.00</td>
<td>1.27</td>
<td>2.53 1.85 3.57 2.79 3.97</td>
</tr>
<tr>
<td>Cerebral Hemorrhage</td>
<td>1.00</td>
<td>1.24</td>
<td>1.24 1.68 2.53 1.41</td>
</tr>
</tbody>
</table>

The Pill

- OCPs and cigarettes – > than 35
  - 5 fold increase in risk
  - OR non-smokers, nonhypertensive << hypertensive (10.7)
  - OR 1.18 for ischemic stroke in all patients on OCPs

HRT

- WHI: estrogen increased stroke 55%
  - No effect on hemorrhagic
- Heart and Estrogen/Progestin Replacement Study (HERS):
  - Estrogen + progestin and medroxyprogesterone did not reduce risk
- Women's Estrogen for Stroke Trial (WEST):
  - Estrogen alone
    - No sig effect on recurrent stroke/fatality
    - Increase in overall stroke rate in first 6 months
Alcohol and Relative Risk

The relationships of alcohol intake with risks of coronary heart disease, ischemic stroke, and dementia among participants in the Cardiovascular Health Study. Long-term abstainers were the reference category. The Y-axis indicates hazard ratios for coronary heart disease and ischemic stroke, and odds ratios for dementia.


<table>
<thead>
<tr>
<th>Alcohol Intake Level</th>
<th>Ischemic Stroke Mortality</th>
<th>Ischemic Stroke Morbidity</th>
<th>Mortality</th>
<th>Morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 drink</td>
<td>0.86 (0.80-0.92)</td>
<td>0.86 (0.81-0.92)</td>
<td>1.00 (0.93-1.07)</td>
<td>0.99 (0.92-1.06)</td>
</tr>
<tr>
<td>3 drinks</td>
<td>1.00 (0.93-1.07)</td>
<td>0.99 (0.92-1.06)</td>
<td>1.17 (1.08-1.26)</td>
<td>1.14 (1.05-1.24)</td>
</tr>
<tr>
<td>5 drinks</td>
<td>1.00 (0.93-1.07)</td>
<td>0.99 (0.92-1.06)</td>
<td>1.17 (1.08-1.26)</td>
<td>1.14 (1.05-1.24)</td>
</tr>
<tr>
<td>7 drinks</td>
<td>1.00 (0.93-1.07)</td>
<td>0.99 (0.92-1.06)</td>
<td>1.17 (1.08-1.26)</td>
<td>1.14 (1.05-1.24)</td>
</tr>
</tbody>
</table>

Framingham: Independent contributor to stroke in old women and young men

Honolulu: independent risk factor (htn, glucose intolerance, other comorbidities)

Nurses Health Study: Direct relationship between body mass and stroke between ages 30 and 55

Health Professionals Follow-Up Study: RR 2.33 in men with hip-waist ratio in the highest quintile
Physical Activity

- Framingham
  - Exercise = fewer strokes
- Honolulu Heart Program
  - Exercise = fewer strokes
- NHANES 1
  - Exercise = fewer strokes
- Study on British Middle aged men
  - Exercise = fewer strokes

More Info....

- Physician’s Health study:
  - 14% lower RR of stroke with vigorous exercise (>5x/wk) among men
- Harvard Alumni Study:
  - Highly physically active had ~18% lower RR
- Women’s health study:
  - Dose response relationship between leisure-time walking and pace with risk of stroke
    - Higher levels associated with 20-40% reduction

More Info....

- Framingham:
  - Benefit in Men, none in women
  - Moderate exercise no worse than heavy
- British Civil Servants: More benefit in intense exercise
- NHANES:
  - Low levels of exercise = Increased stroke in both sexes and races
  - Moderate activity = intermediate protection
- Risk Factor Reduction: Decreased BP, weight, LDL, improved glucose tolerance..... Etc.
Questions??