Project: Ghana Emergency Medicine Collaborative

Document Title: The Management of Acute Ischemic Stroke & TIA

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The Management of Acute Ischemic Stroke & TIA

Rashmi U. Kothari, M.D.
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KCMS/MSU
65 y.o. Fire Chief w/ Lt arm numbness & weakness X 15 minutes

- Has 15 minutes of symptoms now normal
- Wife takes him to ED
- Now refuses to be evaluated
70 y.o male “found down” while cutting lawn

- Last seen 1hr to 911
- Rt arm/leg weakness
- Hx of HTN, DM, resolved old stroke
41y.o male w/ Lt eye deviation & drooling. RN notes initial BP= 200/110

- Brought to ED 5 hrs. after onset
- Lt. Eye deviation, drooling, slurred speech
- RN notes elevated BP=200/110
The Management of Acute Ischemic Stroke & TIA

Rashmi U. Kothari, M.D.
Borgess Research Institute
Department of Emergency Medicine
KCMS/MSU
Stroke Chain of Survival & Recovery

Detection

Dispatch/Decision

Delivery

Drug

Decision

Data

Door/Triage

Elsie esq., flickr

Seattle Municipal Archive, Wikimedia Commons

Reytan, Wikimedia Commons

Valerie Everett, flickr

Andrew Ciscal, Wikimedia Commons

Paramedics Worldwide, Wikimedia Commons

8
Goals

- Stroke definitions
- Management of TIA
- Management of Ischemic Stroke
  - management of hyper-acute stroke
Definition of Stroke

Any disease process that decreases vascular blood flow to a certain region of the brain causing neuronal cell death.
Stroke Subtypes

Ischemic: 85%

Hemorrhagic: 15%

- Thrombotic
- Embolic
- Intracerebral Hemorrhage
- Subarachnoid Hemorrhage

Sources of images undetermined
Stroke Vocabulary

- **TIA**: Symptoms <24 hrs
- **Lacunar**: Small infarcts
- “Mini-Stroke”: TIA
Current Management of TIA
Current Management of TIA

All new onset TIAs should be admitted!!!
Short-term Prognosis after ED Diagnosis of TIA

- Cohort study
- 1707 patients w/ TIAs
- Followed for 90 days
- 3/97-2/98
- 16 EDs

- 10.5% stroked
- 1/2 w/in 2 days
- 25% had:
  - Stroke/TIA
  - Cardiac hospitalization
  - Death

Johnson et al: JAMA 2000;284
**Independent Risk Factor of Stroke within 90-days of a TIA**

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Odds Ratio</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt; 60</td>
<td>1.8</td>
<td>.01</td>
</tr>
<tr>
<td>Diabetes</td>
<td>2.0</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>&gt;10 min duration</td>
<td>2.3</td>
<td>&lt;.005</td>
</tr>
<tr>
<td>Weakness</td>
<td>1.9</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Speech</td>
<td>1.5</td>
<td>.01</td>
</tr>
</tbody>
</table>

*Johnson et al: JAMA 2000;284*
### 90-day Stroke Risk by Number of Risk Factors

<table>
<thead>
<tr>
<th># Risks Factors</th>
<th>Patients N=</th>
<th>Stroke w/in 90 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>22</td>
<td>0%</td>
</tr>
<tr>
<td>1</td>
<td>179</td>
<td>3%</td>
</tr>
<tr>
<td>2</td>
<td>509</td>
<td>7%</td>
</tr>
<tr>
<td>3</td>
<td>584</td>
<td>11%</td>
</tr>
<tr>
<td>4</td>
<td>337</td>
<td>15%</td>
</tr>
<tr>
<td>5</td>
<td>76</td>
<td>34%</td>
</tr>
</tbody>
</table>
# Medical Interventions in Patients with TIAs

<table>
<thead>
<tr>
<th>Condition</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atrial fibrillation</td>
<td>Warfarin, Aspirin</td>
</tr>
<tr>
<td>Carotid stenosis</td>
<td>Heparin, Endarterectomy,</td>
</tr>
<tr>
<td>Cardiovascular event</td>
<td>r/o MI</td>
</tr>
<tr>
<td>Stroke in-evolution</td>
<td>Thrombolysis, Heparin, Endarterectomy</td>
</tr>
</tbody>
</table>
Exceptions to the Rule

- PMH of Stroke/TIA
  - Negative ED CT
  - recent negative stroke w/u
  - Close Follow-up

- Minimal symptoms of short duration
  - w/ negative ED w/u
  - Negative doppler or MRA
  - +Echo
  - Antiplatelet agent
  - Close Follow-up
Current Management of TIA

All new onset TIA’s should be admitted!!!
65 y.o. Fire Chief with Lt arm numbness & weakness X 15 minutes

- Has 15 minutes of symptoms now normal
- Wife takes him to ED
- Now refuses to be evaluated

Naval History and Heritage Command, [flickr](https://creativecommons.org/licenses/by/)
Management of Ischemic Stroke

- Diagnostic tests
- Anticoagulation
- BP management
Diagnostic Tests

- Priority studies
- Recommended studies
- Elective studies
Priority Studies

dextrostick

Source undetermined

Novic84, Wikimedia Commons
44 y.o male “found down” while cutting lawn

- Last seen 1hr to 911
- Rt arm/leg weakness
- Hx of HTN, DM, old resolved stroke
Recommended Studies

- CBC with platelets
- Basic Metabolic Panel
- PT & INR
- CXR
- U/A
Individualized Tests

- Cardiac enzymes
- VDRL
- Antithrombin III antibodies
- Protein C & S deficiency
- Antiphospholipid antibodies
Anticoagulation

- Heparin, aspirin, ticlopidine, clopidogrel, dipyridamole, warfarin
- Commonly used
- Unproven efficacy in acute stroke
Antiplatelet Agents
(aspirin, ticlopidine, clopdiogrel, dipyridamole)

- Long-term reduction in stroke
- Long-term reduction in cardiovascular events
- Not proven in acute stroke
# Antiplatelet Agents

(aspirin, ticlopidine, dipyridamole, clopdiogrel*)

<table>
<thead>
<tr>
<th>Event</th>
<th>Risk Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-fatal Stroke</td>
<td>25%</td>
</tr>
<tr>
<td>Non-fatal MI</td>
<td>35%</td>
</tr>
<tr>
<td>Vascular death</td>
<td>15%</td>
</tr>
<tr>
<td>Death any cause</td>
<td>15%</td>
</tr>
</tbody>
</table>
Heparin

- Commonly used in acute setting
- No data supporting its use
International Stroke Trial (IST)

- 467 Hospitals
- 19,435 Patients

Factorial Design
- Heparin 5,000/12,500 IU
- Avoid Heparin
- Aspirin
- No Aspirin

Treatment
- w/in 48 hrs
- for 14 days

Lancet 1997:3492
### International Stroke Trial: Results

<table>
<thead>
<tr>
<th>Event</th>
<th>Heparin (N=9717)</th>
<th>No Heparin (N=9718)</th>
<th>Events preventable per 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ischemic Stroke (recurrent)</strong></td>
<td>2.9%</td>
<td>3.8%</td>
<td>9*</td>
</tr>
<tr>
<td><strong>Hemorrhagic Stroke</strong></td>
<td>1.2%</td>
<td>0.4%</td>
<td>-8*</td>
</tr>
<tr>
<td><strong>Death or Non-fatal Stroke</strong></td>
<td>11.7%</td>
<td>12%</td>
<td>4</td>
</tr>
<tr>
<td><strong>Dead or Dependent</strong></td>
<td>62.9%</td>
<td>62.9%</td>
<td>0</td>
</tr>
<tr>
<td><strong>Transfused or fatal hemorrhage</strong></td>
<td>1.3%</td>
<td>0.4%</td>
<td>-9*</td>
</tr>
</tbody>
</table>

* 2p<0.05

*Lancet 1997:349*
1989 Survey of Neurologist Regarding Heparin Use

- 82% might decrease recurrent emboli
- 70% might be indicated in progressing stroke
- 6% thought proven useful
- 16% thought proven ineffective

Marsh et al: Neurology 1989
High Risk Stroke/TIA Patients

- Crescendo TIAs
- Vertebrobasilar TIA
- High grade carotid stenosis
- Carotid / vertebral dissection
- Small cardioembolic stroke
HEPARIN
Thrombolytic Candidates

- Can treat patients who are on aspirin
- Avoid antiplatelet & anticoagulants X 24 hrs following thrombolysis
Blood Pressure Management

- Non-Thrombolytic Candidates
- Thrombolytic Candidates – pre-treatment
- Thrombolysied Patients – during & post-treatment

Mvhayes, Wikimedia Commons
Blood Pressure Management In Stroke

- Guidelines in old ACLS (Advanced Cardiac Life Support) Handbook
- In ACLS cards that come with new handbook
BP Management for Non-Thrombolytic Candidates

- Recheck blood pressure
- DON’T TREAT acutely!
Cerebral Autoregulation

Cerebral Blood Flow

cc/min/gm

Mean Arterial Pressure (mmHg)

120/60 (MAP=80)

Source undetermined
Current Guidelines

- Recheck BP
- Treat:
  - Systolic BP > 220-230
  - Diastolic BP > 120-130
- Reduce gradually
BP Management for Thrombolytic Candidates

- **Pre-Treatment**
  - Be gentle
    - Systolic 185>
    - Diastolic 110>

- **During/Post-Tx**
  - Be aggressive
    - Systolic 185>
    - Diastolic 105>
BP Management

- Non-Thrombolytic Candidate
  - Don’t Treat!!!
- Pre-Thrombolysis
  - Be Gentle!!!
- During & Post-Thrombolysis
  - Be Aggressive!!!
41y.o male w/ Lt eye deviation & drooling. RN notes initial BP= 200/110

- Brought to ED 5 hrs. after onset
- Lt. Eye deviation, drooling, slurred speech
- RN notes elevated BP=200/110
Key Points

- Admit all new onset TIAs
- Avoid heparin use
- Treat only extreme HTN
70 y.o. female w/ Rt. sided weakness. RN notes initial BP= 200/110

- Last seen normal 5 hrs. PTA
- Slurred speech, Rt arm & leg weakness
- RN notes elevated BP
Effectiveness of Heparin In Progressive

Phase 1:
- Late 1970’s
- 310 patients
- ↓ speech/motor between 2 exams
- No Heparin

Phase 2:
- Late 1980’s
- 907 patients
- 2 pt. ↓ in SSS
- Heparin infusion
  » No bolus
  » aPTT = 50-80

Journal Internal Med 2000:248
41y.o male w/ Lt eye deviation & drooling. RN notes initial BP= 200/110

- Brought to ED 5 hrs. after onset
- Lt. Eye deviation, drooling, slurred speech
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