STROKE PREVENTION AND TREATMENT

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CASE REPORT:
ACUTE STROKE MANAGEMENT

90 YEAR OLD WOMAN, PREVIOUSLY ACTIVE AND INDEPENDENT, CHRONIC ATRIAL FIBRILLATION, PRESENTS TO UCI WITH ACUTE ONSET LEFT HEMIPLEGIA, SEVERE DYSARTHRIA, AND RIGHT GAZE DEVIATION. IV TPA GIVEN 94 MINUTES AFTER STROKE ONSET. FOLLOWING TPA INFUSION, PATIENT WAS TAKEN TO ANGIOGRAPHY SUITE WHERE CLOT EXTRACTION WAS ATTEMPTED USING SOLITAIRE DEVICE.
THE MODIFIED RANKIN SCALE (mRS)

0 - No symptoms.

1 - No significant disability. Able to carry out all usual activities, despite some symptoms.

2 - Slight disability. Able to look after own affairs without assistance, but unable to carry out all previous activities.

3 - Moderate disability. Requires some help, but able to walk unassisted.

4 - Moderately severe disability. Unable to attend to own bodily needs without assistance, and unable to walk unassisted.

5 - Severe disability. Requires constant nursing care and attention, bedridden, incontinent.

6 - Dead.
OUTCOMES OF IV TPA FOR ACUTE ISCHEMIC STROKE IN PATIENTS AGED 90 OR OLDER (MAYO CLIN PROC 2009)
CASE REPORT: STROKE PREVENTION

90 YEAR OLD FEMALE WITH CHRONIC ATRIAL FIBRILLATION AND HTN (CHADS SCORE 2), HAS GI BLEED (DUE TO PEPTIC ULCER DISEASE) ONE YEAR PRIOR TO ADMISSION. NO TRANSFUSION REQUIRED. ANTITHROMBOTIC THERAPY WAS TERMINATED, AND THERE WAS NO RECURRENT GI BLEEDING.
CASE #1

• 55 YEAR OLD RIGHT-HANDED MALE HAS SUDDEN ONSET LEFT-SIDED WEAKNESS, ARRIVES IN ER 6 HOURS LATER. BLOOD PRESSURE 200/100. EXAM SHOWS DYSARTHRIA, MILD LEFT CENTRAL FACIAL WEAKNESS, 3/5 LEFT HEMIPARESIS, NORMAL SENSORY EXAM.
CASE #1: ISSUES

• STROKE ETIOLOGY: LARGE VESSEL, SMALL VESSEL, CARDIOGENIC?

• INTERVENTION: IV, IA, OR?

• HYPERTENSION MANAGEMENT?

• IMAGING?

• STROKE PREVENTION STRATEGY?
Cerebral Blood Flow Autoregulation and Ischemia

Normal Brain Tissue
Ischemic Brain Tissue

(ml/100g per minute)

Mean Systemic Arterial Pressure (mmHg)
**EFFECTS OF TIGHT CONTROL BLOOD PRESSURE: SYSTOLIC <130**

<table>
<thead>
<tr>
<th>Event</th>
<th>Usual control (n=553)</th>
<th>Tight control (n=557)</th>
<th>HR (95% CI)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death from any cause, MI, stroke, TIA, atrial fibrillation, admission for heart failure, angina, or coronary revascularisation*</td>
<td>52 (9.4%)</td>
<td>27 (4.8%)</td>
<td>0.50 (0.31–0.79)</td>
<td>0.003</td>
</tr>
<tr>
<td>Death from any cause, MI, stroke, admission for heart failure, angina, or coronary revascularisation†</td>
<td>32 (5.8%)</td>
<td>17 (3.0%)</td>
<td>0.51 (0.29–0.93)</td>
<td>0.027</td>
</tr>
<tr>
<td>Single components of composite outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coronary revascularisation</td>
<td>15 (2.7%)</td>
<td>5 (0.9%)</td>
<td>0.33 (0.12–0.91)</td>
<td>0.032</td>
</tr>
<tr>
<td>New-onset atrial fibrillation</td>
<td>21 (3.8%)</td>
<td>10 (1.8%)</td>
<td>0.46 (0.22–0.98)</td>
<td>0.044</td>
</tr>
<tr>
<td>MI</td>
<td>6 (1.1%)</td>
<td>4 (0.7%)</td>
<td>0.66 (0.19–2.34)</td>
<td>0.52</td>
</tr>
<tr>
<td>Admission for heart failure</td>
<td>7 (1.3%)</td>
<td>3 (0.5%)</td>
<td>0.42 (0.11–1.63)</td>
<td>0.21</td>
</tr>
<tr>
<td>Stroke or TIA</td>
<td>9 (1.6%)</td>
<td>4 (0.7%)</td>
<td>0.44 (0.13–1.42)</td>
<td>0.16</td>
</tr>
<tr>
<td>Death from any cause</td>
<td>5 (0.9%)</td>
<td>4 (0.7%)</td>
<td>0.77 (0.21–2.88)</td>
<td>0.70</td>
</tr>
</tbody>
</table>

Verdecchia et al, Lancet, Aug 2009
CASE #2

- 65 YEAR OLD RIGHT-HANDED WOMAN HAS SUDDEN ONSET RIGHT-SIDED WEAKNESS, BROUGHT IN BY PARAMEDICS THREE HOURS AFTER SYMPTOM ONSET. BLOOD PRESSURE 180/100, MILD APHASIA, MODERATE RIGHT CENTRAL FACIAL WEAKNESS, 2/5 RIGHT SIDE WEAKNESS, MILD RIGHT SIDE SENSORY LOSS TO SUPERFICIAL PAIN/LIGHT TOUCH. CT COMPLETED ONE HOUR LATER WNL.
CASE #2: ISSUES

• STROKE ETIOLOGY: LARGE VESSEL, SMALL VESSEL, CARDIOGENIC?

• INTERVENTION: IV, IA, OR ?

• HYPERTENSION MANAGEMENT?

• IMAGING?

• STROKE PREVENTION STRATEGY?
1% REDUCTION TOTAL CHOLESTEROL = 0.8% STROKE RR

1% REDUCTION LDL = 0.4% STROKE RR

De Caterina et al. JACC 55:2010
CASE #3

• 70 YEAR OLD RIGHT-HANDED MAN TRANSFERRED TO HOSPITAL ONE DAY AFTER SUSTAINING ACUTE ONSET APHASIA AND RIGHT HEMIPLEGIA. BLOOD PRESSURE 160/90, HEART RHYTHM ATRIAL FIBRILLATION. HEAD CT SHOWS LARGE LEFT MIDDLE CEREBRAL ARTERY DISTRIBUTION INFARCT.
CASE #3: ISSUES

- STROKE ETIOLOGY: LARGE VESSEL, SMALL VESSEL, CARDIOGENIC?
- INTERVENTION: IV, IA, OR ?
- HYPERTENSION MANAGEMENT?
- ANTICOAGULATION?
- IMAGING?
- STROKE PREVENTION STRATEGY?
HEMORRHAGIC TRANSFORMATION OF ISCHEMIC INFARCT

Cerebrovasc Dis 2001
CHADS2 RISK STRATIFICATION

• C: CONGESTIVE HEART FAILURE (1 POINT)
• H: HYPERTENSION (1 POINT)
• A: AGE > 75 (1 POINT)
• D: DIABETES (1 POINT)
• S: PRIOR STROKE OR TIA (2 POINTS)
RISK STRATIFICATION IN NON-VALVULAR ATRIAL FIBRILLATION

• LOW RISK: <2% ANNUAL STROKE RISK: NO AC
• MEDIUM RISK: 2%-4% ANNUAL STROKE RISK: AC UNCERTAIN
• HIGH RISK: >4% ANNUAL STROKE RISK: AC NEEDED
CHADS2 RISK STRATIFICATION

• LOW RISK: 0 POINTS
• MEDIUM RISK: 1-2 POINTS
• HIGH RISK: 3-6 POINTS
## Table 3. Risk of Ischemic Stroke or Systemic Embolism after the 3-Month Visit, According to Baseline CHADS$_2$ Score and According to Whether Subclinical Atrial Tachyarrhythmias Were or Were Not Detected between Enrollment and the 3-Month Visit.

<table>
<thead>
<tr>
<th>CHADS$_2$ Score</th>
<th>No. of Patients</th>
<th>Subclinical Atrial Tachyarrhythmias between Enrollment and 3 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Present</td>
</tr>
<tr>
<td></td>
<td></td>
<td>no. of patients</td>
</tr>
<tr>
<td>1</td>
<td>600</td>
<td>68</td>
</tr>
<tr>
<td>2</td>
<td>1129</td>
<td>119</td>
</tr>
<tr>
<td>&gt;2</td>
<td>848</td>
<td>72</td>
</tr>
</tbody>
</table>

* The P value for trend is 0.35.
DABIGATRAN VS WARFARIN: PRIMARY OUTCOMES (STROKE OR SYSTEMIC EMBOLISM)
RIVAROXABAN VS WARFARIN

B Events in Intention-to-Treat Population

Cumulative Event Rate (%)

Warfarin

Rivaroxaban

Days since Randomization

No. at Risk
Rivaroxaban
Warfarin

7081 6879 6683 6470 5264 4105 2951 1785
7090 6871 6656 6440 5225 4087 2944 1783

NEJM 2011; 365:883-91
CASE #4

- 60 YEAR OLD RIGHT-HANDED WOMAN PRESENTS WITH ACUTE ONSET ALTERED MENTAL STATUS, 3/5 WEAKNESS ALL FOUR LIMBS, SMALL PUPILS BARELY REACTIVE. HISTORY OF CABG. BLOOD PRESSURE 170/90. SYMPTOM ONSET WAS FOUR HOURS AGO, AND HEAD CT NORMAL EXCEPT FOR QUESTIONABLE HYPERDENSE BASILAR ARTERY.
CASE #4: ISSUES

• STROKE ETIOLOGY: LARGE VESSEL, SMALL VESSEL, CARDIOGENIC?

• INTERVENTION: IV, IA, OR ?

• HYPERTENSION MANAGEMENT?

• IMAGING?
CASE #5

• 65 YEAR OLD RIGHT-HANDED MAN PRESENTS WITH ACUTE ONSET APHASIA AND RIGHT HEMIPLEGIA 12 HOURS AGO. BLOOD PRESSURE 180/100. HEAD CT SHOWS EARLY ISCHEMIC CHANGE IN LEFT MIDDLE CEREBRAL ARTERY DISTRIBUTION. HE IS STABLE FOR TWO DAYS, THEN BEGINS TO DEVELOP PROGRESSIVE OBTUNDATION.
CASE # 5: ISSUES

• STROKE ETIOLOGY: LARGE VESSEL, SMALL VESSEL, CARDIOGENIC?
• INTERVENTION: IV, IA, OR?
• HYPERTENSION MANAGEMENT?
• ETIOLOGY AND MANAGEMENT OF NEUROLOGICAL DECLINE?
• IMAGING?
DIFFERENTIAL DIAGNOSIS FOR POST-STROKE NEUROLOGICAL DECLINE

1. CEREBRAL EDEMA
2. HEMORRHAGIC TRANSFORMATION
3. RE-INFARCTION
4. PROGRESSIVE INFARCTION
5. MEDICAL COMPLICATION
MALIGNANT MCA SYNDROME
DAYS 1-4 POST-STROKE
Hemicraniectomy in the management of space-occupying ischemic stroke

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ABSTRACT

A space-occupying mass effect is a common finding in several stroke subtypes. A large, intracranial mass is a potentially life-threatening complication, irrespective of its underlying origin, with transtentorial or transforaminal herniation being the common endpoint and often the cause of death. Prompt and adequate intervention is therefore required. Although sufficient data on the management of large haematomas are lacking, there is good evidence from randomized trials that in younger patients with life-threatening, space-occupying, so-called “malignant” middle cerebral artery (MCA) infarctions, early hemicraniectomy decreases mortality without increasing the number of severely disabled survivors. Yet many questions concerning hemicraniectomy in malignant MCA infarction remain open: the definition of a malignant MCA infarct within the first hours, optimal timing of surgery, quality of life and acceptance of remaining disability, the role of aphasia in patients with dominant hemispheric infarcts, the effect of age, and the influence of the pre-morbid status on decision making. The joint efforts of neurologists, neurosurgeons, intensive care physicians, and rehabilitation physicians are needed to design and conduct studies that might answer these questions.

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Functional Outcome after Hemicraniectomy and after Conservative Treatment Alone According to the Modified Rankin Score.

A 6 Months

- Hemicraniectomy Group (N=49)
  - Modified Rankin Score
    - 3: 7
    - 4: 32
    - 5: 28
    - 6: 33

- Control Group (N=63)
  - Modified Rankin Score
    - 3: 3
    - 4: 15
    - 5: 13
    - 6: 70

B 12 Months

- Hemicraniectomy Group (N=47)
  - Modified Rankin Score
    - 3: 6
    - 4: 32
    - 5: 19
    - 6: 43

- Control Group (N=62)
  - Modified Rankin Score
    - 3: 5
    - 4: 11
    - 5: 8
    - 6: 76

Kaplan–Meier Estimates of Survival in the Hemicraniectomy and Control Groups

Ischemic Stroke Guidelines

Guidelines for the Early Management of Patients with Acute Ischemic Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

• Stroke 2013 Mar; 44 (3): 870-947. doi: 10.116/STR.0b013e318284056a. @

http://stroke.ahajournals.org/content/44/3/870
Guidelines for Stroke Prevention in Patients with Stroke or TIA

• Guidelines for the Prevention of Stroke in Patients With Stroke or Transient Ischemic Attack: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

• Stroke. 2011; 42:227-276
doi: 10.1161?STR.0b013e3181f7d043. @
http://stroke.ahajournals.org/content/42/1/227.full.pdf+html?sid=19b09a6c-6008-4da2-8aac-7d2b71a81226