Geriatric Head Trauma

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Disclosures

- Dr. Letarte does not have significant financial relationships to report.
- Dr. Letarte is a Captain in the United States Navy. The opinions expressed in this talk are his alone and do not represent those of the Department of Defense or the United States Navy.
Geriatric Brain Trauma

- 80 yo male falls down 7 steps.
- Has a loss of consciousness but is a GCS 14 on presentation.
- Has significant bruising to his shoulders.
- Had a hip deformity, he suspected a hip fracture and came to ED as a Category 2 trauma
80 yo male falls down 7 steps.

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Had a hip deformity, he suspected a hip fracture and came to ED as a Category 2 trauma.
Age Matters

Brain Trauma Foundation Outcome Guidelines

- Age is an independent predictor of poor outcome.
- Less multisystem trauma in older patients
- Mortality is higher
- Worse outcomes at older than
  - 40?
  - 50?
  - 60?

National Brain Injury Study Hypothermia

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>No. with Body Temperature &lt;36.0°C on Admission</th>
<th>% with Poor Outcome*</th>
<th>Relative Risk (95% CI)</th>
<th>P Value</th>
<th>No. with Body Temperature &gt;36.0°C on Admission</th>
<th>% with Poor Outcome*</th>
<th>Relative Risk (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients‡</td>
<td>102</td>
<td>38 (61)</td>
<td>0.8 (0.6–1.0)</td>
<td>0.09</td>
<td>264</td>
<td>69 (54)</td>
<td>1.1 (0.8–1.3)</td>
<td>0.7</td>
</tr>
<tr>
<td>Hypothermia</td>
<td>62</td>
<td>38 (61)</td>
<td>0.8 (0.6–1.0)</td>
<td>0.09</td>
<td>127</td>
<td>69 (54)</td>
<td>1.1 (0.8–1.3)</td>
<td>0.7</td>
</tr>
<tr>
<td>Normothermia</td>
<td>40</td>
<td>31 (78)</td>
<td>1.0 (0.7–1.4)</td>
<td>0.02</td>
<td>137</td>
<td>71 (52)</td>
<td>1.0 (0.8–1.3)</td>
<td>0.84</td>
</tr>
<tr>
<td>Patients &lt;45 years old</td>
<td>81</td>
<td>25 (52)</td>
<td>0.7 (0.5–1.0)</td>
<td>0.02</td>
<td>233</td>
<td>95 (51)</td>
<td>1.0 (0.8–1.3)</td>
<td>0.84</td>
</tr>
<tr>
<td>Hypothermia</td>
<td>48</td>
<td>25 (52)</td>
<td>0.7 (0.5–1.0)</td>
<td>0.02</td>
<td>115</td>
<td>59 (50)</td>
<td>1.0 (0.8–1.3)</td>
<td>0.84</td>
</tr>
<tr>
<td>Normothermia</td>
<td>33</td>
<td>25 (76)</td>
<td>1.1 (0.8–1.5)</td>
<td>0.60</td>
<td>118</td>
<td>59 (50)</td>
<td>1.3 (0.9–2.0)</td>
<td>0.23</td>
</tr>
<tr>
<td>Patients &gt;45 years old</td>
<td>21</td>
<td>13 (61)</td>
<td>1.1 (0.8–1.5)</td>
<td>0.60</td>
<td>31</td>
<td>19 (62)</td>
<td>1.3 (0.9–2.0)</td>
<td>0.23</td>
</tr>
<tr>
<td>Hypothermia</td>
<td>14</td>
<td>13 (93)</td>
<td>1.1 (0.8–1.5)</td>
<td>0.60</td>
<td>12</td>
<td>19 (62)</td>
<td>1.3 (0.9–2.0)</td>
<td>0.23</td>
</tr>
<tr>
<td>Normothermia</td>
<td>7</td>
<td>6 (86)</td>
<td>1.1 (0.8–1.5)</td>
<td>0.60</td>
<td>9</td>
<td>12 (63)</td>
<td>1.3 (0.9–2.0)</td>
<td>0.23</td>
</tr>
</tbody>
</table>

* Poor outcome was defined as severe disability, vegetative state, or death and was adjusted for age and Glasgow coma score on admission.
† Values indicate the relative risk in the hypothermia group as compared with the normothermia group. CI denotes confidence interval.
‡ Data are presented for 366 patients because temperature on admission was missing for 2 patients, outcome data were missing for 7 patients, and Glasgow coma score on admission, age, or both were missing for 17 patients.
What Age Matters?

- Vollmer, 1991
  - > 55
    - 92% (GOS 1, 2, 3)
    - 80% (GOS 1)
  - 46-55: 78% (GOS 1, 2, 3)
    - 49% (GOS 1)

- Braakman, 1980
  - > 51
    - 75% (GOS 1)
  - 41-50
    - 49% (GOS 1)
  - > 61
    - 77% (GOS 1)

- Teasdale, 1979
  - > 60
    - 87% (GOS 1, 2)
    - 40-60
    - 56% (GOS 1)

- Narayan, 1981
  - > 60
    - 78% Poor Outcome
  - 41-60
    - 57% (GOS 1, 2, 3)
    - 46% (GOS 1)

- Signorini, 1999
  - ≥ 50 Linear decline
  - 14-49 No significant probability effect of survival
Is It Physiology or Lack of Trying?

One Quarter of the US Population

Me, My Wife, Your Grandparents, Your Parents and Pretty Soon, YOU.
The Mechanism Is Different

- 80 yo male falls down 7 steps.
- Has a loss of consciousness but is a GCS 14 on presentation.
- Has significant bruising to his shoulders.
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Motor Vehicle Accidents
The Principle Mechanism of TBI Death is Changing
Most TBI Deaths are from Falls
Most Falls Occur in the Elderly
Many Older Patient Present With Higher GCS

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Many Older Adults with Head Bleeds Present with GCS 14-15

- Only 8% of older adults with head trauma meet criteria for transport to a trauma center.
  - GCS is often > 13
  - Mechanism is often Fall from Standing
  - Isolated Head Injury
  - Out of Hospital GCS 15
This Patient Does Not Need Transport to a Trauma Center?

- 83 yo female suffered a fall 2 days prior to admission.
- Family became concerned because she had difficulty holding objects in her left hand. Her normally immaculate house was messy.
- The patient was on Eliquis
- Presented with GCS 14
Motor Vehicle Accidents
Subdural Hematoma

- Evacuated Regardless of the Patient’s GCS
  - >10mm Thickness
  - > 5 mm midline shift
- If the GCS is <9 Evacuate High Risk Patients Even if it is < 10 mm thick and midline shift is < 5mm but the patient has
  - fixed and dilated or asymmetric pupils
  - ICP > 20 mmHg
  - decline in GCS of 2 or more points from the time of injury to hospital admission.
Fall From Standing

- 83 yo female suffered a fall 2 days prior to admission.
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- The patient was on Eliquis
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Due to Cerebral Atrophy, the Elderly Often Accommodate the Bleed

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- If the GCS is <9 Evacuate High Risk Patients Even if it is < 10 mm thick and midline shift is < 5mm but the patient has
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Older Brains are More Likely to Bleed

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Typical Patient Now Seen in ED

- 88 yo fell in shower with an unknown loss of consciousness.
- On Bathroom floor until 5 am.
- Presents with GCS 15, complaining of a slight head ache.
- Has fallen multiple times in last 1-2 weeks.
Most of These Bleeds Are Stable

- 79 yo Female presents after a fall. Presents to ED shortly after the fall GCS 15.
- Fell from Standing, striking head and left eye without loss of consciousness.
- The Patient is on Coumadin.
- She is evaluated and discharged home.
But Some Progress

- Three days later, she presents with increased somnolence and altered mentation.
- She had stopped her Coumadin
Older Patients are More Likely to Be Anticoagulated

- Three days later, she presents with increased somnolence and altered mentation.
- She had stopped her Coumadin.
Older, Anticoagulated Patients Bleed at a Slow and Unpredictable Rate

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Older, Anticoagulated Patients Bleed at a Slow and Unpredictable Rate

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Out-of-Hospital Triage of Older Adults With Head Injury: A Retrospective Study of the Effect of Adding “Anticoagulation or Antiplatelet Medication Use” as a Criterion


- Only 8% of Older Patients with Head Trauma Meet Criteria for Triage to a Trauma Center
  - GCS 14-15
  - Mechanism of Injury
    - Falls from Standing (68%)
  - Isolated Head Injury (91%)
  - Initial Out of Hospital GCS 15 (80%)
- 30% of Older Patients had Preinjury Anticoagulant or Antiplatelet Use
BUT, Bleeding Can Continue for Days

- Three days later, she presents with increased somnolence and altered mentation.
- She had stopped her Coumadin
This is NOT the Classic Presentation of a Subdural Hematoma
Are Low Frequency, High Consequence Events Important?
Should We Care About 3%?

Your Parents, Your Grandparents, Me, My Wife

If this happened 690 times everyday in the United States, would that be OK?
94 yo female presents with deficits on her right side.
Sustained a fall one week prior to presentation.
On Eliquis
New subdural found on CT
The Audio Doesn’t Match the Video

- 94 yo female presents with deficits on her right side.
- Her right sided subdural should be causing left sided deficits.
What Happens When a Stroke Comes in as a Trauma?

- The patient had multiple vascular lesions
  - Including near complete occlusion of the left MCA
Typical Patient Now Seen in ED

- 76 yo admitted after a fall with GCS 14 and CT with a small amount of subarachnoid blood.
- She has a previous history of stroke and seizures.
- Found to have an elevated troponin.
Three Days Later

- Severe Underlying Cerebrovascular Disease
- Falls Were Due to Strokes
- Final Event
  - Hemorrhagic Stroke
Patient Found Down at Home

- 74 yo found at home, lethargic
- On Eliquis
Sometimes, Your Aneurysm Ruptures CAUSING YOU to Fall Down, Crash Your Car etc.

- Found to have a Anterior Communicating Artery Aneurysm
As Age increases, the incidence of cerebrovascular disease occurring with or as a cause of trauma increases.
Can YOU Flip Quickly from the Trauma to the Stroke Protocol

- If eligible, all acute ischemic stroke patients should receive Alteplase (IV r-tPA).
  - **Inclusion Criteria**
    - Diagnosis of ischemic stroke causing measurable neurological deficit
    - Treatment within 4.5 hours (IV r-tPA between 3 & 4.5 hours is not FDA-approved)
  - **Exclusion Criteria**
    - Current intracranial hemorrhage
    - Subarachnoid hemorrhage
    - Active internal bleeding
    - Recent (within 3 months) intracranial or intraspinal surgery or serious head trauma, presence of intracranial
    - Conditions that may increase the risk of bleeding (e.g., some neoplasms, arteriovenous malformations, or aneurysms)
    - Bleeding diathesis
    - Current severe uncontrolled hypertension
94 yo female presents with deficits on her right side.
Sustained a fall one week prior to presentation.
On Eliquis
New subdural found on CT
Often Develops Into This

- 84 yo male in MVC. Has bilateral subdural hematomas.
- Being followed as an outpatient.
And Progresses to This

- Presents one month later with increasing headaches and weakness.
Chronic Subdural Hematoma

- Perhaps History of Previous Fall
  - 20% Do Not Have This History
- Lethargic
- Not Eating
- Written Off to “Flu”
- Associated Conditions
  - UTI
  - Dementia
Chronic Subdural Hematoma

- It is more complicated than simply active bleeding.
- It develops over weeks NOT hours.
- It can progress to herniation but usually on a much slower schedule.
One of These Things is Not Like the Other!

Progresses Slowly
Complex Mechanism

Progresses Quickly
It is Bleeding and Acute Brain Injury
ALWAYS CONSIDER ELDER ABUSE
The US Population Is Aging

Head Injury is Changing

- Different Mechanisms
- Different Physiology
- Different Injury Patterns
- Different Findings
My Wife and I Would Appreciate It If You Can Change Your Practice Too