
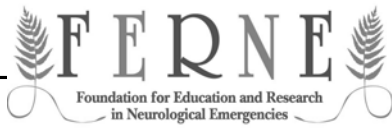


**FERNE / MEMC IV Brain Illness and Injury Course:
Evaluation & Management of
Severe Traumatic Brain Injury Patients with Suspected Elevated ICP
Michelle Biros, MD, FACEP**


**Evaluation & Management
of Severe Traumatic
Brain Injury Patients
with Suspected
Elevated ICP**


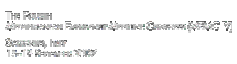
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FERNE
Foundation for Education and Research
in Neurological Emergencies

***FERNE Brain Illness
and Injury Course***

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**4th Mediterranean
Emergency Medicine
Congress
Sorrento, Italy
September 17, 2007**

Michelle Biros, MD 

Michelle Biros, MD, MS


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Objectives

- Discuss key concepts in ED management of severe TBI
- Review the 2007 Brain Trauma Foundation (BTF) recommendations on acute management of elevated ICP

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Severe TBI: Case Presentation

- 18 year old, struck on head
- Agitated at the scene
- GCS score = 8
- En route, decompensates
- On ED arrival, decerebrate posturing

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Key Clinical Questions

What are key considerations for the ED management severe TBI?

Who is at risk for elevated ICP?

What is appropriate ED management of apparent elevated ICP?

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Blood Pressure

What is known

- One episode of SBP < 90 mm increases morbidity and doubles mortality
- Repeated episodes increase risk
- Correcting BP is associated with improved outcomes

What is not known

- Best target values

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Oxygenation

What is known

- Desaturation occurs often in HT and during intubation
- A single episode of hypoxia worsens morbidity and mortality

What is not known

- Level of hypoxia that correlates with poor outcome

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BP and Oxygenation

2007 BTF Recommendations

Level II- BP should be monitored and hypotension (SBP < 90 mm) avoided

Level III- oxygenation should be monitored and hypoxia (paO_2 < 60 mm) avoided

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Who is at risk for elevated ICP?

2007 BTF on ICP monitoring

Level II

- Severe TBI (GCS Score 3-8 after resuscitation), and abnormal CT scan

Level III

- Normal CT and two or more –
 - Age >40; motor posturing; SBP < 90mm

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Emergent Management of ICP

Hyperosmolar Agents

- Mannitol
- Hypertonic saline

Hyperventilation

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Mannitol

Has beneficial effects on ICP, CCP and brain metabolism

- Two possible mechanisms
 - Immediate plasma volume expansion
 - Delayed osmotic effects

Risky in certain patients

- Hypotension, sepsis, renal disease

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Hypertonic Saline

Many possible benefits

- May create an osmotic gradient across the intact BBB, reducing cerebral water content
- Dehydrates endothelial cells, thus increasing vessel diameter
- Expands plasma volume

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Hypertonic Saline

1.6-10%; case series or small studies

Some possible adverse events

- Central Pontine Myelinolysis if previous hyponatremia
- Hypernatremia and hyperosmolality
- Pulmonary edema if preexisting cardiac/ pulmonary disease

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Hyperventilation

What is known

- Reduces ICP by vasoconstriction and subsequent reduced CBF
- CBF is already reduced in TBI
- If too aggressive, may cause cerebral ischemia

What is not known

Does short term hyperventilation change outcome?

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Emergent ICP Management

2007 BTF Recommendations

Level II- Mannitol (0.25-1.0 gr/kg) is effective in reducing elevated ICP

- Avoid arterial hypotension

Level III- Use mannitol only for herniation or progressive deterioration

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Emergent ICP Management

Level II

- Prophylactic hyperventilation not recommended

Level III

- Use only as a temporizing measure
- If possible, avoid in first 24 hours
- Monitor O₂ delivery with S_jO₂ or PbrO₂

Current evidence not strong enough for recommendations on HTS

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Seizure Prophylaxis

What is known;

Seizures may precipitate adverse events

- increase ICP, BP, neurotransmitters
- decrease BP, oxygen delivery

Patients at risk

- GCS Score < 10
- Contusions, SDH, EDH, ICH
- Depressed skull fracture, penetrating HT
- Seizure within 24 hrs of injury

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Seizure Prophylaxis

2007 BTF Recommendations

Level II

Prophylactic anticonvulsants not recommended to prevent late Sz

Level III

Anticonvulsants are indicated to prevent early post-trauma seizures

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Key Learning Points

- Avoid hypotension and hypoxia in patients with severe TBI
- Acute interventions to reduce ICP should occur in cases of herniation or acute deterioration

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Questions?

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