
Optimizing ED Management of Severe Traumatic Brain Injury:

A Diagnosis & Treatment Protocol

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Objectives

- Improve pt outcome in TBI
- Minimize secondary injury of TBI patients
- Improve monitoring of TBI
- Improve treatment of TBI
- Improve knowledge of TBI prognosis
- Improve emergency medicine practice

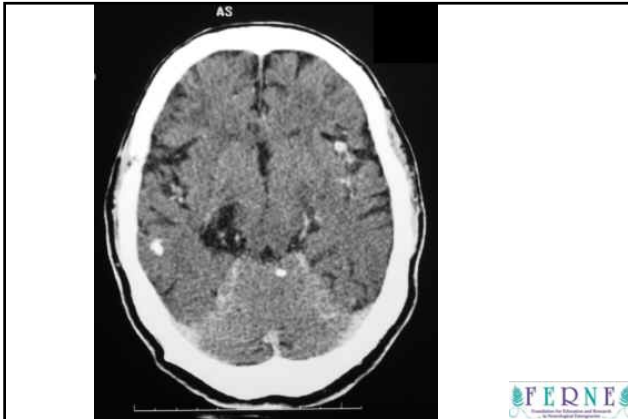
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A Clinical Case

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Suspected TBI

from trauma.org imagebank

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TBI Procedure

Assess the GCS and Pupillary Response

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Glasgow coma scale

		Score
Eye opening	spontaneously	4
	to speech	3
	to pain	2
	none	1
Verbal response	orientated	5
	confused	4
	inappropriate	3
	incomprehensible	2
	none	1
Motor response	obeys commands	6
	localises to pain	5
	withdraws from pain	4
	flexion to pain	3
	extension to pain	2
	none	1
Maximum score		15

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TBI Procedure

Maintain MAP >90

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It's all about Perfusion

Since $CPP = MAP - ICP$ and ICP is assumed to be elevated; we must maintain MAP to maintain CPP.

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TBI Procedure

Maintain Sat >95%

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TBI Procedure

Intubate if the GCS < 9
or you suspect the patient
may decompensate

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Neuroprotective Intubation

- Pretreatment Meds
 - Lidocaine
 - Fentanyl
 - Defasciculating Dose Paralytic
- MAP Stable Dose of Sedative
- Paralytic
- Skilled Intubater

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TBI Procedure

Avoid Prophylactic
Hyperventilation:
Keep CO₂ between 35-38

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Hyperventilation

If pt is showing signs of
impending herniation, we
may hyperventilate to 30 for
a brief period of time

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Signs of Increasing ICP

- Unilateral or bilateral unreactive, dilated pupil
- Extensor posturing (decerebrate)
- A sharp decline in GCS

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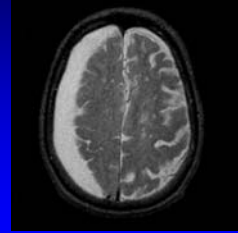


TBI Procedure

Mannitol
1.2-1.4 g / kg

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Confirmed TBI



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TBI Procedure

Continue to Maintain MAP
Continue to Maintain Sats
Continue to Maintain CO₂

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TBI Procedure

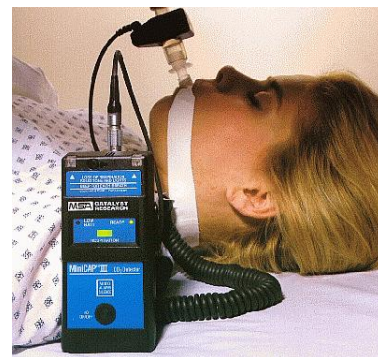
Introduce the patient
to a Neurosurgeon

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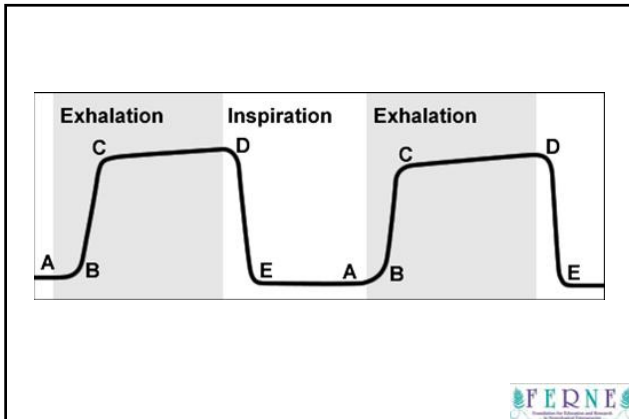
TBI Procedure

Monitor ETCO₂

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ETCO₂

Keep PaCO₂
between 35-38:
Treat EtCO₂ >35


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TBI Procedure

Push Na to ~150
Never < 140


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Na in Resus Fluids

	Na	Cl	mOsm/L
NS	154	154	308
LR	130	109	273


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TBI Procedure

Head of the Bed to 45°


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TBI Procedure

Temp <100° F

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TBI Procedure

Serum Osm < 320

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TBI Procedure

Monitor Urine Output:
Keep Fluid Balance +

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TBI Procedure

Administer Adequate
Sedation &
Pain Control

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TBI Procedure

Early Appropriate
ICP Monitoring

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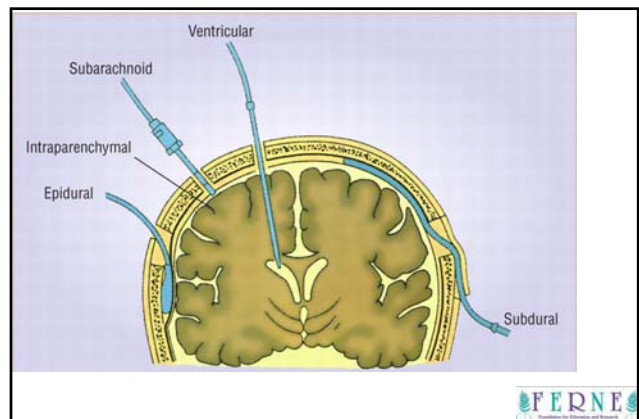
ICP Monitor Indications

GCS (3-8) with abnormal head CTs

GCS (3-8) with normal CTs and two of the following:

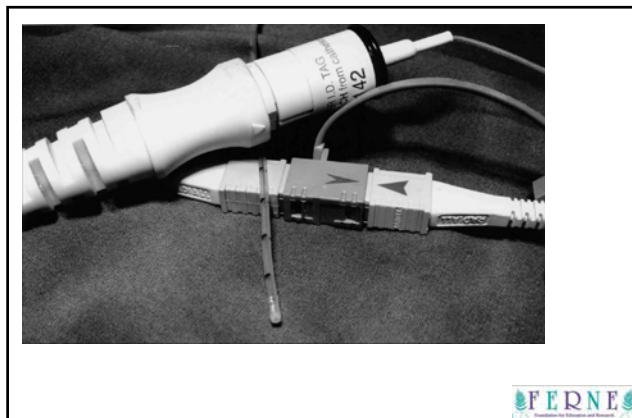
- SBP<90
- Posturing
- Age>40

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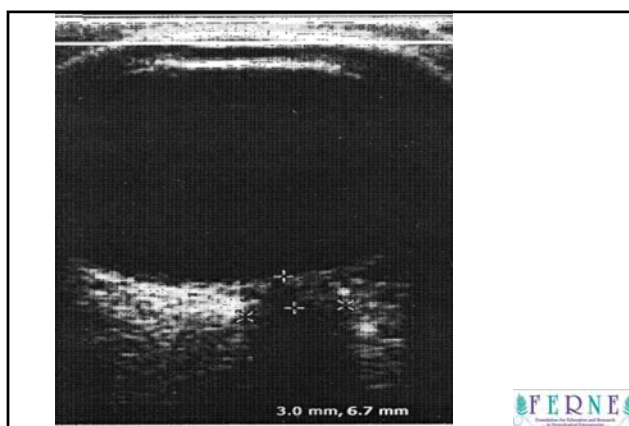


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Blaivas M et al. Elevated intracranial pressure detected by bedside emergency ultrasonography of the optic nerve sheath. *Acad Emerg Med.* 2003 Apr;10(4):376-81.



ICP Monitoring

CPP=MAP – ICP

Keep ICP < 20
Keep CPP > 60

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TBI Procedure

Treat ↑ ICP

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ICP Treatment

Mannitol Boluses:
1 g / kg over ~ 10 minutes
Replace all Urinary Output

ICP Treatment

Hypertonic Saline:
250 cc 3% over
~ 10 minutes

TBI Procedure

Treat ↓ CPP

CPP Treatment

**Fluids
Blood
Inotropes
Pressors**

TBI Procedure

Dilantin Load:
20 mg/kg over 1 hour

TBI Procedure

**Admit to a
NeuroCritical
Care Bed**

Patient Outcome

- Decompressive Craniectomy
- Decompressive Laparotomy
- 4 Weeks In NTICU
- Received Tracheostomy
- Weaned off Vent
- Transferred to Floor
- Intensive OT/PT/Psych Support
- Came to visit at 7 months—Fully Intact

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Further Reading

Guidelines for the Management and Prognosis of Severe Traumatic Brain Injury. <http://www.braintrauma.org>

International Trauma Forum.
<http://www.trauma.org>

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Questions??

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