

PRACTICE GUIDELINE

Effective Date: 4-15-05

Manual Reference: Deaconess Trauma Services

TITLE: ICU MANAGEMENT OF TRAUMATIC BRAIN INJURY AND CEREBRAL PERFUSION PRESSURE

PURPOSE: To define the brain injured patient that is at risk for “secondary injury” and to define guidelines for the prevention and management of secondary injury in the seriously brain injured patient.

DEFINITION OF PATIENTS AT RISK FOR SECONDARY BRAIN INJURY:

1. Positive Head CT associated with a GCS of 8 or less.
2. Severe diffuse swelling with ventricular effacement or obliteration.
3. Hemispheric swelling with effacement of the ventricle or midline shift.
4. Intracerebral hematoma with midline shift.

GUIDELINES:

1. All patients with brain injury and associated other system injuries should be admitted to the ICU under the co-management of the trauma team and the neurosurgery service.
2. Intubate patient; place on volume controlled ventilator. Obtain physician orders for ventilator management and lab tests. Recommendations are as follows:
 - a. Maintain $pO_2 > 80$ torr; maintain O_2 saturation $> 96\%$.
 - b. Maintain pCO_2 35-40 mmHg.
 - c. Monitor lactate levels every 12 hours until normal if the patient has had an episode of hemorrhagic shock.
3. Insert an intracranial pressure monitor:
 - a. Preferably a ventriculostomy.
 - b. If ventriculostomy cannot be placed, consider intraparenchymal monitor.
 - c. May be inserted in the ED or at the bedside in the ICU.
 - d. Start antibiotic for prophylaxis while catheter is in place.
4. Insert arterial line.
5. Insert pulmonary artery catheter, preferably with continuous cardiac output and fiberoptic continuous mixed venous measurements.
6. Head of bed at 30° unless otherwise specified.
7. Maintain sedation as ordered by physician.
8. Notify physician for fever of > 100.5 .
 - a. Consider antipyretics for fever as ordered by physician.
 - b. Consider cooling blanket.
9. Calculate cerebral perfusion pressure (CPP) as mean arterial pressure minus intracranial pressure.
10. Maintain CPP parameters ordered by neurosurgeon. Recommendation of CPP is > 70 torr.
11. If CPP < 70 torr, then determine whether this is due to increased ICP or reduced MAP.

- a. If CPP <70 torr and ICP >25 cm H₂O, then consider measures to reduce ICP.
 - i. Drain ventriculostomy as ordered by neurosurgeon.
 - ii. Consider Mannitol as ordered by the neurosurgeon.
 - a) Consider obtaining serum osmolality every 12 hours as ordered by the neurosurgeon.
 - b) Maintain serum osmolality levels within parameters ordered by the neurosurgeon. Recommendation to call neurosurgeon for level >320 mosm/dL.
 - iii. Barbiturate coma – may be used at the discretion of neurosurgery if no other maneuvers are effective.
 - b. If CPP <70 torr, make sure hemodynamics are not compromised.
 - i. Determine Cardiac Index (CI).
 - ii. If CI <4.0, then determine PCWP.
 - a) Recommendation to maintain PCWP at >14 cm H₂O.
 - b) Consider fluid boluses to maintain appropriate PCWP as ordered by neurosurgeon.
 - iii. If PCWP >14 cm H₂O and CI <4.0, consider vasopressor (Dopamine) as ordered by neurosurgeon.
 - iv. If CI >4.0 and CPP is still <70 torr, consider adrenergic gtt (Neo-synephrine) as ordered by neurosurgeon.
12. If there is any confusion with this protocol, contact neurosurgery or the trauma surgeon.
13. Repeat CT scans according to neurosurgery requests.
14. Start enteral nutrition as soon as possible.

REFERENCES:

See Manual References

REVIEWED DATE	REVISED DATE
JAN 06	JAN 08
JAN 07	