This is a general guideline and does not represent a professional care standard governing providers' obligations to patients. Care may be revised to meet individual patient needs.

Pentobarbital use in Traumatic Brain Injury (TBI)

Indications: To be considered in the setting of uncontrolled elevation of intracranial pressure (ICP) >20 mmHg for at least 30 minutes refractory to maximal medical and surgical ICP lowering therapy (refer to TBI pathway).

Background: Pentobarbital has been shown to reduce ICP by reducing cerebral blood flow (CBF) and cerebral metabolic rate of oxygen (CMRO2) in a dose-dependent fashion. However, studies with pentobarbital as a prophylactic therapy have repeatedly shown no improvement in outcome. The latest guidelines from the Brain Trauma Foundation report a low-quality body of evidence to support the use of high-dose barbiturates to control elevated ICP refractory to maximum medical & surgical treatment. It continues to be used as a potential salvage therapy for pediatric patients with refractory intracranial hypertension making it essential to ensure that families understand that this treatment is reserved for injuries associated with very high morbidity and mortality.

Pre-requisites:

1. Must have ICP monitor in place
2. Must be intubated and mechanically ventilated with end-tidal in line
3. Must have arterial line for continuous blood pressure monitoring
4. Must have central venous line in case of need for pressors
5. Must have norepinephrine or other pressor at bedside and inline
6. Must plan for placement on video EEG for duration of pentobarbital infusion
7. Must have a supportive care team consult
8. Must discuss parameters for notification of neurosurgery service prior to initiation of pentobarbital.

Side effects:

- Hypotension
- Liver failure
- propylene glycol toxicity (acute renal dysfunction, refractory hypotension, lactic acidosis, arrhythmias)
- Hypokalemia
- Bronchospasm

- Pulmonary edema

Monitoring:

- Continuous blood pressure monitoring via arterial line
- Pupillary exam may show fixed, constricted pupils. Notify provider for unilateral or bilateral dilation
- Cough reflex may be absent. Close attention to VAP prevention measures
- Monitor EEG
- Labs: q12 Chem 10 and daily LFTs
- Attention to skin assessment and DVT prevention

Dosing:

- Loading dose: 10 mg/kg IV bolus over 30-60 minutes. Can consider 5 mg/kg bolus in the setting of hypotension
- Start infusion at 1 mg/kg/hr, Range 0.5-5 mg/kg/hr
- Provide 0.5 mg/kg IV bolus and titrate infusion by 0.5 mg/kg/hr every 30-60 minutes to lowest effective dose required to achieve burst suppression on EEG (2-3 bursts/minute).
- In the event that ICPs are well controlled BEFORE burst suppression is achieved, do not uptitrate to burst suppression.
- If EEG shows complete suppression, decrease dose by 50% every 12 hours until burst suppression is again achieved. Once at 0.5 mg/kg/hr, may discontinue infusion.
- If burst suppression is achieved and ICP remains refractory, further increases in pentobarbital should be avoided

Maintenance: Consider discontinuation of all other sedation infusions as well as paralytic infusions while burst suppressed. Infusions for analgesia may continue. Continue pentobarbital infusion in burst suppression for up to 72 hours if ICPs are well controlled.

Weaning: If patient has been burst suppressed for 72 hours, begin weaning pentobarbital infusion by 50% every 12 hours. Once at 0.5 mg/kg/hr, may discontinue infusion. During weaning, if ICP increases to refractory state, consider continuing pentobarbital at previously effective dose for another 24 hours prior to attempting to wean.

Non-responder: Patient may be considered a non-responder to pentobarbital if ICP remains elevated even once burst suppression is achieved.

Other considerations: Consider post-infusion pentobarbital level to determine reliability of neurological exam. Note that this is a sendout lab with delayed turnaround time. Pentobarbital level must be < 5 mcg/ml to be considered non-therapeutic.

References:

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