

The George Washington University Hospital

Standard Practice Manual

Burst – Suppression Protocol

General Description:	Deep anesthesia to the point of EEG electrical silence lowers ICP and decrease the cerebral metabolic usage of oxygen by altering vascular tone, suppressing metabolism, inhibiting free radical mediated lipid peroxidation, and coupling cerebral blood flow to regional metabolic demands. This has a beneficial effect on ICP and global cerebral perfusion.
Purpose:	Anesthesia titrated to a burst-suppression pattern on the EEG is used in patients with severe brain injury when intracranial hypertension is refractory to maximal medical and surgical intracranial pressure (ICP) lowering therapy. This protocol is intended to enable rapid implementation of burst suppression; parameters may be modified to meet individual patient needs.
Patient Population Involved:	Severe brain injured patients with increased ICP refractory to maximal medical and surgical therapy. Patients in status epilepticus or recurrent seizures uncontrollable with standard anticonvulsant therapy.
Providers Involved:	Physicians, Nurses, Pharmacists, and Respiratory Therapists

Protocol:

1. The neurosurgeon/neurologist will assess patients for appropriateness of treatment. Patients sustaining the following are candidates for burst suppression:
 - a. Traumatic brain injury with increased ICP not controlled with maximal medical and surgical interventions.
 - b. Intracerebral hemorrhage including Subarachnoid hemorrhage.
 - c. Status epilepticus.
2. Upon receipt of the physician order to administer institute burst suppression, assure the patient has the following supportive equipment:
 - a. Mechanical ventilator and pulse oximeter/End tidal CO₂ monitor
 - b. Cardiac monitor
 - c. Central venous pressure.
 - d. Arterial catheter for invasive BP monitoring
 - e. Vascular access (large bore lines) sufficient to allow fluid and medication administration
 - f. Bispectral Index Monitor (BIS)
 - g. Bedside EEG monitor capable of monitoring burst suppression, if ordered by neurosurgeon/neurologist
 - h. ICP monitor*
 - Note: *These items may not be needed in certain patients and are at the discretion of the physician.
3. Assess the patient's clinical status. Prior to initiating burst suppression
 - a. Assure ventilatory status is secured by mechanical ventilation. Maintain SaO₂ > 95%.
 - b. Assure patient is normovolemic. Maintain CVP > 5 mm Hg titrate with 5% albumin or NS per order.
 - c. Assure Cerebral Perfusion Pressure (CPP) is > 70 mm Hg. Administer volume as stated above and then begin vasopressors to achieve adequate Mean Arterial Pressure (MAP) per physician order.
 - d. Assure /sequential compression device are in place
 - e. Assess ICP if monitor in place and document.
 - f. Initiate Bispectral Index Monitor (BIS).

4. Dosage of Pentobarbital per physician order to induce burst suppression:
 - A. For increased ICP:
 1. Loading dose: 10 mg/kg of pentobarbital sodium over 30 minutes IV, then pentobarbital 5 mg/kg/hr x 3 hours minutes until BIS shows suppression ratio > 80% or BIS index < 20.
 2. Pentobarbital infusion to maintain BIS SR 70 – 80% or BIS index < 20
Initial maintenance rate 1mg/kg/hr. Bolus 5mg/kg over 30 minutes and increase maintenance rate if not meeting burst suppression or ICP goal per physician order.
 3. Hold infusion if no bursts noted on EEG or suppression ratio 100% > 1 hour and call physician restart when ratio returns to goal, may need rebolus.
 - B. For Status epilepticus:
 1. Loading dose: 10 mg/kg of pentobarbital 50 mg per minute IV, repeat every as needed to cessation of seizures or burst suppression BIS shows suppression ratio > 80% or BIS index , 20.
 2. Pentobarbital infusion to maintain BIS SR 70 – 80%. Initial maintenance after goal met 1mg/kg/hr. If needed bolus 5mg/kg 50mg per minute and increase maintenance rate.
 3. Hold infusion if no bursts noted on EEG or suppression ratio 100% > 1 hour and call physician restart when ratio returns to goal, may need rebolus.
5. Assess patient closely while on burst-suppression therapy.
6. Monitor Neuro status. Pupils may vary in size and be non-reactive. However, changes in eye exam should be reported to neurosurgery/ neurology. Blink reflex and cough reflex will diminish or be absent.
 - 1) Lacrilube both eyes, q 4 hours
 - 2) Monitor ICP and responses to therapy.
 - 3) If EEG is ordered, monitor EEG for burst suppression. Goal is 10-12 seconds (5-6 lines on EEG) of burst suppression as seen on EEG.
 - a. Monitor respiratory status. Due to diminished cough reflex, patient is at great risk for pulmonary sequelae.
 - 1) Monitor ventilator settings, SaO₂, PaO₂, and PaCO₂/ETCO₂.
 - 2) Turn patient at least every 1-2 hours, and as needed; avoid head down positioning – document on flow sheet.
 - 3) Suction patients as indicated
 - b. Monitor hemodynamic status
 - 1) Monitor MAP.
 - 2) Titrate volume to maintain CVP per physician orders
 - 3) Administer vasopressors to maintain an adequate CPP (or MAP > 90 mm Hg if no ICP) as per physician orders. Neosynephrine, Dopamine, or norepinephrine may be used to enhance MAP per order.
 - 4) Monitor serum electrolytes q 24 hours or as needed per physician order.
 - c. Assure system support is instituted
 - 1) NG/OG to low continuous suction
 - 2) Maintain normothermia 36 – 37.5°C.
 - 3) Sequential compression device to reduce risk of DVT
 - 4) Skin assessment and care prn and document on flow sheet
 - 5) Range of motion to extremities as tolerated
7. Upon physician order to discontinue coma, wean pentobarbital to off over one hour.