SGH care pathway for sympathetic storming

**Identify triggers such as**
Suctioning, repositioning, external stimuli

**Adequate hydration**
NG/IV fluids

**Exclude**
hydrocephalus CAT/MRI head
Exclude seizures - EEG

**First line to abort episode**

IV MORPHINE 100 micrograms/kg every 4-6 hours adjusted to response

SE: nausea, vomiting, Sedation, respiratory depression, ileus, hypotension

**Second line to reduce frequency and intensity**

Nonselective Beta blockers –PROPRANOLOL
0.25-0.5mg/kg tds oral/NG route, increased to 1 mg/kg tds if needed
SE: bradycardia, hypotension, bronchospasm, sleep disturbance, prolongation of hypoglycaemia
DO NOT USE METOPROLOL

**Other Rx**
CLONIDINE if Propranolol is ineffective or cannot be used as in asthma
0.5-1 microgram/kg tds [max 300 micrograms/day]
LABETALOL if Propranolol is ineffective
BACLOFEN oral initially 300 micrograms/kg in 4 divided doses; may help if concurrent spasticity

**Broad principles of Management**

Early recognition
Identify triggers
Adequate hydration
Analgesia
Workup of fever to exclude infection
Treatment of hyperthermia
Exclude hydrocephalus, seizures
Maintenance of blood glucose
Pharmacological treatment

**Workup of fever**
Clinical examination
Bloods: FBC, CRP, U&Es
Blood C/ST, urine C/ST
CXR, CSF examination
NPA, throat swab etc.

**Treatment of hyperthermia**
Cool cloths
Paracetamol oral/IV/PR

**Pharmacological treatment**

- Adequate hydration
- NG/IV fluids
- Exclude hydrocephalus CAT/MRI head
- Exclude seizures - EEG

**PICU**

**Nicholls ward**

**Role of family**
Cool cloth
Soothing music
Massage
Quiet conversation

**Continue Propranolol three times a day oral/NG route**

Start Clonidine if Propranolol is ineffective and wean off Propranolol

**Weaning regime:** Propranolol bd for a week, then od for a week, then stop

Wean Clonidine slowly 10-15% of original dose every 48 hours

Consider Gabapentin for neuropathic pain

**Other treatment**
GABAPENTIN for milder symptoms
10mg/kg day 1, 10mg/kg bd day 2, 10 mg/kg tds day 3
Very well tolerated for longer use
SE: mild sedation

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References: Current treatment options in Neurology 2008; Critical Care Nurse 2007
Sympathetic storming is an exaggerated stress response in traumatic brain injury. May also be seen in tumours, hydrocephalus and subarachnoid haemorrhage.

**Diagnosis:**
4 of 6 clinical features be present
- Tachycardia
- Hypertension (High systolic BP)
- Tachypnæa,
- Hyperthermia > 38.5 degree C
- Greater dystonia and extensor posturing
- Diaphoresis/sweating

**When do they occur?**
Paroxysms usually begin 5 to 7 days after the injury but may start earlier.
- They occur on average one to three times per day.
- The duration of each episode can range from less than 1 hour to 10 hours.
- Total duration of the disorder varies widely, ranging from 1 to 2 weeks to several months.

**Are there triggers?**
Events that immediately precede an episode, may include
- Suctioning, repositioning, environmental sensory stimulation (alarms, equipment), or fever

**Why treat?**
Untreated sympathetic storming increases the risk of secondary injury to the brain.
- Intracranial pressure may increase during the episodes
- Prolonged hypertension, arrhythmias, hyperglycaemia, hyperthermia due to elevated metabolic rate, and hypernatremia and dehydration from severe sweating occur as a result of the sympathetic storm.
- Sustained uncontrolled hyperventilation decreases cerebral oxygenation because of vasoconstriction.
- Prolonged hypertension increases the risk of secondary injury of the brain due to increased blood flow leading to edema, risk of rebleeding, and puts prolonged stress on the heart. In general, acute hypertension is not treated because it is a compensatory response. Generally, long-term antihypertensive therapy is not needed.
- Common arrhythmias include bradycardia, ectopic beats and irregular rates, atrial fibrillation, and supraventricular tachycardia. Arrhythmias require treatment only if they are symptomatic or life threatening (e.g., supraventricular tachycardia, atrial fibrillation)
- Neurogenic pulmonary edema may occur if circulating catecholamines cause massive fluid shifts that overload the pulmonary system.

**Management**—see flow chart

**How can families help?**
When the episodes occur, family members can use cool cloths, massage, quiet conversation, and soothing music. These activities provide the family with a means to help provide care for the patient and lessen the inevitable feelings of helplessness experienced by families dealing with traumatic brain injury.