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PAPER 2: PRINCIPLES OF ANAESTHESIA-2

TOPIC: INTRA CRANIAL PRESSURE



Introduction:

- *The pressure within the cranium that is exerted by combined total volume of 3 components*
- *Brain Tissue*
- *Blood*
- *CSF*

Definition:

- *Increased intracranial pressure is defined as cerebrospinal fluid, Pressure greater than 15 mm/hg*
- *Normal ICT is 10-15 mm/hg*
- *ICT >20mm/hg is significant and aggressive treatment.*

Etiology:

Infection, Tumors, Stroke, Aneurysm, Epilepsy, Seizures, Hydrocephalus, Hypertensive brain injury, Hypoxemia, Meningitis



Clinical Manifestation:

- *Headache, Nausea, Vomitting, Increased blood pressure, Decreased mental abilities, Confusion, Double vision, Pupils that doesn't respond to changes in light, shallow breathing, seizures, loss of consciousness and coma*

Complications:

- *Seizures*
- *Stroke*
- *Neurological change*
- *Death*

Management:

Pharmacological management:

- *Mannitol: Mannitol, urea and Hypotonic solutions, among these*



agents not commonly used is mannitol. These drugs are retained in intravascular compartment increasing plasma osmolarity, drawing water from brain tissue decreasing brain edema, however if blood brain barrier is disrupted. These agents can enter the brain tissue increasing cerebral edema.

- Therefore use of mannitol in head injury and stroke should be judicious*
- Mannitol should be repeated only if there is clear evidence for decrease in ICT or improvement in surgical conditions after 1st dose.*

Diuretics:

- Furosemide: It is very effective method of reducing ICT particularly when blood brain barrier is disrupted*
- Steroids*
- Dexamethasone, Methylprednisolone*



- *The exact mechanism by which steroids decrease ICT is not clear. Probably they act by membrane stabilisation or reducing production of CSF*
- *Barbiturates: Thiopentone- Causing cerebral vasoconstriction is effective in decreasing ICT.*

Non-Pharmacological Management:

- *Headup position by increasing venous drainage decreases intra cranial tension*
- *Oxygenation and ventilation to keep paO_2 -100; $paco_2$ -30-35*
- *NBM reduces ICP by avoiding coughing.*

Surgical Management:

- *Decompressive Craniotomy*



Dietary Management:

- *Limit intake of salt*
- *Limit your intake of fats*
- *Avoid red meat and processed meats like pork,bacon and beef*
- *Foods that are rich in vitamin A may have an adverse impact on intracranial hypertension.*

Assessment:

- *Change in level of consciousness - drowsiness,lethargy*
- *Early behaviour changes - restlessness,irritability,confusion and apathy*
- *Falling score on GCS*
- *Changes in vital signs caused by pressure on brain stem.*



General Considerations:

1.Fluids:

- It is difficult to determine the most ideal fluid for neurosurgery. As hyperglycemia can precipitate cerebral edema therefore, glucose containing solutions should be avoided.*
- Ringer lactate is hypo osmolar therefore, large quantities can aggravate cerebral edema*
- Normal Saline in large quantities can cause hyperchloremic metabolic acidosis*
- Therefore, best policy is to alternate ringer lactate and normal saline.*

2.Hypothermia:

- Role of mild hypothermia is only restricted to the surgeries at high risk of ischemia.*



3. Glycemic Control:

- *Both hypoglycemia as well as hyperglycemia can be detrimental. Therefore, blood sugar should be best maintained between 140 and 180mg.*

4. Monitoring:

- *Capnography: Hypercapnia is most potent cerebral vasodilator therefore, significantly increase ICT. Excessive hypocapnia can cause cerebral ischemia.*
- *Pulse Oximetry: Hypoxia should be avoided as it increases ICT by causing cerebral vasodilation.*
- *Continuous invasive BP: Hypotension can cause cerebral ischemia. Hypertension can increase ICT and haemorrhage.*



THANK YOU