**Hypertonic saline**

**Indication for use of hypertonic saline**
- Osmotherapeutic agent for treatment of cerebral oedema and raised intracranial pressure (eg head injury, DKA).\(^1,2\)
- Treatment of symptomatic hyponatraemic seizures.\(^3,4\)
- “Small volume” resuscitation for shock (eg associated with traumatic head injury) or as a renoprotective agent (eg prevention of radiocontrast and cytotoxic nephropathy, rhabdomyolysis induced renal failure).

**Mechanism of action**
- IV hypertonic saline (HS) induces a shift of fluid from the intracellular to the extracellular space across the osmotic gradient it generates.
- It therefore reduces brain water, increases blood volume and increases plasma sodium. Note that intracellular volume is inversely proportional to plasma sodium concentration.

**Advantages of hypertonic saline over mannitol**
- Hypertonic saline is as effective as mannitol for treatment of raised intracranial pressure in traumatic brain injury in children. Plasma sodium of up to 170 mmol/L have been targeted to control ICP.
- HS may produce less "rebound" intracranial hypertension following compared to mannitol which cannot be easily removed from intracellular space.
- HS does not cause obligatory osmotic diuresis and hence is likely to preserve or augment plasma volume rather than deplete it.
- Mannitol may precipitate acute renal failure and may not be excreted in oligo-anuria whereas HS is renoprotective.
- HS directly increases plasma Na, measurable changes in blood osmolality can be easily monitored by measuring plasma Na. The effect of mannitol on plasma osmolality can only be estimated using an osmole gap.

**Dose of 3% saline (or pre-made 2.7% saline when available)**
- Standard dose is 3 mls/kg of IVI 3% saline (over 10 – 20 minutes) via central vein (preferable) or peripherally.
- Use similar dose (3mls/kg) even if the pre-made 2.7% saline solutions is used (clinical difference = negligible)
- Dose may be repeated as clinically indicated according to the indication of use.
- 3mls/kg of 3% saline may increase plasma Na by approximately 2 - 3 mmol/L. A greater increase may occur if a large diuresis occurs. Check plasma Na if any doubt on the rate of Na increase.
- For hyponatraemic seizures there is no fixed threshold above which seizures stop, usually an increase in Na of 3 to 7 mmol/L is adequate.
- An acute rise in plasma Na at a rate less than 10mmol/L in 24 hrs is probably safe.

**PREPARATION OF 3% SALINE USING 30% SALINE**

A. 0.9% saline

B. 0.5% saline

C. 0.5% saline

D. 3% saline

**References**