

HYPERKALAEMIA

RECOGNITION AND ASSESSMENT

Definition

- Serum potassium >6 mmol/L (normal 3.0-5.5)
- Neonates often tolerate concentrations up to 7.5-8.0 mmol/L without ECG changes

SYMPTOMS AND SIGNS

- Cardiac arrest
- ECG abnormalities:
 - tall peaked T waves
 - widened QRS complex
 - sine waves
 - bradycardias

Causes

- Renal failure – secondary to hypoxic ischaemic encephalopathy (HIE), sepsis and hypotension, or structural abnormalities
- Very low-birth-weight babies without renal failure (non-oliguric hyperkalaemia) – first 12-48 hr
- Excess K⁺ in IV solutions

INVESTIGATIONS

- Ensure sample not haemolysed, repeat and send free-flowing venous sample or arterial sample
- If potassium >6.5 mmol/L, connect to cardiac monitor

IMMEDIATE TREATMENT

Serum potassium >6.0 mmol/L (stable with normal ECG)

- Stop all K⁺ IV solutions or oral supplements
- Reconfirm hyperkalaemia
- Institute continuous ECG monitoring

Serum potassium >7.5 mmol/L without ECG changes

- As above
- Give salbutamol 4 microgram/kg IV in glucose 10% over 5-10 min – effect evident within 30 min but sustained benefit may require a repeat infusion after a least 2 hr
 - if IV access difficult, give nebulized salbutamol 2.5 mg as a single dose (difficult to administer if ventilated and not formally evaluated in neonates) and repeat if necessary
- Give intravenous insulin and glucose (12 units of soluble insulin in 100 mL of 25% glucose – 5 mL/kg given over 30 min) – very effective and has an additive effect with salbutamol
- Repeat U&E
- Repeat infusion as necessary until K⁺ <7 mmol/L
- **Monitor blood glucose every 15 min for first 2 hr during and after infusion**
- aim for blood glucose 4-7 mmol/L

Serum potassium >7.5 mmol/L with ECG changes

- Give 10% calcium gluconate 2 mL/kg IV (diluted with equal volume glucose 10%) over 5-10 min
- Flush line with sodium chloride 0.9%
- Give intravenous sodium bicarbonate (1 mmol/kg) –effective even in patients who are not acidotic (2 mL of 4.2 % sodium bicarbonate = 1 mmol)
- Follow rest of the management as above

Further treatments – discuss with consultant

- A cation-exchange resin, such as calcium resonium (500 mg/kg rectally, with removal by colonic irrigation 8-12 hrly ,repeat every 12 hrs. Dose can be doubled at least once to 1 gm/kg in severe hyperkalaemia), is useful for sustained reduction in serum potassium but takes many hours to act and is best avoided **in sick preterms who are at risk of NEC (Necrotizing enterocolitis)**
- If severe hyperkalaemia persists despite the above measures in term babies with otherwise good prognosis, contact renal team for consideration of dialysis
- Exchange transfusion using fresh blood or washed red blood cells provides another strategy for sustained and reliable reduction in serum K⁺ concentration

SUBSEQUENT MANAGEMENT

- Recheck 4-6 hrly – if arrhythmias present with renal failure, monitor hrly
- Monitor urine output and maintain good fluid balance
- If urine output <1 mL/kg/hr, unless baby volume depleted, give furosemide IV 1 mg/kg until volume corrected
- Treat any underlying cause (e.g. renal failure)

Consequences



Figure: Hyperkalaemia leads to tall, peaked T waves, ventricular arrhythmias, widening of QRS, then sine wave QRS complex (before cardiac arrest)