

Potassium balance

دكتور مقدار فؤاد

Potassium balance

- **Potassium is almost entirely intracellular.** Not less than 98 per cent is intracellular, and only 2 per cent is present in the extracellular fluid.
- **Three quarters** of the total body potassium (approximately 3500 mmol) is found in skeletal muscles. When the body needs endogenous **protein as a source of energy**, potassium, as well as nitrogen, is mobilised.
- **Each day** a normal adult ingests approximately 1.0 mmol/kg of potassium in food; fruit, milk and honey are rich in this cation.
- Except for a very small quantity in formed faeces, and a still smaller quantity in sweat, most excretion occurs in urine.

The augmented potassium excretion of trauma

- Following trauma, including operation trauma, there is a spell **نوبة**, varying directly with the degree of tissue damage, of increased excretion of potassium by the kidneys.
- **This loss is greatest during the first 24 hours** and lasts, for example in the case of partial gastrectomy, for about 3 or 4 days.
- So great are the **body's reserves of potassium** that, unless the patient was severely depleted at the time of the operation, hypokalaemia may not reveal itself for 48 hours.

Hypokalaemia

➤ Hypokalaemia can occur suddenly or gradually.

Sudden hypokalaemia is unlikely to be encountered in surgical practice. It occurs most frequently in diabetic coma treated by insulin and prolonged infusion of saline solution.

Gradual hypokalaemia is the type encountered in surgical practice.

- *It is **most commonly seen** in patients who present for surgery with **chronic hypokalaemia** as a result of potassium-losing medications such as **diuretics**.
- *The **diarrhoea** from ulcerative colitis, villous tumours of the rectum and the loss from **external fistulae** of the alimentary tract are also common causes (e.g. duodenal fistula, ileostomy); the potassium content of the discharge from some of these fistulae is twice that of the plasma potassium concentration.

- *Another frequent cause of hypokalaemia is **prolonged gastroduodenal** aspiration with fluid replacement by intravenous isotonic saline solution.
- *It is also prone to occur in the postoperative period following **extensive resections for carcinoma** of the alimentary tract, because often the operation has to be undertaken after months of weight loss and potassium depletion.

Clinical features

➤ **Most patients are asymptomatic**, but at risk of the sequelae of hypokalaemia such as cardiac arrhythmias. Such consequences are more likely during surgery and anaesthesia, especially in the presence of **pre-existing myocardial disease**.

➤ **Symptoms of severe hypokalaemia include:**

- **Listlessness**
- **Slurred speech,**
- **Muscular hypotonia,**
- **Depressed reflexes and**
- **Abdominal distension** as a result of a paralytic ileus.

- **Weakness of the respiratory muscles** may result in rapid, shallow, gasping respirations; these are conducive to postoperative pulmonary complications.
- The diagnosis is supported by electrocardiography (ECG), which may show a **prolonged QT interval, depression of the ST segment and flattening or inversion of the T-wave.**

Treatment

- **Oral potassium:** Potassium can be given in the form of milk, meat extracts, fruit juices and honey. However, in hospital practice, tablets of potassium chloride 2 g can be given by mouth 6-hourly.

Intravenous potassium:

Rapid intravenous supplementation (especially when renal function is impaired) carries the risk of dysrhythmias and cardiac arrest if the serum concentration rises to a dangerous level.

Administration should be properly controlled; the level of potassium should be checked daily; the urine output must be adequate. The potassium deficit can be restored by adding 40 mmol potassium chloride to each litre of 5per cent glucose, glucose—saline or 0.9 per cent saline solution, which is given 6—8-hourly. Severe hypokalaemia should be treated in a high dependency or intensive care environment.

Potassium

- Potassium deficiency is present if the serum potassium value is less than 3.5 mmol/litre. The normal range is 3.5—5.0 mmol/litre.
- **It must be remembered** that intracellular potassium deficiency may be present although the plasma concentration is normal,
- deficiency is to be expected if oral feeding has been withheld for more than 4 days.

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