Emergency 11.1: Diabetic ketoacidosis

Establish the diagnosis

Triad of:

1 *Hyperglycaemia:* glucose usually more than 15 mmol/l

2 *Metabolic acidosis:* pH lower than 7.35, HCO_3^- less than 17 mmol/l

3 *Ketonuria:* ketonuria 3+ or more

Main metabolic features

- *Hyperglycaemia:* leading to dehydration from osmotic diuresis
- *Metabolic acidosis:* caused by elevated ketone bodies from insulin deficiency
- *Hyperkalaemia:* secondary to acidosis, whole-body potassium stores will be low

Mainstays of treatment

Intravenous rehydration

Intravenous insulin

Replacement of low body potassium stores

Initial treatment

1 l 0.9% saline over 30 min

Actrapid insulin 6 units intravenously (Actrapid insulin 20 units intramuscularly if no intravenous access)

Consider treating an underlying cause

Insulin

Start intravenous infusion of soluble insulin at 6 units/h. If blood glucose does not fall, first check patency of intravenous lines and that infusion apparatus working; if these are satisfactory increase prescribed dose of insulin. Aim to reduce blood glucose by no more than 3–5 mmol/l/h.

Fluid

As a guide, infuse 1 l over first 30 min, then 1 l over 1 h, then 1 l over 2 h, then 1 l over 4 h, then 1 l over 6 h. Consider central venous pressure monitoring in the elderly, those with heart failure or renal failure

Change fluid from 0.9% saline to 5% glucose when blood glucose has fallen below 10 mmol/l, but continue to infuse intravenous insulin

Potassium

Potassium should usually be given from the second bag of fluid, unless the patient is oliguric or K^+ is more than 6 mmol/l. Give 20–40 mmol/l with each litre of fluid (maximum rate of 20 mmol/h). Increase rate of potassium replacement if K^+ falls below 4 mmol/l. Plasma potassium should be measured after 60 min, and then every 2–4 h until stable

Alkali

Consider giving 50 mmol of 1.4% sodium bicarbonate if pH is lower than 7.0, after seeking specialist advice

Precipitating causes

- Stopping insulin deliberately or running out
- Infections increasing insulin resistance
- Myocardial infarction