



Hypernatraemia (Na > 150)

Sept 2014

Epidemiology

Mortality 50-70% (mostly due to underlying cause); mortality 75% if > 160; mortality acute > chronic

Usually assoc with severe underlying medical illness; occurs in 1% all inpatients

In children: mod if > 150, severe if > 170

Corrected Na = measured Na + ((BSL - 5)/3)

Causes

1. HYPOVOLAEMIC

Loss of water > loss Na

Renal (peeing out H₂O)

Urinary Na > 20 (high as H₂O > Na lost from kidneys)

Urinary Osm normal

Conditions:

Diuretics

Osmotic diuresis (glucose, mannitol, myeloma)

Amyloid, sarcoid, ETOH, post-obstructive diuresis

Extra-renal (GI loss - pooing/vomiting out H₂O)

Urinary Na < 20 (loss as kidneys reserve Na)

Incr urinary osm

Conditions:

GI loss (D, V, NGT)

Third space losses (burns, pancreatitis, peritonitis), sweating

Management

Correct shock with N saline

Calculate fluid deficit and restore with 0.45% saline over 72hrs.

Water deficit (L) = 1L per 3-5 incr Na = $(0.6 \times \text{kg}) \times ((\text{Na} - 140)/140)$

Give deficit + maintenance (1500ml/day in adults), with 1st 1/2 over 24hrs, 2nd 1/2 over next 48hrs.

Correct for ongoing losses.

Rate of correction: 0.5 mmol/L/hour or 10-12 mmol/L/day

2. EUVOLAEMIC

Minimal loss of body water, No change in body Na

Renal

Decr urinary osm < 150, urinary Na < 20

Diabetes insipidus: idiopathic (50% all hyperNa) - Serum osm < 800 mosm/L

Extrarenal

Incr urinary osm > 800

GI losses, sweating, third spacing, decr water intake due to decr thirst

Kidneys conserving H₂O or decr access to H₂O (most common cause; eg. elderly, young)

Management

Treat as above but won't require saline bolus (1/2 over 6-12hr, 1/2 over next 48hrs)

Give ADH 5-10iu IV/SC BD-QID, DDAVP 2-4mcg IV/SC BD if DI



3. HYPERVOLAEMIC

Incr body Na - incr body water

Urinary Na >20 (kidneys trying to lose Na)

Na poisoning (eg. Hypertonic saline, formula in infants, NaHCO₃, N saline)

Hyperaldosteronism (1Y = Conns, Cushings; 2Y = CCF, hepatic cirrhosis, nephrotic syndrome)

Incr urinary K

Management

Furosemide + free water (as furosemide causes excretion of more Na than H₂O)

Dialysis if renal failure

Symptoms

Occur with Na >158

Brain cell shrinkage - cerebral haemorrhage - confusion, seizures, coma

Osm 350 – 375 Restlessness, irritability, thirst, anorexia, N+V

Osm 375 – 400 Tremor, ataxia

Osm 400 – 430 Hyperreflexia, twitching, spasticity

Osm >430 Seizures, death; subcortical and SAH

Investigations

Na 150 – suggests dehydration

Na 170-190 – suggests DI

Na >190 – suggests incr Na intake

Others: BSL (?osmotic diuresis)

Management

Too rapid correction - cerebral oedema; correct at <0.5mmol/L/hr or 10-15mmol/L/day

Aim to correct over 48-72hrs, 50% in 1st 24hrs, 50% over next 48hrs

Use N saline to restore intravascular vol - then use 0.45% saline for maintenance

Children: if mod: give paedialyte no more than 15ml/kg/hr

use 0.45% saline + 2.5% dex and replace over 48hrs

if severe: use 0.45% saline + 2.5% dex and replace over 72-96hrs

Diabetes Insipidus

Inability to concentrate urine - large amounts of severely diluted urine

Failure of:

- production of ADH (central DI: neoplasm, pituitary surgery, trauma, idiopathic)

- response to ADH (nephrogenic DI: hypercalcaemia, hypokalaemia, renal disease, lithium, sickle)

Symptoms: polyuria + polydipsia, but normal glucose

Ix: hypernatraemia (dehydration), urine - dilute, low spec gravity, low osmolality and electrolyte levels

serum osmolality > 290 mosmol/L

serum [Na⁺] > 145 mmol/L

urine osmolality < 150 mosmol/L

Fluid deprivation test - should make less, more concentrated urine - does not happen in DI

Desmopressin test - if central will concentrate urine (kidneys respond normally), if renal remains dilute