



Hyponatraemia

Sept 2014

Mild 125-134 Moderate 120-124 Severe <120

1. HYPERTONIC

Osm >295

No change TBW/Na

Osmotically active particle in plasma (glucose, mannitol) - water moves from ICF into ECF - dilutes Na

Management: Treat cause (may cause osmotic diuresis - genuine decr Na); IVF may help

2. ISOTONIC

Osm 275-295

aka pseudohyponatraemia

No change TBW/Na

Due to: incr lipids, incr protein (myeloma, Waldenstroms)

3. HYPOTONIC

Osm <275

Due to: solute depletion or solute dilution

a. HYPOVOLAEMIC (most common):

Loss of Na > H₂O

Renal

Diuretics, osmotic diuresis (glucose, urea, mannitol)

Mineralocorticoid deficiency

Na losing nephropathy (RTA, CRF, interstitial nephritis, cerebral salt wasting syndrome)

Extra-renal

Upper GI: vomiting

Middle GI: pancreatitis, bowel obstruction

Lower GI: diarrhoea

Others: sweat, bleeding, burns

Test urine Na to determine renal vs extra-renal: >20mmol/L = renal; < 20mmol/L = extra-renal

Management: give N saline; correct at <0.5mmol/hr or <12mmol/day; aim to get Na >125

b. EUVOLAEMIC:

Causes:

SIADH (most common)

Endocrine: Addisons (+ incr K), hypothyroid

Water intoxication: psychogenic, MDMA

Drugs: SSRI/TCA/MAOI, ecstasy, oxytocin, carbamazepine, NSAIDs, omeprazole

Test urine osmolality: <100mosm/L = primary polydipsia; >100mosm/L = SIADH or endocrine

Management: fluid restrict to 500-1500ml/day; consider ADH antagonist if SIADH

c. HYPERVOLAEMIC:

Incr H₂O >> Na

ARF (can't excrete H₂O)

CHF, cirrhosis, nephrotic syndrome

Management: fluid and salt restrict; diuresis (loop); dialysis



Symptoms

More likely if: fast decrease ($>0.5/\text{hr}$). large decrease (<120 in $<24\text{hrs}$) or $\text{osm} <240$; worse in women/children

>125 Mild GI Sx (anorexia, N+V)

$125-115$ Lethargy, confusion, muscle weakness

<115 Decr LOC, seizures; can cause brainstem herniation - cerebral oedema, osmotic demyelination

Investigations

Clinical picture; ?on diuretics; urine and blood Na and osm; BSL

Incr urine osm: SIADH, renal / hepatic / cardiac failure, hypovolaemia, hypothyroid

Decr urine osm: ADH working fine

Urine chloride <20 : hypovolaemia

Management

Indications for hypertonic saline: coma, seizure, new onset profound decr LOC; not indicated if asymp

Dose: give 25-100ml/hr (1-2ml/kg/hr) 3% saline via CVL

100ml 3% saline = 50mmol

Can give more rapidly (eg. 500ml or 4-6ml/kg bolus over 10mins) if seizing

Endpoint: Sx resolved / Na incr by 8-20mmol/L / Na >125

Aim for correction of **1mmol/L/hr** (max 10-14mmol/L/day)

SE: central pontine myelinosis (osmotic demyelination) if too rapid correction of chronic ($>48\text{hr}$)

- develops over 3-5/7

- symmetrical lesions around pons, occurs in 25% severe cases

- altered LOC, seizures, brain stem signs, pseudobulbar palsy, quadriparesis, dysarthria, tremor, ataxia

- RF - alcoholic, malnourished, decr K, burns, elderly

SIADH

ADH causes water retention and sodium loss = hyponatraemia

Causes:

Malignancy (ectopic ADH) - lung (small cell, mesothelioma), GI, GU, lymphoma, sarcoma, thymoma

Infective lung disease

CNS - infection, abscess, AIDs, trauma, stroke

Drugs - cytotoxics, antidepressants, antipsychotics, desmopressin, oxytocin, vasopressin

Clinical:

Euvolaemia + symptoms of hyponatraemia + signs of cause (eg Ca)

Investigations:

Hyponatremia <130 mEq/L

POsm <270 mOsm/kg (hypotonic)

PLUS:

Urine Na⁺ concentration >30 mEq/L = "inappropriate natriuresis"

Urine Osmolality >100 mosmol/kg

Management:

Treatment of hyponatraemia

Acute onset/very unwell - can correct quickly

Slow onset/asymptomatic - correct slowly = fluid restriction