

## **Electrolytes imbalance**

Ward management of hyponatraemia

In the ward maximum case of hyponatraemia are hypovoluemic hyponatraemia.

Normal Na<sup>+</sup> 135- 145 mmol/L

Hyponatraemia if Na<sup>+</sup> <135 mmol/L.

### **When to suspect hyponatraemia practically?**

1. If patient complaint of marked anorexia after any episode of vomiting and/or diarrhoea.
2. If patient complaint of anorexia, vomiting after starting any diuretics.
3. Patient unconscious or drowsy after vomiting or diarrhoea.
4. Patient has intractable vomiting for which no other cause (like UTI, hepatitis, AKI, CKD, GOO etc) found.

### **For correction of sodium we commonly use the following**

P 1 TSF table salt contain 96 mmol/L sodium.

P 1 L normal saline contain 154 mmol/L sodium.

P 500 ml 3% sodium contains 512 mmol/L sodium.

### **Types of hyponatraemia**

According to the rapidity of development

1. Acute hyponatraemia- if hyponatraemia has developed rapidly (<48 hours).
2. Chronic hyponatraemia- hyponatraemia developed slowly over 48 hours.

According to severity

1. Mild hyponatraemia-serum sodium 130-135 mmol/L
2. Moderate hyponatraemia-serum sodium 125-129 mmol/L
3. Severe hyponatraemia-serum sodium <124 mmol/L

### **Correction of hyponatraemia**

## **Hypovolaemic hyponatraemia**

A) Mild and moderate hyponatraemia usually can be corrected orally with table salt intake.

B) Severe hyponatraemia

1. Acute hyponatraemia-if there is signs of cerebral oedema, such as obtundation or convulsions etc. Sodium levels should be restored rapidly to normal by infusion of hypertonic (3%) sodium chloride.

A common approach is to give an initial bolus of 150 mL over 20 minutes, then wait for 1 hour and check sodium. 3% sodium 150 ml can be repeated 2 times, depending on the neurological response and rise in plasma sodium.

2. Chronic hyponatraemia- The rate of correction of the plasma Na concentration in chronic asymptomatic hyponatraemia should not exceed 10 mmol/L/24 hrs, and an even slower rate is generally safer.

C) The underlying cause should also be treated e.g. stop of diuretic, treatment of cause of vomiting etc.

## **Euvolaemic hyponatraemia (SIADH, hypothyroidism, primary polydipsia)**

Patients with euvolaemic hyponatraemia generally respond to fluid restriction in the range of 600–1000mL/24 hrs, accompanied where possible by withdrawal of the precipitating stimulus (such as drugs causing SIADH).

In patients with persistent hyponatraemia due to prolonged SIADH, oral urea therapy (30–45g/day) can be used. Oral vasopressin receptor antagonists such as tolvaptan may also be used.

## **Hypervolaemic hyponatraemia (CCF, Cirrhosis, Nephrotic syndrome, CKD)**

1. Treatment of the underlying condition.

2. Cautious use of diuretics in conjunction with strict fluid restriction. Potassium sparing diuretics (spironolactone) may be particularly useful in this context when there is significant secondary hyperaldosteronism.

## **Management of hyponatraemia**

1. Treatment of hypernatraemia depends on both the rate of development and the underlying cause. If it has developed rapidly, rapid correction may be attempted. This can be achieved by infusing an appropriate volume of intravenous fluid (isotonic 5% dextrose or hypotonic 0.45% saline) at an initial rate of 50–70mL/hr.

2. Treatment of the underlying cause.

(In clinical practice common cause of hypernatraemia is inadequate preparation of ORS (dilute in <500 ml water).

### **Management of hypocalcaemia**

1. Inj. 20 ml of 10% solution of calcium gluconate IV slowly over 10-20 minutes.
2. Continuous IV infusion may be required for several hours (equivalent of 10 mL 10% calcium gluconate/hour).
3. Cardiac monitoring is recommended.

### **Treatment of severe hypercalcaemia of malignancy**

1. Rehydration with normal saline as much as 2-4 L/day (may need monitoring with CVP in old age or renal impairment).
2. Bisphosphonates e.g. disodium pamidronate 90 mg IV over 4 hours.
3. Additional rapid therapy
  - a) Forced diuresis with saline & frusemide.
  - b) Prednisolone 40 mg daily.
  - c) Calcitonin.
  - d) Haemodialysis.

### **Hypokalaemia**

Hypokalaemia if  $< 3.5$  mmol/L.

### **Management**

Oral correction is safest and easiest way for mild to moderate hypokalaemia  $K^+ > 2.5$  mmol/L.

Intravenous potassium is indicated for patients with severe hypokalemia and for those who cannot take oral supplementation & if  $K^+$  is  $< 2.5$  mmol/L. Practically 2 amp. potassium injection add in 1000 ccc normal saline then iv @ 10 d/minute. Potassium should not be infused rapidly (cause phlebitis) and with dextrose containing fluid (dextrose containing fluid shift potassium inside the cell and reduce serum potassium level).

### **Precautions**

1. A rate of 20 mEq/hour may be given through a central venous catheter.

2. Continuous ECG monitoring is indicated, and the serum potassium level should be checked every 3-6 hours.
3. For the initial administration, avoid glucose-containing fluid to prevent further shifts of potassium into the cells with glucose.
4. Magnesium deficiency also needs to be corrected at the same time, particularly in refractory hypokalemia.

### **Hyperkalaemia**

Hyperkalaemia if  $> 5$  mmol/L.

### **Management**

These 3 are commonly practiced in the ward.

1. Intravenous calcium gluconate 10 ml of 10 % solution.
2. Nebulization with salbutamol solution.
3. Intravenous glucose 50 ml of 50% (in ward we use 25 % glucose 100 ml) plus short acting insulin 5 units in drip.

Other treatment options are

1. Inj. IV sodium bicarbonate.
2. IV frusemide and normal saline.
3. Ion -exchange resin (e.g. resonium orally or rectally).
4. Dialysis.