HYPERNATREMIA CASE FOR NEPHKIDS

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Case scenario

- A 6 year old,15 kg child with craniopharyngioma, was operated for the same and was shifted to PICU postoperatively on ventilatory support.

12 hours postoperatively, child's vitals were

- Heart rate-155/min
- Respiratory rate-34/min
- Arterial Blood pressure -80/46 mmHg
- Child was under sedation in view of ventilatory support
- Urine output- 10 ml /kg/hr last 3 hours

Case scenario

- Investigations done revealed :
- CBG-80 mg/dl
- Serum sodium-159 mEq/L
- Serum potassium-3.8 mEq
- Urea-55 mg/dl
- Creatinine-1 mg/dl
- Serum osmolality -346 mosm/Kg

Question

- What is the inference from the above case scenario?
- Is this common post neurosurgeries?
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Answer

- Children with craniopharyngioma are expected to have associated endocrine abnormalities due to its location near the pituitary and hypothalamus.
- 8-35% of patients with craniopharyngioma have Diabetes insipidus preoperatively
- Postoperatively 70-90% of children develop Diabetes Insipidus
- It may be transient or permanent.

Question ?

- What type of hypernatremia is this?

Answer

- This is Moderate hypovolemic hypernatremia

Question ?

- How do we differentiate Central from Nephrogenic diabetes insipidus?

Answer

	Central DI	Nephrogenic DI
Defect	Decreased ADH release from Pituitary	ADH resistance in V2 receptors in kidney
Etiology	• Idiopathic • Trauma • Intracranial surgeries • Ischemic Encephalopathy	• Drugs (Lithium, cidofovir, Foscarnet) • Electrolyte abnormalities (hypercalcemia,Hypokalemia)
Clinical features	Polyuria Nocturia	Polyuria Polydipsia Nocturia
Response to Desmopressin	Increased urine osmolality (> 50% from baseline 1 to 2 hours after administration)	Little or no change

Question

- What are the clinical manifestations of hypernatremia?

Answer

- Clinical manifestations are related to neurological system.
- Children manifest hypernatremic symptoms when sodium level approaches 165 mEq/L .
- Acute onset hypernatremia (< 48 hours) present with irritability ,high pitched cry, altered sensorium, increased muscle tone or frank seizure.
- Death due to Respiratory failure with serum osmolality >400 mOsm/Kg.
- In chronic hypernatremia(>48 hours) rapid fluid resuscitation will lead to cerebral edema
- Sudden changes in serum osmolality can lead to Osmotic Demyelination Syndrome.

Question

- How would you manage this child ?

Answer

- Formula for free water correction:

- 0.6 x patient's weight in kg.[Patients Na. -1]

$$\frac{\text{0.6 x patient's weight in kg.[Patients Na. -1]}}{140}$$

- Where 0.6 x weight is estimated total body water and 140 is desired Na

- **Can you calculate for this child ?**

Glucose 2.5% & Sodium Chloride 0.45% 500mls

Answer

- Once hypovolemia is corrected,½ NS with 2.5 % or 5 % D is used. depends on the rate of infusion and change in osmolality required based on acute or chronic hypernatremia
- Adrogue Madias equation for correction
- This estimates the change in serum Sodium by 1 Litre of any intravenous fluid
- ={(Na content of IVF) +K content of IVF)} – Patient serum Sodium
- ——————————————————————————————
- 0.6 X weight(TBW in litres)+1
- Do not decrease > 10 m Eq /L of sodium over 24 hours.
- If sodium fall >0.6, decrease the infusion rate
- If sodium fall <0.5, increase the rate
- During therapy, if sodium falls too rapidly and/or neurological symptoms develop, consider a short infusion of 3% NS over 1-2 hours
- Dialysis may be required in extreme cases

THANK YOU !