A case of DYSELECTROLYTEMIA

Dr. Prathyusha

Dr. Lalitha janakiraman 's unit

CASE SUMMARY

- 4 month old, female infant
- 1st born to NC parents, term, b.wt: 3.25kg
- No neonatal hospitalization
- Attained head control
- Weight 6.1 kg

h/o loose stools

decreased urine output

decreased activity

AT ADMISSION [18-4-12]

- Ill looking, signs of dehydration
- Normal blood pressure [101/50 (71)]
- Normal systemic examination, Dx- 121
- Normal external genitalia

INVESTIGATIONS

- TC 13300 [N 59, L38, M 03]
- Hb 11.4
- RBS 99
- Urea 71
- S. creatinine 1.1
- Na 109
- K 6.5
- Cl 81
- HCO 3 14
- Ca 1.14
- Anion gap 15

Appropriate IVF to correct dehydration

- Urea 71 → → 54 → 37
- Creat 1.1 → → 0.9 → 0.4
- Na 109 → 128 → 135 → 135
- K 6.5 → 4.4 → 3.7 → 3.3
- HCO_3 14 → 15 → 9 → 15

FURTHER EVALUATION

- S. cortisol 0.14 [0.5- 1.2]
- S. 17 OH progesterone 9.0 [10- 240]

- USG abdomen was normal
  normal kidneys
  normal uterus and ovaries

DISCHARGED AS
HYPONATREMIC DEHYDRATION

One month later 22-5-12

- loose stools
- Vomiting
- Signs of some dehydration
- Weight – 6.2 kg

INVESTIGATIONS

- RBS 121
- B. urea 78
- Creatinine 2.0
- Na 110
- K 7.9[tall T waves in ECG]
  Ca gluconate, k bind,
  salbutamol nebulization
- cl 76
- Hco3 14

4 month old infant with history of recurrent episodes

- Dehydration
- Prerenal azotemia
- Acidosis
- Hyponatremia
- Hyperkalemia
- ?CAH / ?ADDISONS / MINERALOCORTICOID DEFICIENCY

Endocrinologist and Nephrologist opinion was sought

Urine electrolytes

- sodium 65
- Potassium 35.3
- Chloride 95
- Bicarbonate 2.2
- pH 6.0

- SERUM OSMOLALITY 280
- URINE OSMOLALITY 360

ACTH STIMULATION TEST

8.00 am : Cortisol 206 [10 – 240]

8.15 am : Inj. Synactin IV

9.00 am : Cortisol 367 [10 – 240]
17 OH progesterone 1.31 [0.5 – 1.2]

FREE T4, TSH normal

- Plasma renin activity
- Serum Aldosterone levels sent

- Mantoux
- Chest X ray

- STARTED ON ORAL FLUDROCORTISONE
- DISCHARGE DIAGNOSIS
- SUSPECTED MINERALOCORTICOID DEFICIENCY

<1 week 28-5-12

- Vomiting
- Decresed activity
- Signs of some dehydration

INVESTIGATIONS

- RBS 171
- B. urea 73
- Creatinine 1.9
- Na 117
- K 8.9[tall T waves in ECG]

  Ca gluconate, k bind, salbutamol nebulisations
- cl 79
- Hco3 14

MOST AWAITED RESULTS

- Plasma rennin activity - > 37
- Serum aldosterone level - > 250
  [5-90]

- FINAL DIAGNOSIS

- PSEUDOHYPOALDOSTERONISM

TREATMENT

- STOP Fludrocortisone
- Common salt supplementation
- K – bind
- Regular electrolyte monitoring

AT REVIEW

DATE	31-5-12	11-6-12	25-6-12	25-7-12
SODIUM	135	138	137	135
POTASSIUM	4.7	4.8	4.5	4.4

DISCUSSION

Electrolyte of concern – K^+

- SPURIOUS LABORATORY VALUE
- INCREASED INTAKE
- TRANSCELLULAR SHIFTS
- DECREASED EXCRETION
    - Renal failure
    - Primary adrenal disease
    - Hyporeninemic Hypoaldosteronism
    - Renal tubular disease
    - Medications

Associated with Hyponatremia

- Primary Adrenal disease [congenital/ acquired]
  CAH
  Most common is 21-OH deficiency in male,
  girl- ambiguous genitalia

- Adrenal insufficiency : Adrenal hypoplasia
  Adrenoleukodystrophy

- Renal tubular diseases
  Hypoaldosteronism [RTA IV]
  Aldosterone resistance

TTKG [TRANS TUBULAR POTASSIUM GRADIENT]

- Evaluate renal response to hyperkalemia
- To differentiate decreased K+ excretion from other etiologies

$$\frac{[K]\ \text{urine}}{[K]\ \text{plasma}} \times \frac{\text{plasma osmolality}}{\text{urine osmolality}}$$

- TTKG > 10 - Renal excretion is normal
- TTKG < 8 - Defect in excretion of potassium [deficiency or resistance of aldosterone]

PSEUDOHYPOALDOSTERONISM

- Incidence of PHA 1 in 80000
- Incidence of CAH 1 in 15000

PSEUDOHYPOALDOSTERONISM

- Type I PHA

AD – renal Type 1 PHA
spontaneous remissions

AR - Systemic Type 1 PHA
defects in salt reabsorption in other organs
lungs (mimic cystic fibrosis)
cholelithiasis, Meibomian glands,
skin and placenta

- Type II PHA
  - Gordon syndrome
  - familial hyperkalemia and hypertension
  - only salt retending variety
  - low doses of thiazide diuretics

- Type III PHA
  - transient resistance
  - secondary to nephropathies
  - obstructive uropathy or UTI
  - main characteristic of this type of PHA is a decreased GFR

MANAGEMENT

- Initial Supportive Measures

  Dehydration:

  Fluid boluses

  (Ensure that, IVF contain no potassium)

  Hyperkalemia

- Appropriate nephrologist and endocrinologist consult.

- Dietary sodium supplementation
- Potassium restriction

- Potassium-binding resins
- Alkalizing agents (sodabicarb / citrate)
- Prostaglandin inhibitors

  Indomethacin (dec Na excretion)

  some patients may not benefit
- Hydrochlorothiazide (in PHA type II)

POINTS TO REMEMBER

- DEHYDRATION WITH LETHARGY

  Try to preserve a blood sample at admission

  Will be useful to evaluate dysectrolytemia

- Urine electrolytes will help in finding out etiology.