A case of DYSELECTROLYTEMIA

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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
- HCO₃: 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
- Mantoux
- Chest X ray

STARTED ON ORAL FLUDROCORTISONE

DISCHARGE DIAGNOSIS

SUSPECTED MINERALOCORTICOID DEFICIENCY
<1 week  28-5-12

- Vomiting
- Decreased 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

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<th>DATE</th>
<th>31-5-12</th>
<th>11-6-12</th>
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<td>SODIUM</td>
<td>135</td>
<td>138</td>
<td>137</td>
<td>135</td>
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<tr>
<td>POTASSIUM</td>
<td>4.7</td>
<td>4.8</td>
<td>4.5</td>
<td>4.4</td>
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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.