

HYPERKALEMIA - NEPHKIDS DISCUSSION

Moderator: Prof Shanthi S

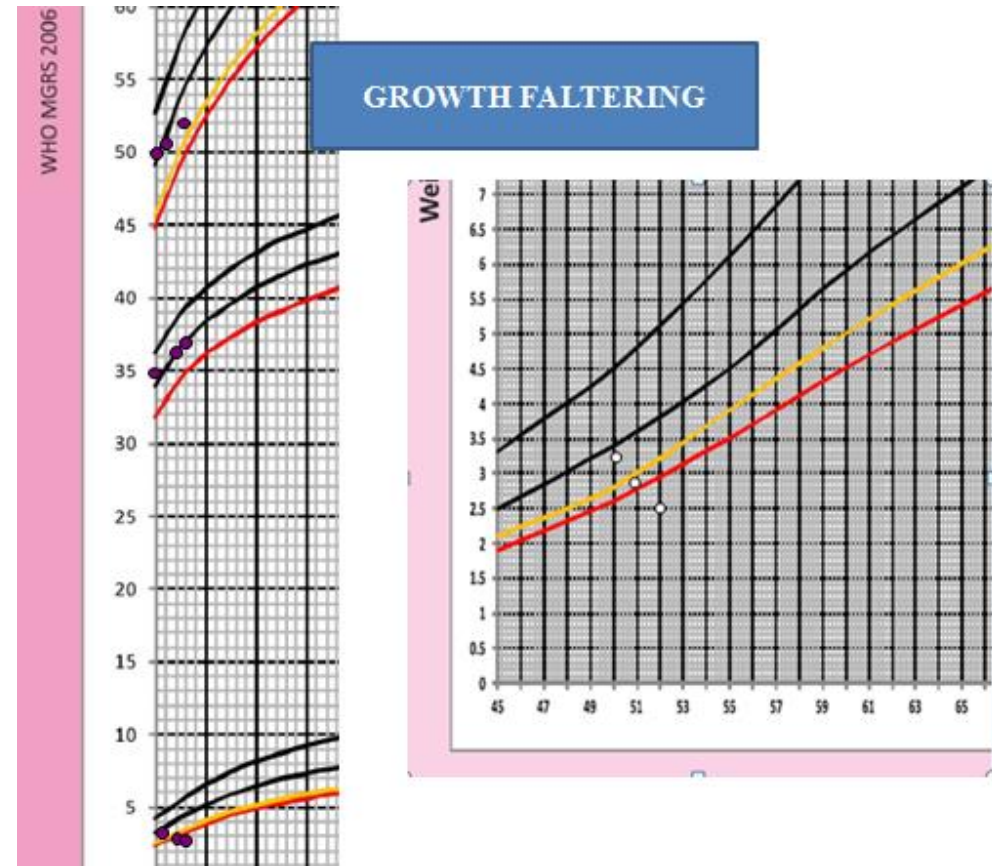
Presenter: Dr Hemchand K Prasad

Case presentation

- 7week old infant is rushed to the emergency room
- H/o lethargy since morning and irritability,
- H/o Not taking feeds for 2 days
- H/o Not gaining weight (Birth weight - 3.8 kg, current weight 3.0 kg)
- Child is voiding urine well.
- H/o significant pigmentation present

Assessment in E room – compensated shock. Ambiguous genitalia present, and CBG = 24 mg/dL.

Case presentation



Case presentation

- Assessment in E room – compensated shock.
- Ambiguous genitalia present
- CBG = 24 mg/dL.
- High index of suspicion for Acute adrenal insufficiency should be considered in this clinical scenario
- A bedside ECG should performed showed - features of hyperkalemia
- Electrolyte reports should traced – Serum Na – 126 mEq/L and Serum Potassium – 7.8 mEq/L and serum bicarbonate – 15.6 mEq/L

High index of suspicion for Acute adrenal insufficiency

- Age of presentation (4-8 weeks)
- Failure to thrive
- Shock
- Hypoglycemia
- Normal urine output
- pigmentation
- Genital abnormality

Major priorities in this child

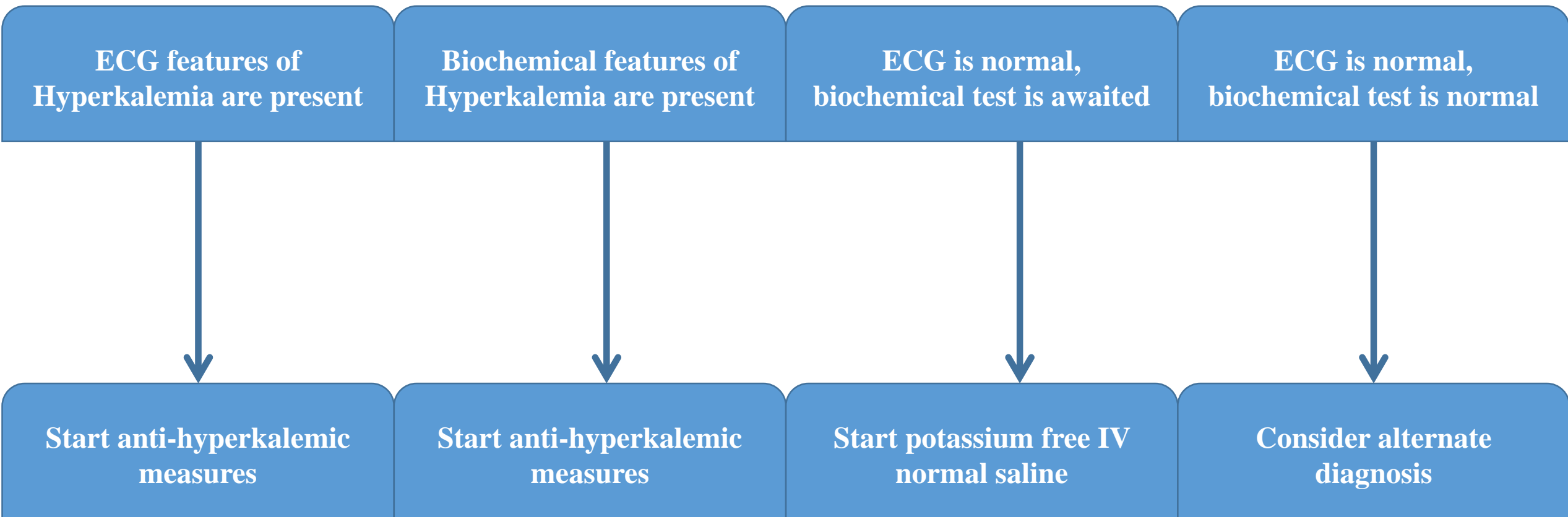
- Taking sample in the emergency room
- Correction of hyperkalemia
- Correction of hypoglycemia and Stress dose of hydrocortisone

Sample in ER before giving Hydrocortisone

PLASMA (EDTA)	SERUM (PLAIN)
ACTH (iced tube, immediately transport to laboratory)	CORTISOL
PLASMA RENIN ACTIVITY	TOTAL TESTOSTERONE
	17-OH PROGESTERONE
	ALDOSTERONE

Index child sample taken for...

Sample		
17 – OH Progesterone		
Total testosterone		
ACTH		
Serum cortisol		
Plasma renin activity		
Serum aldosterone concentration		



**ECG features of
Hyperkalemia are present**

**Biochemical features of
Hyperkalemia are present**

**ECG is normal,
biochemical test is awaited**

**ECG is normal,
biochemical test is normal**

**Start anti-hyperkalemic
measures**

**Start anti-hyperkalemic
measures**

**Start potassium free IV
normal saline**

**Consider alternate
diagnosis**

Evidence of hyperkalemia is present

Drug	Dose	Mechanism
Salbutamol nebulisation	Nebulised salbutamol 2.5mg stat	agents to push the potassium into cell
Inj Calcium gluconate	Inj Calcium gluconate 1.5 ml IV mixed with equal amount of 5% dextrose given over 5 min with cardiac monitoring	Membrane stabilization
Sodium bicarbonate	Sodium bicarbonate 3mEq with equal amount of 5% dextrose given over 10-15 minutes.	agents to push the potassium into cell
Glucose insulin drip	Insulin dextrose: 0.3unit of plain insulin with 15 ml of 10%Dextrose and slow IV administration	agents to push the potassium into cell

Stress dose of hydrocortisone

The dose of hydrocortisone is 100 mg per square meters. If one is unable to calculate body surface area, dose is administered as follows:

i. < 3 years – 25 mg stat, 25 mg/day in divided doses

ii. 3-12 years – 50 mg stat and 50 mg/day in divided doses

iii. > 12 years – 100 mg stat and 100 mg/day in divided doses

Should mineralocorticoid be given in the emergency room

- NO. The stress dose of hydrocortisone provides a good mineralocorticoid action as well.

Infant case management

- Infant give 25 mg Hydrocortisone stat and 6 mg every 6 hours
- Quickly shifted by rapid tapering of hydrocortisone and addition of oral fludrocortisone at 50 mcg once a day along with salt supplementation
- Repeat electrolytes done showed serum potassium of 4.8 mEq/L in 12 hours
- Usually potassium levels are stabilised very quickly with stress dosing of hydrocortisone
- If hyperkalemia persists think of alternative causes
- Follow up biochemical parameters and adjust doses

Infant case management

Baby electrolyte parameters normalized and stabilized on:

- Oral Hydrocortisone 15 mg/sq M in three divided doses
- Oral fludrocortisone 50 mcg once a day
- Oral NaCl (Salt) Supplementation 1 pinch three times a day

Index child sample taken for...

Sample	Value	Interpretation
17 – OH Progesterone	>200 ng/mL	Elevated
Total testosterone	230 ng/dL	Elevated
ACTH	1250 pg/mL	Elevated
Serum cortisol	2.5 mcg/dL	Low
Plasma renin activity	>20 ng/mL/hour	Elevated
Serum aldosterone concentration	undetectable	Low

Renin high
Aldosterone low



CAH
Hypoaldosteronism

Renin low
Aldosterone low



Intrinsic renal disease

Renin high
Aldosterone high



Pseudohypoaldosteronism

Stress dosing of Hydrocortisone

Yes	No
febrile illness (38.5°C), gastroenteritis with dehydration, major surgery accompanied by general anesthesia, and major trauma	everyday mental and emotional stress and minor illness routine physical exercise Vaccination

Wear steroid cards, educate parents on stress dosing and access to home injection of hydrocortisone - Mandatory for all children

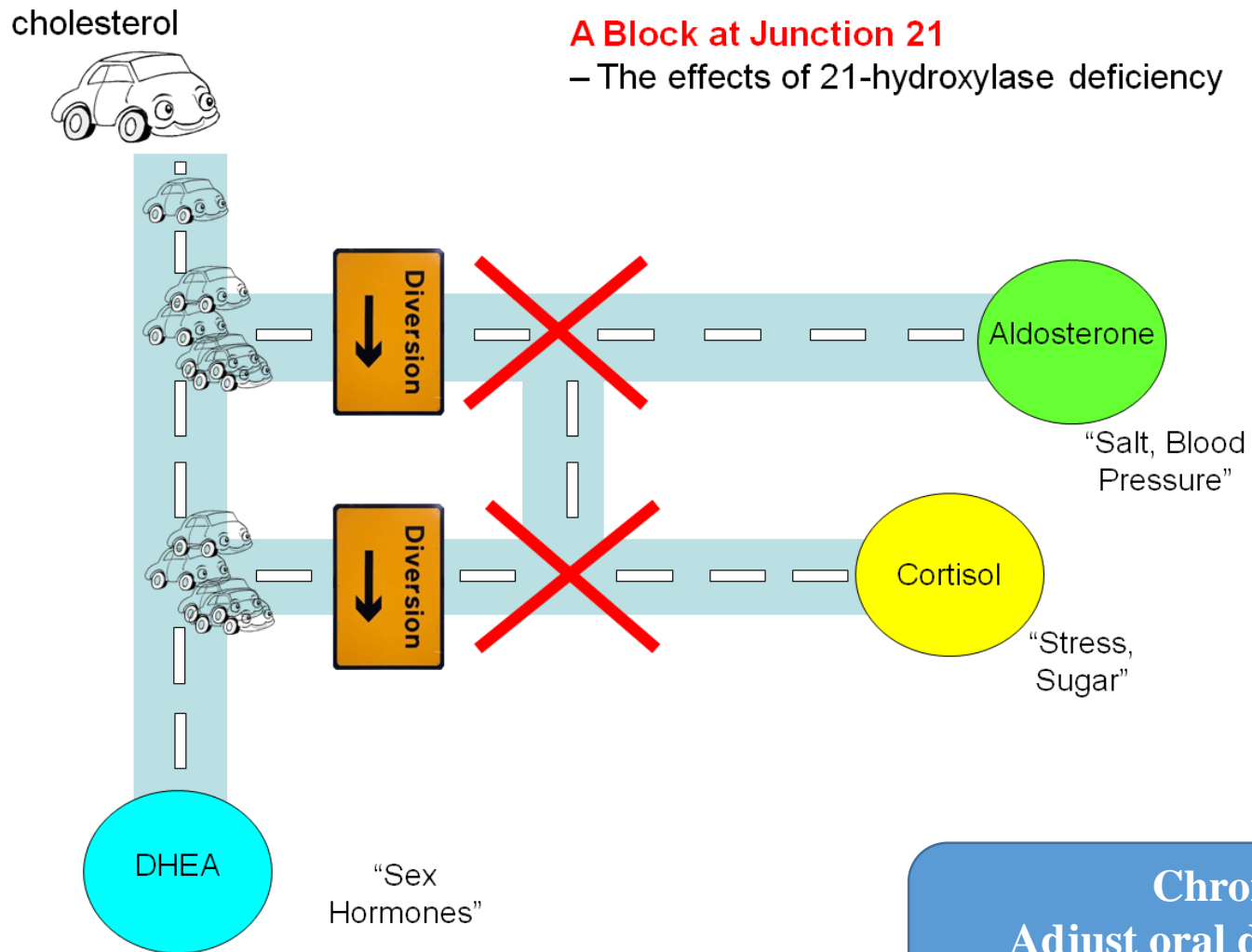
Follow up

- Child came for follow up at 4 months. Good catch up growth observed.
- Developmental milestones were normal. Pigmentation had reduced.
- Repeat biochemical parameters showed:
 - 17 OH Progesterone level: 8 ng/mL (previously > 200 ng/mL)
 - Total testosterone level: 25 ng/dL (previously 230 ng/dL)
 - Serum sodium: 130 mEq/L (marginally low)
 - Serum potassium: 5.9 meQ/L (marginally high)

Infant case management

- As 17 OH Progesterone and total testosterone, growth and development are normal - same dose of hydrocortisone administered
- Long standing chronic hyperkalemia treated by:
 - a) Increasing the mineralocorticoid dose: oral fludrocortisone 75 mcg daily
 - b) Increasing salt intake and explaining to the parent regarding the importance of compliance to salt
 - c) Early weaning food and addition of extra salt in the weaning foods

Acute deficiency:
Stress dose of hydrocortisone
Aggressive anti-hyperkalemic measures,
3% saline administration



Chronic deficiency:
Adjust oral dose of hydrocortisone
Adjust oral dose of mineralocorticoid
Add more salt

Learning points from the case

- Hyperkalemia in adrenal disorders – hydrocortisone responsive. Hyperkalemia measures are required for a very short duration.
- High index of suspicion is needed. “It is better to suspect and not find, rather than not suspect and fine”
- Critical sampling – key to making a right diagnosis
- Judicious interpretation of renin and aldosterone – important for a proper diagnosis

THANK YOU