

(11) The medical paediatric team is asked to see a child of 3 years on the surgical ward who has just had a convulsion. Two days before the child had a bowel resection for an intussusceptions which was not reducible and ischaemic at the time of operation. Since the operation the child has received 110ml/kg per day of 5% dextrose and has been afebrile.

The electrolytes from this morning are:

Sodium	113 mmol/l
Potassium	3.1 mmol/l
Chloride	88 mmol/l
Bicarbonate	20 mmol/l
Urea	1.6 mmol/l
Glucose	6.2 mmol/l

- (1) What is the osmolality of the serum?
- (2) What is the most likely cause?
- (3) What further investigation would like to confirm the diagnosis?
- (4) How would you manage the child?

(22) A 4-year-old boy is started on chemotherapy for newly diagnosed acute lymphoblastic leukemia. Before treatment the serum creatinine was 55 mmol/l.

Routine biochemistry 3 days later shows:

Sodium	143 mmol/l
Potassium	8.1 mmol/l
Bicarbonate	9 mmol/l
Urea	45.3 mmol/l

- (1) What abnormalities are shown
- (2) Why has this happened?
- (3) What further investigation would you do?
- (4) Could it have been prevented?

- (26) A 7-day-old male infant, born at term, Apgar scores 8 at 5 min, 10 at 10 min, birth weight 3.6 kg, is seen because of poor feeding and lethargy. On examination, weight is 3.1kg, hypotonic, lethargic and clinically dehydrated; hyperpigmented scrotum.

Investigations

Hb	20 g/dl
WBC	$25 \times 10^9/l$
Serum sodium	118 mmol/l
Serum potassium	5.3 mmol/l
Urinary sodium	80 mmol/l

- (1) What immediate treatment?
- (2) What is the most likely diagnosis?

- (28) A 5-month-old girl is admitted to hospital with severe diarrhea and vomiting. On examination: pulse 160/min, BP 70/40, decreased skin turgor and dry mucous membranes.

Investigations

Plasma electrolytes

Sodium	125 mmol/l
Potassium	3.8 mmol/l
Urea	12 mmol/l
Creatinine	270 μ mol/l
Calcium	2.3 mmol/l

Blood glucose 4 mmol/l

Urine

Sodium	4 mmol/l
Osmolality	580 mosmol/kg
Urea	258 mmol/l

Urine output approximately 0.6ml/kg per h

- (1) What diagnosis can be made on the basis of the clinical findings and plasma electrolytes?
- (2) What complication has arisen?

(52) An 18-month-old male infant is investigated for persistent vomiting and failure to thrive. Results were as follows:

Blood

Sodium	133 mmol/l
Potassium	3.0 mmol/l
Chloride	112 mmol/l
Bicarbonate	11 mmol/l
Urea	3.0 mmol/l
Creatinine	40 mmol/l
Calcium	2.3 mmol/l
Phosphate	1.4 mmol/l

Arterial pH 7.18

Urine pH 5.2

Urinalysis on Multistix: no abnormality seen

Urine amino acids: normal

- (1) What is the diagnosis?
- (2) What treatment is required?

- (5) A 4-year-old boy is admitted to intensive care with septicaemia and hypotension.

Investigations

Plasma electrolytes:

Sodium	136 mmol/l
Potassium	4.9 mmol/l
Chloride	90 mmol/l
Bicarbonate	8 mmol/l
Glucose	5 mmol/l

- (1) What further diagnosis is possible with these results?
- (2) How would you confirm this?

(12) A 12-year-old complains headaches. On examination she is found to have a blood pressure of 150/100. There are no other abnormal physical signs.

Investigations so far reveal:

Plasma

Sodium	141 mmol/l
Potassium	3.0 mmol/l
Bicarbonate	35.0 mmol/l
Urea	3.8 mmol/l

Urine

Albumin positive
Blood negative
WBC 3/high power field
Culture negative

IVU normal

Plasma renin activity (PRA) (normal = <7pg/ml per h)

High inferior vena cava	10.9 pg/ml per h
Low inferior	5.8 pg/ml per h
Right renal vein	14.7 pg/ml per h
Left renal vein	8.2 pg/ml per h

Urine catecholamines, normal

- (1) What is the pathophysiological cause of her hypertension?
- (2) What is the likely anatomical cause?
- (3) What would be the next step in the investigation?

- (62) A 7-year-old boy is admitted to the ENT ward for nasal polypectomy having had a chronic cough and postnasal drip for many years.

Preoperative blood gases were as follows:

pH	7.38
P_{CO_2}	65 mmHg (8.6 kPa)
P_{O_2}	55 mmHg (7.3 kPa)
Bicarbonate	31 mmol/l

- (1) What abnormality is shown by the blood gases?
- (2) What is the most likely underlying diagnosis?

(78) A 13-year-old girl presents in casualty with chest pain and breathlessness. Her arterial blood gases in room air are as follows:

PO ₂	86 mmHg (11.5 kPa)
Pco ₂	19 mmHg (2.5 kPa)
Bicarbonate	20 mmol/l

- (1) What do they show?
- (2) What is the likely diagnosis?

(94) A 1-day-old premature infant of 29 weeks gestation, birth weight 1.8kg, is given positive pressure ventilation for respiratory distress syndrome. He has marked bruising of the skin. Results of investigations were as follows:

Arterial blood gas

pH 7.25

P_O₂ 15 kPa (112.5 mmHg)

P_{CO}₂ 6.7 kPa (50 mmHg)

Bicarbonate 15 mmol/l

Hb 13 g/dl

WBC $3 \times 10^9/l$

Platelets $80 \times 10^9/l$

Prothrombin time 15 s, control 40 s

Partial prothrombin time (kaolin) 90 s,
control 40 s

Thrombin time 15 s, control 8 s

FDP 10 mg/dl

Sodium 134 mmol/l

Potassium 4.0 mmol/l

Urea 4.4 mmol/l

- (1) What abnormalities are shown?
- (2) What, if any, further investigations would you do?
- (3) What three changes do you think are required in this baby's management?

(102) A 2-year-old boy is admitted to hospital following a grand mal convulsion. He has been listless and irritable for the last few days and a week ago had diarrhoea and vomiting lasting 4 days.

Investigations

HB 6.1 g/dl
WBC $12.1 \times 10^9/l$
80% neutrophils
14% lymphocytes
Platelets $35 \times 10^9/l$
Blood film: fragmented red cells
Platelets $80 \times 10^9/l$
Prothrombin time 14 s, control 13.5 s
Partial prothrombin time (kaolin)
(PTTK) 45 s; control 38 s
Thrombin time (TT) 12 s, control 9 s
FDP 8 mg/dl (normal 2-10 mg/dl)
Fibrinogen 3.3 g/l (normal 1.8-3.5 g/l)
Sodium 126 mmol/l
Potassium 6.0 mmol/l
Bicarbonate 15 mmol/l
Creatinine 200 $\mu\text{mol/l}$

- (1) What is the diagnosis?
- (2) What other clinical information do you need to know urgently?

(103) A 'normal' term neonate weighting 3.4 kg is found 'gasp'ing' at 12 hours of age.

Arterial blood gas shows:

pH	7.04
P_{CO_2}	19 mmHg (2.5 kPa)
P_{O_2}	51 mmHg (6.8 kPa)
Bicarbonate	6 mmol/l

- (1) What physiological abnormality is shown?
- (2) What further clinical test should be performed?
- (3) What important diagnosis should be considered in this situation?
- (4) Name two other conditions that could present like this.

(112) The following arterial blood gas results are from an 11-year-old girl with post-infective polyneuritis.

pH	7.26
P_{O_2}	9.2 kPa (69 mmHg)
P_{CO_2}	9.5 kPa (71 mmHg)

- (1) What do these results show?
- (2) What is the cause?
- (3) What immediate treatment is required?