Self-assessment

Case 1

A two year-old boy was admitted to the Emergency Department after having a witnessed tonic clonic seizure lasting for less than 5 minutes at home. The child is normally fit and well with no previous history of febrile or afebrile seizure or family history of epilepsy. Prior to the seizure, there were no respiratory or coryzal symptoms. No definitive history eliciting head trauma was mentioned. However, the parent noticed that he had been drinking excessively (estimated 2–3 litres) throughout the course of the day. On examination, the child was post-ictal, drowsy and lethargic. There was no rash. The rest of his examination was unremarkable. His blood results showed a sodium level of 125 mmol/litres with normal renal function. He was fluid restricted and observed overnight. His sodium levels normalized to 135 mmol/litres with good recovery. He was referred to the Endocrinology team for follow up.

1. The child had a hyponatraemic seizure. Which ONE of the following conditions does NOT cause low serum sodium levels?
   a. Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH).
   b. Diabetes Insipidus
   c. Diarrhoea
   d. Hypertriglyceridaemia
   e. Cirrhosis

2. Which ONE of the following statements in regards to hyponatraemia is false?
   a. In hospitalized children, hypotonic fluid use for maintenance hydration is potential risk factor.
   b. Acute hyponatraemia can cause brain cell swelling and cerebral oedema.
   c. The emergency treatment of hyponatraemia is fluid restriction and 0.9% sodium chloride solution.
   d. The recommended rate of correcting low sodium levels should not be faster than 10 mmol/litres a day.
   e. In the treatment of SIADH, Intravenous furosemide may be needed.

3. Select ONE true answer about SIADH
   a. Urine osmolality is usually low
   b. Urine sodium can be high
   c. Serum osmolality is high
   d. Occurs commonly with nephrotic syndrome
   e. SIADH does not cause hyponatraemia

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Case 2

A three year-old boy presented to the Emergency Department with a 24-hour history of diarrhoea, vomiting and fever. He was tachycardic at 170/minutes, tachypnoeic, pale and lethargic. He was resuscitated with intravenous fluids and broad spectrum antibiotics. Despite that, he continued to be tachycardic and hypotensive. He was intubated and ventilated, started on inotropic support and later admitted to the paediatric intensive care unit. His throat swab grew Group A Streptococcus. He made a good recovery in the ward. He was discharged home a few days later with oral penicillin V.

1. In septic shock in children, which ONE of the following is true?
   a. *Escherichia coli* is a common cause of paediatric sepsis
   b. Vasopressin is recommended as a first-line inotrope
   c. Bounding peripheral pulses sign is usually seen in cold shock
   d. Fresh frozen plasma when given as a bolus can cause hypotension
   e. Enteral feeding is not recommended to start early.

2. Which ONE of the following indicates possible organ dysfunction?
   a. Mean arterial pressure (MAP) 80 mmHg
   b. Urine output 1.5 ml/kg/hours
   c. Serum lactate of 4.5
   d. INR of 1.1
   e. Platelet count of 120,000

3. The child returned to ED with facial swelling and haematuria, you suspect post-streptococcal glomerulonephritis (PSGN). Select ONE true answer.
   a. PSGN is the best example for mesangioproliferative GN
   b. It occurs up to one week post-streptococcal infection
   c. A negative anti-streptolysin titre would rule out the diagnosis
   d. Many cases are subclinical and self-resolving
   e. In the acute phase, C_3 levels are normal and C_4 are low

Case 3

An 8 year-old girl visited the Emergency Department with lethargy, poor feeding, diarrhoea and vomiting, fever for almost two weeks, mouth ulcers, and ankles pain for a few months. Her mother was concerned that she was losing weight over the last month. There was no significant past medical history and she did not have any allergies. Her white cell count and CRP were raised and she was started on intravenous fluids. She had mild discomfort at the right lower quadrant of her abdomen. Blood cultures were negative and a chest X-ray was unremarkable. An abdominal ultrasound suggested an area of ileal thickening and some free fluid.

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1. What is the probable diagnosis of this case?
   a. Viral gastroenteritis
   b. Intussusception
   c. Irritable bowel syndrome
   d. Crohn disease
   e. Protein intolerance

2. What is the investigation of choice to confirm the diagnosis in this case?
   a. Abdominal X-ray
   b. CT abdomen
   c. Abdominal ultrasound
   d. Colonoscopy and Upper GI endoscopy with biopsy
   e. Faecal calprotectin

3. The patient underwent an upper endoscopy which later showed the presence of *Helicobacter pylori*. What is the appropriate regime you would choose for this girl?
   a. A five-day course of Amoxicillin, Metronidazole, Clarithomycin
   b. A five-day course of Amoxcillin, Metronidazole, Omeprazole
   c. A 7-day course of Amoxicillin, Clarithomycin, Omeprazole
   d. A 7-day course of Amoxcillin, Metronidazole, Clarithomycin
   e. A three-week course of Amoxicillin, Metronidazole, Omeprazole

Case 4

A two-and-a-half-year-old boy was admitted to the Emergency Department with general malaise, fever, poor feeding and a 12-hour progressive swelling to the right elbow associated with erythema. The child has had chicken pox a week prior to the presentation and all skin lesions were scabbed. The child was normally fit and well. His vaccinations were all up to date and there was no significant past medical history.

His vital signs were HR 180/minutes, RR 60/minutes Systolic Bp 80 mmHg, MAP 55 mmHg, CRT 3 seconds. Initial blood results showed the following results: CRP 137, Lactate 3 and the rest of his bloods (including clotting studies) were within normal limits. He settled with initial intravenous fluid resuscitation and antibiotics and he was prepared to be transferred to the paediatric intensive care unit.

1. Which diagnosis is least likely, select ONE answer
   a. Necrotizing fasciitis
   b. Septic arthritis of the right elbow
   c. Haemoarthrosis of the right elbow
   d. Varicella zoster with superimposed infection
   e. Streptococcal toxic shock syndrome (TSS)

2. Which of the following measures are NOT included in the criteria of TSS?
   a. Fever
   b. Systolic BP below the 5th centile for age
   c. CRP more than 200
   d. Dysfunction of at least two other organ systems
   e. Rash

3. In the treatment of TSS, which statement is false?
   a. There is no role for the use of Clindamycin
   b. Vancomycin may be used if the patient is allergic to penicillin
   c. Intravenous immunoglobulins should be considered
   d. Aggressive fluid support is usually needed
   e. Vasopressor infusion may be necessary in case of cardiovascular compromise

Answers

Case 1

(1. b, 2. c, 3. b).

Hyponatraemia is a serum sodium level less than 135 mmol/litres. The causes of hyponatraemia can be classified according to the patient's volume status:

1) Hypovolaemic hyponatraemia (seen in diarrhoea secondary to gastroenteritis or cerebral salt wasting syndrome).
2) Hypervolaemic hyponatraemia (seen in congestive heart failure, cirrhosis or nephrotic syndrome).
3) Normovolaemic hyponatraemia (seen in SIADH or water intoxication).

Pseudohyponatraemia is a laboratory artefact that presents when the plasma contains very high concentrations of protein (Multiple myeloma) or lipid (hypertriglycerideamia).

The treatment of hyponatraemia is based on the specific aetiology. However, it is important to avoid overly rapid correction that might lead to central pontine myelinolysis or osmotic demyelination syndrome. The current recommendation, according to the British National Formulary (BNF), is to correct sodium levels by a rate not faster than 10 mmol/litres in 24 hours. However, acute hyponatraemia with severe neurological symptoms, requires urgent correction of sodium levels in order to reduce the incidence of cerebral oedema. Intravenous hypertonic saline (4–6 ml/kg of 3% sodium chloride) is the recommended treatment.

Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH) is characterized by hyponatraemia, inappropriately concentrated urine, high urine osmolality, low plasma osmolality and normal-to-high urine sodium. It is an uncommon condition in children. It can be caused by CNS disorders (trauma, infection, tumour, haemorrhage), pneumonia, hypothalamic-pituitary surgery and excessive administration of Vasopressin in the treatment of Diabetes Insipidus. Drugs, such as Carbamazepine and some tricyclic antidepressants can increase vasopressin secretion or mimic vasopressin action. The recommended treatment is fluid restriction, usually to two-thirds of oral intake or less and diuresis to remove excessive free water.

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