Chapter 1

Paper A – Questions

A1

A 40-year-old female who is intubated and ventilated following a subarachnoid haemorrhage (SAH) 7 days previously has a serum sodium concentration of 128 mmol/l and serum osmolality of 270 mOsm/kg.

Which of the following statements is true?

a. Cerebral salt-wasting syndrome (CSWS) is rarely associated with SAH
b. Cerebral salt-wasting syndrome is associated with a reduced serum osmolality
c. To diagnose SIADH, the patient must be clinically dehydrated
d. SIADH almost always requires pharmacological treatment
e. To diagnose SIADH urine osmolality must be greater than serum osmolality

A2

An 82-year-old female undergoes total hip replacement under general anaesthesia. She receives an intravenous induction and volatile maintenance, with propofol and isoflurane, respectively. In recovery she becomes extremely agitated and appears to be hallucinating, in association with a sinus tachycardia at a rate of 110 bpm.

Which of the following drugs, if administered during the procedure, is most likely to be responsible for her current clinical state?

a. Atropine 0.6 mg
b. Morphine 5 mg
c. Ephedrine 6 mg
d. Isoflurane 1.1%
e. Cyclizine 50 mg

A3

The commonest source of airborne micro-particles in the operating theatre is:

a. Staff failing to wear facemasks
b. Foot traffic into and out of theatre
c. Staff wearing home-laundered theatre clothing
d. Intraoperative use of a forced air warmer (e.g. *Bair Hugger*®)
e. Staff failing to wear footwear covers

A4

The introduction of the agent Suggamadex has drastically changed the management of aminosteroid-induced neuromuscular blockade.

Which of the following facts concerning its use is most accurate?

a. It can be used to rapidly reverse blockade induced by vecuronium, rocuronium and pancuronium
b. A deep block, characterized by no train of four (TOF) twitches, but a post-tetanic count (PTC) of 1–2 can be successfully reversed using a dose of 2 mg/kg
c. If rocuronium is used in a dose of 1.2 mg/kg for a RSI, it can be completely reversed after 3 minutes using a dose of 12 mg/kg
d. The activity of the oral contraceptive pill may be reduced by Suggamadex
e. The speed of reversal of neuromuscular blockade is slower if a volatile anaesthetic has been used to maintain anaesthesia

A5

Anaesthesia provided for electroconvulsive therapy (ECT) is frequently provided in remote locations and the conduct of anaesthesia may influence the efficacy of treatment.

Which of the following statements is most correct?

a. It is recommended that anaesthesia must be provided by a consultant anaesthetist
b. The presence of an anaesthetic machine is mandatory
c. Pipeline oxygen must be available
d. Propofol should be avoided as it prevents the induction of an adequate seizure
e. Suxamethonium is used primarily to prevent musculoskeletal injury

A6

The provision of general anaesthesia in the MRI scanner has many equipment considerations.

Which of the following statements is most accurate?

a. Equipment designated as magnetic resonance (MR) safe will function normally and not interfere with the correct operation of the MR imaging equipment
b. MR compatible equipment should pose no safety threat to either patients or staff
c. MR conditional equipment has been shown to demonstrate no known hazards in a specified MR environment
d. 3-tesla (T) MRI scanners are quicker, more efficient and cause fewer problems with monitoring than 1.5-T scanners
e. The use of temperature probes should be avoided

A7

A 62-year-old male admitted to the ICU following emergency repair of ruptured abdominal aortic aneurysm repair has developed multisystem organ failure and thrombocytopenia. He is prescribed continuous haemofiltration with an ultrafiltrate of 35 ml/kg per hour. The lifespan of the filter is short due to problems attributed to clot formation despite using unfractionated heparin. You have just been informed that the patient has heparin-induced thrombotic thrombocytopenia.

What first-line strategy would you employ to improve the lifespan of the filter?
a. Change the unfractionated heparin to LMWH
b. Prescribe warfarin to maintain INR 1.5–2.5
c. Use epoprostenol instead of heparin
d. Administer the replacement fluid pre-filter
e. Administer danaparoid

A8

Analgesia for upper limb procedures can be provided by means of a brachial plexus block. For operations on the proximal part of the upper limb, a relatively high approach is required and an interscalene block is used.

Which of the following is true?
a. Diaphragmatic paralysis occurs commonly after bilateral stellate ganglion block
b. An interscalene block commonly misses the roots of the ulnar nerve
c. There is significant risk of intrathecal injection at this level
d. 2% of interscalene blocks result in recurrent laryngeal nerve palsy
e. 60% of interscalene blocks result in a phrenic nerve block

A9

A 27-year-old man on the ICU underwent decompressive craniectomy 7 days following an acute subdural haematoma. He remains intubated and ventilated and has become agitated with a heart rate of 120 bpm and a BP of 80/40 mmHg. His urine output is 200 ml/h. Further serum and urinalysis reveals the following results:

Serum	osmolality 300 mOsm/l;	Na^+ 120 mmol/l
Urine	osmolality 300 mOsm/l;	Na^+ 40 mEq/l

Which of the following would be the most appropriate next step in your management?
a. Fluid restriction
b. Fluid resuscitation with 0.9% NaCl
c. Demeclocycline
d. Fludrocortisone
e. Desmopressin

A10

A patient with a known history of migraine presents to the emergency department with a severe migraine, which has failed to respond to his usual treatment of paracetamol and ibuprofen.

Which of the following is most likely to help him with his acute pain?
a. Sumitriptan
b. Amitriptyline
c. Codeine
d. Propanolol
e. Pizotifen

A11

A 19-year-old female presents to the emergency department stating that she took an overdose of 50 × 500 milligram paracetamol tablets 30 minutes ago. It is decided to attempt gastrointestinal decontamination.

Which of the following regimens would be the most appropriate in order to reduce paracetamol absorption in this patient?

a. 30 millilitres of ipecacuanha administered by mouth to induce vomiting
b. Whole bowel irrigation with 1.5 litres/hour polyethylene glycol via nasogastric tube until the effluent runs clear
c. Whole bowel irrigation with 2 litres/hour polyethylene glycol via nasogastric tube until the effluent runs clear
d. Gastric lavage via a 30 F orogastric tube
e. Activated charcoal 50 grams administered by mouth

A12

A 26-year-old male weighing 70 kg has presented to the emergency department following a house fire. He is estimated to have full thickness burns to the chest, abdomen, back and right arm. He has partial thickness burns to the right leg.

Using the Parkland formula, you estimate that the amount of replacement fluid the patient requires in the first 8 hours is:

a. 8820 ml Hartmann's solution
b. 8820 ml 4.5% human serum albumin solution
c. 6300 ml Hartmann's solution
d. 6300 ml 4.5% human serum albumin solution
e. 17640 ml Hartmann's solution

A13

An understanding of hypoplastic left heart syndrome (HLHS) can aid understanding of the fetal heart, and can demonstrate how ventilatory strategies can be used to manipulate physiology.

Which statement is correct regarding HLHS?

a. It is the most frequently occurring duct-dependent cardiac malformation, and may initially be managed with a prostaglandin infusion to maintain duct patency and systemic circulation, until the child reaches 3 kg in weight
b. Children should have S_pO_2 in the normal, or near normal range following repair in the neonatal period (Norwood procedure)
c. If the S_pO_2 is 88% following Norwood procedure, a sensible first option would be to decrease the F_iO_2
d. Rising lactate and hypotension following initial surgery can be an indication to start vasopressors
e. Patients with a Fontan circulation benefit from a low circulating volume as this offloads the single ventricle, and reduces cardiac work

A14

Fibromyalgia is part of a spectrum of chronic pain disorders. Progress has been made in the treatment of chronic pain, but reliable long-term treatment is still problematic.

In the treatment of fibromyalgia, which of the following is most correct?

a. Tricyclic antidepressants reduce pain by increasing 5-HT release
b. SSRIs improve mood but have little effect on pain
c. MAOIs have no role in chronic pain
d. Lidocaine infusions of 5–8 mg/kg over 2 hours reduce daily pain scores
e. The 'Magill' scale describes patient responses to TENS therapy

A15

Intra-aortic balloon pump (IABP) increases the oxygen delivery to the myocardium and decreases the myocardial oxygen demand thereby improving its function, especially in heart failure.

Which of the following physiological effects are not seen with a well-functioning IABP?

a. ↑ Aortic diastolic pressure
b. ↓ Left ventricle end-diastolic pressure
c. ↑ Coronary blood flow
d. ↓ Renal blood flow
e. ↓ Haemoglobin levels by up to 5%

A16

A 12-year-old boy with moderate learning difficulties requires multiple dental extractions due to poor dentition and previous dental abscesses. He has multiple previous admissions to hospital. He is crying, appears terrified and is refusing to have topical local anaesthetic cream applied or to co-operate.

What is the best initial approach to this child?

a. Decline to anaesthetize the child on this occasion until he is calm
b. Manually restrain him in the anaesthetic room with the consent of his carers, and attempt a gas induction
c. Manually restrain the child on the ward to give parenteral sedation
d. Offer oral midazolam, starting at 0.1 mg/kg, with a maximum dose of 15 mg. If that does not work, re-book the case for another day
e. Offer oral midazolam, starting at 0.1 mg/kg, with maximum dose of 15 mg. Repeat the dose if the first does not work

A17

Pleural effusions are caused by a number of pathologies.

Which of the following statements regarding pleural effusions is true:

a. The pH of normal pleural fluid is 7.2
b. Congestive heart failure is a common cause of an exudative pleural effusion
c. Liver cirrhosis can cause an transudative pleural effusion
d. A transudative pleural effusion is characterized by a protein content of >30 g/l
e. According to Light's criteria, an exudative pleural effusion has a pleural fluid/serum LDH ratio of <0.6

A18

A 75-year-old patient with type 2 diabetes had a below-knee amputation under a combined spinal–epidural block. Three months later he is still complaining of phantom limb pain despite simple analgesics.

Which treatment has the best evidence to support its use in this scenario?

a. Mirror-box therapy
b. Oxycodone
c. Spinal cord stimulation
d. Ketamine
e. Gabapentin

A19

A 75-year-old female who is being treated with broad-spectrum antibiotics for ventilator-associated pneumonia develops abdominal distension and diarrhoea. Her white cell count is 20×10^9 and her temperature is 38.9 °C. You suspect that she has *Clostridium difficile* infection.

The most appropriate first-line treatment would be:

a. enteral vancomycin 125 mg qds
b. enteral metronidazole 400 mg tds
c. intravenous metronidazole 400 mg tds
d. enteral vancomycin 125 mg qds and intravenous metronidazole 500 mg tds
e. enteral vancomycin 500 mg qds

A20

After the 2007 CEMACH report, the Royal College of Obstetricians and Gynaecologists published guidance on thromboprophylaxis during pregnancy.

In which of the following clinical scenarios should thromboprophylaxis be continued for at least 7 days postnatally?

a. Age >35
b. Obesity (BMI >30)
c. Patient requiring antenatal thromboprophylaxis
d. Previous venous thromboembolism
e. Caesarean section in labour

A21

A 10-year-old boy with appendicitis has been listed for an urgent appendicectomy. He has some mild learning disabilities and is on sodium valproate for his epilepsy. His seizures are generally well controlled but his mum reports that his last grand-mal seizure was 2 days ago.

In anaesthetizing the child with epilepsy, which of the following is true?

a. Regional blockade or local anaesthetic infiltration should be avoided, since local anaesthetic toxicity can present with tonic–clonic seizures
b. Sevoflurane is preferable to isoflurane for maintenance of anaesthesia
c. Fentanyl is a preferable opioid to alfentanil
d. Atracurium infusion is preferable to rocuronium boluses since higher doses of neuromuscular blockers are required
e. Pethidine is a preferable opioid to morphine

A22

A 60-year-old man is referred to your pain management clinic via his GP. He gives a 6-month history of worsening lumbar back pain that is not eased with rest or simple analgesics. He suffers from ulcerative colitis, which is well controlled with mesalazine. On examination, he has a good range of lumbar spine movement, normal power and reflexes but reduced sensation in the L5 dermatome on the right.

What would be the next step in his management?

a. Arrange a lumbar epidural
b. Prescribe a strong opioid and review in 3 months
c. Refer for a neurological opinion
d. Refer for a course of physiotherapy
e. Request an MRI scan

A23

Pharmacokinetics of anaesthetic drugs in the morbidly obese patient changes significantly. Which of the following statements with regard to anaesthetic drug dosing in the morbidly obese is true?

a. Thiopentone sodium dose for induction is calculated according to total body weight
b. The dose of suxamethonium is calculated on the basis of lean body weight
c. The dose of hyperbaric bupivacaine 0.5% for subarachnoid block should be halved
d. Rocuronium dose depends on total body weight
e. Propofol used as infusion for total intravenous anaesthesia should be based upon total body weight

A24

Haemorrhage is one of the top five most common causes of maternal death according to the 2010 CMACE report.

Which of the following is correct regarding blood transfusion in the pregnant state?

a. Red cell alloimmunization is most likely to occur in the second trimester
b. Only Kell-negative blood should be used for transfusion in women of child-bearing age
c. Massive blood loss may be defined as the loss of one blood volume within a 24-hour period
d. Anti-D prophylaxis is required if a Rh D negative woman receives Rh D positive FFP or cryoprecipitate
e. The platelet count should not be allowed to fall below 75×10^9/l in the acutely bleeding patient

A25

Cardiac resynchronization therapy (CRT) has a role to play in the management of patients.

It is indicated for:

a. Moderate aortic stenosis
b. Paroxysmal atrial fibrillation
c. Recurrent ventricular tachycardia
d. Restrictive cardiomyopathy
e. LBBB

A26

Postoperative cognitive dysfunction (POCD) is increasingly recognized as a cause of post-operative morbidity.

With regard to its predisposing factors, which of the following statements is true?

a. There appears to be a genetic predisposition
b. Early POCD is more likely in patients with lower levels of education
c. Prolonged POCD is associated with significant periods of intraoperative hypoxaemia
d. Prolonged POCD is associated with increased duration of anaesthesia
e. Prolonged POCD affects 1% of patients of more than 60 years of age after major surgery

A27

Diabetes is the most common endocrine disorder affecting UK patients. It is a complex disorder and can have multi-systemic effects, many of which are relevant to anaesthetic practice.

When managing these patients, which is the greatest consideration?

a. Polydipsia results from a direct effect of increased plasma glucose concentration on the supraoptic nucleus
b. Patients with autonomic neuropathy have increased variability of their heart rate on inspiration as they are unable to increase their stroke volume
c. Regional blocks are useful in diabetic patients, and adrenaline should be used to increase the duration of block
d. Pain in diabetic patients may increase insulin requirements by as much as 20%
e. Undiagnosed infections are present in 4% of diabetic patients

A28

A broncho-pleural fistula is an abnormal communication or a passage between the bronchial tree and the pleural space, causing a persistent leak.

If these patients are mechanically ventilated, the management strategy should be:

a. Low tidal volumes and high respiratory rate
b. Reduced inspiratory pressures
c. High tidal volumes and low respiratory rate
d. Low inspiratory times and high PEEP
e. High inspiratory times and low PEEP

A29

You are asked to review a 68-year-old woman with shortness of breath and hypotension on the surgical HDU, 24 hours after an anterior resection for bowel cancer.

Which of the following statements regarding venous thromboembolism (VTE) in this patient is most true?

a. In high-risk patients D-Dimer tests should be taken before subjecting patients to the radiation load of a CTPA
b. Around 25% of PTE present with haemodynamic instability
c. Caval filters may increase rates of VTE

d. A high D-dimer result is highly suggestive of PTE
e. Patients with suspected PTE should be treated with anticoagulants immediately even if no imaging is available

A30

Which is the most important consideration that should be observed when performing laser airway surgery with an endotracheal tube (ETT) in place:

a. Inspired oxygen concentration should be kept as low as possible
b. Nitrous oxide may help maintain a low F_iO_2, which will help avoid airway burns
c. Saline-soaked gauze or pledgets should be placed around the ETT, to eliminate the risk of ignition
d. The ETT cuff should be filled with a mixture of methylene blue and saline, to dissipate heat and make cuff rupture obvious
e. Efficient smoke evacuation is mandatory near the operating site to protect the surgeon from smoke plumes

Chapter 1

Paper A – Answers

A1

Answer: e.

The diagnostic criteria for SIADH are:

- Hypotonic hyponatraemia (serum sodium < 135 mmol/l and serum osmolality < 280 mOsm/l)
- Urine osmolality > serum osmolality
- Urine sodium concentration > 18 mmol/l
- Normal thyroid, adrenal and renal function
- Clinical euvolaemia

SIADH is often a self-limiting disease.

Cerebral salt-wasting syndrome (CSWS) is characterized by renal loss of sodium resulting in polyuria, natriuresis, hyponatraemia and hypovolaemia. It is the clinical signs of dehydration that differentiate it from SIADH. CSWS is predominantly associated with SAH and traumatic brain injury. The biochemical criteria for CSWS are:

- Low or normal serum sodium
- High or normal serum osmolality
- High or normal urine osmolality
- Increased haematocrit, urea, bicarbonate and albumin as a consequence of hypovolaemia

Bradshaw K, Smith M. Disorders of sodium balance after brain injury. *Contin Educ Anaesth Crit Care Pain* 2008; **8**(4): 129–133

A2

Answer: a.

This patient is most likely to be suffering from the *central anticholinergic syndrome (CAS)*. This is a disorder caused by cerebral penetration of antimuscarinic drugs, leading to a syndrome of central excitation or depression. It may thus be characterized by emergence delirium and agitation or by reduced consciousness level and coma.

CAS is frequently associated with peripheral anticholinergic side effects including dry mouth, tachycardia, blurred vision and urinary retention. Any anticholinergic drug able to

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