

This section is designed to test your knowledge of selected topics in this issue of the journal. The correct answers are given at the foot of the page.

Self-assessment

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MULTIPLE CHOICE QUESTIONS

1 Complications of regional anaesthesia

Which of the following are true regarding nerve injury following a peripheral nerve blockade?

- A. Nerve injury due to ischaemia carries a better prognosis when compared to that due to compression
- B. Nerve injury due to excessive stretch typically results in a neuropraxia
- C. Nerve injury from needle or catheter trauma is reliably associated with pain or paraesthesia during the procedure
- D. The rate of long-term nerve injury following peripheral nerve blockade (PNB) is 2–4 per 10,000
- E. Use of a long bevel regional block needle minimizes the risk of peripheral nerve injury

2 Upper limb nerve blocks

Which of the following are true regarding the uses and complications of an interscalene block?

- A. Provides anaesthesia completely for laparoscopic shoulder surgery
- B. The C5/6 nerve roots are generally seen as hypo-echoic round structures lying between the scalenus medius and scalenus posterior muscles
- C. The needle introduced out of plane from superior to inferior is preferred for catheter insertion due to the more favourable needle direction relative to the plexus
- D. The low volume technique eliminates the risk of phrenic nerve blockade
- E. The risk of Horner's syndrome is quoted to be around 50%

3 Intravenous regional anaesthesia (IVRA)

Which of the following statements are true regarding the technique and drugs used for intravenous regional anaesthesia (IVRA)?

- A. Lidocaine 0.5% up to a dose of 200 mg may be used for IVRA
- B. Ropivacaine has a quicker onset of action than prilocaine during IVRA
- C. IVRA is contra-indicated in patients with sickle cell disease
- D. The tourniquet must remain inflated for at least 20 minutes to minimize the risk of LA toxicity
- E. Methaemoglobinaemia has been associated with prilocaine doses below 3 mg/kg

4 Lower limb nerve blocks

Which of the following are true about the applied anatomy and uses of adductor canal block for knee arthroplasty?

- A. Blockade of the saphenous nerve in the adductor canal provides analgesia with preservation of quadriceps strength
- B. The saphenous nerve is the terminal sensory branch of the femoral nerve
- C. Located medial to the superficial femoral artery in the adductor canal at mid-thigh level
- D. A more proximal approach at the distal aspect of the femoral triangle (sub-sartorial block) will block the nerve to vastus medialis
- E. Adductor canal block may not provide equivalent analgesia to a femoral nerve block

SINGLE BEST ANSWER

5 A 28-year-old primi is in labour and a lumbar epidural has been inserted. There is no great relief from the epidural and the anaesthetist administers a 20-ml bolus of 0.5% bupivacaine. Immediately after the bolus the patient complains of peri-oral tingling, muscle fasciculation and is getting confused. Which of the following is true about her diagnosis and management?

- A. Aspiration prior to injection would have definitely prevented this complication
- B. Shortening of PR and QRS intervals is seen on ECG
- C. The fall in the plasma levels of α -1-acid glycoproteins may be one of the factors responsible for these symptoms
- D. Lipid emulsion should be administered if the patient suffers seizures
- E. Vasopressin may be used to treat the hypotension

6 A 70-year-old COPD male patient is admitted to ICU with infective exacerbation. He is intubated and mechanically ventilated. A central line is inserted in the right internal jugular vein and the chest X-ray shows a pneumothorax with radiological separation of the lung from the chest wall of more than 2 cm on plain film. Which of the following is true about the management of this patient?

- A. Size of pneumothorax is not a usual indication for insertion of a chest drain
- B. Any mechanically ventilated patient with a pneumothorax should have a chest tube inserted
- C. Needle aspiration should not be considered in this patient
- D. Pigtail chest drains are more effective than wide bore drains in mechanically ventilated patients
- E. Pigtail catheter drainage has less rate of insertion complications than wide bore chest drains

1. Correct answers: B, D

2. Correct answers: C, E

3. Correct answers: A, C, D

4. Correct answers: A, B, D

5. Correct answer: C. This lady is exhibiting local anaesthetic systemic toxicity (LAST) due to bupivacaine. Within the systemic circulation, Las tend to bind to plasma proteins thereby limiting the portion of free drug available for metabolism. They have an affinity primarily towards α -1-acid glycoproteins (AAG) which constitute 1–3% of plasma protein. Once the α -1-acid glycoproteins (AAG) are saturated, residual drug can bind to albumin. Bupivacaine has a higher percentage of protein binding and a longer duration of action than lidocaine, which may explain the increased cardiotoxicity and notoriously refractory cardiac arrhythmias observed in bupivacaine-induced LAST. Once plasma protein binding is saturated, the level of free drug in the systemic circulation will rise rapidly leading to the sudden onset of symptoms associated with severe, life-threatening toxicity. Plasma levels of α -1-acid glycoproteins and thus local anaesthetic uptake is affected by pregnancy, burns, hepatocellular pathologies, drug interactions and notably in patients treated for HIV. Female patients are at higher risk of toxicity than male patients, with the risk being further increased in pregnancy. This is because progesterone increases the sensitivity of axons to lipophilic local anaesthetic agents cross the blood brain barrier with ease. Early excitatory symptoms arise from blockade of cortical inhibitory pathways and include nervousness, confusion, agitation, tinnitus, visual disturbance, paraesthesia, peri-oral tingling and muscle fasciculation. Ion channel blockade within cardiomyocytes shortens the refractory period of cardiac action potentials leading to conduction defects, with prolongation of both PR and QRS intervals classically observed on ECG. Hypotension, tachycardia and arrhythmias ensue, progressing to severe hypotension, bradycardia and ultimately cardiac arrest.

Evidence, largely in the form of peer-reviewed case reports, suggests that lipid emulsion shows optimal efficacy when administered at the earliest opportunity after toxicity has been recognized. Seizures should be treated promptly with benzodiazepines or small boluses of propofol in addition to lipid rescue. Int of cardiac arrest local CPR protocols should be followed and concomitant lipid emulsion rescue initiated; however, it is advised that if epinephrine is administered it should be in small doses (1 μ g/kg). Vasopressin, calcium channel blockers and beta-blockers should be avoided as they have an additive myocardial depressant effect. Aspiration of the needle (to detect vascular puncture) prior to injection should be performed to provide reassurance of correct positioning, acknowledging that it is associated with an approximate 2% false negative rate.

6. Correct answer: B. Size and symptoms are the usual indications for insertion of a chest drain for pneumothoraces. The size of a pneumothorax is a relative indication for treatment, with radiological separation of the lung from the chest wall of more than 2 cm on plain film chest X-ray as a suggested threshold. Small, non-compromising spontaneous pneumothoraces may be managed conservatively. Larger pneumothoraces in the absence of dyspnoea may also be expectantly managed in otherwise stable patients and conversely, symptoms of breathlessness in pneumothoraces of any size should be considered for active treatment. Any mechanically ventilated patient with a pneumothorax should have a chest tube inserted. Needle aspiration can be considered in the first instance for any size of pneumothorax, but should only be attempted once, and further treatment should be considered if more than 2.5 litres of air is aspirated.

Seldinger catheter drains (>14F, also known as 'pigtail' or 'small-bore') are thought to be as effective as wide-bore (>20F, also known as surgical) chest drains for simple pneumothoraces in the spontaneously breathing patient. Wide-bore chest drains are more effective in mechanically ventilated patients. Although pigtail catheter drainage may be better tolerated by the patient, it should not be assumed to be safer. As a result, the rate of insertion complications is similar between the two types of chest drains. 12F Seldinger chest or 28F wide-bore drains are typically used for isolated pneumothorax.