Self-assessment

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.

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MULTIPLE CHOICE QUESTIONS

1 Drugs affecting the autonomic nervous system

Which of the following are true about the pharmacological actions of dexmedetomidine ?

A. ☐ Is a partial agonist at central and peripheral α-2 receptors

B. ☐ It has a predominant action on α-2: α-1 in the ratio 200:1

C. ☐ Has a selectivity eight- to ten-fold greater than clonidine for α-2 receptors

D. ☐ Has significant opioid-sparing effects

E. ☐ Is useful in the treatment of intractable neuropathic pain

2 Implantable technology for pain management

Which of the following are true regarding the intrathecal drug delivery (ITDD) system?

A. ☐ May be considered for cancer pain in those with a life expectancy of less than 3 months

B. ☐ It is not useful in treatment of non-cancer pain

C. ☐ Clonidine is one of the drugs that can be used safely via this system

D. ☐ Pre-existing leg oedema is an absolute contraindication for ITDD

E. ☐ MRI does not interfere with the function of the ITDD system

3 Pharmacology in the management of chronic pain

Which of the following drugs have long-term efficacy in the management of chronic pain?

A. ☐ Paracetamol

B. ☐ NSAIDs

C. ☐ Lidocaine

D. ☐ Ketamine

E. ☐ Opioids

4 Opioids in the management of persistent non-cancer pain (PNCP)

Which of the following are true about the recommendations for the use of opioids in PNCP?

A. ☐ A reduction of 30% in pain is required to justify on-going treatment

B. ☐ It is a criminal offence to be in control of a vehicle if a person is on a high dose of prescribed opioids

C. ☐ Transmucosal opioids may be considered for the management of persistent pain

D. ☐ Patients with pain that is not opioid sensitive may be referred to specialist pain services

E. ☐ To assess effectiveness, an initial opioid trial should involve prescription of an immediate release opioid formulation for 1–2 weeks.

SINGLE BEST ANSWER

5 A 70-year-old male presents to the pain team for intractable chest wall pain due to malignant pleural mesothelioma. The pain team plans to perform radiofrequency lesioning of the spinothalamic tract on the opposite side. Which of the following are true regarding the procedure and the management of this patient?

A. ☐ This is a rescue analgesic technique in the terminal stage of the disease

B. ☐ This procedure is carried out between the third and the fourth cervical vertebrae

C. ☐ The requirement of opioids is significantly reduced immediately post procedure

D. ☐ Respiratory failure can be a major complication

E. ☐ Coagulation abnormality is an absolute contraindication for performing this technique

6 A 24-year-old is hit by a car moving at high speed. He suffered a severe traumatic brain injury and a small pneumothorax. He is being transferred via an air ambulance, head loaded first. Which of the following physiological changes can happen during the transfer?

A. ☐ During takeoff there may be an increase in the intracranial pressure

B. ☐ A reduced cerebral perfusion pressure may worsen the brain injury during the landing

C. ☐ The pneumothorax need not be drained as it may cause delay in transfer

D. ☐ Oxygen requirements are reduced with the increase in altitude

E. ☐ Blood pressure monitoring by an automated NIBP cuff may be used instead of an arterial line

ANSWERS

1. Correct answers. C, D, E

2. Correct answers. A, C

3. Correct Answer: C

4. Correct Answers: A, D, E

5. Correct Answer: C. The technique of percutaneous cervical cordotomy involves interruption of the spinothalamic tract on the contralateral side of medically refractory cancer pain through radiofrequency lesioning. Unilateral chest wall pain (costopleural syndrome) due to malignant pleural mesothelioma is a strong indication, but other good indications for which we have performed this procedure have included incident pain due to metastatic pathological fractures of long limb bones, brachial plexus invasion due to pancoast tumours, breast cancer, lung cancers and others. In mesothelioma, we recommend early referral, ideally when the patient first commences strong opioids; or once chest wall invasion occurs so as to be able to perform the procedure while the patient is in a more physiologically stable state. Contraindications are relative and include coagulation abnormalities, local infection, inability of the patient to co-operate, and limited respiratory and physiological reserve. This is not a rescue analgesic technique in the terminal stage of the disease. Percutaneous cervical cordotomy (PCC) is carried out between the 1st and 2nd cervical vertebral levels as this is the widest space (no facet joint) and allows easy access to the intrathecal space and needle trajectory adjustments. Usually opioids are reduced by half immediately post cordotomy and this reduction is very well tolerated by patients. Generally it is difficult to completely wean off opioids as these may be needed for other pains. Rarely, severe mirror pain has occurred in a very few patients but mild mirror pain occurs in about 15–25% of patients. There have been suggestions that respiratory inadequacy after cordotomy could be a problem, but this has not been the case in our experience.

6. Correct Answer: B. The inertial force leads to the displacement of mobile structures and fluid within the body to dependent areas. For instance, when an ambulance accelerates forwards with a patient loaded head first, the organs and blood are pulled towards the feet. In the critically ill these mechanisms are often obtunded causing hypotension. Hypovolaemia and positive pressure ventilation also reduce venous return and worsen hypotension. It is important that unstable patients are fluid resuscitated prior to transfer and inotropes and vasopressors are available during transfer. Periods of instability (e.g. takeoff) should also be anticipated and preemptive actions taken (e.g. increasing vasopressors). An uncompensated reduction in cardiac output will lead to reduced arterial pressure and reduced cerebral perfusion pressure. This may worsen secondary brain injury.

During deceleration (landing) blood and CSF are pulled into the cranial cavity leading to a rise in ICP and reduction in cerebral perfusion pressure which may worsen secondary brain injury. For aircraft, as altitude increases the air temperature decreases by roughly $2^{O}C$ per 1000 feet. Modern day passenger jets are well insulated and avoid large changes in temperature as they climb. Small aircraft such as helicopters and less well insulated transport aircraft expose the patient to the cold environment as they climb. Vibrations in all vehicles cause interference with monitoring devices, particularly automated NIBP cuffs and ECGs. For primary transfers the blood pressure is commonly estimated by pulse strength and for secondary transfers there should be a low threshold for insertion of an arterial line prior to transfer. Automatic NIBP cuffs also consume large amounts of electricity so greatly shorten the battery life of monitors.

There is a reduction in alveolar oxygen tension. Healthy crew can compensate up to 10,000 feet without supplementary oxygen but a patient with impaired gas exchange will require an increased F_IO_2 below this altitude. It is essential when pressure reduces to increase F_IO_2 and continually monitor SpO_2. A higher oxygen requirement should also be taken into account when calculating the total oxygen requirement for the transfer. Pneumothoraces will expand as height increases worsening gas exchange and potentially causing a tension pneumothorax. National guidelines state that in patients with a proven or suspected pneumothorax a chest tube or thoracostomy should be performed prior to air transfer and a skilled practitioner with appropriate equipment should accompany the patient in case the procedure needs repeating in flight. Chest tubes should not be clamped during flight.