Multiple Choice Questions

Hypertension: pathophysiology and perioperative implications

1. Elements of good practice during preoperative measurement of blood pressure include:
   (a). The pulse should be checked before the measurement is taken.
   (b). The patient’s arm should be hanging loosely at their side.
   (c). Engaging the patient in conversation whilst the reading is being taken will help them to relax and so yield a reading that is representative of the patient’s true blood pressure.
   (d). If the blood pressure is elevated, then a second reading should be taken after an interval of at least 1 min.
   (e). Three sequential elevated blood pressure measurements taken at least 1 min apart in the pre-assessment clinic are sufficient to confirm the diagnosis of hypertension.

2. The following investigations are appropriate as part of the initial assessment of a patient who has newly diagnosed hypertension:
   (a). Blood glucose.
   (b). Dipstick test of urine for microalbuminuria.
   (c). Transthoracic echocardiogram.
   (d). Serum lipids.
   (e). Plasma renin activity.

3. Indicators that a patient with raised blood pressure is likely to have secondary hypertension include:
   (a). Hypertension requiring drug treatment in a 26-year-old man.
   (b). Systolic blood pressure rising to 195 mm Hg recorded on repeated measurements in a patient admitted on the day of surgery is probably due to anxiety or white coat hypertension and can be discounted in preoperative risk assessment.
   (c). Patients with a preoperative diagnosis of systemic hypertension have been shown to have a markedly increased risk of myocardial injury if they experience intraoperative hypotension.
   (d). Managed intraoperative hypotension with a reduction in mean arterial pressure of ~20% reduces bleeding and improves outcome in carotid endarterectomy.
   (e). If blood pressure measurements are persistently >140/90 mm Hg in the absence of pain or discomfort after successful hip arthroplasty, then referral for further blood pressure measurements in the community should be performed by the general practitioner.

4. Appropriate statements regarding blood pressure management in the perioperative period include:
   (a). In an adult patient whose preoperative blood pressure is between 160/90 and 180/110 mm Hg, elective surgery is unlikely to be deferred for initiation or modification of antihypertensive treatment.
   (b). A systolic blood pressure >180 mm Hg recorded on repeated measurements in a patient admitted on the day of surgery is probably due to anxiety or white coat hypertension and can be discounted in preoperative risk assessment.
   (c). Patients with a preoperative diagnosis of systemic hypertension have been shown to have a markedly increased risk of myocardial injury if they experience intraoperative hypotension.
   (d). Managed intraoperative hypotension with a reduction in mean arterial pressure of ~20% reduces bleeding and improves outcome in carotid endarterectomy.
   (e). A need for treatment with two drugs to achieve good long-term blood pressure control in a 45-year-old man.

Antihypertensive drugs

1. A 37-year-old woman is admitted for an elective day-case dental extraction under general anaesthesia. She has a background of hypertension and takes ramipril 10 mg once daily. Other than an occasional dry cough that she has had for a year, you do not find additional medical problems. She is booked in for in vitro fertilization in 8 weeks’ time. Appropriate statements regarding ramipril include:
   (a). Conversion of angiotensin I to angiotensin II is inhibited.
   (b). There is decreased renal afferent arteriolar tone.
   (c). Her dry cough is likely to be caused by increased synthesis of bradykinin.
   (d). She is likely to have low plasma renin levels.
2. Four weeks before elective inguinal hernia repair under general anaesthesia, a 75-year-old male patient is assessed in the preoperative clinic. He has a background of ischaemic heart disease, hypertension, stage 3 chronic kidney disease and gout. His daily drug history includes: amlodipine 10 mg, aspirin 75 mg, bendroflumethiazide 2.5 mg, furosemide 20 mg, losartan 50 mg and simvastatin 40 mg. Appropriate considerations regarding his medication include:

(a). Losartan has long-term renoprotective effects and is thus unlikely to be omitted on the day of surgery.
(b). He is likely to have high plasma angiotensin II levels.
(c). Furosemide and bendroflumethiazide are likely to put the patient at risk of glucose intolerance.
(d). He is at risk of an exacerbation of gout since he is taking amlodipine.
(e). T-type calcium channels are likely to be blocked by amlodipine.

3. A 72-year-old man in the preoperative clinic is found to be hypertensive with a non-invasive blood pressure reading of 158/96 mm Hg. Further investigations that are likely to influence the choice of an appropriate antihypertensive include:

(a). Urea and electrolytes.
(b). Liver function tests.
(c). Electrocardiogram.
(d). Fundoscopy.
(e). Renal ultrasound.

4. A 50-year-old Caucasian male with essential hypertension presents for day-case knee arthroscopy. He has neither significant comorbidities nor evidence of end-organ damage. His drug history includes daily doses of ramipril 10 mg, atenolol 50 mg and amlodipine 5 mg. Appropriate statements regarding his antihypertensive medication include:

(a). According to National Institute of Health and Care Excellence (NICE) guidance, the first-line antihypertensive drug would be amlodipine.
(b). If he is experiencing a chronic dry cough, then losartan 50 mg, once daily, would be an appropriate alternative to ramipril.
(c). Atenolol is likely to be withheld on the morning of surgery.
(d). Amlodipine 5 mg is likely to be withheld on the morning of surgery.
(e). If the patient is persistently hypertensive, then the daily dose of amlodipine is likely to be increased to 10 mg.

**Acute coronary syndromes**

1. Appropriate statements concerning non-ST elevation myocardial infarction (NSTEMI) and ST elevation myocardial infarction (STEMI) include:

(a). NSTEMI is likely to be associated with a larger area of myocardial necrosis than STEMI.
(b). The incidence of STEMI is decreasing.
(c). STEMI is likely to be implied by 1 mm ST elevation in two consecutive chest leads.
(d). Patients with STEMI should be risk-stratified according to the GRACE (Global Registry of Acute Cardiac Events) score to guide further treatment.
(e). Coronary heart disease is now the second biggest killer in the UK after cancer.

2. A 69-year-old gentleman presents at the preoperative assessment clinic 6 weeks before planned left total hip replacement. He has a history of hypertension, diabetes mellitus and ischaemic heart disease. He has had a drug-eluting coronary stent deployed in his left anterior descending artery for 9 months. His current medication includes aspirin, clopidogrel, ramipril, simvastatin and bisoprolol. You are asked to assess the risk of him stopping his anti-platelet therapy in the perioperative period. Appropriate statements regarding anti-platelet therapy include:

(a). Clopidogrel is a glycoprotein IIb/IIIa inhibitor.
(b). Aspirin and clopidogrel are used to prevent re-endothelialization of the stent.
(c). Despite this forthcoming hip operation, aspirin and clopidogrel should be continued for at least 12 months after stent placement.
(d). Thrombosis is more likely with this stent than with a bare metal stent.
(e). His diabetic history is likely to increase his likelihood of in-stent thrombosis.

3. A 68-year-old male with a history of myocardial infarction 2 years ago and stage 3 chronic kidney disease is undergoing an elective sigmoid colectomy. He develops 40 min of sustained tachycardia whilst on the operating table under general anaesthesia. Below is a representative sample of the electrocardiogram from lead II during this period.
In the postoperative unit 6 h later, a number of blood tests are taken. The results are shown below:

<table>
<thead>
<tr>
<th>Test</th>
<th>Level</th>
<th>Normal range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemoglobin</td>
<td>9.8 g dl⁻¹</td>
<td>13–18 g dl⁻¹</td>
</tr>
<tr>
<td>Platelets</td>
<td>156 × 10⁹ L⁻¹</td>
<td>150–400 × 10⁹ L⁻¹</td>
</tr>
<tr>
<td>INR</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>Serum sodium</td>
<td>134 mmol L⁻¹</td>
<td>135–145 mmol L⁻¹</td>
</tr>
<tr>
<td>Serum potassium</td>
<td>4.2 mmol L⁻¹</td>
<td>3.5–5.0 mmol L⁻¹</td>
</tr>
<tr>
<td>Urea</td>
<td>13 mmol L⁻¹</td>
<td>2.5–6.7 mmol L⁻¹</td>
</tr>
<tr>
<td>Serum creatinine</td>
<td>202 µmol L⁻¹</td>
<td></td>
</tr>
<tr>
<td>Troponin I (cTnI)</td>
<td>5.1 ng ml⁻¹</td>
<td>&lt;0.01 ng ml⁻¹</td>
</tr>
</tbody>
</table>

Appropriate statements regarding this scenario include:

(a). The troponin taken postoperatively is unlikely to be helpful in diagnosing an ischaemic cardiac event as it would normally be elevated anyway as a result of the surgery and renal disease.

(b). Commencing a prophylactic beta blocker 2 days before operation is likely to reduce his risk of mortality.

(c). If myocardial ischaemia were present, it would likely be caused by thrombotic coronary occlusion.

(d). Therapy with aspirin, clopidogrel and anti-thrombin should be started in the recovery room.

(e). Hypercarbia and hypothermia are two factors that may contribute to intraoperative ischaemia.

4. As a member of the outreach team, you are asked to see a 61-year-old lady on the respiratory ward. She was admitted 2 days ago with an infective acute exacerbation of asthma. She did not require intensive care support as her symptoms resolved after administration of nebulizers and steroids. She has a history of smoking, hypertension, diabetes mellitus and obesity. Unfortunately, 12 h ago she developed central chest tightness associated with dyspnoea and sweating for an hour. The ECG taken during the episode and blood test results taken 12 h after the onset of pain are shown below. Her current vital signs include a blood pressure of 159/90 mm Hg and a pulse rate of 94 beats min⁻¹.

Blood tests:

<table>
<thead>
<tr>
<th>Test</th>
<th>Level</th>
<th>Normal range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemoglobin</td>
<td>12.6 g dl⁻¹</td>
<td>12–17 g dl⁻¹</td>
</tr>
<tr>
<td>Platelets</td>
<td>352 × 10⁹ L⁻¹</td>
<td>150–400 × 10⁹ L⁻¹</td>
</tr>
<tr>
<td>INR</td>
<td>1.0</td>
<td>(0.9–1.1)</td>
</tr>
<tr>
<td>Serum sodium</td>
<td>142 mmol L⁻¹</td>
<td>135–145 mmol L⁻¹</td>
</tr>
<tr>
<td>Serum potassium</td>
<td>4.8 mmol L⁻¹</td>
<td>3.5–5.0 mmol L⁻¹</td>
</tr>
<tr>
<td>Urea</td>
<td>5.8 mmol L⁻¹</td>
<td>2.5–6.7 mmol L⁻¹</td>
</tr>
<tr>
<td>Serum creatinine</td>
<td>98 µmol L⁻¹</td>
<td></td>
</tr>
<tr>
<td>Troponin I (cTnI)</td>
<td>3.9 ng ml⁻¹</td>
<td>&lt;0.01 ng ml⁻¹</td>
</tr>
</tbody>
</table>

She was given oral aspirin 300 mg during the pain. No further medication has been given. Appropriate statements regarding this patient include:

(a). The diagnosis is ST-segment elevation myocardial infarction.

(b). The prodrug clopidogrel should be prescribed and taken for 12 months.

(c). Non-dihydropyridine calcium channel blockers should be used for heart rate control rather than beta blockers if required.

(d). You manage to arrange primary coronary intervention (PCI), which will occur within the next 8 h. Treatment-dose fondaparinux should therefore be given.

(e). Prasugrel has a faster onset of action than clopidogrel.
Anaesthesia for children with renal disease

1. Appropriate statements regarding causes of renal disease in children include:

(a). Compared with infants, children aged 5–12 years are more likely to present with malignancy.
(b). Approximately 50% of cases are likely to be caused by essential hypertension.
(c). Compared with females, there is a higher incidence of renal disease in male children.
(d). Among all documented cases of renal disease, renal dysplasia is a common diagnosis.
(e). Compared with renal transplantation in children younger than 5 years, renal transplantation in adolescents is associated with a lower mortality rate but a higher rate of graft failure.

2. Clinical features of chronic kidney disease in children include:

(a). Microcytic, hypochromic anaemia necessitating treatment with ferrous sulphate.
(b). Delay in development of language and motor skills.
(c). Accelerated atherosclerosis.
(d). Malnutrition and delayed growth.
(e). Metabolic acidosis, hypernatraemia and hypochloraemia

3. A 4-year-old girl with nephrotic syndrome presents for a renal biopsy owing to lethargy, malaise, peripheral oedema and deteriorating renal function. She has dry mucous membranes and her weight is 19.0 kg. Her drug history includes daily doses of prednisolone 10 mg, captopril 5 mg and furosemide 20 mg. Recent results are as follows:

<table>
<thead>
<tr>
<th>Test</th>
<th>Level</th>
<th>Normal range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemoglobin</td>
<td>87 g L⁻¹</td>
<td>110–140 g L⁻¹</td>
</tr>
<tr>
<td>Platelets</td>
<td>420 × 10⁹ L⁻¹</td>
<td>(200–450 × 10⁹ L⁻¹)</td>
</tr>
<tr>
<td>Sodium</td>
<td>131 mmol L⁻¹</td>
<td>133–146 mmol L⁻¹</td>
</tr>
<tr>
<td>Potassium</td>
<td>5.0 mmol L⁻¹</td>
<td>3.5–5.0 mmol L⁻¹</td>
</tr>
<tr>
<td>Urea</td>
<td>17 mmol L⁻¹</td>
<td>2.5–6.5 mmol L⁻¹</td>
</tr>
<tr>
<td>Creatinine</td>
<td>163 μmol L⁻¹</td>
<td>25–60 μmol L⁻¹</td>
</tr>
<tr>
<td>Glomerular filtration rate</td>
<td>31 ml min⁻¹</td>
<td>89–165 ml min⁻¹</td>
</tr>
</tbody>
</table>

The following statements are appropriate:

(a). A paediatric nephrologist is involved in the management of this girl provided there is progression of chronic kidney disease (CKD) to stage 5.
(b). If a rapid-sequence induction is performed, then succinylcholine (1–2 mg kg⁻¹) would be the neuromuscular blocker of choice.
(c). Captopril is likely to be omitted in the perioperative period.
(d). Tracheal intubation is likely to be performed.
(e). Hartmann’s solution in bolus doses of 5–10 ml kg⁻¹ is an acceptable choice of crystalloid for intravascular volume replacement.

4. A 3-year boy with end-stage renal failure caused by renal dysplasia and reflux nephropathy presents for transplantation of a kidney donated by a living, adult relative. He weighs 11 kg and currently receives peritoneal dialysis at home. Appropriate statements concerning this situation include:

(a). Compared with children who receive a renal transplant from donors who are brainstem-dead, this boy’s graft survival rate is likely to be longer.
(b). After transplantation, his growth rate would be expected to improve.
(c). One of his femoral arteries is a more suitable site for arterial line insertion than one of his radial arteries.
(d). If acute rejection of his renal transplant occurs, vascular thrombosis is the most likely reason.
(e). After uneventful surgery during which normothermia was maintained, this boy is likely to be extubated in theatre rather than in the paediatric intensive care unit.
Computed tomography of the chest: I. Basic principles

1. Appropriate statements regarding the computed tomographic image of the chest, shown below, include:

(a). The structure labelled ‘A’ is the right atrium.
(b). The structure labelled ‘B’ is the main pulmonary artery.
(c). The structure labelled ‘C’ is the inferior vena cava.
(d). The structure labelled ‘D’ is the superior vena cava.
(e). The structure labelled ‘E’ is the left lung parenchyma.

2. Appropriate statements regarding intravenous contrast used for computed tomography include:

(a). It is administered at the rate of 10–15 ml s⁻¹.
(b). A contrast study is necessary to identify aortic dissection.
(c). Intravenous (i.v.) contrast is likely to obscure a small oesophageal leak.
(d). A contrast study is necessary to identify pulmonary embolus.
(e). Central access is the preferred route of administration.

3. Appropriate statements regarding the computed tomography pulmonary artery (CTPA) image of the chest, shown below, include:

(a). The structure labelled ‘A’ is the left subclavian vein.
(b). The structure labelled ‘B’ is the trachea.
(c). The structure labelled ‘C’ is the hemiazygos vein.
(d). The structure labelled ‘D’ is the apex of the left lung.
(e). The structure labelled ‘E’ is the oesophagus.

4. The following are appropriate statements concerning high-resolution computed tomography (HRCT):

(a). During HRCT, slices of 20 mm are likely to be used.
(b). HRCT is likely to expose the patient to 90% more radiation than conventional helical CT.
(c). Intravenous contrast is likely to be administered.
(d). It is likely to be requested to assess conditions such as interstitial lung disease and emphysema.
(e). HRCT is likely to be useful in the trauma setting.

Enhanced recovery for gastrointestinal surgery

1. A 65-year-old gentleman with colorectal cancer is scheduled for an elective right hemi-colectomy using an enhanced recovery programme. Recommended elements of the enhanced recovery programme are likely to include:

(a). Morphine administered by a patient-controlled analgesic system with diclofenac but without regional block.
(b). Administration of a balanced crystalloid solution at 10 ml kg⁻¹ h⁻¹.
(c). Methylprednisolone at 30 mg kg⁻¹ intravenously administered 90 min before surgery.
2. The proposed benefits of enhanced recovery programmes include reduced duration of hospital stay, reduced postoperative morbidity, reduced hospital costs and improved patient satisfaction. As of 2014, such benefits have been demonstrated in randomized controlled trials for the following surgical specialities/procedures:

(a). Colorectal surgery.
(b). Oesophagogastrectomy.
(c). Gastrectomy.
(d). Liver resection.
(e). Pancreatic surgery.

3. A 63-year-old gentleman with oesophageal cancer amenable to surgical resection has been scheduled to undergo two-stage oesophagogastrectomy involving right-sided thoracotomy and midline laparotomy. His comorbidities are hypertension and asthma (requiring two or three hospital admissions per year). His current medications are amlodipine and beclomethasone and salbutamol inhalers. Appropriate statements regarding his perioperative management include:

(a). Pre-emptive multimodal analgesia that includes regular paracetamol, ketorolac and a thoracic epidural is likely to be optimal for analgesia.
(b). Paravertebral block is likely to be as effective as thoracic epidural for postoperative analgesia.
(c). Early extubation in theatre, before transfer to intensive care, is mandatory.
(d). A carbohydrate drink of 100 g the evening before surgery followed by a further carbohydrate drink of 50 g on the morning of surgery are not appropriate in this setting.
(e). Oesophageal Doppler is the optimal choice for guiding intravenous fluid administration.

4. In clinical trials comparing enhanced recovery with conventional perioperative care, enhanced recovery has been shown to:

(a). Reduce the duration of hospital stay.
(b). Reduce the incidence of postoperative complications.
(c). Improve patient satisfaction.
(d). Reduce hospital costs.
(e). Alter the surgical stress response.

Implementation of evidence-based practice in anaesthesia

1. Appropriate statements regarding searching of literature include:

(b). The OVIDSP platform truncation with either $ or * limits a search term to exact keyword matches.
(c). The Cochrane Anaesthesia Research Group (CARG) does not deal with pre-hospital medicine.
(d). The Find Citations function requires prior knowledge of the publishing journal.
(e). The OVIDSP platform assumes words in the same search field are an exact phrase.

2. Appropriate statements regarding systematic reviews include:

(a). The term PROSPERO refers to a tool for critically appraising a study.
(b). A meta-analysis often forms part of a systematic review.
(c). Invariably, systematic reviews are likely to be of high quality.
(d). Searching is likely to be restricted to material published within the most recent 5 years.
(e). Before searching the literature, a clinical question that includes a format such as PICO (population, intervention, control and outcome) is likely to be formulated.

3. A randomized controlled trial of high quality is likely to:

(a). Give reasons for loss of patients to follow-up.
(b). Contain a forest plot in its results.
(c). Declare all sources of funding and support.
(d). Blind all persons involved in the research.
(e). Be registered on the DARE database before commencement.

4. Appropriate statements regarding forest plots include:

(a). A pooled analysis represented by a diamond on the line of equality indicates no statistical difference between two exposure groups.
(b). If more than half the reviewed studies show no statistical difference in an outcome between two exposure groups, then the pooled statistic of a meta-analysis cannot be in favour of either exposure group.
(c). Increasing the amount of data studied widens the 95% confidence interval.
(d). ‘Relative risk’ and ‘risk ratio’ are synonymous terms.
(e). In randomized controlled trials, the threshold for the probability of a type I error is 2%.

Pathophysiology of cardiovascular dysfunction in sepsis

1. A 56-year-old man presents to the general surgeons with severe abdominal pain. He has a computed tomographic (CT) scan that reveals free fluid in the abdominal cavity and consolidation as well as collapse at the base of his right lung. After laparotomy in which a necrotic gall bladder was found, he is admitted to the intensive care unit. His trachea is intubated and his lungs are ventilated with a fractional inspired oxygen concentration of 70%. Other than confirming collapse and consolidation at the right base, the chest radiograph shows correct positioning of both the tracheal tube and the central venous catheter. Despite administration of norepinephrine at 0.8 μg kg⁻¹ min⁻¹, there is hypotension and atrial fibrillation at 100 beats min⁻¹. A transoesophageal echocardiography scan shows severe hypokinesia of the left and right ventricles, with right ventricular dilatation. Blood tests for clotting and renal function show results that are within normal limits.

2. In the patient described in the previous question, appropriate statements regarding the role of calcium in cardiac muscle include:

(a). Calcium binds to myosin during cardiac myocyte shortening.
(b). Calcium reuptake during diastole occurs by active transport.
(c). The calcium L-channel is directly affected by tumour necrosis factor α in sepsis.
(d). During diastole, reduced reuptake of calcium into the endoplasmic reticulum is likely to increase left ventricular end-diastolic pressure (LVEDP).
(e). High intracellular calcium concentration during systole facilitates the binding of the inotrope levosimendan to troponin-C.

3. In the patient described in the first question, tumour necrosis factor α (TNFa) is likely to:

(a). Cause fever.
(b). Be secreted by the activated vascular endothelium.
(c). Act as a vasodilator in the peripheral circulation.
(d). Act as a pulmonary artery vasoconstrictor.
(e). Be associated with atrial fibrillation.

4. Appropriate statements regarding vascular control in the patient described in the first question include:

(a). The presence of hypoxic pulmonary vasoconstriction is likely to be attributable to a mixed venous oxygen content that is lower than normal.
(b). He is likely to have pulmonary vasoconstriction that is mediated by endothelin.
(c). His vascular control of the systemic circulation is attenuated by the effect of nitric oxide on the baroreceptor reflex.
(d). His cortisol secretion is likely to be decreased.
(e). His pH is unlikely to have an effect on pulmonary vascular tone.

### Table: Blood Tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>Normal range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full blood count</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haemoglobin</td>
<td>9.8 g dl⁻¹</td>
<td>13.5–17.5 g dl⁻¹</td>
</tr>
<tr>
<td>White cell count</td>
<td>23 × 10⁹ L⁻¹</td>
<td>4–11 × 10⁹ L⁻¹</td>
</tr>
<tr>
<td>Platelet count</td>
<td>90 × 10⁹ L⁻¹</td>
<td>150–450 × 10⁹ L⁻¹</td>
</tr>
<tr>
<td>Arterial blood gas analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>7.29</td>
<td>7.35–7.45</td>
</tr>
<tr>
<td>pO₂</td>
<td>9.6 kPa</td>
<td>11–14 kPa</td>
</tr>
<tr>
<td>pCO₂</td>
<td>4.7 kPa</td>
<td>4.1–6.1 kPa</td>
</tr>
<tr>
<td>Base excess</td>
<td>−11 mmol L⁻¹</td>
<td>−2 to +2 mmol L⁻¹</td>
</tr>
<tr>
<td>Lactate</td>
<td>3.5 mmol L⁻¹</td>
<td>0.5–1.6 mmol L⁻¹</td>
</tr>
<tr>
<td>Glucose</td>
<td>4.1 mmol L⁻¹</td>
<td>4–6.1 mmol L⁻¹</td>
</tr>
<tr>
<td>C-reactive protein</td>
<td>230 mg L⁻¹</td>
<td>&lt;5 mg L⁻¹</td>
</tr>
</tbody>
</table>

Appropriate statements regarding his cardiovascular system include:

(a). Given this presentation of an acute abdomen, myocardial ischaemia is likely to be ruled out as a cause of his haemodynamic findings.
(b). Right ventricular dilatation is likely to occur as a result of collapse and consolidation at the base of the right lung.
(c). Using transoesophageal echocardiography, pulmonary artery systolic pressure is estimated provided there is mitral regurgitation.
(d). Severe hypokinesia of the left ventricle is likely to be attributable to the lactate concentration.
(e). The tachyarrhythmia is likely to be caused by the septic response but not by nociception.