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THE COLLEGES OF MEDICINE OF SOUTH AFRICA

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Examination for the Diploma in Anaesthetics of the College of Anaesthetists of South Africa

7 February 2018

Paper 1 — 3 hours

All questions to be answered. Each question to be answered in a separate book (or books if more than one is required for the one answer)

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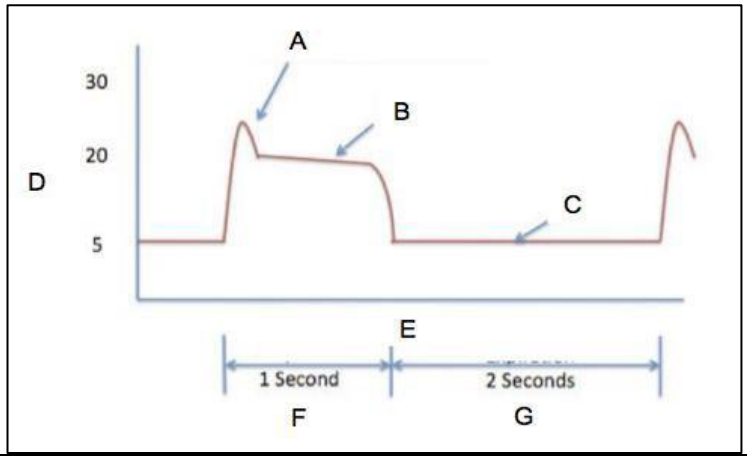
1 Regarding ventilation and ventilator graphics

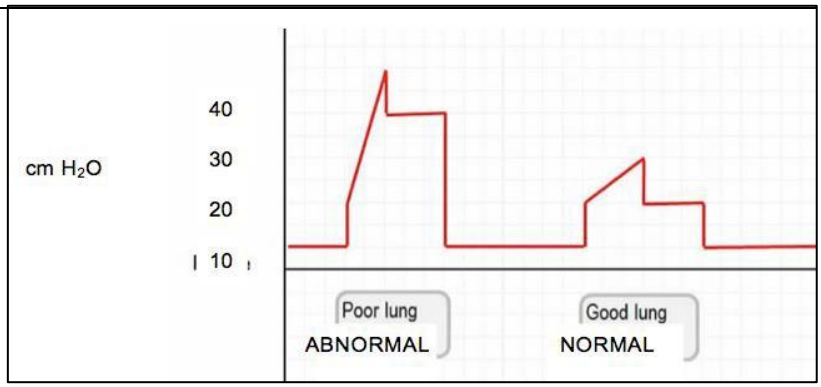
a) Label A to G on this normal pressure time curve (seen below) on an anaesthetic monitor or ventilator screen. (8)



b) Define lung compliance. (1)

c) What is the normal lung compliance? (1)

d) List five causes of the abnormal curve shown below. (5)



PTO/ Page 2 Question 1e)…

e) How will the normal airway pressure curve change if an endotracheal tube is blocked by a mucus plug or the heat moisture exchange filter (HMEF) is obstructed? (1)
f) List 3 disadvantages of a HMEF use beside the one mentioned above. (3)
[19]

2 Give a specific indication for each drug listed below
a) Flumazenil.
b) Neostigmine.
c) Acetylcysteine.
d) Naloxone.
e) Suggamadex.
[5]

3 A trauma patient is receiving an opioid based general anaesthetic, the bi-spectral index monitor of the electroencephalogram (EEG) reads 72
a) What is your next course of action? (1)
b) List 4 clinical signs that can suggest an inadequate depth of anaesthesia. (2)
c) List 4 things that can mask the signs you have mentioned above. (2)
d) List 2 post-operative consequences of intra-operative awareness. (1)
[6]

4 A previously healthy 9-year-old girl is booked for an emergency appendisectomy. The surgeon will be performing the procedure laparoscopically
a) Name 5 important pre-operative considerations in this patient presenting for emergency surgery. (5)
b) Discuss the peri-operative analgesia plan for this patient. (10)
c) List 5 key changes in the respiratory system during laparoscopic surgery. (5)
d) List 5 key changes in the cardiovascular system during laparoscopic surgery. (5)

Twenty minutes after establishment of the pneumo-peritoneum in the above patient, the amplitude of the capnography trace suddenly decreases and then disappears
e) List 5 possible causes. (5)
f) Describe your immediate management. (10)
[40]

5 Regarding the pregnant patient
a) List 10 physiological changes that take place in the respiratory system of the pregnant patient. (10)
b) Explain why the pregnant patient is considered a “difficult intubation”. (5)
c) List 5 factors (patient and anaesthetic) and their mechanisms of action, which contribute towards hypotension during a caesarean section. (10)
d) Briefly describe the management to address each of the factors mentioned above in “c”. (5)
[30]

6 Regarding post-dural puncture headache
a) List the risk factors for development of a post-dural puncture headache. (5)
b) List the management of a post-dural puncture headache. (5)
[10]

7 Regarding Ischaemic heart disease

a) Describe 3 features that define: unstable angina. (6)

b) List 6 conditions (clinical or surgical) that independently increase the peri-operative risk of a myocardial infarction (MI). (6)

c) List the intra-operative principles of maintaining a favourable myocardial oxygen supply-demand balance in a patient at risk of a peri-operative MI. (6)

d) List 3 monitor changes that may be an indication of the patient experiencing cardiovascular ischaemia under general anaesthesia. (3)

[21]

8 Provide <u>one</u> example of each of the following grades of surgery

a) Low risk surgery. (1)

b) Intermediate risk surgery. (1)

c) High risk surgery. (1)

[3]

9 Regarding pre-operative assessment

a) Describe how one would assess activities of daily living to evaluate the equivalent of 4METS with at least one example. (3)

b) Discuss the information provided by Coronary angiography. (3)

[6]

10 Regarding Neurophysiology

a) Explain the difference between primary and secondary brain injury. (2)

b) Explain the Monro-Kellie hypothesis. (3)

c) Draw a diagram for each factor below to indicate how it would influence cerebral blood flow (4)

i) Mean arterial blood pressure.

ii) Arterial oxygen tension (P_aO_2).

iii) Arterial carbon dioxide tension (P_aCO_2).

iv) High doses of inhalational / volatile agents.

[9]

11 A patient was involved in a motorbike accident. He has multiple fractures including long bone and lumbar fractures

a) What is his Glasgow coma scale with the following findings on clinical examination?

- Eyes- open to pain.
- Motor- Withdraws from pain.
- Verbal- Incoherent sounds.
- Total score = (1)

b) What is your anaesthetic approach if this patient comes for an open reduction and internal fixation of an open tibia-fibula fracture (i.e. general versus regional anaesthesia)? Explain your choice. (5)

c) What are the recommendations for administration of Suxamethonium in patients with spinal cord injury? Explain these recommendations. (2)

[8]

12 List 6 anaesthetic concerns in a patient with a full stomach and a penetrating eye injury. [6]

PTO/Page 4 Question 13…

13 Regarding the “STOPBANG” questionnaire for Obstructive sleep apnoea

a) List each of the factors assessed in the STOPBANG questionnaire. (4)

b) List 3 anaesthesia concerns if the patient has a high score on the STOPBANG questionnaire? (3)

[7]

14 You anaesthetise a child and administer suxamethonium. On emergence, there is prolonged paralysis. You suspect a “Scoline Apnoea” and ask for the laboratory to test a blood sample with Dibucaine

a) What is Dibucaine? (1)

b) The Dibucaine Number is quoted as 45%, what does that mean? (2)

c) Briefly state how you will manage the child? (2)

[5]

15 You perform a caudal block on a 5-year-old child, who weighs 18kgs. You administer 18ml of 0.375% bupivacaine in the caudal space. When you turn the child supine they have a severe bradycardia and a low blood pressure, which requires you start cardio-pulmonary resuscitation**.** List the differential diagnoses of what may have happened. [5]

16 A child is having a surgical debridement because they have sustained burns. Intra-operatively you notice their temperature to be 34%, and the surgeon is complaining about more bleeding than he expected

a) Why is the patient bleeding more than expected? (1)

b) List 6 ways to prevent hypothermia peri-operatively in this patient. (3)

c) When will you awaken the patient if his his temperature is the only abnormality at the end of the procedure? (1)

[5]

17 List 5 preventative measures to reduce post-operative nausea and vomiting (PONV) in children with a history of PONV. [5]

18 A 9-year-old, ASA 1, 25kg boy is having an open reduction internal fixation of his femur fracture. An hour into the procedure you notice that he developed a tachycardia, low blood pressure and his haemoglobin (Hb) is 5g/dl on the ward Hb monitor. You estimate blood loss to be 300ml

a) What percentage of blood volume has been lost? (2)

b) You plan to transfuse packed cells: what is the targeted Hb and how much blood will you transfuse if blood loss has stopped at this point? (3)

[5]

19 You have to anaesthetise a 4-year-old 16kg child. You want to do a gas induction using a Jackson-Reese modification of an Ayers T-piece circuit

a) What Mapleson classification is this circuit? (1)

b) Is it appropriate to use a Jackson-Reese on this child? Give a reason for your answer. (2)

c) What total fresh gas flow rate would you set on your flow meters? (2)

[5]

20 Describe how you would perform an ilio-inguinal block on a child who is coming for an inguinal herniotomy. [5]

PTO/Page 5 Question 21…

21 Regarding emergence delirium

a) List 4 risk factors for emergence delirium. (2)

b) If you suspect an emergence delirium in a child in the recovery area, briefly state how would you manage it? (3)

[5]

22 You are asked to transport an intubated and ventilated, 36-year-old, 70kg male patient, from the intensive care unit (ICU) to theatre for a "relook" laparotomy. He had a laparotomy for a perforated appendix, 3 days previously

- The doctors in ICU state that they have been struggling with his blood pressure today.
- His fluid balance chart shows he is in positive balance by 4 litres over the three days.
- His haemoglobin is 7,8g/dl.
- He is on low dose nasogastric feeds.

a) List the airway equipment and drugs you will take with you to ensure safe ventilation for the duration of the transfer and to manage a potential unplanned extubation during transport. (6)

b) After isoflurane is started he is paralysed with cisatracurium. His peripheral oxygen saturation is 90% with an inspiratory oxygen fraction (FiO_2) of 0,8. His peak airway pressure is 42cmH_2O with a plateau pressure of 36cmH_2O. List the five most likely differential diagnoses and briefly indicate your initial treatment of each scenario. (10)

c) The surgeon decides to perform a bowel resection. He anticipates 500ml blood loss. Briefly describe your transfusion strategy and the practical steps you would take to maintain an adequate haemoglobin level. (7)

d) The nasogastric tube accidentally comes out during transfer back to ICU. You reinsert the tube. What is your advice to the ICU doctor on call regarding reinstitution of nasogastric feeds and the possible need for parenteral nutrition? (3)

e) List the surviving sepsis recommendations regarding infection management in patients with sepsis. (4)

[30]

23 Regarding persistent postsurgical pain (PSP)

a) Define the concept of "persistent postsurgical pain". (2)

b) Name 3 surgical procedures that increase the risk for development of postsurgical pain. (3)

c) Other than surgical procedures, list 10 risk factors for PSP. (5)

[10]

24 Discuss the multimodal interventions that could be used to attenuate the surgical stress response. [10]

25 Regarding the geriatric patient

a) What are physiological changes that you have to take into consideration when prescribing your peri-operative pain medication to a geriatric patient? (4)

b) Discuss your peri-operative pain management plan including the dose and site of administration for drugs used. (6)

[10]

PTO/Page 6 Question 26…

26 You have been requested to provide sedation for a patient undergoing an upper gastro-intestinal scope in the endoscopy suite

a) Discuss your patient selection criteria for such a procedure. (5)

b) What are your concerns with regards to working in a remote site such as the endoscopy suite? (10)

c) Describe your technique including drugs and monitoring for this case. (10)

d) What would you do if the sedation regimen you used in (26c) fails? (2)

e) According to the 'continuum of sedation', what are the features of Deep sedation? (3)

[30]