



THE COLLEGES OF MEDICINE OF SOUTH AFRICA

Incorporated Association not for gain
Reg No 1955/000003/08



Examination for the Subspecialty Certificate in Cardiology of the
College of Physicians of South Africa

26 July 2018

Paper 1

(3 hours)

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

- 1 a) Discuss the pathophysiology of Takotsubo Cardiomyopathy. (15)
b) What are the genetic and acquired causes of left ventricular hypertrophy? (5)
c) In individuals with a possible diagnosis of athlete's heart versus hypertrophic cardiomyopathy (HCM), which echocardiographic criteria and other investigations help distinguish HCM from cardiovascular adaptation changes in an athlete? (15)
d) What are the conduction complications and the proposed mechanisms post surgical aortic valve replacement (AVR) and Transcatheter Aortic Valve Implantation (TAVI)? (10)
[45]
- 2 a) List the categories of drugs used in the treatment of idiopathic pulmonary hypertension and describe the mechanism of action of these drugs. (You may use an annotated diagram to illustrate this). (10)
b) i) What is a pulsus paradoxus? (2)
ii) Describe the pathophysiology of a pulsus paradoxus within the context of pericardial tamponade. (A flow diagram maybe used). (10)
iii) Under what circumstances may pericardial tamponade occur with no pulsus paradoxus. (3)
c) Describe the haemodynamics and individual haemodynamic signs that may be observed on the haemodynamic tracings that are recorded in a patient undergoing left and right heart catheterisation with idiopathic restrictive cardiomyopathy. (10)
d) Describe using a diagram the pathophysiology of acute submassive pulmonary thromboembolic disease. (10)
[45]

Question 3 a), b) and c) to be answered in one book. Question 3d) to be answered in a separate book.

- 3 a) Discuss the action potential, how this is pertinent to arrhythmias and how antiarrhythmic drugs may affect this. (15)
b) Discuss the anatomy of AV node and proximal His bundle with respect to ablation of AVNRT and also of the AV junction, and also with respect to His bundle pacing. A figure may prove useful. (15)
c) Discuss the positioning of the electrodes for a 12-lead ECG, and also discuss how the QTc is calculated. (5)
d) Discuss the mechanisms and pathophysiology of anemia in heart failure. (10)
[45]

Questions 4a) and 4b) to be answered in one book. Question 4c) in a separate book and Question 4d) to be answered in a separate book.

- 4 a) When evaluating a myocardial perfusion scan, what are the non-perfusion markers of severity? Name them and briefly describe the pathophysiology. (15)
- b) i) Describe the pathophysiological mechanisms that explain the basis of 18FDG PET (18F-Fluorodeoxyglucose Positron Emission Tomography) scan for viability assessment. (6)
- ii) How is it interpreted in clinical practice? (4)
- c) Explain diuretic resistance and nephron remodelling. Describe the mechanisms and the treatment options by which diuretic resistance may be overcome. (10)
- d) Discuss the pathophysiology and causes of positive remodelling of coronary arteries and coronary artery aneurysms. (10)
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Paper 2

(3 hours)

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

- 1
- Define and discuss the “Paradigm Shift Concept” in the management of the diabetic patient. Support your argument based on the primary findings of the randomised controlled studies of the EMPAREG-OUTCOME and CANVAS studies including the proposed mechanisms of cardiovascular benefit of this class of medication. (12)
 - Describe/tabulate the different hypoglycemic drug classes used to treat diabetes and discuss the cardiovascular outcomes attributed to these drugs. Mention the trials supporting these outcome data. (15)
 - Discuss, with supporting trials, coronary revascularisation in the diabetic patient with asymptomatic and symptomatic acute and chronic coronary artery disease. Mention, with supporting trials, the type of revascularisation preferred in different categories of diabetic patients. (18)
- [45]

Questions 2 a), b), c) and d) to be answered in one book. Question 2 e) to be answered in a separate book.

- 2 A 23-year-old woman presents with severe shortness of breath and is unable to walk 100m. The resting BP= 124/80 mmHg and her heart rate is 96 beats/min. A 2/4 early to mid diastolic murmur is heard and she is approximately 20 weeks pregnant. The salient echocardiographic features reveal that she has moderate aortic regurgitation. Analysis of the CW doppler of the mitral valve during diastole reveals that the pressure half time is 150 ms and the mean mitral gradient is 28 mmHg. There is mild TR with a right ventricular systolic pressure of 58 mmHg.
- What are the potential effects of pregnancy on this patient’s current hemodynamics? (10)
 - Briefly outline the advantages and pitfalls of the various echocardiographic techniques that may be used to calculate the mitral valve area in this patient. (10)
 - Briefly outline the limitations of the echocardiographic techniques used to assess this patient’s aortic regurgitation. (5)
 - What medical therapy may be offered to this patient? Briefly explain your rationale. (5)
 - Discuss anti-coagulation of a pregnant patient who has had a metallic, prosthetic valve replacement. Mention how to manage the anticoagulation, drug options, monitoring, risks and potential complications. (15)
- [45]

Questions 3 a), b) and c) to be answered in one book. Question 3 d) and e) to be answered in a separate book.

- 3 a) Discuss sudden cardiac arrest during competitive sport. Include the pathophysiological mechanisms, pathology and explain the concept of commotio cordis. (12)
- b) Optimised time targets have been investigated during acute ST elevation myocardial infarction (STEMI) in order to improve ideal patient outcomes and are now included in guidelines. Please provide the accepted time targets relating to STEMI for the following:
- i) Maximum time from First Medical Contact (FMC) to ECG and diagnosis.
 - ii) Maximum time from STEMI diagnosis to wire crossing in patients presenting at primary PCI hospitals.
 - iii) Maximum time from STEMI diagnosis to bolus or infusion start of fibrinolysis in patients unable to meet primary PCI target times.
 - iv) Time delay from start of fibrinolysis to evaluation of its efficacy (success or failure).
 - v) Time delay from start of fibrinolysis to angiography (if fibrinolysis is successful). (5x1)
- c) Set out the aspects to be considered by the heart team when deciding between transcatheter aortic valve implantation (TAVI) and surgical aortic valve replacement under the headings listed below. Feel free to use a table.
- i) Clinical characteristics. (3)
 - ii) Anatomical and technical aspects. (7)
 - iii) Cardiac conditions in addition to aortic stenosis that require consideration for concomitant intervention. (2)
- d) Discuss the approach to management of an infected cardiac implantable electronic device. (8)
- e) Discuss the recent CABANA trial in atrial fibrillation and the controversies around its interpretation. (8)
- [45]
- 4 A 20-year-old female patient was diagnosed at a secondary hospital with a TIA. On the screening echocardiogram performed at that hospital, mild to moderate mitral regurgitation and moderate aortic regurgitation with evidence of vegetations on the leaflets of both valves were found. She is sent for further evaluation to a tertiary centre where you work
- a) What is the value of brain imaging in this patient? (5)
 - b) What evidence may you find on an echocardiogram that may point to the presence of acute aortic regurgitation? (6)
 - c) What is the role of trans oesophageal Echo (TEE) in infective endocarditis? (7)
 - d) Briefly outline the factors in this patient that may influence your decision for early surgery in this patient. (9)
 - e) If after 14 days of empiric antibiotic therapy the patient develops a recurrent fever what would be the differential diagnosis. (6)
 - f) Discuss valve repair/replacement options in this patient, including the pros and cons. (12)
- [45]