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Question: 1471

A 68-year-old male with LVEF 35% and moderate pulmonary hypertension is undergoing AVR. After 90 minutes of CPB, separation is attempted with norepinephrine 0.1 µg/kg/min and epinephrine 0.05 µg/kg/min. The patient remains hypotensive with MAP 55 mmHg and high right-ventricular pressure despite optimized preload. The most appropriate next pharmacologic maneuver is to add:

A. Inhaled nitric oxide 20 ppm to selectively reduce pulmonary vascular resistance and RV afterload
B. Intravenous nitroglycerin 0.5–1.0 µg/kg/min to reduce afterload and left-ventricular filling pressure
C. Intravenous milrinone 50 µg/kg bolus over 10 minutes followed by 0.5 µg/kg/min infusion

Answer: A

Explanation: This scenario describes difficult separation from CPB with right-sided failure and systemic hypotension, a classic indication for selective pulmonary vasodilators. Inhaled nitric oxide (iNO) reduces pulmonary vascular resistance and RV afterload without causing systemic hypotension, thereby improving RV function and cardiac output. Intravenous milrinone, although a phosphodiesterase-3 inhibitor with combined inotropic and vasodilatory effects, can lower systemic vascular resistance and may worsen hypotension in this setting. Nitroglycerin is a systemic venodilator that primarily reduces preload and left-ventricular filling pressure but does little to address the main problem of RV-pulmonary-circuit mismatch. Therefore, inhaled nitric oxide is the preferred agent to facilitate separation when RV-pulmonary afterload is the primary barrier.

Question: 1472

A patient with a lumbar drain shows a CSF pressure of 2 mmHg. The anesthesiologist is concerned about "over-drainage." Which of the following clinical signs is most

associated with this condition?

A. New-onset cranial nerve palsies or subdural hematoma
B. Sudden increase in lower extremity motor strength
C. Acute hypertension and bradycardia (Cushing's triad)

Answer: A

Explanation: Over-drainage of CSF (typically when pressure is < 5 mmHg) can cause "brain sag," where the brain shifts downward due to the loss of buoyancy. This can stretch cranial nerves (especially the abducens nerve, CN VI) or cause the rupture of bridging veins, leading to a subdural hematoma.

Question: 1473

A 64-year-old male with an implantable cardioverter-defibrillator (ICD) placed for secondary prevention of ventricular tachycardia (VT) is scheduled for a radical prostatectomy involving the use of monopolar electrosurgery. The surgical site is approximately 12 cm from the ICD generator. Which of the following is the most appropriate perioperative management strategy for this patient's device?

A. Proceed without changes as the surgical site is sufficiently distant from the ICD
B. Program the ICD to deactivate tachyarrhythmia detection and therapy before surgery
C. Place a magnet over the device to switch it to an asynchronous VOO pacing mode

Answer: B

Explanation: For patients with an ICD undergoing surgery where electromagnetic interference (EMI) is expected (such as monopolar cautery), placing a magnet will usually inhibit tachycardia therapies (shocks/antitachycardia pacing) but will NOT typically change the pacing mode to asynchronous (unlike a simple pacemaker). If the

patient is also pacemaker-dependent, the device must be programmed to an asynchronous mode (VOO/DOO) to prevent EMI-induced oversensing and subsequent pacing inhibition. Given the proximity and the use of monopolar cautery, the most robust board-level recommendation is to electronically deactivate the ICD's detection/shocks and use external monitoring/defibrillation pads as a backup.

Question: 1474

A 70-year-old patient with chronic aortic regurgitation is scheduled for surgery. Which heart rate strategy is most appropriate?

A. Maintain fixed heart rate regardless of hemodynamics
B. Induce bradycardia to maximize diastolic filling
C. Maintain higher heart rate to reduce diastolic regurgitant time

Answer: C

Explanation: Tachycardia reduces diastolic time, thereby decreasing the duration of regurgitation and improving forward cardiac output in chronic aortic regurgitation.

Question: 1475

A patient with pulmonary hypertension undergoes right heart catheterization. Pulmonary artery pressure is 78/34 mm Hg, pulmonary capillary wedge pressure is 10 mm Hg, and cardiac output is 3.8 L/min. Which classification is most consistent with these findings?

A. Restrictive cardiomyopathy with postcapillary pressure transmission
B. Pulmonary venous hypertension caused by left ventricular diastolic dysfunction
C. Precapillary pulmonary hypertension with elevated pulmonary vascular resistance

Answer: C

Explanation: Severe elevation in pulmonary artery pressure with normal pulmonary capillary wedge pressure indicates precapillary pulmonary hypertension. The normal wedge pressure excludes elevated left-sided filling pressure as the primary mechanism. Reduced cardiac output further supports advanced pulmonary vascular disease with increased right ventricular afterload.

Question: 1476

Tachycardia-induced cardiomyopathy is best characterized by:

A. Reversible LV dysfunction with rhythm control
B. Irreversible myocardial fibrosis
C. Progressive worsening despite rhythm correction

Answer: A

Explanation: Tachycardia-induced cardiomyopathy is reversible with control of arrhythmia or heart rate normalization.

Question: 1477

A 65-year-old male with severe aortic stenosis and LVH undergoes AVR. After separation from CPB, HR is 92 bpm, PR 220 ms, QRS 140 ms, and CI 2.1 L/min/m². The patient is mildly hypotensive with MAP 68 mmHg. The surgeon requests pacing to optimize hemodynamics. The most appropriate pacing strategy is:

A. Program ventricular-appearing sequential pacing (DDD) at 80–90 bpm to maintain

AV synchrony

B. Use right-ventricular apical pacing at 100 bpm to maximize cardiac output

C. Accept the current rate and rhythm while optimizing contractility and afterload

Answer: C

Explanation: This patient has a prolonged PR and wide QRS consistent with pre-existing or perioperative conduction disease. In a setting of severe LVH and relatively preserved cardiac index, aggressive pacing at high rates can increase myocardial oxygen demand and impair diastolic filling. Moreover, right-ventricular apical pacing induces dyssynchronous ventricular activation and can mimic or worsen cardiomyopathy, especially in patients with diseased ventricles. Current pacing-guideline-driven approaches favor minimizing unnecessary ventricular pacing and avoiding fast-rate pacing in hearts with thick, non-compliant walls and possible diastolic dysfunction. Optimization of inotropy, afterload, and volume, with pacing reserved for true hemodynamically significant bradycardia or high-grade AV block, is safer and more physiologically sound. Therefore, acceptance of the current rate while optimizing other determinants of cardiac output is preferred over routine pacing.

Question: 1478

A 69-year-old man with coronary artery disease, on dual antiplatelet therapy with aspirin 81 mg daily and ticagrelor 90 mg twice daily following drug-eluting stent placement 11 months ago, presents for elective floor surgery (hernia repair). His latest cardiac catheterization showed no new lesions. What is the most appropriate antiplatelet management?

A. Continue both aspirin and ticagrelor through the day of surgery

B. Hold both aspirin and ticagrelor 7 days before surgery, resume both 48 hours postoperatively

C. Hold ticagrelor 5-7 days before surgery, continue aspirin, resume ticagrelor 24-48 hours postoperatively

Answer: C

Explanation: For patients on dual antiplatelet therapy (DAPT) undergoing elective non-cardiac surgery, aspirin should generally be continued if the bleeding risk is low-to-moderate, as discontinuation increases thrombotic risk. Ticagrelor (P2Y12 inhibitor) should be held 5-7 days before surgery (ticagrelor has a shorter half-life than clopidogrel but still requires 5 days for platelet function recovery). This patient's drug-eluting stent was placed 11 months ago, which exceeds the minimum 6-month DAPT duration for elective non-urgent surgery in most cases. According to ACC/AHA guidelines, P2Y12 inhibitors should be withheld 5-7 days before surgery (ticagrelor/prasugrel 5-7 days, clopidogrel 5 days), while aspirin is continued when possible. Option A is incorrect because continuing ticagrelor significantly increases bleeding risk. Option C is inappropriate as aspirin should be continued if the surgical bleeding risk permits.

Question: 1479

A patient undergoing descending aortic repair develops renal dysfunction postoperatively. Primary cause?

A. Increased cardiac output
B. Aortic cross-clamp-related ischemia
C. Hyperventilation

Answer: B

Explanation: Renal ischemia during cross-clamping can lead to acute kidney injury.

Question: 1480

A patient with a history of Tetralogy of Fallot repair is undergoing TE**E.** The anesthesiologist notes significant "patch margin" regurgitation. Where is this regurgitation located?

A. Through the tricuspid valve leaflets themselves
B. At the site of the ventricular septal defect closure
C. At the site of the atrial septal defect closure

Answer: B

Explanation: ToF repair involves closing a large VSD with a patch. "Patch margin" regurgitation (or a residual VSD) occurs when there is a leak around the edges of this patch. This results in a persistent left-to-right shunt and can cause LV and RV volume overload.

Question: 1481

A patient undergoing heart transplantation has complete surgical denervation of the donor heart. During acute hemorrhage, which response is expected?

A. Increased circulating catecholamine-mediated chronotropic response over time
B. Immediate reflex tachycardia mediated by intact cardiac sympathetic fibers
C. Rapid baroreceptor-mediated augmentation of vagal withdrawal

Answer: A

Explanation: The transplanted heart lacks direct autonomic innervation. Immediate reflex heart rate responses to hypovolemia are therefore absent. However, circulating catecholamines released from the adrenal medulla can gradually increase heart rate and contractility. The chronotropic response is delayed relative to intact autonomic reflexes.

Question: 1482

A 55-year-old man with chronic severe aortic regurgitation and aortic root dilatation undergoes AVR with aortic root replacement. After separation from cardiopulmonary bypass, the anesthesiologist notes a low-voltage, flattened arterial waveform with a narrow pulse pressure and frequent premature ventricular contractions. The patient is tachycardic at 115 bpm and hypotensive despite modest inotrope support. Which of the following is the most likely cause of this hemodynamic deterioration?

A. Acute reduction in regurgitant volume and afterload mismatch leading to left-ventricular systolic dysfunction.
B. Over-correction of preload from aggressive diuresis during weaning from bypass, resulting in hypovolemia.
C. Persistent severe aortic regurgitation due to improper valve-annulus sizing and paravalvular leak.

Answer: A

Explanation: After correction of chronic severe aortic regurgitation, the left ventricle is suddenly exposed to higher afterload and receives no regurgitant volume, creating an "afterload mismatch." If the ventricle has not developed sufficient contractile reserve or reverse remodeling, this can manifest as systolic dysfunction, hypotension, and arrhythmias. Inotropes and careful afterload-modulating agents may be required to support the transition. Persistent AR or hypovolemia can also cause hypotension, but the pattern of narrow pulse pressure, low-voltage waveform, and arrhythmias after a technically successful repair is more consistent with afterload-induced decompensation than residual leak or volume depletion.

Question: 1483

A patient with severe tricuspid regurgitation shows hepatic vein systolic flow reversal. What does this indicate?

A. Normal right atrial compliance
B. Severe regurgitation with significant systolic backflow
C. Isolated tricuspid stenosis without regurgitation

Answer: B

Explanation: Hepatic vein systolic flow reversal is a specific echocardiographic sign of severe tricuspid regurgitation indicating systolic backflow into the venous system.

Question: 1484

Cold agglutinin disease is suspected pre-CP**B.** Best management?

A. Cool below antibody activation threshold
B. Use cold cardioplegia only
C. Proceed with normothermic CPB

Answer: C

Explanation: Avoid hypothermia entirely; cold exposure triggers RBC agglutination and hemolysis.

Question: 1485

A 66-year-old with significant COPD is undergoing an evaluation for heart failure. The cardiologist chooses a pharmacological stress test using Regadenoson rather than

Adenosine. What is the primary advantage of Regadenoson in this patient?

A. It has a much shorter half-life than adenosine, allowing for quicker reversal
B. It is a selective A_{2A} receptor agonist, reducing the risk of bronchospasm
C. It provides better visualization of the inferior wall in patients with a high diaphragm

Answer: B

Explanation: Adenosine is a non-selective adenosine receptor agonist that can stimulate A_1 receptors in the lungs, potentially causing bronchoconstriction in patients with reactive airway disease (COPD/Asthma). Regadenoson is a selective A_{2A} receptor agonist, which primarily causes coronary vasodilation with much less effect on the bronchial A_1 receptors, making it safer for patients with pulmonary comorbidities.

Question: 1486

During circulatory arrest for aortic arch repair, which temperature range is typically targeted for neuroprotection?

A. Deep hypothermia around 18–20°C
B. Normothermia at 37°C
C. Mild hypothermia around 34–35°C

Answer: A

Explanation: Deep hypothermic circulatory arrest significantly reduces cerebral metabolic rate and allows safe interruption of circulation.

Question: 1487

A 48-year-old woman with severe dilated cardiomyopathy (LVEF 18%) and acute cardiogenic shock is considered for a trans-septal centrifugal device (TandemHeart). Which of the following anatomy-related findings on transesophageal echocardiography (TEE) would be a relative contraindication to TandemHeart placement?

A. Mild left-ventricular hypertrophy with preserved diastolic function.
B. Large patent foramen ovale (PFO) with right-to-left shunting.
C. Moderate non-rheumatic tricuspid regurgitation.

Answer: B

Explanation: A large PFO with right-to-left shunting increases the risk of systemic air embolism and paradoxical emboli during TandemHeart insertion, which requires a trans-septal puncture. TEE is critical to exclude such anatomic substrates before proceeding. Moderate tricuspid regurgitation and LV hypertrophy are not absolute barriers to TandemHeart placement.

Question: 1488

During TEVAR, the anesthesiologist uses "permissive hypertension" ($MAP > 90\ mmHg$) during the deployment and post-deployment period. What is the physiological rationale for this?

A. To reduce the risk of contrast-induced acute kidney injury
B. To increase the diameter of the aorta to ensure the stent expands fully
C. To improve perfusion to the spinal cord through collateral pathways

Answer: C

Explanation: In the setting of aortic coverage (especially when intercostal arteries are

occluded by the stent), the spinal cord becomes dependent on collateral flow from the subclavian and iliac arteries. Maintaining a high systemic MAP ensures that these collateral vessels provide enough pressure to perfuse the spinal cord and prevent ischemia.

Question: 1489

A patient is undergoing an RF ablation for atrial fibrillation under general anesthesia. The anesthesiologist is using a jet ventilator to minimize respiratory motion of the heart. Which of the following is a primary risk or consideration when using high-frequency jet ventilation (HFJV) for this procedure?

A. Difficulty in assessing the depth of anesthesia due to lack of end-tidal CO2
B. Increased risk of pneumothorax due to dynamic hyperinflation and auto-PEEP
C. Marked bradycardia caused by the rapid vibratory stimuli of the atrial wall

Answer: B

Explanation: HFJV is often used in the EP lab to provide a "still heart" by eliminating the large excursions of the diaphragm associated with tidal breathing. However, HFJV can lead to "stacking" of breaths (auto-PEEP) if expiration is not adequate, which can cause barotrauma and pneumothorax. Additionally, because there is no traditional tidal exchange, conventional end-tidal CO2 monitoring is inaccurate, necessitating frequent arterial blood gas sampling or transcutaneous CO2 monitoring to ensure adequate ventilation.

Question: 1490

Coronary perfusion in aortic stenosis primarily occurs during:

A. Diastole

B. Both equally

C. Systole

Answer: A

Explanation: Coronary perfusion is predominantly diastolic.

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