



## **Answers to the AANA Journal Course No. 19 Examination Update for nurse anesthetists**

Here are the correct answers to the examination conducted as part of the *AANA Journal's* 19th course: Update for Nurse Anesthetists. The course consists of a 6-part series, beginning in the April 1999 issue and concluding in the February 2000 issue. The actual examination, which is reprinted here in total to provide readers with a convenient reference and an additional learning tool, was initially published in the April 2000 issue.

For those of you who took the examination, we suggest that you compare your recorded answers with our correct answers to see how you scored. We also suggest that you keep the examination and correct answers for future reference and review.

To have successfully completed the course, you must have had 42 out of the 60 questions correct (80%); a total of 6 CE hours will be awarded for this successful completion. By August 31, 2000, notification will be mailed to those who have passed the examination and thus successfully completed the course. Of these individuals, AANA members automatically have their 6 CE credits recorded for them as do individuals with record-keeping contracts through the AANA.

Again, we hope that this 19th *Journal* course has proved to be of value to you.

### **Magnesium homeostasis and deficiency**

1. The primary organ of magnesium regulation is the:
  - ▶ 1. kidney
  - 2. small intestine
  - 3. thyroid
  - 4. pancreas
2. The majority of magnesium in the body is found in:
  - ▶ 1. extracellular fluid
  - ▶ 2. bone
  - 3. intracellular fluid
  - 4. muscle
3. Magnesium infusions will:
  - 1. promote ventricular ectopy
  - 2. have a negative inotropic effect
  - 3. increase systemic vascular resistance
  - ▶ 4. decrease mean arterial and pulmonary artery pressure
4. Reducing available magnesium in smooth muscle potentiates the constrictive action of:
  - 1. potassium
  - 2. norepinephrine
  - 3. serotonin
  - ▶ 4. all of the above
5. Causes of magnesium deficiency include:
  - 1. extensive colon resection
  - ▶ 2. administration of loop diuretics
  - 3. chronic obesity
  - 4. multiple long bone fractures
6. Plasma magnesium declines may occur during normal gestation secondary to:
  - 1. increased skeletal muscle mass
  - 2. decreased plasma protein binding
  - 3. decreased concentration of aldosterone
  - ▶ 4. increased red cell mass and reduced renal absorption of magnesium
7. Magnesium administration will result in:
  - 1. decreased sinus node recovery time
  - ▶ 2. increased AV node refractory period
  - 3. decreased QRS duration
  - 4. increase after repolarizations
8. For patients with variant angina or coronary artery disease, magnesium supplementation may:
  - 1. increase exercise induced angina
  - ▶ 2. decrease coronary artery spasm
  - 3. increase pulmonary vascular resistance
  - 4. decrease cardiac output
9. Magnesium deficiency will result in:
  - 1. prolonged cardiac action potential
  - 2. spontaneous cardiac depolarizations
  - 3. potassium wasting
  - ▶ 4. all of the above
10. Magnesium:
  - ▶ 1. competes for calcium binding sites in vascular smooth muscle
  - 2. is an anion
  - 3. does not serve as a cofactor
  - 4. plays no role in deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) synthesis

**Accelerated detoxification from opioid addiction under anesthesia: The Midas touch or the emperor's new clothes?**

11. Which are the dominant receptor sites for opioid action?
- ▶ 1. mu
  - 2. kappa
  - 3. alpha
  - 4. delta
12. Which of the following is used as a central alpha agonist to attenuate the sympathetic response to abrupt withdrawal:
- 1. naloxone
  - 2. naltrexone
  - ▶ 3. clonidine
  - 4. fentanyl
13. Which of the following is a sign normally seen during withdrawal from opioids?
- 1. grand mal seizures
  - 2. alterations in consciousness
  - 3. respiratory depression
  - ▶ 4. profuse sweating
14. Which opioid is used in traditional assisted opioid withdrawal?
- 1. heroin
  - ▶ 2. methadone
  - 3. morphine
  - 4. fentanyl
15. Which drug is used as a long-term prevention of relapse?
- 1. clonidine
  - ▶ 2. naltrexone
  - 3. naloxone
  - 4. propranolol
16. What pharmacologic agent is utilized to precipitate acute opioid withdrawal under anesthesia during the rapid detoxification process?
- 1. naltrexone
  - ▶ 2. naloxone
  - 3. methadone
  - 4. propofol
17. Which of the following is a characteristic of the addictive state?
- 1. drug limits personal or work schedule
  - 2. lack of success in attempts to reduce use of the drug

- 3. tolerance to the drug
  - ▶ 4. all of the above
18. Which of the following drugs used as an adjunct in opioid withdrawal has the potential complication of respiratory depression?
- ▶ 1. levo-alpha-acetylmethadol (LAAM)
  - 2. clonidine
  - 3. ondansetron
  - 4. somatostatin
19. Which of the following is not an opioid?
- 1. heroin
  - 2. morphine
  - 3. fentanyl
  - ▶ 4. psilocybin
20. Which of the following is mediated by the mu receptors?
- ▶ 1. physical dependence
  - 2. inhibition of antidiuretic hormone
  - 3. hypertonia
  - 4. vagal tone

**Anesthetic considerations for minimally invasive direct vision coronary artery bypass grafting**

21. The key elements that differentiate the minimally invasive direct vision coronary artery bypass (MID-CAB) procedure from conventional coronary artery bypass grafting (CABG) surgery include which of the following?
- 1. the procedure is performed while the heart is beating and mechanical stabilizers are used to stabilize the heart during grafting
  - 2. a preconditioning test is performed by the surgeon to assess ventricular dysfunction and ischemia
  - 3. cardiopulmonary bypass is initiated only if the patient's condition deteriorates
  - ▶ 4. all of the above
22. The MIDCAB procedure's benefits include:
- 1. the elimination of cardiopulmonary bypass
  - 2. smaller, more aesthetic incision
  - 3. reduction in perioperative morbidity and earlier hospital discharge
  - ▶ 4. all of the above
23. The MIDCAB selection criteria include:
- ▶ 1. high-risk patient unable to tolerate cardiopulmonary bypass
  - 2. decompensated heart failure

3. inability to tolerate one-lung ventilation
4. aortoiliac disease

24. The MIDCAB procedure's exclusion criteria include:

1. renal disease
- ▶ 2. aortic valvular insufficiency
3. diabetes
4. double vessel disease

25. Anesthetic maintenance should provide for maximal coronary artery perfusion while minimizing the hemodynamic effects of painful stimulation that includes all of the following except:

1. aortic rib disarticulation
- ▶ 2. clamping
3. excision of the pericardium
4. sternal incision

26. Temporary slowing of the heart during surgical anastomosis is best achieved by:

- ▶ 1. esmolol bolus or infusion at 100 to 300 µg/kg per minute
2. norepinephrine infusion
3. sodium nitroprusside infusion
4. glycopyrrolate infusion

27. Ischemia during the performance of the vessel anastomosis by the surgeon is clearly evidenced by which of the following:

1. ST elevation
2. increases in pulmonary artery pressure
3. ventricular wall motion abnormalities
- ▶ 4. all of the above

28. What is the most sensitive determinant of ischemia?

1. ST changes of greater than or equal to 1 mm
2. change in PaO<sub>2</sub>
3. decrease in pulmonary artery diastolic pressures
- ▶ 4. transesophageal echocardiogram

29. Appropriate choices for postoperative analgesia include:

1. thoracic epidurals
2. intercostal nerve blocks
3. opioids or nonsteroidal anti-inflammatory medications
- ▶ 4. all of the above

30. Which of the following describes the postoperative course for a patient following a MIDCAB?

- ▶ 1. large postoperative diuresis
- ▶ 2. early extubation and early mobilization

3. intensive care unit stay of 2 to 3 days
4. discharge home within 5 to 7 days

### Anesthesia-related noncardiogenic pulmonary edema: A literature review

31. All the following can result in pulmonary edema except:

1. increased pulmonary capillary pressure
2. decreased plasma colloid osmotic pressure
- ▶ 3. increased interstitial hydrostatic pressure
4. increased pulmonary capillary permeability

32. Negative pressure pulmonary edema can result from:

1. positive end-expiratory pressure (PEEP)
- ▶ 2. a Müller maneuver, by producing markedly negative intrathoracic pressure
3. a Valsalva maneuver
4. excessive use of a diuretic

33. Which of the following would more closely simulate a closed glottis?

- ▶ 1. strong inspiratory effort while biting down forcefully on the endotracheal tube
2. positive pressure ventilation during extubation
3. a forceful cough upon extubation
4. breath-holding during emergence

34. The estimated incidence of noncardiogenic pulmonary edema after upper airway obstruction is:

1. 15% in children and 5% in adults
2. 7% in children and 3% in adults
3. 10% in children 8% in adults
- ▶ 4. 12% in children and 11% in adults

35. Cardiac effects associated with sustained negative intrathoracic pressure include all the following except:

- ▶ 1. significant increase in heart rate
2. significant decrease in ejection fraction
3. increased left ventricular transmural pressure
4. 6% decrease in blood pressure

36. Ventricular interdependence refers to:

1. loss of left ventricular compliance
2. alteration in pulmonary microvascular pressures
- ▶ 3. the direct influence of mechanical events occurring within 1 ventricle exerted upon the other ventricle
4. the tremendous venous return to the right ventricle during significant negative intrathoracic pressure

37. Pharmacologic agents that have been reported to produce noncardiogenic pulmonary edema are:
1. butorphanol
  2. buprenorphine
  - ▶ 3. nalmeferne and naloxone
  4. furosemide
38. Disease states associated with noncardiogenic pulmonary edema include:
1. sepsis
  2. oxygen toxicity
  3. aspiration of gastric contents
  - ▶ 4. all the above
39. Methods of treatment for noncardiogenic pulmonary edema after upper airway obstruction may include:
1. supplemental oxygen only
  2. paralysis
  3. intubation and ventilation
  - ▶ 4. all the above
40. The patient suspected of experiencing laryngospasm should remain in the postanesthesia care unit for:
1. only an extra 30 minutes
  - ▶ 2. 2 to 12 hours
  3. 1 to 2 hours
  4. about 1 hour

**Utilizing the Ohmeda draw-over vaporizer in the operating room**

41. The first documented use of the draw-over anesthesia system occurred in which decade?
1. 1910s
  2. 1920s
  - ▶ 3. 1930s
  4. 1940s
42. The universal portable anesthesia complete (UPAC) vaporizer system does not have the following component in the field configuration:
- ▶ 1. tidal volume interface
  2. self-inflating bag
  3. oxygen inlet nipple
  4. agent refill port
43. Which of the following anesthesia agents was the UPAC primarily designed for?
- ▶ 1. isoflurane or halothane
  2. methoxyflurane
  3. sevoflurane
  4. desflurane
44. What is the approximate rate of consumption of isoflurane if the vaporizer is set at 1.75% with a flow rate of 6 L/min total throughput gas flow rate?
1. 27 mL/h
  - ▶ 2. 31.5 mL/h
  3. 34.5 mL/h
  4. 36 mL/h
45. Which of the following combinations is not recommended for the UPAC vaporizer system?
1. facemask with spontaneous respirations
  2. endotracheal tube with manually assisted respirations
  3. laryngeal mask airways with manually controlled respirations
  - ▶ 4. endotracheal tube with ventilator-controlled respirations
46. According to the article, what is the optimal operating temperature for the UPAC vaporizer?
1. 5 to 15°C
  2. 10 to 20°C
  - ▶ 3. 12 to 35°C
  4. 15 to 50°C
47. Which of the following modifications was *not* made, according to the article, to utilize the UPAC in the operating room?
- ▶ 1. supplemental oxygen or 18-inch oxygen reservoir tubing
  2. peak inspiratory pressure gauge or in-line oxygen sensor
  3. end-tidal carbon dioxide monitor or scavenger hose to evacuation system
  4. tidal volume gauge or mass spectrometer
48. Which of the following characteristics is unique to the UPAC vaporizer that the TEC-5 Ohmeda vaporizer does not incorporate?
1. nonbreathing capacity
  - ▶ 2. incorporates nonreturn valve into vaporizer
  3. can be used with nitrous oxide
  4. has a safety interlock mechanism
49. Common technical modifications to the UPAC vaporizer to increase oxygen concentration include all except:
1. using an oxygen concentrator
  2. extending the oxygen reservoir tubing
  - ▶ 3. using higher flows of room air
  4. supplementing with oxygen from a compressed gas source

50. Comparing the UPAC and TEC-5 vaporizers, select the true statement:
1. the UPAC is agent specific
  - ▶ 2. the UPAC holds about 85 mL of liquid agent
  3. the TEC-5 cannot be used with nitrous oxide
  4. the TEC-5 does not have a safety interlock mechanism

### Anesthesia for the ruptured globe

51. The normal range for intraocular pressure (IOP) is:
1. 1 to 2 mm Hg
  2. 5 to 8 mm Hg
  - ▶ 3. 11 to 21 mm Hg
  4. 25 to 34 mm Hg

52. All of the following statements are true of Forderstruktur ocular fibers except:
1. they have multiple nerve endings called "en grappe"
  2. they contract more vigorously and for a greater duration than seen with Fibrillenstruktur ocular fibers
  - ▶ 3. they have a refined and well-developed post-junctional apparatus
  4. they are less dominant than Fibrillenstruktur ocular fibers

53. Which of the following statements most accurately depicts the relationship of endotracheal intubation and succinylcholine administration with IOP?
- ▶ 1. the stress of endotracheal intubation increases IOP to a greater extent than the administration of succinylcholine
  2. endotracheal intubation attenuates the rise in IOP associated with succinylcholine administration
  3. endotracheal intubation preceded by succinylcholine administration prolongs the duration of elevation of IOP
  4. endotracheal intubation produces a similar rise in IOP as seen with succinylcholine administration

54. The primary mechanism regulating IOP is:
- ▶ 1. the balance between the secretion and resorption of aqueous humor
  2. vascular resistance of the choroid plexus
  3. sodium content of the aqueous humor
  4. extraocular muscle tone

55. Constricted pupils:
1. narrow the spaces of Fontana, thereby increasing IOP

- ▶ 2. open the spaces of Fontana, thereby decreasing IOP
3. narrow the spaces of Fontana, thereby decreasing IOP
4. open the spaces of Fontana, thereby increasing IOP

56. Succinylcholine does not increase IOP:
1. if a small dose of a nondepolarizing muscle relaxant is given prior to the administration of succinylcholine
  2. if a small "self-taming" dose of succinylcholine is used before the intubating dose is given
  3. if an adequate dose of succinylcholine is used (at least 1.5 mg/kg)
  - ▶ 4. this is false; no method has been proven to prevent the rise in IOP

57. Anesthetic induction agents produce dose-related decreases in IOP with the possible exceptions of:
1. propofol and nitrous oxide
  2. thiopental and halothane
  - ▶ 3. etomidate and ketamine
  4. propofol and thiopental

58. Nondepolarizing muscle relaxants:
1. have no effect on IOP
  2. increase IOP by producing pupillary dilation
  - ▶ 3. decrease IOP by relaxing the extraocular muscles
  4. none of the above

59. Select the true statement regarding induction of anesthesia with thiopental or propofol in the patient with an open eye injury:
- ▶ 1. either drug, used alone, will not always prevent an increase in IOP
  2. 1 to 2 mg/kg of thiopental effectively prevents an increase in IOP
  3. 0.5 to 1 mg/kg of propofol effectively prevents an increase in IOP
  4. 1 mg/kg of succinylcholine and 1 mg/kg of thiopental always prevents an increase in IOP

60. Select the true statement regarding alpha<sub>2</sub> agonists, laryngoscopy, and IOP:
1. antagonizing postsynaptic alpha<sub>2</sub> receptors depress sympathetic activity
  - ▶ 2. oral clonidine, 90-120 minutes prior to induction, may prevent increased IOP
  3. clonidine, given orally, peaks in about 20 minutes
  4. dexmedetomidine cannot be given intravenously