Here are the correct answers to the examination conducted as part of the AANA Journal’s 30th course: Update for Nurse Anesthetists. The course consists of a 6-part series, beginning in the April 2010 issue and concluding in the February 2011 issue. The examination, which is reprinted here in total to provide readers with a convenient reference and an additional learning tool, was published in the April 2011 issue and on the AANA website.

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 1, 2010, 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.

We hope this 30th Journal course has been of value to you.

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Anesthesia Case Management for Thyroidectomy

1. Triiodothyronine is _____ times more metabolically active than thyroxine.
   1. 6
   2. 8
   ▶ 3. 10
   4. 12

2. An important step in synthesis of thyroid hormone occurs when iodine is attached to which amino acid?
   1. alanine
   ▶ 2. tyrosine
   3. luceine
   4. valine

3. The antithyroid hormone agent that is preferred because of ease of dosing and rare major side effects is:
   1. propylthiouracil
   ▶ 2. methimazole
   3. Lugol solution
   4. propranolol

4. Antithyroid drugs should be given preoperatively:
   1. until 2 weeks before surgery
   2. until a euthyroid state is achieved
   3. until iodine can be administered
   ▶ 4. up to and including the morning of surgery

5. The majority of thyrotoxicosis that is associated with hyperthyroidism is caused by:
   ▶ 1. Graves disease
   2. Addison disease
   3. Cushing disease
   4. myasthenia gravis

6. The effects of unilateral recurrent laryngeal nerve injury includes:
   1. respiratory distress
   2. aphonina
   ▶ 3. hoarseness
   4. stridor

7. The nerve integrity monitor (NIM) endotracheal tube (Medtronic Xomed, Jacksonville, Florida) monitors the function of the ________ nerve.
   1. glossopharyngeal
   2. vagus
   ▶ 3. recurrent laryngeal
   4. superior laryngeal

8. Which induction agent has antithyroid effects?
   1. propofol
   ▶ 2. thiopental
   3. ketamine
   4. etomidate

9. Management of thyroid storm includes the administration of:
   1. α₁ agonists
   ▶ 2. calcium chloride
   3. dantrolene
   ▶ 4. β-adrenergic antagonists

10. Which is a sign/symptom of hypocalcemia?
    1. shortened Q-T on the electrocardiogram
    2. voice hoarseness
    ▶ 3. paresthesias of the extremities
    4. somnolence

Cystic Fibrosis: A Systems Review

11. Which is the primary ion channel affected by the cystic fibrosis transmembrane conductance regulator (CFTR) gene?
    1. calcium ion channels
    2. sodium ion channels
    ▶ 3. potassium ion channels
    4. chloride ion channels
12. What is the most appropriate description of the pathophysiology in the respiratory system in a patient with cystic fibrosis (CF)?
   1. muscles surrounding the airways become tight
   2. disruption in the connective tissue
   3. impaired mucociliary action due to thick secretions
   4. diffuse inflammation of lung parenchyma

13. If coagulopathy is present in a patient with CF, what is the most likely etiology?
   1. insufficient pancreatic enzymes
   2. deficient vitamins A, E, and D
   3. synthesis of vitamin K-dependent coagulation may be impeded
   4. warfarin therapy

14. Which organ system is not primarily affected by CF?
   1. renal
   2. reproductive
   3. hepatobiliary
   4. pulmonary

15. Because of the potential for airway hyperreactivity in the patient with CF, which of the following should be avoided?
   1. morphine and thioptental
   2. lactated Ringer’s solution
   3. inhalational anesthetic agents
   4. stress dose corticosteroids

16. Which medication is NOT appropriate in the management of a patient with CF?
   1. high dose, preoperative sedatives
   2. tobramycin
   3. salmeterol
   4. Pulmozyme

17. What is the most common procedure requiring anesthesia for the patient with CF?
   1. strabismus repair
   2. nasal polypectomy
   3. mastectomy
   4. craniotomy

18. Which clinical intervention would be most appropriate for managing the airway secretions in the patient with CF?
   1. robinul
   2. desflurane
   3. humidification
   4. ketamine

19. Which of the following preoperative tests may be indicated specifically in ADVANCED cases of CF?
   1. serum electrolytes
   2. electrocardiogram
   3. pulmonary function tests
   4. sputum culture and sensitivity

20. Which is the most common lung pathogen associated with CF?
   1. *Streptococcus pneumonia* and *Klebsiella pneumoniae*
   2. *Klebsiella pneumoniae* and *Haemophilus influenzae*
   3. *Haemophilus influenzae* and *Streptococcus pneumoniae*
   4. *Pseudomonas aeruginosa* and *Staphylococcus aureus*

21. A high frequency ultrasound transducer might be preferred for central venous catheter insertion because:
   1. high frequency ultrasound allows for greater penetration deep within the tissue
   2. high frequency ultrasound is attenuated less than lower frequency ultrasound
   3. high frequency ultrasound provides greater resolution at shallow depths
   4. high frequency ultrasound has better resolution in the Fraunhofer zone

22. Which transducer would provide the best image when performing an interscalene block?
   1. a 4 MHz transducer
   2. a 7 MHz transducer
   3. a 2 MHz transducer
   4. a 20 kHz transducer

23. Doppler ultrasound can be used to:
   1. create a B-mode image of anatomical structures
   2. detect and measure blood flow
   3. differentiate the propagation velocities of bone and muscle
   4. determine electrical resistance in nerve tissue

24. The central premise of the Doppler effect is that a change in frequency occurs when:
   1. either the source or detector is moving in relation to the other
   2. both the source and detector are both moving in the same direction
   3. the transmitting frequency is equal to the receiving frequency
   4. the angle between the source and detector is 90°

25. Scattering of ultrasound waves is seen primarily:
   1. when there is minimal difference between the acoustic impedances of 2 adjacent tissues
   2. when there is significant difference between the acoustic impedances of 2 adjacent tissues
   3. when an ultrasound beam strikes the interface of 2 tissues with different acoustic impedances at an oblique angle
➤ 4. when the ultrasound beam is larger than the object it strikes

26. Attenuation is highest in:
➤ 1. muscle
2. blood
3. fluid-filled cysts
4. low frequency ultrasound

27. Large, smooth surfaces, such as a block needle, create what type of reflection?
➤ 1. diffuse reflection
2. specular reflection
3. refraction
4. scattering

28. Blood vessels may appear as dark circular images on a B-mode image because:
1. sound strikes the boundary of tissues at an oblique angle, they do not return directly to the transducer
2. the majority of sound reflects back to the transducer secondary to the large impedance between 2 tissues
3. sound must travel through multiple layers, the strength of the wave is diminished such that an image cannot be generated
➤ 4. the ultrasound beam is larger than the blood cells within the vessel, causing a diffuse, uniform wave to be reflected back, resulting in a black image

29. The speed at which sound travels through a medium is:
➤ 1. propagation velocity
2. pulse-echo
3. refraction
4. specular reflection

30. When an ultrasound image is not properly oriented during central line placement, movements of the needle during insertion:
1. will occur in the same direction on the image as intended by the anesthetist
➤ 2. will occur in the opposite direction (mirror-image) on the image as intended by the anesthetist
3. will not be affected by transducer orientation
4. can be predicted based on the patient’s anatomical position

32. Use of a laryngeal mask airway is an excellent approach for procedures performed:
1. via open thoracotomy
2. involving tracheal resection
➤ 3. via a flexible fiberoptic bronchoscope
4. with concomitant one-lung ventilation

33. Although there is mixed opinion on the use of muscle relaxants in patients undergoing stent placement, a notable advantage of their use is to:
➤ 1. inhibit the coughing associated with instrumentation of the airway
2. protect the airway by minimizing the risk of aspiration
3. guarantee an easy intubation in all cases
4. relax timorous tissue, thus providing easier ventilation

34. Tumors impinging on the airway may be treated with argon plasma coagulation or laser techniques demanding:
1. careful consideration regarding the concentration of oxygen to be used
2. excellent preoperative discussion between the anesthetist and pulmonologist
3. thoughtful planning to minimize the risk for an intraoperative fire
➤ 4. all the above

35. During rigid tracheoscopy:
1. ventilation is impossible with long, mandated periods of apnea
➤ 2. ventilation is accomplished through the side port with a jet ventilator
3. mechanical ventilation with tidal volumes at least 3 times normal must be used
4. normal, large tidal volume, spontaneous ventilation is used

36. In caring for patients with tracheomalacia, a major concern is:
1. hemoptysis
2. coagulopathy
➤ 3. complete tracheal collapse
4. hypocarbia

37. The notion of the tumor producing a “ball-valve” effect refers to:
1. air trapping due to air entering the lungs but unable to exit during exhalation
2. total obstruction of the airway with no movement in or out of the lungs
3. a small Venturi-like effect in the airway
4. a functional mechanical obstruction similar to that seen with a kinked endotracheal tube

38. Plasma levels of tracheal instillation of local anesthetic are similar to those seen with:
1. epidural local anesthesia
2. spinal anesthesia
3. intravenous administration
4. subcutaneous administration

39. The essential element(s) of a fire include:
   1. heat
   2. fuel
   3. oxygen
   4. all the above

40. A patient, who has previously undergone stent placement, may be admitted to the emergency department with acute ventilatory impairment as a result of:
   1. a hairline fracture of the stent
   2. dislodgement/migration of the stent
   3. immunological rejection
   4. gradual onset of inflammatory response

41. Which of the following best describes the relationship between ventricular assist devices (VADs) and cardiac contractility?
   1. VADs simultaneously increase the contractility while decreasing blood flow
   2. VADs have no effect on the heart’s contractility
   3. VADs decrease the contractility
   4. VADs increase the contractility

42. How do VADs help improve myocardial function?
   1. VADs decrease the size of cardiac myocytes
   2. VADs paradoxically increase the size of cardiac myocytes
   3. VADs enhance the release of oxygen from the hemoglobin molecule
   4. VADs directly block the formation of endogenous catecholamines

43. Which generation of VADs allows the clinician to use noninvasive blood pressure monitoring?
   1. generation 1
   2. generation 2
   3. generation 3
   4. noninvasive blood pressure monitoring cannot be used in all types of ventricular assist devices

44. The recommended method to induce a patient with a VAD for anesthesia is:
   1. inhalation induction
   2. rapid sequence induction
   3. general anesthesia is not recommended, so use regional anesthesia
   4. any way is correct to induce a patient with a VAD

45. You see a patient who is about to undergo a cholecystectomy. This patient has a VAD and an implantable cardioverter-defibrillator (ICD). For surgery, it is best to:
   1. leave the ICD on and place external defibrillator pads on the patient
   2. leave the ICD as no further precautions are needed
   3. turn the ICD off, place external defibrillator pads on the patient
   4. turn the ICD off, no further measures required

46. What type of electrocautery is preferred in patients who are on VADs?
   1. monopolar
   2. bipolar
   3. either monopolar or bipolar will work without complications
   4. never use electrocautery on these patients

47. Pump function of the VAD depends on:
   1. preload
   2. afterload
   3. both preload and afterload
   4. neither, as no blood flows through the pump

48. The drug of choice for a patient with a VAD who is hypotensive is:
   1. vasopressin
   2. norepinephrine
   3. dopamine
   4. epinephrine

49. What is the most common postoperative complication in a patient with a VAD undergoing noncardiac surgery?
   1. infection
   2. VAD dislodgement
   3. bleeding
   4. pneumonia

50. Before semielective surgery on a patient with a VAD, anticoagulation should be:
   1. discontinued
   2. changed to intravenous heparin
   3. kept the same
   4. fully reversed before any procedure

Ventricular Assist Devices and Anesthetic Implications for Noncardiac Procedures

Intraoperative Magnetic Resonance Imaging for Neurosurgical Procedures: Anesthetic Implications

51. The IMRIS Neuro unit is:
   1. similar to a portable magnetic resonance imaging (MRI) machine
   2. does not pose any risk to the patient
   3. is mounted to the ceiling
   4. similar to a conventional, full-scale MRI
52. With the Medtronic Polestar system:
   1. there is a risk with ferrous objects in the operating room
   ➤ 2. can be used with standard operating room equipment and instruments
   3. similar to a conventional, full-scale MRI
   4. stored between a locked, hidden wall

53. Advantages of using IMRI during surgery include all of the following EXCEPT:
   1. precise location of tumor
   2. decreased incidence of returning for additional surgery
   3. diagnosis of a perioperative hemorrhage
   ➤ 4. decreased incidence of cerebral edema

54. Brain tissue may shift within the cranium during surgical procedures resulting in:
   ➤ 1. the surgeon may not always know the precise location of the tumor
   2. the absolute necessity that the head be wedged between 2 pieces of foam
   3. the routine and consistent use of furosemide to shrink brain tissue
   4. the use of mildly induced hyperventilation to gently “swell” the brain against the bony cranium

55. If a ferrous oxygen tank is brought into the IMRI room:
   ➤ 1. it could fly toward the magnet and cause injury
   2. it will not react to the magnet
   3. it must be placed on the 5-G line
   4. it must be placed in front of the 5-G line

56. All ferrous objects should be removed from the patient and staff, including:
   1. pagers
   2. stethoscopes
   3. body piercings
   ➤ 4. all of the above

57. If a patient has a ferrous implant in his hip:
   1. nothing will happen
   ➤ 2. he should not be allowed in the IMRI operating room
   3. his hip should be covered with a lead covering
   4. the reaction with the magnet and the implant could make him become hypothermic

58. If a patient or a staff member has a tattoo, potential dangers include:
   1. swelling at the site of the tattoo
   2. burning at the site of the tattoo
   3. interference with the MRI image
   ➤ 4. all of the above

59. Because of the risk of excessive noise during diagnostic MRI, ear plugs should be:
   1. worn by the patient only
   2. worn by the staff only
   ➤ 3. worn by the patient and the staff
   4. optional at the healthcare worker’s discretion

60. Which one of the following statements is FALSE?
   1. breathing circuit and intravenous tubing extensions should be placed to ensure an adequate distance between the intravenous pump and the MRI unit
   2. MRI-compatible anesthesia equipment should be used in the operating room with IMRI
   ➤ 3. a reinforced endotracheal tube should be used
   4. indwelling urinary catheters with bladder temperature capability cannot be used in the IMRI operating room