

**SCHWARTZ,  
PRINCIPLES OF  
SURGERY:**

**PreTest® Self-Assessment and Review**

Edited by

Seymour I. Schwartz, M.D.

# **SCHWARTZ, PRINCIPLES OF SURGERY:**

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**Seymour I. Schwartz, M.D.**

Professor of Surgery  
University of Rochester  
School of Medicine and Dentistry  
Rochester, New York

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Editorial Supervisor: *Jane Edwards*  
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# List of Contributors

**James T. Adams, M.D.**

Professor of Surgery  
University of Rochester School of  
Medicine and Dentistry  
Rochester, New York

**Elethea H. Caldwell, M.D.**

Associate Professor of Plastic Surgery  
University of Rochester School of  
Medicine and Dentistry  
Rochester, New York

**Robert L. Caldwell, M.D.**

Clinical Assistant Professor of Surgery  
University of Rochester School of  
Medicine and Dentistry  
Director of Surgical Education  
Highland Hospital  
Rochester, New York

**Peter C. Canizaro, M.D.**

Associate Professor of Surgery  
Cornell University Medical College  
New York, New York

**John R. Devanny, M.D.**

Associate Professor of Orthopaedics  
University of Rochester School of  
Medicine and Dentistry  
Rochester, New York

**Richard M. Green, M.D.**

Clinical Assistant Professor of Surgery  
Director of Vascular Laboratory  
University of Rochester School of  
Medicine and Dentistry  
Rochester, New York

**Richard J. Gusberg, M.D.**

Assistant Professor of Surgery  
Yale University School of Medicine  
New Haven, Connecticut

**J. Raymond Hinshaw, M.D.**

Professor of Surgery  
University of Rochester School of  
Medicine and Dentistry  
Chief of Surgery  
Rochester General Hospital  
Rochester, New York

**Joel H. Horovitz, M.D.**

Associate Professor of Surgery  
Cornell University Medical College  
New York, New York

**Raymond J. Ippolito, M.D.**

Associate Professor of Surgery  
Yale University School of Medicine  
New Haven, Connecticut

**Barbara K. Kinder, M.D.**

Assistant Professor of Surgery  
Yale University School of Medicine  
New Haven, Connecticut

**Arnold Luterman, M.D.**

Assistant Professor of Surgery  
Cornell University Medical College  
Assistant Attending Surgeon  
New York Hospital  
New York, New York

**Allyn George May, M.D.**

Professor of Surgery  
University of Rochester School of  
Medicine and Dentistry  
Rochester, New York

**Carl J. May, M.D.**

Chief General Surgery  
Veterans Administration Hospital  
West Haven, Connecticut  
Associate Professor of Surgery  
Yale University School of Medicine  
New Haven, Connecticut

**John H. Morton, M.D.**

Professor of Surgery  
Associate Professor of Health Services  
University of Rochester School of  
Medicine and Dentistry  
Rochester, New York

**George Reading, M.D.**

Associate Professor of Plastic Surgery  
University of Rochester School of  
Medicine and Dentistry  
Rochester, New York

**Scott Stewart, M.D.**

Associate Professor of Surgery  
University of Rochester School of  
Medicine and Dentistry  
Rochester, New York

**William T. Stubenbord, M.D.**

Associate Professor of Surgery  
Cornell University Medical College  
New York, New York

**Thomas F. Sweeney, M.D.**

General and Vascular Surgeon  
Yale-New Haven Medical Center  
New Haven, Connecticut

**Robert S. Weiner, M.D.**

Clinical Professor of Surgery  
University of Rochester School of  
Medicine and Dentistry  
Chief of Cardio-Thoracic Surgery  
Rochester General Hospital  
Rochester, New York

**Michael F. Yarborough, M.D.**

Assistant Professor of Surgery  
Cornell University Medical College  
New York, New York

# Introduction

*Schwartz, Principles of Surgery: PreTest Self-Assessment and Review*\* has been designed to provide physicians with a comprehensive, relevant, and convenient instrument for self-evaluation and review within the broad area of surgery. Although it should be particularly helpful for residents preparing for the American Board of Surgery (ABS) Qualifying, In-Training, and Certifying Examinations, it should also be useful for board-certified surgeons preparing for recertification. Study of this self-assessment and review book should help to (1) identify areas of relative weakness; (2) confirm areas of expertise; (3) assess knowledge of the sciences fundamental to surgery; (4) assess clinical judgment and problem-solving skills; and (5) introduce recent developments in surgery.

This book consists of 600 multiple-choice questions that (1) are representative of the major areas covered in *Principles of Surgery*, ed. 3, by Schwartz et al., and (2) parallel the format and degree of difficulty of the questions on the above-mentioned board exams. Each question is accompanied by an answer, a paragraph-length explanation, and a page reference to *Principles of Surgery*, ed. 3, to a more specialized textbook or current journal article, or to multiple sources. A bibliography listing all the sources used for the questions follows the last chapter. All of this material was prepared by physicians representing the major surgical specialties, including general surgery, under the aegis of the editorial board of *Principles of Surgery*, ed. 3,—Seymour I. Schwartz, M.D., G. Tom Shires, M.D., Frank C. Spencer, M.D., and Edward H. Storer, M.D.

We have assumed that the time available to the reader is limited; as a result, this book can be used profitably a chapter at a time. By allowing no more than one and a half minutes to answer each question, you can simulate the time constraints of the actual board exams. When you finish answering all of the questions in a chapter, spend as much time as necessary verifying answers and carefully reading the accompanying explanations. If after reading the explanations for a given chapter, you feel a need for a more extensive and definitive discussion, consult the specific pages in *Principles of Surgery*, ed. 3, or any of the other references listed.

We have used two basic question types in accordance with the format of the American Board of Surgery In-Training, Qualifying, Certification, and Recertification exams. Considerable editorial time has been spent trying to ensure that each question is clearly stated and discriminates between those physicians who are well-prepared in the subject and those who are less knowledgeable.

For those practicing physicians who wish to participate in a continuing medical education (CME) program, this review book is also part of a CME package, offering a unique combination of study, as well as the opportunity to earn up to 50 Category 1 CME credits. This package includes: (1) this self-assessment and review book and (2) a CME examination—a 175-question, standard board-format, multiple-choice test. As an organization accredited by both the Liaison Committee on Continuing Medical Education and the American Medical Association, the University of Rochester Medical Center, Office of Continuing Professional Education, certifies that successful completion of the CME exam (60 percent correct) meets the criteria for 50 hours of Category 1 CME credit for the Physician's Recognition Award of the American Medical Association. If you do not achieve a passing score, you are still eligible for up to 22 credit hours in Category 5(a), based on hour-for-hour use of the self-assessment and review book, and up to 22 credit hours in Category 5(d), based on hour-for-hour use of

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\*Additional McGraw-Hill/PreTest publications, to accompany *Principles of Surgery*, ed. 3, consisting of:

*Schwartz, Principles of Surgery: PreTest Self-Assessment and Review with CME Examination*—A package that includes (1) this 600 multiple-choice question review book and (2) a 175 multiple-choice question test, successful completion of which meets the criteria for up to 50 hours of Category 1 CME credit.

the CME examination. After studying *Principles of Surgery*, ed. 3, or other appropriate readings, and this self-assessment and review book, a participant should be prepared to pass the examination.

This book is a teaching device that provides readers with the opportunity to evaluate and update their clinical expertise, their ability to interpret data, and their ability to diagnose and solve clinical problems. We hope that you will find this book interesting, relevant, and challenging. The author, as well as the PreTest staff, would be very happy to receive your comments and suggestions.

# **Basic Considerations**



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Seymour I. Schwartz, M.D.

# Anesthesiology; Physiologic Principles; Nutritional Management; and Fluid and Electrolytes

**DIRECTIONS:** Each question below contains five suggested answers. Choose the **one best** response to each question.

## Questions 1-2

A 64-year-old previously healthy man is admitted to a hospital because of a closed head injury and ruptured spleen following an automobile accident. During the first four days of hospitalization, following laparotomy and splenectomy, he receives 5% dextrose in  $\frac{1}{4}$ -normal saline solution at a rate of 125 ml/hour. Recorded daily fluid outputs include 450 to 600 ml of nasogastric drainage and 700 to 1,000 ml of urine. The patient is somnolent but easily aroused until the morning of the fifth hospital day when he is noted to be in deep coma; by the afternoon, he begins having seizures. The following laboratory data are obtained:

Serum electrolytes (mEq/l):  $\text{Na}^+$  130;  $\text{K}^+$  1.9;  
 $\text{Cl}^-$  96;  $\text{HCO}_3^-$  19

Sérum osmolality: 260 mOsm/l

Urine electrolytes (mEq/l):  $\text{Na}^+$  61;  $\text{K}^+$  18

1. What is the most likely cause of the patient's seizures?

- (A) Hypokalemia
- (B) Hyponatremia
- (C) Hypocalcemia
- (D) Hypomagnesemia
- (E) Intracranial bleeding

2. Which of the following statements about diagnosis or treatment of this patient's condition is true?

- (A) His hyponatremia may be secondary to an elevated blood glucose level
- (B) His hypokalemia is probably secondary to metabolic acidosis
- (C) An emergency carotid arteriogram should be obtained as the first step in his management
- (D) An intravenous infusion of 20 ml of 50% magnesium sulfate should be given over a four-hour period as the first step in his management
- (E) A small quantity of hypertonic saline solution should be given as the first step in his management

3. The diagnosis of pulmonary embolus can be confirmed by the hemodynamic finding of

- (A) an elevated central venous pressure (CVP) with arterial hypotension
- (B) an elevated CVP with an elevated pulmonary artery diastolic pressure
- (C) an elevated pulmonary artery diastolic pressure with a normal pulmonary capillary wedge pressure
- (D) an elevated pulmonary artery diastolic pressure with an elevated pulmonary capillary wedge pressure
- (E) an elevated pulmonary artery wedge pressure with a normal CVP

4. All of the following statements concerning ketamine are true EXCEPT

- (A) it has a milder side effect in children than adults
- (B) it increases intracranial pressure
- (C) it relaxes the muscles of the upper airway
- (D) it tends to increase the heart rate
- (E) it is contraindicated for surgery of the mouth or nose

5. The proper positioning of a central venous pressure catheter is best verified by

- (A) observing movement of the fluid column
- (B) obtaining chest x-rays
- (C) measuring the length of catheter inserted
- (D) observing an oscilloscopic tracing
- (E) obtaining a clinically believable result

6. Three days following surgery for gastric carcinoma, a 50-year-old alcoholic man exhibits delirium, muscle tremors, and hyperactive tendon reflexes. Magnesium deficiency is suspected. Which of the following statements regarding this situation is NOT true?

- (A) A decision to administer magnesium should be based on the serum magnesium level
- (B) Adequate cellular replacement of magnesium will require one to three weeks
- (C) A concomitant calcium deficiency should be suspected
- (D) Calcium is a specific antagonist of the myocardial effects of magnesium
- (E) Electrocardiographic changes consistent with hypermagnesemia include a widened QRS complex and peaked T waves

7. The pulse pressure (the difference between systolic and diastolic blood pressure) can be used as an index of

- (A) peripheral vascular resistance
- (B) cardiac output
- (C) left atrial filling pressure
- (D) stroke volume
- (E) blood volume

### Questions 8-9

Ten days following institution of parenteral hyperalimentation in a 26-year-old man who has granulomatous colitis, the central venous catheter is removed from his left subclavian vein, and the entry site of the catheter is covered with a gauze dressing. Several minutes later, he becomes agitated and complains of severe chest pain. Examination reveals hypotension, tachypnea, and a loud "mill wheel" murmur over the precordium.

8. The most likely diagnosis is

- (A) rupture of cardiac papillary muscle
- (B) air embolism
- (C) arteriovenous fistula
- (D) pulmonary embolism
- (E) hemopneumothorax

9. Immediate treatment of this patient should include

- (A) high-flow oxygen via face mask and metaraminol by intravenous drip
- (B) insertion of anterior and posterior chest tubes
- (C) placement on his left side with his head down and feet elevated
- (D) endotracheal intubation and intravenous infusion of dopamine
- (E) none of the above

10. In a postoperative patient who has developed bibasilar rales, hemodynamic assessment shows that the central venous pressure is 15 cm H<sub>2</sub>O, and the pulmonary capillary wedge pressure is 6 mm Hg. These results indicate that

- (A) cardiac output is elevated
- (B) peripheral vascular resistance is low
- (C) pulmonary capillary permeability is increased
- (D) hydrostatic pressure is elevated
- (E) a potent diuretic should be administered

11. The most common complication of the use of a pulmonary artery catheter is

- (A) pulmonary artery thrombosis
- (B) aseptic, right-sided endocarditis
- (C) perforation of the pulmonary artery
- (D) ischemic pulmonary infarction
- (E) cardiac arrhythmia

12. An elderly diabetic patient who has acute cholecystitis is found to have a serum sodium level of 122 mEq/l and a blood glucose of 600 mg/100 ml. After correcting the glucose concentration to 100 mg/100 ml with insulin, the expected serum sodium concentration would be approximately
- (A) 116 mEq/l
  - (B) 122 mEq/l
  - (C) 132 mEq/l
  - (D) 137 mEq/l
  - (E) 148 mEq/l
13. Cardiac output determined by the indicator-dilution technique may be miscalculated in the presence of
- (A) ventricular septal defect
  - (B) hypervolemia
  - (C) acidosis
  - (D) chronic obstructive pulmonary disease
  - (E) pulmonary venous admixture
14. Which of the following constitutes a **contraindication** to the insertion of a radial artery catheter for monitoring?
- (A) Arterial hypotension
  - (B) Arteriosclerosis
  - (C) Peripheral vasoconstriction
  - (D) Nonpatency of the ulnar artery
  - (E) The necessity of placement in a dominant hand

**DIRECTIONS:** Each question below contains five suggested answers. For each of the five alternatives of each item, you are to respond either YES (Y) or NO (N). In a given item all, some, or none of the alternatives may be correct.

### Questions 15-16

A 32-year-old male construction worker who has suffered a closed head injury and abdominal trauma in a fall is hospitalized and undergoes laparotomy, splenectomy, and repair of a large liver laceration. He is intermittently hypotensive during surgery, and blood pressure is unobtainable on three occasions. Estimated blood loss is approximately 6,500 ml, and replacement fluids include 3,000 ml of lactated Ringer's solution and 6,000 ml of whole blood. In the recovery room, the patient is awake and has stable vital signs and a urine output of 50 to 70 ml/hour. Blood urea nitrogen and serum electrolytes are normal. He is started on dextrose in ½-normal saline at 125 ml/hour for maintenance fluid. His urine output increases progressively, and by the third postoperative day, it averages 140 ml/hour with a specific gravity of 1.008.

15. Which of the following conditions might explain the patient's elevated urine output?

- (A) Diabetes insipidus
- (B) Hyperglycemia
- (C) Inappropriate antidiuretic hormone secretion
- (D) Nonoliguric renal failure
- (E) Excessive fluid administration

16. Although an attempt is made to reduce the patient's urine output by fluid restriction, on the fifth day of this management, urine volume remains unchanged and the patient is found to have orthostatic hypotension, decreased skin turgor, dry mucous membranes, and maniacal behavior. These findings can be explained by which of the following abnormalities?

- (A) Adrenal insufficiency
- (B) Hypernatremia
- (C) Hyperkalemia
- (D) Extracellular fluid volume deficit
- (E) Hypoglycemia

17. Which of the following statements concerning halothane are true?

- (A) It is associated with a rapid onset of action and emergence
- (B) It is effective when administered with 98 to 99 percent oxygen
- (C) It has a slight vasodilator effect
- (D) It increases the sensitivity of ventricular pacemakers to arrhythmogenic stimuli
- (E) It increases the sensitivity of the respiratory center to carbon dioxide

18. Which of the following acid-base disorders are consistent with arterial pH 7.34,  $P_{CO_2}$  65 mm Hg, and bicarbonate 34 mEq/l ?

- (A) Well-compensated respiratory acidosis
- (B) Partially compensated metabolic acidosis
- (C) Uncompensated respiratory acidosis
- (D) Primary metabolic alkalosis complicating acute respiratory acidosis
- (E) Primary metabolic acidosis complicating chronic respiratory alkalosis

19. The possibility that halothane may be hepatotoxic has received much attention. Which of the following statements regarding this issue are true?

- (A) "Halothane hepatitis" involves the development of jaundice two to five days after anesthesia, preceded by a high fever and eosinophilia
- (B) "Halothane-hepatitis" is believed to occur more frequently following multiple exposures to halothane than after a single exposure
- (C) "Halothane hepatitis" is now known to be a sensitization reaction
- (D) The risk of hepatic injury from halothane is increased in the presence of preexisting liver disease
- (E) Halothane does not produce predictable dose-dependent hepatic injury like a true hepatotoxin

20. Which of the following findings may be associated with a metabolic alkalosis?
- (A) A bicarbonate/carbonic acid ratio greater than 20:1
  - (B) Excessive renal loss of potassium
  - (C) Excessive ingestion of aspirin
  - (D) Pancreatic fistula
  - (E) Compensatory hypoventilation
21. Which of the following statements pertaining to inhalation anesthetics are true?
- (A) They all share the advantage of controllable reversibility
  - (B) Their concentrations in blood or brain determine their anesthetic effect
  - (C) Their dose-response curves are parallel
  - (D) Electroencephalography is useful in clinically judging the depth of anesthesia they produce
  - (E) Respiratory rate and skin color are good clinical indicators of the degree of hypoxia or hypercapnia they produce
22. Which of the following substances administered intravenously will actually lower the potassium level in a patient who has acute hyperkalemia?
- (A) Sodium lactate
  - (B) Citric acid
  - (C) Calcium gluconate
  - (D) Dextrose
  - (E) Sodium chloride
23. Malignant pyrexia associated with the use of succinylcholine is a condition that
- (A) involves a genetically transmitted susceptibility
  - (B) most frequently affects otherwise healthy young men
  - (C) can be diagnosed in advance only by muscle biopsy and metabolic studies
  - (D) often is characterized by muscular rigidity
  - (E) involves a rapid temperature rise to 41.1°C (106°F) or higher, as well as neurologic damage and cardiovascular collapse
24. Which of the following statements about intravenous maintenance fluids during the post-operative period are correct?
- (A) Urine output for the preceding 24-hour period should be replaced with 5% dextrose in water on a volume-for-volume basis
  - (B) Nasogastric drainage should be replaced with normal saline solution
  - (C) Approximately 20 mEq of potassium chloride should be given for each liter of nasogastric drainage
  - (D) A progressive fall in serum sodium is treated best by fluid restriction
  - (E) Most patients should receive at least 100 g of glucose daily
25. Which of the following statements concerning local anesthesia are true?
- (A) Twitching and convulsions may occur as a reaction and should be treated with intravenous diazepam
  - (B) Sudden hypotension may occur as a reaction and should be treated with placement in the head-down position and vasopressors
  - (C) Systemic toxic reactions are usually the result of allergy or hypersensitivity
  - (D) The maximum safe dosage of lidocaine for a healthy, 70-kilogram adult is 750 mg in a 20-minute period
  - (E) The duration of action varies among different agents used in the procedure
26. Symptomatic hypercalcemia (serum calcium greater than 15 mg/100 ml) in a patient who has metastatic breast carcinoma or hyperparathyroidism is a medical emergency. Which of the following measures will effect a reduction in serum calcium within 24 hours?
- (A) Intravenous mithramycin
  - (B) Extracellular fluid volume replacement
  - (C) Parenteral furosemide
  - (D) Intravenous inorganic phosphates
  - (E) Oral or parenteral corticosteroids

27. Which of the following statements regarding mixed venous oxygen saturation are true?

- (A) It varies directly with the cardiac output
- (B) It varies directly with the inspired oxygen concentration
- (C) It is increased in association with hypovolemia
- (D) It decreases before the blood pressure does during shock
- (E) It may decrease with positive end-expiratory pressure

28. Which of the following complications are associated with the use of **both** parenteral hyperalimentation and alimentation through a jejunal tube using elemental diets?

- (A) Hypoglycemia
- (B) Hyperosmolar, nonketotic coma
- (C) Diarrhea
- (D) Glycosuria
- (E) Hyperchloremic metabolic acidosis

29. Which of the following statements concerning spinal anesthesia are true?

- (A) Respiratory function with spinal anesthesia usually remains normal despite high levels of sensory denervation
- (B) Decreased cardiac output during spinal anesthesia almost always is a result of decreased venous return to the right side of the heart
- (C) The sympathetic blockade induced by spinal anesthesia causes reduced arterial pressure because of arterial and arteriolar vasodilatation
- (D) The level of denervation attained by spinal anesthesia is the same for motor and sensory fibers
- (E) Headaches resulting from spinal anesthesia primarily are due to chemical irritation

30. Which of the following conditions may cause a metabolic acidosis characterized by an increased "anion gap?"

- (A) Diarrhea
- (B) Uncontrolled diabetes mellitus
- (C) Ureterosigmoidostomy
- (D) Hemorrhagic shock
- (E) Renal failure

31. Concerning thiopental, which of the following statements are true?

- (A) Its high lipid solubility is associated with the presence of an oxygen atom at the C2 position in the barbituric acid ring
- (B) Its buildup in fatty depots throughout the body is rapid
- (C) The rate at which it crosses the blood-brain barrier is related inversely to its degree of ionization
- (D) It has a direct cardiovascular depressant action and also causes peripheral vasodilatation
- (E) Its depressant effects last longer than those observed with inhalation anesthetics

32. Which of the following patients would be suitable candidates for institution of parenteral hyperalimentation without any delay?

- (A) A 68-year-old woman who has pyloric outlet obstruction, extracellular fluid volume deficit, pH 7.52,  $\text{PCO}_2$  46 mm Hg, and  $\text{HCO}_3^-$  37 mEq/l
- (B) A 46-year-old man awaiting surgery for carcinoma of the distal esophagus who has had a recent 20-pound weight loss
- (C) A newborn infant who has intestinal atresia with 14 cm of normal small bowel
- (D) A 24-year-old woman who has a high small bowel fistula nine days after surgery for abdominal trauma
- (E) A 74-year-old man who is unable to eat because of mental obtundation two weeks after a cerebral vascular accident

33. In relation to the use of narcotics as adjuncts in anesthesia, which of the following statements are true?

- (A) There is no significant difference in the amount of respiratory depression caused by different narcotics if the drugs are administered in equianalgesic dosages
- (B) The duration of action of different narcotics may vary considerably
- (C) Used in conjunction with weak anesthetics, narcotics considerably increase analgesia
- (D) When used intravenously, narcotics should be given in repeated small doses
- (E) Fentanyl (Sublimaze), is the most potent narcotic currently available



34. Which of the following statements regarding the proportion of total body water to body weight are true?

- (A) It remains relatively constant on a daily basis in a healthy individual
- (B) It is higher in obese than in lean individuals
- (C) It decreases progressively with advancing age in adults
- (D) It is higher in newborn infants than in young children
- (E) It is generally higher in women than in men

35. Which of the following statements regarding muscle relaxants are true?

- (A) The mechanism of action of succinylcholine involves depolarization of the motor end plate
- (B) The duration of action of succinylcholine is approximately 30 to 45 minutes
- (C) The mechanism of action of curare involves competition with acetylcholine for the motor end plate
- (D) Only the depolarizing type of neuromuscular block is susceptible to reversal
- (E) The best way to evaluate the degree of neuromuscular block is through electrical stimulation of a peripheral motor nerve

36. Which of the following statements concerning nitrous oxide are true?

- (A) It has a depressant effect on cardiovascular function
- (B) It decreases sympathetic activity
- (C) It produces leukopenia on chronic exposure
- (D) It is odorless and has a high patient acceptance
- (E) It is 30 times more soluble than nitrogen in blood