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THE JOURNAL OF BONE & JOINT SURGERY  
CONTINUING MEDICAL EDUCATION

CME

REVIEW QUESTIONS

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OCTOBER, NOVEMBER, DECEMBER  
2003

## PURPOSE

The purposes of this CME program are:

- To provide the general orthopaedic surgeon with an ability to assess his or her continuing competence in orthopaedics through the acquisition of contemporary scientific information.
- To provide a broad-based review and update of the major subspecialty areas in orthopaedics.
- To make *The Journal* reader aware of new advances in orthopaedic surgical techniques and technology.

## INSTRUCTIONS

In order to benefit most from this educational experience and qualify for Continuing Medical Education credit, please observe the following instructions:

1. Read the learning objectives listed on the Response Form and be certain that they meet your individual learning needs.
2. These CME questions have been derived from the information presented in the October, November, and December issues of the American volume of *The Journal of Bone and Joint Surgery* (Volume 85-A, Numbers 10, 11, and 12). A careful study of each article should yield the best response to each question.
3. Read each question carefully, identify the best answer, and record that answer on the CME Response Form in the back of this document.
4. To receive CME credit, it is absolutely essential that you complete all portions of the attached Response Form and answer each question.
5. In order for the American Academy of Orthopaedic Surgeons to document your participation in the CME activity, Academy Fellows must provide their AAOS membership number in the designated area on the Response Form.
6. In addition to providing the answers to the CME questions, you must complete the examination evaluation questions. These questions are found on the Response Form. The way you answer these evaluation questions will not in any way affect the score that you achieve.
7. All completed answer sheets will be graded, and you will be advised of the results of this examination within four weeks after it is received. In order to qualify for CME credit, a score of more than 50% correct must be achieved on the examination. A charge of \$25 per quarter, or \$95 per year, must be paid at the time that the answer sheet is submitted. **The deadline to submit your answers for grading this set of questions is April 15, 2004.**

1. **Which of the following factors is the most important for achieving stability of a revision proximal ingrowth femoral stem?**
  - A. age of the patient
  - B. bone quality
  - C. fill of the isthmus
  - D. gender of the patient
  - E. titanium-metal substrate
2. **Patients undergoing simultaneous bilateral total knee arthroplasty instead of staged bilateral total knee arthroplasty will have:**
  - A. twice the number of days in intensive care
  - B. twice the rate of wound infections
  - C. a longer hospital stay
  - D. a greater cost of treatment
  - E. a lower mortality rate at thirty days
3. **An advantage of intramedullary nailing of humeral shaft fractures with a locking flexible nail is a decreased prevalence of:**
  - A. nonunion
  - B. radial nerve injury
  - C. elbow pain or dysfunction
  - D. infection
  - E. shoulder pain or dysfunction
4. **Which of the following methods of femoral revision for periprosthetic fracture resulted in the lowest combined rate of subsequent femoral loosening and fracture nonunion?**
  - A. a cemented short-stem femoral component
  - B. a cemented long-stem femoral component
  - C. an uncemented proximally porous-coated monoblock component
  - D. an uncemented extensively porous-coated femoral component
  - E. an allograft-prosthesis composite or tumor prosthesis
5. **The three most common risk factors for secondary osteoporosis found in older women who have sustained fractures are:**
  - A. chronic use of steroid medication, use of anticonvulsant medication, and chronic renal failure
  - B. diabetes, congestive heart failure, and dementia
  - C. hyperthyroidism, hyperparathyroidism, and malnutrition
  - D. hypertension, nephrolithiasis, and osteoarthritis
  - E. cirrhosis, malabsorption, and peptic ulcer disease
6. **Benefits of the extended trochanteric osteotomy in complex primary total hip arthroplasty include all of the following EXCEPT:**
  - A. improved acetabular exposure
  - B. easier hardware removal
  - C. decreased prevalence of dislocation
  - D. correction of femoral deformity
  - E. ease of femoral canal preparation

- 7. Which of the following statements is true with regard to surgical intervention for thoracolumbar fractures?**
- the timing of surgical decompression has been shown to correlate with neurologic recovery
  - surgical decompression is effective in improving neurologic recovery in patients with complete thoracic level burst fractures
  - surgery is recommended in the setting of progressive neurologic deterioration in the presence of substantial objective cord compromise
  - laminectomy alone may result in better neurologic recovery rates than posterior decompression and stabilization
  - posterior indirect reduction of canal compromise is as effective as anterior surgery at two weeks following injury
- 8. Based on studies examining the physiology of injury and subsequent healing of the rotator cuff in a sheep model, the most important factor in predicting an improvement in the force of muscle contraction after a detached tendon is repaired is:**
- the chronicity of the injury
  - the size of the tear
  - the age of the animal
  - the method of tendon repair
  - the animal's diet
- 9. Cotrel-Dubouset instrumentation provides better long-term radiographic outcome than does Harrington instrumentation in adolescent idiopathic scoliosis. Which of the following functional outcomes were better in the Cotrel-Dubouset group than in the Harrington instrumentation group?**
- total score on the Scoliosis Research Society questionnaire
  - occurrence of back pain
  - score on the sit-up test
  - trunk side-bending
  - lumbar flexion
- 10. Indications for transfer of the rectus femoris muscle in children with cerebral palsy include:**
- all patients undergoing lateral hamstring lengthening
  - delayed and diminished peak knee flexion in swing phase
  - patella alta seen on lateral radiographs of the knee
  - rapid, increased knee extension in midstance phase
  - increased hip flexion in terminal stance phase
- 11. Patients undergoing total knee arthroplasty under continuous epidural anesthesia who have not taken exogenous glucocorticoids (e.g., prednisone) before surgery experience the following normal stress response to the intervention:**
- no significant surgical stress response (no increase in the twenty-four-hour urine cortisol-to-creatinine clearance ratio)
  - a mild, transient surgical stress response manifested as a small increase in the twenty-four-hour urine cortisol-to-creatinine clearance ratio, and no other changes
  - a large but transient surgical stress response, with an order-of-magnitude increase in the twenty-four-hour urine cortisol-to-creatinine clearance ratio, which returns to normal by postoperative day 3
  - a large and sustained surgical stress response, with an order-of-magnitude increase in the twenty-four-hour urine cortisol-to-creatinine clearance ratio, which remains significantly elevated over the baseline value on postoperative day 3
  - no increase in the first twenty-four-hour period, but a significant surgical stress response on postoperative day 3
- 12. Following total knee arthroplasty, there is a significant decrease in bone mineral density about the knee. Which of the following statements is true?**
- with resumption of normal activities, the bone mineral density increases to the preoperative level at six months postoperatively
  - alendronate therapy significantly increases bone mineral density, compared with that in controls, at six months postoperatively
  - the site of major loss of bone mineral density is in the distal part of the femur
  - changes in bone mineral density are most pronounced at twelve months
  - bone mineral density is most reduced in patients undergoing cementless total knee arthroplasty
- 13. Among individuals who are at least fifty years old, which of the following fractures has been shown to increase the relative risk of hip fracture significantly more in men than in women?**
- spine (vertebral body) fracture
  - elbow (olecranon) fracture
  - wrist (distal radial [Colles]) fracture
  - ankle (distal tibial and fibular) fracture
  - calcaneal (os calcis) fracture
- 14. Which of the following rotator cuff tears is the best indication for a pectoralis major transfer?**
- irreparable tear of the supraspinatus and infraspinatus
  - irreparable tear of the supraspinatus
  - irreparable tear of the infraspinatus
  - irreparable tear of the supraspinatus and subscapularis
  - irreparable tear of the subscapularis

- 15. What is the postulated cause of tape blisters?**
- allergic reaction to the tape adhesive
  - lack of cellular oxygenation
  - shear at the dermal-epidermal junction
  - shear at the subcutaneous tissue-dermal junction
  - lack of moisture permeability of the tape
- 16. Patellofemoral instability during total knee arthroplasty may be associated with:**
- malalignment of the limb
  - malrotation of the femoral implant
  - malrotation of the tibial implant
  - an oversized femoral implant
  - all of the above
- 17. For a forty-five-year old, 185-lb (84-kg) librarian with grade-III or IV noninflammatory arthrosis involving only the medial compartment of the knee, the decision to perform unicompartmental arthroplasty is best made on the basis of:**
- surgical findings
  - history
  - standing radiographs
  - ligamentous stability
  - findings on physical examination
- 18. An otherwise healthy sixty-eight-year-old postmenopausal woman sustains a twisting injury to her back as she attempts to avoid a fall. She does not complain of radiation of pain into the lower extremities and has no bladder or bowel symptoms suggestive of neurologic incontinence. A radiograph shows osteoporotic fractures in the L2 and L3 vertebrae, with extension of the fracture line to the posterior cortex of the L3 vertebral body. Which of the following would be the most reasonable next step?**
- medical management with a trial of ris-dronate and, if no response is seen within two weeks, a switch to teriparatide
  - admit the patient to the hospital for intravenous narcotics and a work-up, including a bone scan and magnetic resonance imaging
  - a soft brace, analgesic medication, and progressive increase in activities as pain allows
  - percutaneous vertebroplasty with polymethylmethacrylate
  - surgical stabilization to diminish the risk of neurologic compromise
- 19. The most common complication following treatment of distal radial fractures with Non-union SRS is:**
- infection
  - tendon rupture
  - loss of reduction
  - digital stiffness
  - carpal tunnel syndrome
- 20. Serum cobalt concentrations during the first five years after metal-on-metal total hip arthroplasty:**
- show a gradual increase over time
  - are high initially and then gradually decrease (the so-called run-in wear phenomenon)
  - remain in a constant range slightly above the detection limit
  - remain at  $>10 \mu\text{g/L}$  at all measured time-points
  - are five times higher than the concentrations in patients treated with ceramic-on-polyethylene total hip arthroplasty
- 21. Thermal capsular shrinkage has a high failure rate with which type of instability?**
- traumatic anterior instability
  - posterior voluntary instability
  - subtle instability
  - subluxation associated with a SLAP lesion
  - all multidirectional instability
- 22. The use of monocortical screws in plate fixation of a fracture can be as effective as bicortical screws, provided that:**
- they are used in cancellous bone
  - the plate itself has little contact with the bone
  - the screw heads are locked into the hole on the plate
  - anatomical reduction of the fracture is achieved
  - the screws are not removed after the fracture has healed
- 23. Bone quality is a variable factor that may influence the fixation stability of tibiotalocalcaneal arthrodesis. Which of the following most clearly supports the use of blade-plate-and-screw fixation over intramedullary rod fixation in osteopenic bone?**
- in a cadaver model, the blade-plate-and-screw construct shows significantly less plastic deformation than does intramedullary rod fixation after cyclic loading
  - the blade-plate-and-screw construct is significantly stiffer than the intramedullary rod construct at initial loading and after cyclic loading through 250,000 cycles
  - the final stiffness after cycle loading in a cadaver model is slightly higher than the initial stiffness of both the blade-plate-and-screw construct and the intramedullary rod construct
  - with decreasing bone mineral density, a greater difference in plastic deformation occurs between the specimens of matched cadaver pairs, with greater plastic deformation found in the specimen that is fixed with an intramedullary rod
  - the blade-plate-and-screw construct is technically more difficult than the intramedullary rod construct

- 24. The stability of a thoracolumbar burst fractures is primarily determined by:**
- the degree of canal stenosis from retropulsed bony fragments
  - the degree of comminution of the vertebral middle column
  - the integrity of posterior osteoligamentous complex
  - loss of anterior vertebral body height
  - the presence of a posterior arch fracture
- 25. During a fall, which position of the forearm results in an Essex-Lopresti injury?**
- neutral
  - full supination
  - mid-supination
  - pronation
  - varus
- 26. An example of an indirect cause of iatrogenic limb lengthening with total hip arthroplasty is:**
- inferior positioning of the acetabular component
  - superior positioning of the femoral component
  - use of an excessively long femoral neck
  - use of an excessively large femoral head
  - retroversion of the acetabular component
- 27. Which of the following statements regarding the use of a torque wrench when applying a halo in a small child is most true?**
- specific torque wrenches are not necessary as all pins are tightened by hand to "two-finger" tightness
  - the torque wrench that is supplied by the halo manufacturer should be used regardless of the patient's size as this wrench is specifically designed for the halo pins that are used with that particular halo
  - torque wrenches from various manufacturers do not vary significantly with respect to the ability to apply torque accurately at the low settings used in small children
  - halo pins applied in children under five years of age should be applied with a lower torque setting (in inch pounds) that approximates the age of the child (in years) and should be applied by a wrench specific to this purpose
  - the safest wrenches used for pediatric halo application are the fully adjustable torque drivers provided by the manufacturer
- 28. During revision total hip replacement of both the femoral and the acetabular component in a patient with no autologous blood available, use of an intraoperative blood collection and reinfusion device such as the Cell Saver:**
- is contraindicated
  - is not a useful adjunct for blood conservation
  - will decrease net blood loss by about 100 mL
  - will decrease net blood loss by about 500 mL
  - will decrease net blood loss by >1500 mL
- 29. In a patient with moderate-to-severe degenerative arthritis of the first metatarsophalangeal joint (hallux rigidus), which of the following is the best indication for arthrodesis rather than cheilectomy?**
- sedentary lifestyle
  - grade-4 hallux rigidus
  - advanced age
  - metatarsus primus elevatus
  - male gender
- 30. When a patient requires total arthroplasty of both knees, either simultaneous bilateral total knee arthroplasty or two separate unilateral total knee arthroplasties can be undertaken to achieve the desired outcome. Which combination of factors is most important in determining this decision?**
- history of deep venous thrombosis, age, and cardiovascular risk factors
  - gender, age, and cardiovascular risk factors
  - patient's informed choice, age, and cardiovascular risk factors
  - history of rheumatoid arthritis, age, and cardiovascular risk factors
  - type of hardware utilized, age, and cardiovascular risk factors
- 31. A forty-year-old biologist with Achilles tendinopathy who is not responding to treatment with a heel lift, medication, and local physiotherapy inquires about the consequences of corticosteroid injection. What are the effects of dexamethasone on human tenocytes?**
- decreased collagen synthesis and matrix deposition
  - decreased cell viability, cell proliferation, and collagen synthesis
  - decreased cell proliferation
  - abnormal matrix deposition
  - abnormal collagen synthesis
- 32. With the knee in an extended position, a finding of lateral patellar tilt:**
- is usually associated with anterior knee pain
  - is a normal finding
  - should be treated with arthroscopic lateral release
  - results in high contact pressure at the lateral patellar facet
  - leads to the development of patellofemoral arthritis
- 33. Noggin inactivates the BMP-4-signaling pathway and blocks BMP-4-induced heterotopic ossification by:**
- decreasing the synthesis of BMP-4 receptors
  - degrading the BMP-4 receptors

- C. binding to BMP-4 and preventing BMP-4 from binding to its receptors  
 D. decreasing the synthesis of BMP-4 messenger RNA and protein  
 E. binding to Noggin receptor and activating signaling of a pathway that inhibits BMP signaling
- 34. Which of the following statements regarding open calcaneal fractures is INCORRECT?**
- A. they are associated with a higher percentage of fracture comminution  
 B. even with aggressive débridements, they are associated with a high likelihood of deep infection developing  
 C. treatment should be similar to that of open ankle fractures  
 D. some calcaneal fractures can be treated with open reduction and internal fixation  
 E. the use of external fixation may help to preserve function without increasing infection rates
- 35. Neer initially described multidirectional instability of the shoulder as:**
- A. instability in any direction with a positive sulcus sign  
 B. subluxation of the humerus over the glenoid rim on laxity testing  
 C. symptomatic instability in the anterior, posterior, and inferior directions  
 D. a positive sulcus sign with instability in either an anterior-inferior direction or a posterior-inferior direction  
 E. a painful shoulder in a baseball pitcher with a grade-III sulcus sign
- 36. Which of the following growth factor applications is currently approved by the Food and Drug Administration for clinical use in the United States?**
- A. OP-1 for distal radial fracture  
 B. rhBMP-2 for spine fusion  
 C. rhBMP-2 for tibial fracture  
 D. GDF-5 for Achilles tendon repair  
 E. Sox-9 for articular cartilage repair
- 37. When infection at the site of a knee replacement is treated with a two-stage exchange arthroplasty with an interim articulating spacer containing metal and polyethylene, the surgeon may expect:**
- A. a higher prevalence of reinfection  
 B. a cure rate similar to that after standard two-stage exchange  
 C. a cure rate similar to that after standard two-stage exchange but with potentially less bone loss  
 D. a decreased risk of recurrent infection  
 E. a cure rate similar to that after standard two-stage exchange but with potentially more bone loss
- 38. Which of the following factors is the most closely correlated with extensor tendon complications at the wrist after dorsal plate fixation for a dorsally angulated fracture of the distal part of the radius?**
- A. initial fracture displacement  
 B. patient age  
 C. plate material (titanium, stainless steel, etc.)  
 D. mechanism of injury  
 E. plate design
- 39. When comparing surgeons who perform a high volume of shoulder arthroplasties with those who perform a low volume, which of the following is true?**
- A. high-volume surgeons use more different types of implants  
 B. low-volume surgeons treat more arthritis  
 C. patients of high-volume surgeons have a lower chance of sustaining one complication  
 D. patients of high-volume surgeons have better discharge planning  
 E. the operative time of high-volume surgeons is shorter
- 40. Which of the following is the most important factor in maximizing the accuracy of computer-assisted radiographic wear measurements following total hip arthroplasty?**
- A. abduction angle of the acetabular component  
 B. exposure settings of the radiograph  
 C. magnification of the radiograph  
 D. centering of the radiograph relative to the pelvis  
 E. resolution at which the radiograph is scanned
- 41. After high-energy tibial plafond fractures, which of the following is significantly related to the quality of the outcome?**
- A. treatment method  
 B. smoking  
 C. presence of a contralateral injury  
 D. mechanism of injury  
 E. marital status  
 F. personal income
- 42. In elderly patients undergoing posterior lumbar decompression and arthrodesis, which of the following factors was not associated with an increased prevalence of complications?**
- A. increased blood loss  
 B. longer operative time  
 C. diabetes mellitus  
 D. multilevel fusion  
 E. increased age
- 43. Which of the following contributes most to reduction in wear rates of polyethylene acetabular liners?**
- A. smaller femoral head size  
 B. larger femoral head size

- C. increased cross-linking of polyethylene
- D. duration of wear testing
- E. fluid absorption during wear testing

**44. The mechanical strength of the bone-cement interface is increased most by:**

- A. lower pressurization of cement
- B. greater bone porosity
- C. decreased cement penetration distance
- D. trabecular orientation parallel to the implant surface
- E. trabecular orientation perpendicular to the implant surface

**45. Total knee arthroplasty substantially improved the function of patients with diastrophic dysplasia. Which of the following additional procedures was most often needed to perform total knee arthroplasty successfully?**

- A. shortening or bending of prosthetic stems
- B. corrective supracondylar osteotomy
- C. popliteus tendon tenotomy
- D. vastus medialis advancement over the patella
- E. lateral collateral ligament tenotomy

**46. An indication to revise a well-fixed modular cementless acetabular component at the time of revision hip surgery is:**

- A. presence of pelvic osteolysis
- B. intraoperative hip instability at the time of trial reduction
- C. excessive wear of the bearing surface
- D. the acetabular component in vivo for more than ten years
- E. a deficient locking mechanism of the acetabular component

**47. Which of the following treatments has provided the best outcomes for patients presenting with bilateral infection at the sites of total knee arthroplasties?**

- A. bilateral arthroscopic débridement and oral antibiotics
- B. bilateral open débridement, retention of the

- prostheses, and chronic antibiotic suppression
- C. bilateral serial open débridements and retention of the prostheses
- D. bilateral resection arthroplasty with organism-specific intravenous antibiotics followed by delayed replantation
- E. nonoperative treatment with chronic oral suppressive antibiotics

**48. Indications for the surgical correction of severe lordosis and kyphosis in children with cerebral palsy include:**

- A. lordosis and/or kyphosis of  $>60^\circ$
- B. loss of sitting ability and back pain
- C. loss of bowel or bladder control
- D. physical therapy
- E. poor appearance

**49. The most practical information that can be provided to a patient with distal triceps tendon deficiency requiring surgical reconstruction is:**

- A. the outcome is unpredictable
- B. the improvement of strength almost always approaches normal
- C. the recovery period is similar to that after biceps tendon repair
- D. acute repair within three weeks after the injury provides the best outcome
- E. delayed reconstruction is associated with a recovery period equal to that after immediate repair

**50. Bone mineral density measurements are an indication of:**

- A. calcium homeostasis
- B. bone turnover
- C. net skeletal mass
- D. cancellous-to-cortical ratio
- E. body mass index

**Conflict of Interest**

The author of these CME questions does not have any financial conflict of interest with regard to the subject matter discussed in these review questions.

**RESPONSE FORM**

**EXAMINATION EVALUATION**

Did the January 2004 CME Review Questions meet these educational objectives\*:

1. Provide a broad-based review and update specifically in the area of musculoskeletal trauma?  Yes  No
2. Strengthen your problem-solving abilities related to patient care particularly in the area of trauma?  Yes  No
3. Make you aware of new advances in orthopaedic surgical techniques and technology?  Yes  No

Comments (please comment on the quality of the questions and their relationship to your practice): \_\_\_\_\_

\*Note: These objectives will change every quarter.

**SURVEY (optional)**

1. Is this your own copy of *The Journal*?  
 Yes  No
2. Which of the following best describes your practice type?  
 General orthopaedics  
 General orthopaedics with subspecialty interest  
 Exclusively subspecialty  
 Resident or student  
 Researcher  
 Other: \_\_\_\_\_
3. What are your specialty interests? Please rank in order of importance (1 = highest importance).  

___ Adult	___ Spine
___ Geriatric	___ Hand
___ Pediatric	___ Rheumatology
___ Rehabilitation	___ Foot and Ankle
___ Sports	___ Other: _____
___ Trauma	
4. Which is your number-one priority to read when you receive *The Journal* (American volume only) each month?  
 Commercial advertising  Current Concepts  
 Classified advertising  Letters to The Editor  
 Clinical scientific articles  Basic scientific articles  
 Orthopaedic Forum  Instructional Course Lectures

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**QUESTIONS?**

Please contact the CME Division of *The Journal of Bone and Joint Surgery* at 781-449-9780 x124.

**ANSWER KEY**

**Black out the correct answers**

- |               |               |                 |
|---------------|---------------|-----------------|
| 1. A B C D E  | 18. A B C D E | 35. A B C D E   |
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| 9. A B C D E  | 26. A B C D E | 43. A B C D E   |
| 10. A B C D E | 27. A B C D E | 44. A B C D E   |
| 11. A B C D E | 28. A B C D E | 45. A B C D E   |
| 12. A B C D E | 29. A B C D E | 46. A B C D E   |
| 13. A B C D E | 30. A B C D E | 47. A B C D E   |
| 14. A B C D E | 31. A B C D E | 48. A B C D E   |
| 15. A B C D E | 32. A B C D E | 49. A B C D E   |
| 16. A B C D E | 33. A B C D E | 50. A B C D E   |
| 17. A B C D E | 34. A B C D E |                 |

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