
THE JOURNAL OF BONE & JOINT SURGERY

CONTINUING MEDICAL EDUCATION

CME

REVIEW QUESTIONS

JANUARY, FEBRUARY, MARCH
2009

THIS CME EXAM IS ALSO AVAILABLE AT JBJS.ORG AS AN INTERACTIVE ONLINE EXAM.

THE DEADLINE TO SUBMIT YOUR ANSWERS FOR GRADING
THIS SET OF QUESTIONS IS JULY 15, 2009.

OBJECTIVES

The objectives 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.

DISCLOSURE

- Robert Poss, MD, Deputy Editor for Electronic Media, and Editor, JBJS CME Program, receives royalties from Stryker Corporation for development of a total knee arthroplasty design.
- James D. Heckman, MD, has no financial relationships or interests to disclose.

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 January, February, and March issues of the 2009 American volume of *The Journal of Bone and Joint Surgery* (Vol. 91-A). A careful study of each article should yield the best response to each question.
3. Record your answers and complete all portions of the attached Response Form in the back of this document. The online subspecialty CME activities repeat some questions that appear in the quarterly general CME activities. If you are participating in both activities and claiming CME credits, you must consider this duplication when determining the number of credits you claim for each activity. However, to claim up to ten credits to satisfy self-assessment examination requirements mandated by the Maintenance of Certification process, you must take the *online* JBJS quarterly examination.
4. 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.
5. 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.

6. The written quarterly CME activity cannot be used to satisfy SAE requirements as mandated by the ABOS. To claim SAE credit, you must successfully participate in the electronic version of this activity.
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. The charge 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 July 15, 2009.**

1. **A sixty-six-year-old man who is moderately obese has symptomatic degenerative arthritis of the right knee. Radiographs demonstrate tricompartmental loss of articular cartilage with bone-on-bone changes in all compartments. The patient has heard that computer-assisted navigation offers improved alignment and orientation of the components in total knee arthroplasty. You are an experienced arthroplasty surgeon and prefer to use conventional techniques, and you tell him that, on the basis of a recent study, computer-assisted surgical navigation did not improve component alignment and orientation because:**
 - A. accuracy of component placement requires use of three-dimensional computed tomographic evaluation in addition to navigation
 - B. intraoperative determination of selected tibial landmarks (the tibial tuberosity and the center of the tibia) is highly variable
 - C. navigation is more accurate in younger, thinner patients
 - D. navigation reduces the number of outliers in an assessment of the accuracy of component placement, but there is no difference in the mean values
2. **A fifty-five-year-old pianist fell on his outstretched dominant wrist and sustained a closed displaced fracture of the distal part of the radius. You recommend that he undergo surgical repair eight days postinjury, and you plan to use a 2.4-mm locking plate. The patient is very concerned about the timing of the restoration of motion postoperatively. On the basis of a recent study, you can tell the patient that the maximum restoration of wrist and forearm motion will be seen by:**
 - A. three months
 - B. six months
 - C. nine months
 - D. twelve months
3. **A fifty-four-year-old man with diabetes and neuropathy presents with a swollen erythematous foot. There is a Wagner Grade-1 ulceration in the plantar-medial aspect of the midfoot. The ulcer resolves with use of a contact cast, and the swelling decreases. The ulceration then recurs despite management in a Charcot Restraint Orthosis Walker and weekly supervision by an orthopaedist and a prosthetist. Radiographs show a Charcot dislocation through the tarsometatarsal joints that has become more angulated and displaced since the first visit three months previously. Diagnostic imaging and serum levels of markers for infection are not suggestive of osteomyelitis. The next step in treatment should be:**
 - A. more frequent follow-up by the orthopaedist and prosthetist
 - B. application of alginate gel three times per week and application of a skin graft substitute
 - C. treatment with hyperbaric oxygen
 - D. midtarsal fusion with deformity correction following resolution of the ulcer with resumed use of the contact cast

- E. amputation of the leg
- 4. In a goat model, a complex musculoskeletal wound was created and then inoculated with *Pseudomonas aeruginosa*. The wounds were treated with débridement and a variety of irrigation solutions delivered by pulsatile lavage. An additional experiment compared the relative effectiveness of pulsatile lavage and delivery with a bulb syringe. The method that resulted in the least amount of residual bacteria in the wound forty-eight hours later was:**
- normal saline solution and high-pressure pulsatile lavage
 - benzalkonium chloride and high-pressure pulsatile lavage
 - normal saline solution and use of a bulb syringe
 - castile soap and high-pressure pulsatile lavage
 - castile soap and use of a bulb syringe
- 5. Some surgeons reconstruct both the anteromedial and the posterolateral bundle of the anterior cruciate ligament. In one study, the authors compared graft forces in reconstructed knees with forces in the native anterior cruciate ligament under the same loading conditions. Which of the following anterior cruciate reconstruction techniques produced the highest graft forces as measured during testing with application of a 100-N anterior tibial force?**
- double-bundle reconstruction, posterolateral tension = anteromedial tension at 10°
 - double-bundle reconstruction, posterolateral tension = anteromedial tension at 30°
 - double-bundle reconstruction, posterolateral tension = (anteromedial tension + 30 N) at 10°
 - double-bundle reconstruction, posterolateral tension = (anteromedial tension + 30 N) at 30°
 - single-bundle reconstruction
- 6. In an analysis of 51,345 revision total hip arthroplasties performed in the U.S. between October 1, 2005, and December 31, 2006, the most prevalent diagnosis for which a revision procedure was performed was:**
- infection
 - aseptic loosening of one or both components
 - dislocation
 - bearing surface wear
 - osteolysis
- 7. A sixty-six-year-old man was diagnosed with pelvic chondrosarcoma seven months ago. He underwent resection of the tumor (Enneking zone II and zone III) and reconstruction with a femoral autograft. In a series of thirteen patients treated with this procedure, the most common adverse outcome was found to be:**
- tumor recurrence
 - mechanical failure of the reconstruction
 - deep infection
 - hip dislocation
 - pulmonary embolism
- 8. A fifty-two-year-old man presents to you with morning stiffness, pain, and weakness of the right knee that had a gradual onset. Ten years ago, he was involved in a motor-vehicle accident during which the right knee forcefully struck the dashboard. Examination shows knee joint effusion and tenderness to palpation of the medial aspect of the right knee. The posterior drawer test is positive for the right knee. A radiograph of the right knee joint shows joint space narrowing and osteophyte formation in the medial compartment. Which of the following patterns of cartilage contact and deformation is most likely to be present in this patient's knee?**
- anterior and lateral shift of cartilage contact in the medial compartment, resulting in increased cartilage deformation
 - anterior and medial shift of cartilage contact in the medial compartment, resulting in decreased cartilage deformation
 - anterior and medial shift of cartilage contact in the medial compartment, resulting in increased cartilage deformation
 - posterior and lateral shift of cartilage contact in the medial compartment, resulting in increased cartilage deformation
 - posterior and lateral shift of cartilage contact in the medial compartment, resulting in decreased cartilage deformation
- medial compartment, resulting in decreased cartilage deformation
- 9. In the clinical assessment of a knee injury, which of the following tests is most important in distinguishing an anterior cruciate ligament injury that is stable (functional) from one that is rotationally unstable (nonfunctional)?**
- KT-1000 measurement
 - pivot shift test
 - Lachman test
 - magnetic resonance imaging
 - arthroscopic appearance
- 10. Femoroacetabular impingement occurs secondary to abnormal morphology of the femoral head-neck region and/or the acetabulum. There are two types of femoroacetabular impingement: cam and pincer. What is the principal underlying deformity in the cam type of femoroacetabular impingement?**
- insufficient concavity of the femoral head-neck junction anterolaterally
 - varus femoral neck-shaft angle
 - high greater trochanter
 - dysplastic acetabulum
 - acetabular retroversion
- 11. A twenty-year-old swimmer has a number of recurrent anterior shoulder dislocations despite two arthroscopic repairs. Radiographs demonstrate an engaging Hill-Sachs lesion with bone deficiency in the inferior part of the glenoid. How much bone deficiency of the inferior part of the glenoid constitutes an indication to proceed with a bone augmentation procedure?**
- 5%
 - 10%
 - 15%
 - 20%
 - 30%
- 12. Aseptic loosening is the most frequent cause of failure of cementless total hip arthroplasty. It has been proposed that use of bisphosphonates might decrease the prevalence of periprosthetic bone loss and thus reduce the likelihood of component migration. In a prospective randomized study of patients undergoing cementless total hip arthroplasty, one group received a single dose of intravenous zoledronic acid, and the other group received a placebo. At two years postoperatively, the authors found that, in comparison with the controls, the zoledronic acid group had:**
- clinical improvement
 - reduction in the prevalence of acetabular component migration
 - reduction in the prevalence of stem subsidence
 - reduction in the prevalence of periprosthetic fractures
 - reduction in the prevalence of revision
- 13. A thirty-eight-year-old woman sustained a severe traumatic brain injury (a Glasgow Coma Scale score of 3 at the scene of the accident) and a displaced fracture of the proximal third of the right femoral shaft in a high-speed head-on motor-vehicle accident. The fracture was treated operatively with an intramedullary nail. The twelve-week follow-up revealed a good healing course of the right femoral fracture, with a full and pain-free range of movement of the hip and symptom-free full weight-bearing on the lower limb. Radiographs of the right femur showed osseous union with hypertrophic callus formation and heterotopic ossification in the muscles lateral to the femoral shaft. What is the most likely scenario that is occurring at the cellular level at the fracture site and adjacent muscles?**
- increased activity of osteoprogenitor stem cells
 - increased proliferation of mature osteoblasts
 - reduced activity of osteoclasts
 - increased activity of mature osteoclasts
 - reduced activity of osteoprogenitor stem cells
- 14. During fluoroscopic imaging of the foot and ankle, the surgeon and patient are exposed to the least**

- amount of radiation when the extremity is imaged in a position:**
- closest to the x-ray source with use of a standard c-arm fluoroscope
 - midway between the image intensifier and the x-ray source with use of a standard c-arm fluoroscope
 - closest to the image intensifier with use of a standard c-arm fluoroscope
 - closest to the image intensifier with use of a mini-c-arm fluoroscope
 - closest to the x-ray source with use of a mini-c-arm fluoroscope
- 15. A nineteen-year-old hockey player is referred to you four months after sustaining a skate cut over the anterior aspect of the right ankle during a game. He was originally treated with irrigation and wound closure, but he subsequently walked with a slapping gait and had weakness of ankle dorsiflexion. Physical examination shows hyperextension of the hallux and the lesser digits when the ankle is actively dorsiflexed. He has a positive Silfverskiold test. Your diagnosis is a tear of the tibialis anterior tendon. The preferred treatment is:**
- repair of the tibialis anterior tendon with use of a free tendon graft if necessary and simultaneous gastrocnemius recession
 - repair of the tibialis anterior tendon with use of a free tendon graft if necessary
 - physical therapy with the goals of increased ankle dorsiflexion strength and proprioception
 - transfer of the tibialis posterior tendon through the interosseous membrane
 - use of an ankle-foot orthosis (AFO)
- 16. A seven-year-old girl with cerebral palsy and spastic diplegia (Gross Motor Function Classification System [GMFCS] level I with onset at birth) is walking with an improved gait but continues to toe walk and has a jump-gait pattern. She exhibits lower-extremity spasticity, bilateral popliteal angles of -20° , ankle dorsiflexion of 10° with the knees extended, and ankle dorsiflexion of 15° with the knees flexed. What is the best treatment option?**
- reassurance that she is progressing sufficiently well and a return to the clinic in six months
 - a well-contoured foot orthosis (UCBL) to reduce muscle tone
 - an ankle-foot orthosis (AFO) that limits plantar flexion
 - an orthosis that prevents hyperextension of the knee
 - bilateral surgical lengthening of the iliopsoas, hamstrings, and Achilles tendon
- 17. A fifty-eight-year-old woman fell from the first step of a ladder and sustained an injury to the dominant elbow. She is seen three days later with a painful swollen elbow. A lateral radiograph shows a displaced fracture of the capitellum. You should also suspect an injury to the:**
- medial collateral ligament
 - trochlea
 - radial head
 - triceps tendon
 - radial nerve
- 18. A twenty-three-year-old man presents with worsening right hip pain. He describes stabbing pain in the groin and occasional "catching." On examination, he has a positive impingement sign. A hip-centered anteroposterior pelvic radiograph suggests acetabular retroversion with a low crossover sign. The posterior wall line is medial to the center of the femoral head, indicating deficient posterior wall coverage. A magnetic resonance imaging arthrogram shows a labral tear and little to no articular cartilage damage. After the appropriate discussion, you recommended a Bernese periacetabular osteotomy. What approach for periacetabular osteotomy presents the least risk to the vascularity of the hip and acetabulum?**
- posterior
 - posterolateral
 - lateral
 - anterior
- 19. Five years ago, half of the surgeons in a large orthopaedic group changed their choice of operative repair of Gustilo type-IIIa tibial fractures from open reduction and plate fixation to intramedullary rod fixation. As a research project, the surgeons who changed to intramedullary rod fixation retrospectively reviewed their outcomes and reported them. The level of evidence of their study was Level IV, therapeutic. The level of evidence of that study could have been improved if the authors had:**
- prospectively analyzed the same patients
 - collected data over a ten-year period as opposed to the five-year period
 - compared their intramedullary rod group with the patients who had been treated with open reduction and plate fixation by the other surgeons
 - included all tibial fractures (Gustilo types I through IIIc)
 - included patients from multiple centers who had undergone the same surgery for the same diagnosis
- 20. An eighteen-year-old man falls from his racing bike and sustains a closed displaced midshaft clavicular fracture. You advise him that, on the basis of a recent multicenter study:**
- his risk of nonunion will be higher if he is treated nonoperatively
 - the time to union will be shorter if he is treated nonoperatively
 - he is more likely to return to sports at an early stage if he is treated nonoperatively
 - after operative treatment, he will have a very small (<5%) risk of requiring additional surgery
 - the functional outcome will be better if he is treated nonoperatively
- 21. You are the team physician for the local high-school football team. During the second quarter of a game, the star receiver dives for a ball overthrown by the quarterback and lands awkwardly on his right shoulder. He is able to get up and hobble to the sideline, clutching his right arm by his side. In the locker room, you determine that he has an acute anterior dislocation of the shoulder. A radiograph confirms the diagnosis and shows no fractures. The patient states that this is the first time that he has had a dislocation. You reduce the shoulder with the use of mild analgesia, and the patient reports immediate cessation of pain. He reports that he does not have paresthesias but does have mild weakness in the right upper extremity compared with the left. The player and coach ask you if he can return to play for the second half. You inform the coach, the player, and his family that the best course of action is that the player not return to the game and that he:**
- will require magnetic resonance imaging before he can return to football
 - will require physical therapy and may be able to return to playing this season, with an abduction brace, once his strength has returned
 - will probably require surgery to prevent redislocation if he is to return to football
 - should not return to playing football
- 22. It is well known that pressure in the carpal tunnel is elevated in patients with carpal tunnel syndrome. Twenty patients undergoing carpal tunnel release agreed to insertion of a catheter pressure transducer to measure peak pressures during certain activities of daily living. Before the carpal tunnel release, baseline pressures were 30 to 50 mm Hg, whereas, with maximum grip, the pressure reached:**
- 100 mm Hg
 - 200 mm Hg
 - 600 mm Hg
 - ≥ 1000 mm Hg
- 23. A sixty-seven-year-old woman presents to the emergency room after falling on her right shoulder. Radiographs demonstrate an isolated three-part proximal humeral fracture. You caution the patient that she should be evaluated for the possibility of having osteoporosis and that a study has shown that she may be**

- at risk for sustaining a hip fracture in the future. In what time interval is the patient most at risk for sustaining a subsequent hip fracture?**
- zero to twelve months
 - twelve to twenty-four months
 - twenty-four to sixty months
 - more than sixty months
- 24. A twenty-six-year-old soccer player presents for follow-up one year after undergoing operative repair of disruptions of the femoral attachments of the superficial medial collateral ligament, posterior oblique ligament, and medial patellofemoral ligament. The ligaments were secured to the femur with metallic suture anchors. If the ligaments were anchored in correct anatomic alignment, a lateral radiograph would show three suture anchors, from anterior to posterior, placed into the medial femoral condyle. The correct sequence of the structures, from anterior to posterior, is:**
- medial patellofemoral, posterior oblique, superficial medial collateral ligament
 - superficial medial collateral, posterior oblique, medial patellofemoral ligament
 - medial patellofemoral, superficial medial collateral, posterior oblique ligament
 - posterior oblique, medial patellofemoral, superficial medial collateral ligament
- 25. A thirty-two-year-old laborer fell 12 ft (3.7 m) and sustained an isolated displaced Sanders type-IB intra-articular calcaneal fracture with substantial loss of calcaneal height and varus malalignment of the posterior tuberosity. The patient would prefer nonoperative treatment. On the basis of a review of a consecutive series of sixty-nine patients (seventy-five fractures) who underwent either early open reduction and internal fixation or nonoperative treatment prior to eventually requiring subtalar arthrodesis, you tell the patient that the preferred initial treatment is:**
- nonoperative; if subtalar arthrodesis is necessary subsequent to nonoperative treatment it should be technically easy
 - nonoperative; subtalar arthrodesis subsequent to nonoperative treatment is associated with fewer wound-healing problems than is subtalar arthrodesis subsequent to an operative procedure
 - operative; subtalar arthrodesis subsequent to operative treatment should be straightforward because of restoration of normal anatomy
 - operative; the clinical and functional outcomes of subtalar arthrodesis subsequent to operative treatment should be almost equal to those subsequent to initial nonoperative treatment
- 26. A forty-seven-year-old white man presents with an overtly fungating 12-cm high-grade soft-tissue sarcoma in the anterolateral part of the thigh. The tumor developed rapidly over a three-month period without antecedent trauma. The patient was previously healthy but is a heavy smoker. Clinical and radiographic staging evaluations demonstrate no evidence of metastatic disease. Following wide local excision and radiation therapy for the primary tumor and adjuvant systemic chemotherapy, this patient would be expected to:**
- have severe local wound complications and poor functional results
 - have decreased disease-specific survival compared with a patient with a localized 9.0-cm nonfungating tumor
 - have an aggressive early local recurrence requiring palliative amputation
 - respond well to nontraditional, alternative medicine therapies
 - have rapid formation of multiple metachronous fungating lesions at remote sites
- 27. A twelve-year-old girl is referred after she was examined in a school-screening program and found to have thoracic scoliosis. The findings of a clinical examination and plain radiographs are consistent with a diagnosis of adolescent idiopathic scoliosis with a curvature of 35°. A family member inquires about the possibility that surgery will slow the progression of the curve. On the basis of findings in a pig thoracic model, what structural changes might be expected after spinal hemiepiphysiodesis?**
- increased disc height and decreased growth-plate-cell size
 - decreased disc height and increased growth-plate height on the contralateral side
 - decreased disc height and decreased growth-plate hypertrophic zone height on the treated side
 - decreased disc height at the treated vertebral levels on the ipsilateral side compared with the disc height on the contralateral side
 - no change in disc height and decreased hypertrophic cell height at the treated vertebral levels on the treated side
- 28. A thirteen-year-old boy is diagnosed with nonmetastatic osteosarcoma of the distal part of the right femur. He undergoes a course of preoperative chemotherapy followed by a limb-salvage procedure without postoperative complications. Following the procedure, the parents ask that the resumption of chemotherapy be delayed because the child "has been through too much." You gently but firmly inform them that a recent study has demonstrated that a delay in the resumption of chemotherapy of twenty-one days or more is associated with:**
- a delay in functional rehabilitation
 - tumor recurrence
 - an increased rate of local recurrence
 - an increased rate of metastasis
 - decreased overall survival
- 29. A sixty-five-year-old woman slipped on ice and sustained a low-energy fracture of the distal part of the radius. As part of her evaluation, the severity of the fracture was classified with use of the AO/OTA system and she also underwent dual x-ray absorptiometry scanning of the hip to measure bone density. The authors of one study found that low bone mineral density is associated with:**
- subsequent fractures at other sites
 - a poor clinical outcome following fracture repair
 - increased severity of a distal radial fracture
 - a high body mass index
 - an inactive lifestyle
- 30. In a consecutive series from Taiwan of first-time revision total knee arthroplasties for treatment of aseptic loosening or polyethylene wear, a group of patients who had reimplantation with vancomycin-impregnated cement had significantly fewer infections than did a control group treated with standard cement. The authors recommended consideration of the use of vancomycin because its advantages include:**
- good thermal stability
 - good clinical results in previously published studies
 - effectiveness against more virulent pathogens that are resistant to cephalosporins
 - relative low cost
 - all of the above
- 31. A twenty-five-year-old man is injured in a motorcycle collision. He arrives at the trauma center intubated and sedated with a severe head injury, chest and abdominal injuries, as well as multiple skeletal injuries. The left elbow and wrist are unstable and deformed, and there is a wrist fracture associated with an open wound. Radiographs demonstrate a displaced unstable articular fracture of the distal part of the radius and a fracture-dislocation of the elbow. Which of the following factors is most influential in determining the need to perform a forearm fasciotomy of the left forearm in this unconscious patient?**
- the open wound associated with the radial fracture
 - the motorcycle collision as the mechanism of injury
 - polytrauma
 - concomitant injuries of the distal part of the radius and the elbow
 - articular involvement by the distal radial fracture
- 32. A four-year-old child with fibrodysplasia ossificans progressiva is seen by a physician because of a two-week**

- history of soft-tissue swelling of the right deltoid following a routine preschool intramuscular immunization. Examination shows a tender, swollen, warm, and firm right deltoid and short malformed great toes. The range of motion of the right shoulder is decreased. Radiographs of the right shoulder and arm show heterotopic ossification of the right deltoid muscle. Which of the following cell types are the most likely responding cells leading to heterotopic ossification in this child?**
- smooth-muscle progenitor cells
 - endothelial progenitor cells
 - satellite cells from skeletal muscle
 - macrophage progenitor cells
 - T-lymphocyte progenitor cells
- 33. A sixty-five-year-old woman who is a former gymnast is a candidate for a right total knee arthroplasty. One of her primary goals is to maximize the range of motion of her new knee, and she has heard that the high-flexion knee design improves flexion and function. You usually perform total knee arthroplasty with use of a standard posterior-cruciate-retaining design. On the basis of a prospective comparison of patients treated with high-flexion and standard cruciate-retaining total knee arthroplasty designs, you can tell her that:**
- resting flexion was greater in the high-flexion-design group
 - ease of kneeling was greater in the high-flexion-design group
 - postoperative WOMAC (Western Ontario and McMaster Universities Osteoarthritis Index) scores were better in the standard-knee-design group
 - postoperative pain scores were better in the standard-knee-design group
 - factors other than the knee design per se are major contributors to the final flexion and functional outcomes
- 34. Tears of the acetabular labrum are an increasingly recognized problem in patients with hip deformities such as developmental dysplasia of the hip or Legg-Calvé-Perthes disease as well as in active patients with normal hip anatomy who sustain trauma. What is the current understanding of the function of the labrum?**
- it secretes hyaluronic acid into the joint fluid
 - it provides load-sharing in the normal hip, a function analogous to that of the meniscus in the knee
 - it is essential for stability of the normal hip at the extremes of rotation
 - it acts as a seal to maintain fluid lubrication
 - it is a vestigial structure with no known function
- 35. A seventy-five-year-old man slips on ice and sustains an intertrochanteric fracture of the left hip. After reviewing the radiographs, you determine that the fracture pattern is unstable and treatment with an intramedullary nail would be preferable to use of a sliding hip screw. Which of the following intertrochanteric fracture patterns are considered unstable and would benefit from surgical treatment with intramedullary fixation?**
- reverse obliquity fractures
 - fractures with subtrochanteric extension
 - fractures with large posteromedial fragments
 - transstrochanteric fractures
 - all of the above
- 36. When informing a patient about available treatment options, it is the surgeon's professional responsibility to offer:**
- every available option
 - only those options that the surgeon thinks are best
 - those options with a likely chance of success without unreasonable risks
 - only the options that the surgeon feels comfortable performing
 - the options that the surgeon's hospital is equipped to handle
- 37. A thirty-five-year-old man sustained multiple injuries in a motor-vehicle collision, including a fracture of the femoral diaphysis. He is rapidly transferred to a nearby Level-I trauma center. He is intubated with an arterial base deficit of 6.5 mmol/L on admission. The presence of which of the following associated injuries makes the patient most likely to benefit from a delay (of more than twelve hours after admission) in definitive fracture care?**
- subarachnoid hemorrhage
 - traumatic pneumothorax
 - splenic laceration
 - intertrochanteric hip fracture
- 38. A sixty-five-year-old woman underwent primary total knee arthroplasty seven days ago. At twenty-four hours postoperatively, Hemovac drainage was only 50 mL. At the time of the initial dressing change, she was found to have a 5-mm diastasis of the suture line and a draining hematoma. In the subsequent six days, the wound had not sealed and you recommend that she be returned to the operating room for evacuation of the hematoma and wound closure. In this study, the most significant risk factor for development of wound-healing problems was found to be:**
- a body mass index of >30
 - tobacco smoking
 - diabetes mellitus
 - steroid use
 - peripheral vascular disease
- 39. In a large prospective trial performed to study improvement in pain and function following total knee arthroplasty, patients were randomized to receive a metal-backed or an all-polyethylene tibial component, a fixed or a mobile bearing, and patellar resurfacing or no patellar resurfacing. The study demonstrated that all groups:**
- had improvement by three months after the surgery with additional small improvements up to two years after the surgery
 - had improvement by three months after the surgery with no further improvements thereafter
 - had a steady rate of improvement up to two years after the surgery
 - had little improvement in the first three months after the surgery but had larger improvements thereafter (by two years)
- 40. A twenty-three-year-old woman seeks advice for treatment of a varus deformity of the right femur that has resulted in 5.0 cm of shortening of the right lower extremity. She was treated as a child for rickets. The current calcium, phosphorus, and alkaline phosphatase serum values are normal. She has no other musculoskeletal abnormalities. You recommend that she undergo fixator-assisted acute femoral deformity correction and consecutive lengthening over an intramedullary nail. You explain to the patient that use of an intramedullary nail provides which of the following advantages?**
- the external fixation device can be removed during the consolidation period
 - increased stability is provided by the intramedullary nail
 - there is a decreased risk of fracture
 - there is a decreased risk of recurrent deformity
 - all of the above
- 41. A twenty-one-year-old man presents one day after sustaining an injury to the left knee while playing tennis. When running to the left sideline to reach the ball, he planted the left foot and felt the left knee suddenly twist. He had immediate pain and swelling of the knee. He had no history of a similar injury. Today, the knee is markedly swollen. There is tenderness on the medial side of the knee. The patient can perform a straight-leg-raising maneuver. The collateral ligaments are intact. He resists attempts to perform a range of motion of the knee and to subluxate the patella laterally. Radiographs and magnetic resonance imaging demonstrate a laterally subluxated patella and normal patellofemoral anatomy. The patient is a varsity tennis player and hopes to compete in the regional championships eight months from now. You recommend:**
- immobilization in a knee splint for six weeks
 - use of a knee brace and immediate institution of quadriceps-strengthening exercises
 - operative realignment with medialization of the tibial tubercle
 - operative reconstruction of the medial

patellofemoral ligament

42. A sixty-seven-year-old right-hand-dominant man presents to you with a chief symptom of weakness of the right shoulder but no pain. Physical examination shows marked weakness of shoulder abduction above 90° on the right side compared with that on the left side. The strength of external rotation with the arm at the side is well preserved bilaterally. Both shoulders have normal active and passive ranges of motion. The patient enjoys playing golf and has no shoulder symptoms while doing so. Radiographs of the right shoulder show no specific findings. Which of the following is the most likely diagnosis?
- frozen shoulder
 - rotator cuff tear
 - osteoarthritis of the glenohumeral joint
 - glenohumeral instability
 - subacromial impingement syndrome
43. A twenty-year-old woman has had pain and "clicking" on the right side of the groin for three months. She is a collegiate long jumper and notes increased symptoms after she runs or jumps. Physical examination demonstrates pain with flexion and internal rotation of the right hip and reduced internal rotation at 90° of hip flexion. Radiographs demonstrate an acetabulum with normal coverage of the femoral head, a positive cross-over sign, and a pistol-grip deformity of the proximal part of the femur with a decreased head-neck offset anteriorly. Your diagnosis is cam-type femoral acetabular impingement. Which of the following factors is associated with an increased risk of acetabular cartilage delamination in this patient?
- female sex
 - young age
 - labral tear
 - acetabular retroversion
 - decreased head-neck offset
44. A forty-eight-year-old sheet-metal worker presents with pain in the right shoulder, which is worse during his routine overhead work. On examination, when you ask him to raise his arm overhead, you note that the scapula rotates upwardly and tilts anteriorly (i.e., the inferior scapular angle becomes more prominent) relative to the thorax. In contrast, in a study of shoulder motion in asymptomatic volunteers, the authors found that, when the subjects raised the arm, overhead scapular motion consisted of:
- downward rotation and posterior tilting
 - downward rotation and anterior tilting
 - upward rotation and anterior tilting
 - upward rotation and posterior tilting
45. Video-assisted thoracoscopic surgery is an alternative to posterior spinal fusion for the treatment of thoracic adolescent idiopathic scoliosis. In a comparative study of the two techniques, the authors found which of the following results to constitute an advantage of the video-assisted technique?
- shorter operative time
 - greater percent curve correction
 - sparing of an average of one lumbar segment
 - fewer transfusions
 - higher patient-reported outcome scores
46. A ten-week-old Native American infant with bilateral talipes equinovarus is being treated according to the guidelines of the Ponseti technique. The family lives in rural New Mexico, and the parents speak with one another in their native language. Correction of the deformity in each foot has been achieved by weekly stretching and cast application followed by Achilles tenotomy. In this setting, which of the following is most appropriate to promote long-term success of the treatment?
- providing information regarding web sites that offer orthotic tutorials in the family's native language
 - prescribing ankle-foot orthoses rather than abduction orthotic devices
 - promoting childcare arrangements that include the extended family in the orthotic training
- D. emphatically reinforcing that failure to use orthotics properly will result in recurrence of the deformity
47. A twelve-year-old boy emigrates to the U.S. from an African country. He had poliomyelitis at the age of five years and lost motor control of the right foot and ankle. He can otherwise walk with sufficient muscle strength to be considered an independent ambulator. His parents reject the idea of a splint as a permanent solution and hope that you can perform surgery to stabilize the ankle and foot. On the basis of a long-term retrospective study of patients who had undergone pantalar arthrodesis, you can tell the parents that:
- the procedure must result in perfect ankle alignment to be successful
 - the likelihood of immediate postoperative complications is low
 - the likelihood of subsequent ipsilateral knee arthritis is high
 - long-term Short Form-36 scores suggest poor patient function
48. An eighty-year-old woman sustains a periprosthetic supracondylar femoral fracture in a ground-level fall while walking in her home. The surgeon elects to treat this fracture with a lateral locked-plate construct. Which of the following is true concerning the strength of fixation of locked constructs in diaphyseal osteoporotic bone?
- constructs with all locked screws in the diaphysis have a higher load to failure in torsion than do constructs with all nonlocked screws
 - constructs with all locked screws in the diaphysis have a higher load to failure in bending than do constructs with all nonlocked screws
 - constructs with all locked screws in the diaphysis have strength in axial loading that is equivalent to that of constructs with all nonlocked screws
 - hybrid constructs (those with a nonlocked screw added at the end of the plate) have lower strength in torsion than do constructs with all locked screws
 - hybrid constructs (those with a nonlocked screw added at the end of the plate) have greater strength in bending than do constructs with all locked screws
49. Antibiotic-impregnated cement is currently approved by the U.S. Food and Drug Administration for use only in revision total hip arthroplasty following infection. However, registry studies from Europe suggest that its use in primary total hip arthroplasty is efficacious. In a cost-effectiveness study of the use of antibiotic-impregnated cement in primary total hip arthroplasty, the authors found that it would be cost-effective in which of the following scenarios?
- patients younger than seventy years old
 - patients older than eighty-five years old
 - if the cost of the cement was approximately \$1200
 - patients with a body mass index of ≥ 35
 - female patients
50. A sixty-two-year-old man has progressive pain and varus deformity of the right knee secondary to degenerative arthritis. Nonoperative treatments no longer control hip pain, and you have recommended that he consider total knee arthroplasty. Because his brother had an adverse outcome following total knee arthroplasty due to deep infection, the patient is reluctant to undergo the procedure. He asks what type of antibiotic prophylaxis is optimal to reduce the chance of postoperative infection. You tell him that there are many factors to consider, but a review of the Finnish Arthroplasty Register revealed that the lowest prevalence of infection was in patients who received prophylaxis with:
- intravenous antibiotics beginning twenty-four hours preoperatively
 - intravenous antibiotics beginning less than one hour prior to incision
 - intravenous antibiotics plus antibiotic-impregnated bone cement
 - antibiotic-impregnated bone cement only

RESPONSE FORM

ACCREDITATION STATEMENT

This activity has been planned and implemented in accordance with the Essential Areas and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of the American Academy of Orthopaedic Surgeons (AAOS) and *The Journal of Bone and Joint Surgery* (JBJS). The AAOS is accredited by the ACCME to provide continuing medical education for physicians. The AAOS designates this educational activity for up to 10 hours of category-1 credit toward the AMA Physicians' Recognition Award. Each physician should claim only those hours of credit that he/she actually spent in the educational activity.

The deadline to submit your answers for grading this set of questions is July 15, 2009.

EXAMINATION EVALUATION (MANDATORY)

Did the January through March 2009 CME Review questions meet these educational objectives*:

1. Provide a broad-based review and update specifically in the areas of sports medicine and the hand? Yes No
2. Strengthen your problem-solving abilities related to patient care particularly in the areas of sports medicine and the hand? 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.

ANSWER KEY

Black out the correct answers

- | | | |
|---------------|---------------|---------------|
| 1. A B C D | 18. A B C D | 35. A B C D E |
| 2. A B C D | 19. A B C D E | 36. A B C D E |
| 3. A B C D E | 20. A B C D E | 37. A B C D |
| 4. A B C D E | 21. A B C D | 38. A B C D E |
| 5. A B C D E | 22. A B C D | 39. A B C D |
| 6. A B C D E | 23. A B C D | 40. A B C D E |
| 7. A B C D E | 24. A B C D | 41. A B C D |
| 8. A B C D E | 25. A B C D | 42. A B C D E |
| 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 |
| 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 |
| 13. A B C D E | 30. A B C D E | 47. A B C D |
| 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 |
| 17. A B C D E | 34. A B C D E | |

CME Credits Claimed* _____

*Required. Please enter the number of CME credit hours you are claiming for this exam. You must complete this field to receive CME credit.

AAOS Member Number _____

(Without this number, the AAOS will not track your CME credits.)

Last Name _____ First Name _____ Degree _____

Mailing Address _____

City/State _____ Zip Code _____

Phone Number _____

Fax Number _____ E-mail Address (optional) _____

PAYMENT OPTIONS

Payment must accompany the CME Response Form.

Mail to: CME Division, The Journal of Bone and Joint Surgery, 20 Pickering Street, Needham, MA 02492

Subscription (4 quarterly exams) \$220.00
Single exam \$60.00

Please check one:

Check/money order made payable to *The Journal of Bone and Joint Surgery* (drawn on a U.S. bank or U.S. bank draft only)

Mastercard Visa AMEX

Account number: _____

Expiration date: ____/____/____

Name as it appears on card: _____

I authorize my credit card to be charged \$ _____ for this activity.

Signature _____

QUESTIONS?

For payment questions, contact the Subscription Department at 781-449-9780, x1240. For questions regarding submitted tests, contact Kate Horgan at 781-449-9780, x1225. E-mail all other questions to cme@jbjs.org.