

Sample Orthopaedic Surgery Questions & Critiques

The sample NCCPA items and item critiques are provided to help PAs better understand how exam questions are developed and should be answered for NCCPA's Orthopaedic Surgery CAQ Exam.

Question #1

A 40-year-old woman comes to the emergency department because she has pain in her right arm two hours after she fell in her home. Physical examination shows swelling and deformity of the right arm. The patient is unable to dorsiflex the wrist. X-ray studies show a spiral midshaft fracture of the humerus. Which of the following nerves is most likely affected by this fracture?

- A. Axillary
- B. Median
- C. Musculocutaneous
- D. Radial**
- E. Ulnar

Content Area: Fractures/Dislocations (25%)

Critique

This question tests the examinee's knowledge of anatomy and the ability to correlate this knowledge with findings on physical examination and x-ray studies. The correct answer is Option (D), radial. The radial nerve courses posterior to the middle third of the humeral shaft and is prone to injury with fractures of the midshaft of the humerus. Sensory distribution of the radial nerve includes the first dorsal web space of the hand, and motor innervation includes the dorsal forearm extensor muscles, including those of the wrist.

Option (A), axillary, is incorrect because this nerve is located posterior to the humeral neck. It provides sensation over the deltoid region and innervates the deltoid muscle. Option (B), median, is incorrect because this nerve courses through the medial aspect of the arm between the biceps brachii and brachialis muscles. It provides sensation to the radial aspect of the palm and fingers as well as the distal dorsal surfaces of the thumb, index finger, long finger, and the radial aspect of the ring finger. Motor innervation within the hand includes the muscles of the thenar eminence. Option (C), musculocutaneous, is incorrect because this nerve does not innervate any muscles involved in motor function of the wrist or hand. Option (E), ulnar, is incorrect because this nerve courses through the arm relatively parallel to the median nerve and is not in proximity to the humerus at the level of the fracture. It provides sensation to the ulnar aspect of the dorsal and palmar surfaces of the hand and innervates the flexor carpi ulnaris,

which provides wrist flexion and ulnar deviation. The patient described is unable to dorsiflex the wrist, which is not related to the ulnar nerve.

Question #2

A 12-year-old boy is brought to the office by his mother because he has had intermittent pain in the right hip during the past two weeks. The patient ambulates with difficulty. He has not had fever, chills, malaise, recent illness, or trauma to the hip. The patient is obese but otherwise healthy. On physical examination, vague pain in the groin is elicited on range of motion of the right hip. The most appropriate next step is x-ray studies to rule out which of the following conditions?

- A. Femoral acetabular impingement syndrome
- B. Legg-Calvé-Perthes disease
- C. Septic arthritis
- D. Slipped capital femoral epiphysis**
- E. Tear of the labrum

Content Area: Pediatric (4%)

Critique

This question tests the examinee's ability to discriminate between various types of conditions involving the hip joint in a pediatric patient and determine which condition is most likely to be ruled out by x-ray studies. The correct answer is Option (D), slipped capital femoral epiphysis. The history and physical examination findings are characteristic of slipped capital femoral epiphysis, including obesity, limp, and pain with range of motion of the joint.

Option (A), femoral acetabular impingement syndrome, is incorrect because femoral acetabular impingement syndrome is not a pediatric condition. Option (B), Legg-Calvé-Perthes disease, is plausible but incorrect in this patient considering his age because the mean age of onset of Legg-Calvé-Perthes disease is 7 years and x-ray studies do not rule this condition out. Option (C), septic arthritis, is plausible but incorrect because the patient has no history of acute illness and x-ray studies do not rule this condition out. Option (E), tear of the labrum, is incorrect because the patient has no history of injury and because MRI is the best diagnostic study to evaluate tear of the labrum.

Question #3

A 19-year-old woman is brought to the emergency department by ambulance after she sustained an injury to the right knee while rollerblading. The patient says she felt sudden, severe pain in the knee when she turned a corner quickly. She fell to the ground and was unable to bear weight on the right leg. Physical examination shows swelling and deformity of the right knee as well as inability to fully extend and straighten the right lower extremity. X-ray studies show dislocation of the patella. In addition to administration of analgesics, which of the following is the most appropriate management?

- A. Arthroscopic lateral release
- B. Closed reduction of the patella**
- C. Medial patellofemoral ligament reconstruction
- D. Open reduction of the patella
- E. Tibial tubercle medialization

Content Area: Fractures/Dislocations (25%)

Critique

This question tests the examinee's ability to select the most appropriate management of a patient with a known diagnosis. The correct answer is Option (B), closed reduction of the patella. The patient's age, gender, and athletic activity are all predisposing factors of this injury, and the x-ray study confirms the diagnosis. Prompt reduction of a dislocated patella is the most appropriate management because the longer the patella remains dislocated, the more damage is done to the medial retinaculum and the medial ligamentous structure. In addition, risks of closed reduction are minimal compared with other surgical options.

Option (A), arthroscopic lateral release, is incorrect because this procedure is not indicated for management of acute patellofemoral instability. It is a more suitable intervention for patients with retinacular tightness and pain. Option (C), medial patellofemoral ligament reconstruction, is incorrect because this procedure is used to manage chronic patellofemoral instability. Option (D), open reduction of the patella, is incorrect because surgery is rarely required for management of dislocation of the patella. Open reduction may be needed, but this is only in circumstances in which closed reduction is repeatedly unsuccessful or when a clear mechanical obstruction to reduction is evident. Option (E), tibial tubercle medialization, is incorrect because this procedure is used to correct patellofemoral alignment in patients with patellofemoral instability due to factors such as increased Q angle.

Question #4

A 20-year-old man who plays baseball on his college team comes to the clinic because he has had pain in his right elbow for the past three weeks. The pain began approximately one week after the beginning of the baseball season. Physical examination of the elbow shows full range of motion in flexion, extension, supination, and pronation. No pain is elicited on varus or valgus stress of the elbow. Dorsiflexion of the right hand against resistance immediately elicits pain that is localized to the lateral aspect of the elbow. Which of the following is the most likely diagnosis?

- A. Distal biceps tendinitis
- B. Fracture of the radial head
- C. Lateral epicondylitis**
- D. Olecranon bursitis
- E. Sprain of the lateral collateral ligament

Content Area: Soft-Tissue Injuries and Disorders (25%)

Critique

This question tests the examinee's ability to recognize signs and symptoms of a musculoskeletal disorder to determine the most likely diagnosis. The correct answer is Option (C), lateral epicondylitis. Overuse or repetitive motion activities involving wrist extension and/or supination are common causes of lateral epicondylitis. Clinical manifestations usually include pain in the lateral aspect of the elbow and the dorsal aspect of the forearm that is exacerbated by use. Physical examination usually shows maximal point tenderness over the lateral epicondyle and/or the area overlying the extensor carpi radialis brevis muscle. Extension or supination of the wrist against resistance typically elicits pain.

Option (A), distal biceps tendinitis, is incorrect because this condition involves pain with supination of the forearm, not with dorsiflexion of the wrist. Option (B), fracture of the radial head, is incorrect because the patient has no history of substantive trauma. In addition, the physical examination findings of full range of motion in all planes and provocation of pain on dorsiflexion of the wrist against resistance point away from this diagnosis as a possibility. Option (D), olecranon bursitis, is incorrect because this condition involves inflammation of the bursa overlying the olecranon process and none of the physical examination findings in the patient described are suggestive of this condition. Option (E), sprain of the lateral collateral ligament, is incorrect because the physical examination finding of no pain elicited on varus or valgus stress of the elbow excludes this condition as the most likely diagnosis. Additionally, activities that involve overhead throwing, such as baseball in the patient described, are more likely to involve the medial collateral ligament rather than the lateral collateral ligament.

Question #5

A 32-year-old man comes to the clinic because he has had pain in his back for the past 24 hours. The patient says he first noticed the pain when he awoke in the morning and had difficulty getting out of bed. He had been playing flag football the day before the pain began but did not sustain any injuries during the game. Acetaminophen has provided only minimal relief of the patient's pain. On physical examination, pain is elicited on palpation of the back on the left, lateral to the region of L2-L5. Full range of motion is noted in vertebral flexion, extension, lateral rotation, and lateral bending, with some hesitancy because of pain on the left side. Which of the following is the most appropriate initial step?

- A. **Anti-inflammatory and muscle relaxant therapy**
- B. CT scan of the lumbar spine
- C. Epidural injection of a corticosteroid
- D. MRI of the lumbar spine
- E. Strict bed rest and application of moist heat to the lower back

Content Area: Spine (7%)

Critique

This question tests the examinee's ability to recognize signs and symptoms of a common musculoskeletal disorder and then determine the most appropriate initial step. The correct answer is Option (A), anti-inflammatory and muscle relaxant therapy. In high-performing or "weekend" athletes, the most common causes of pain in the lower back are musculoligamentous sprains and strains. Typical signs and symptoms include pain and muscle spasm localized over the posterior paraspinous muscles. Range of motion may be decreased because of pain. Pain in the midback as well as neurologic symptoms, which are suggestive of structural deformities, should be absent. During the acute phase, the most appropriate management is therapy with anti-inflammatory drugs and muscle relaxants.

Option (B), CT scan of the lumbar spine, is incorrect because there is no clinical evidence of structural deformity (e.g., fracture) or neurologic symptoms. Option (C), epidural injection of a corticosteroid, is incorrect because although this therapy has been shown to be effective in reducing radicular pain in patients with disk herniation, it is not indicated in the treatment of acute strain or sprain of the back. Option (D), MRI of the lumbar spine, is incorrect because there is no clinical evidence of structural deformity or neurologic complaint (e.g., radiculopathy). Option (E), strict bed rest and application of moist heat to the lower back, is plausible but incorrect because most studies show that patients have a more rapid functional recovery if they maintain some level of activity, even during the acute phase.

Question #6

A 54-year-old man with a history of metastatic lung cancer comes to the office because he had sudden onset of pain in his lower back 24 hours ago. Which of the following findings in this patient differentiates lumbar disk herniation from cauda equina syndrome as the cause of his pain?

- A. Anesthesia of the saddle region
- B. Bilateral weakness of the legs
- C. Impotence
- D. Pain radiating to one buttock**
- E. Urinary incontinence

Content Area: Spine (7%)

Critique

This question tests the examinee's ability to discriminate between clinical characteristics of lumbar disk herniation and cauda equina syndrome. The correct answer is Option (D), pain radiating to one buttock. Most lumbar disk herniations are posterolateral, and 90% to 95% of compressive radiculopathies occur at the level of L4-L5 and L5-S1. Pain associated with disk disease is usually localized to the lower back and gluteal region and commonly radiates down the leg, particularly below the knee. Therefore, pain radiating to one buttock differentiates lumbar disk herniation from cauda equina syndrome. Cauda equina syndrome is typically associated with significant neurologic disability and is caused by an intraspinal lesion caudal to the conus medullaris that impacts two or more of the 18 nerve roots comprising the cauda equina. Clinical manifestations most often include bilateral leg weakness in multiple root distributions (L3-S1); bowel, bladder, and sexual dysfunction; and/or perineal sensory loss (S2-S4). Causes of cauda equina syndrome include neural tube defects, infection or inflammation, trauma, spinal stenosis, or mass lesions (e.g., tumor, ruptured disk).

Therefore, Option (A), anesthesia of the saddle region, Option (B), bilateral weakness of the legs, Option (C), impotence, and Option (E), urinary incontinence, are incorrect because they are characteristic of cauda equina syndrome and do not support the diagnosis of lumbar disk herniation.

Question #7

A 72-year-old man comes to the office for follow-up examination eight weeks after he underwent total arthroplasty of the right hip. The patient's rehabilitation had been progressing fairly well until approximately five days ago, when worsening pain developed in the hip. The patient says the pain is aggravated by walking and persists during sleeping hours even after he takes acetaminophen. Infection of the prosthetic joint is suspected. Which of the following is the most likely causative organism?

- A. **Coagulase-negative staphylococcus**
- B. *Escherichia coli*
- C. Group A beta-hemolytic streptococcus
- D. *Haemophilus influenzae*
- E. *Pseudomonas aeruginosa*

Content Area: Joint Disorders (20%)

Critique

This question tests the examinee's ability to apply scientific concepts to a clinical scenario by discriminating between multiple possible bacterial species to determine the most likely causative organism of an orthopedic infection. The correct answer is Option (A), coagulase-negative staphylococcus. The most commonly cultured microorganism (30% to 43%) from prosthetic joint infections is coagulase-negative staphylococcus. The likelihood of infection with other organisms depends on perioperative or contiguous factors, hematogenous seeding from distant infections, and/or other comorbid diseases. The scenario described does not include any of these factors.

Option (B), Escherichia coli, and Option (E), Pseudomonas aeruginosa, are incorrect because they are gram-negative bacilli, which are uncommon causes of prosthetic joint infection. Gram-negative bacilli account for 3% to 6% of prosthetic joint infections. Option (C), group A beta-hemolytic streptococcus, is incorrect because streptococci account for only 9% to 10% of prosthetic joint infections. Option (D), Haemophilus influenzae, is incorrect because it is a very uncommon cause of prosthetic joint infection. Its absolute burden is unknown.

Question #8

A male neonate who was delivered vaginally at term one hour ago has a deformity of the right foot. On physical examination, plantar flexion of the ankle, inversion of the subtalar joint, and medial subluxation of the talocalcaneal and calcaneocuboid joints are noted. The position of the foot cannot be passively corrected. Which of the following disorders is the most likely diagnosis?

- A. Calcaneovalgus
- B. Congenital clubfoot**
- C. Metatarsus adductus
- D. Pes planus
- E. Tarsal coalition

Content Area: Pediatric (4%)

Critique

This question tests the examinee's knowledge of anatomy and the ability to correlate this knowledge with physical examination findings to determine the diagnosis. The correct answer is Option (B), congenital clubfoot. The physical examination findings described are characteristic of congenital clubfoot.

Option (A), calcaneovalgus, is incorrect because this condition involves the foot in dorsiflexion, not plantar flexion. Option (C), metatarsus adductus, is incorrect because this condition is characterized by deformity that can be passively corrected. Option (D), pes planus, is incorrect because in patients with this condition, the foot is flexible. Option (E), tarsal coalition, is incorrect because this condition typically presents during the second decade of life but can present as early as 3 years of age, when the tarsal bones begin to ossify.

Question #9

A 35-year-old man comes to the primary care office because he has had pain and swelling of his right knee for the past three days. Also, for the past two days, he has felt feverish. The patient is able to ambulate, but walking exacerbates the pain in his knee. Temperature is 39.3°C (102.7°F). On physical examination, the right knee is red, warm to touch, and tender. A large effusion is noted. Which of the following diagnostic studies of the knee is the most appropriate initial step?

- A. Arthrocentesis**
- B. Arthroscopy
- C. Bone scan
- D. CT scan
- E. MRI

Content Area: Infectious Disease/Connective Disorder (5%)

Critique

This question tests the examinee's ability to select the most appropriate study to determine the diagnosis. The correct answer is Option (A), arthrocentesis. The clinical presentation described is characteristic of septic joint. Arthrocentesis for aspiration and analysis of joint fluid is the only diagnostic study that will specify the diagnosis of septic joint.

Option (B), arthroscopy, is incorrect because this study is not the initial step in diagnosis. Option (C), bone scan, is incorrect because this study is appropriate to nonspecifically localize areas of inflammation but cannot be used to distinguish infectious from sterile processes. Option (D), CT scan, and Option (E), MRI, are incorrect because these studies are more sensitive for diagnosing osteomyelitis and periarticular abscesses.

Question #10

A 19-year-old man who is a long-distance runner is referred to the office by his primary care provider because he has had dull, aching pain in his right thigh after running during the past nine months. Six months ago, the patient's primary care provider prescribed ibuprofen, which relieves the pain only temporarily. The patient has no history of specific injury. Physical examination shows no abnormalities of the right lower extremity. X-ray studies of the right femur show cortical thickening of the distal one-third of the shaft with a central nidus measuring approximately 8 mm in diameter. Which of the following is the most likely diagnosis?

- A. Aneurysmal bone cyst
- B. Enchondroma
- C. Osteoblastoma
- D. Osteochondroma
- E. Osteoid osteoma**

Content Area: Benign and Malignant Bone Tumors (5%)

Critique

This question tests the examinee's ability to review a detailed clinical scenario, including history and physical examination findings, evaluate x-ray study findings, and then determine the most likely diagnosis. The correct answer is Option (E), osteoid osteoma. The x-ray finding of cortical thickening with a central nidus is characteristic of osteoid osteoma.

Option (A), aneurysmal bone cyst, is incorrect because although the femur is the most common site of involvement of aneurysmal bone cyst, it usually presents as a large lytic lesion. Option (B), enchondroma, is incorrect because although the distal femur is a potential location for this lesion, it is characterized as a lytic area filled with a calcified matrix. Option (C), osteoblastoma, is plausible but incorrect because although it is closely related to osteoid osteoma, the two are distinguished by the size of the nidus: larger than 2 cm represents osteoblastoma, and 1 cm or less represents osteoid osteoma. In addition, the pain of osteoblastoma is less likely to be relieved by nonsteroidal anti-inflammatory drug therapy. Option (D), osteochondroma, is incorrect because this lesion arises from the growth plate on the metaphyseal side and results in an exostosis that points away from the joint of origin.

Question #11

A 16-year-old girl who plays tennis on her high school team is brought to the emergency department by her parents because she has had pain and worsening swelling of her right knee since she sustained an injury during a match four hours ago. The patient says she was playing on a hard court and fell directly onto her knee. She was able to complete the match. The pain is localized to the anterior aspect of the knee and is dull in nature. The patient rates the pain as 6 on a 10-point scale. Physical examination of the right knee shows a fluctuant mass (5×3 cm) over the patella. Full range of motion is noted, and muscle strength is 5/5. Result of apprehension test is negative. Which of the following is the most likely diagnosis?

- A. Dislocation of the patella
- B. Fracture of the patella
- C. Patellar tendinitis
- D. Prepatellar bursitis**
- E. Rupture of the patellar tendon

Content Area: Soft-Tissue Injuries and Disorders (25%)

Critique

This question tests the examinee's ability to discriminate among various types of injury involving the patella to determine the most likely diagnosis. The correct answer is Option (D), prepatellar bursitis. The history and physical examination findings of a direct blow to the anterior aspect of the knee followed by localized pain, swelling, a fluctuant mass, normal to near-normal range of motion (depending on size of the mass), and normal muscle strength are characteristic of prepatellar bursitis.

Option (A), dislocation of the patella, is incorrect because the patient does not exhibit characteristics of this condition, such as the knee acutely giving way, intense pain, rapid swelling, and deformity. Additionally, findings on range of motion and muscle strength testing would not be expected to be normal if dislocation of the patella were present. Also, negative result of apprehension test effectively excludes dislocation of the patella as a possible diagnosis. Option (B), fracture of the patella, is plausible but incorrect in the patient described for several reasons. Pain from fracture is typically intense and would most likely preclude the patient from completing her tennis match. Additionally, in a patient with fracture of the patella, physical examination is unlikely to show full range of motion and muscle strength is likely to be diminished because of pain. Option (C), patellar tendinitis, is incorrect because this condition typically is the result of an overuse injury from repetitive overloading of the extensor mechanism of the knee. The physical examination findings in the patient described are not consistent with patellar tendinitis. Option (E), rupture of the patellar tendon, is incorrect because this injury would cause pain and swelling localized to the patellar tendon and decreased muscle strength because of pain. Complete rupture of the patellar tendon would manifest as inability to extend the knee.

Question #12

A 35-year-old woman who is obese comes to the orthopedic clinic because she has pain and swelling of her right ankle 24 hours after she sustained a twisting injury when she slipped on an icy sidewalk. Physical examination shows tenderness, edema, and ecchymosis of the right ankle. X-ray studies of the ankle show a bimalleolar fracture with widening of the syndesmosis. Which of the following is the most appropriate management?

- A. Application of a long leg cast
- B. Application of a short leg cast
- C. Application of a walking boot
- D. Closed reduction and external fixation
- E. Open reduction and internal fixation**

Content Area: Fractures/Dislocations (25%)

Critique

This item tests the examinee's ability to recognize the signs and symptoms of a common musculoskeletal disorder and interpret findings of x-ray studies to determine the appropriate management. The correct answer is Option (E), open reduction and internal fixation. This intervention is necessary for restoration of stability and anatomic alignment of the ankle joint and syndesmosis. The patient described has a bimalleolar fracture, which is inherently unstable, requiring surgical reduction and stabilization to restore function and prevent long-term complications such as posttraumatic arthritis.

Option (A), application of a long leg cast, and Option (B), application of a short leg cast, are incorrect because these interventions would not adequately stabilize the fracture and the syndesmotic injury in the patient described. Furthermore, application of a cylindrical cast is contraindicated in a patient with an acute fracture of the ankle because this intervention increases the risk for neurovascular compromise from associated swelling. Option (C), application of a walking boot, and Option (D), closed reduction and external fixation, are incorrect because these interventions would also not adequately stabilize the fracture and the syndesmotic injury in the patient described.

Question #13



A 75-year-old man is referred to the clinic by his primary care provider because he has pain in his left shoulder that has been worsening over the past six months. The patient says the pain has progressed to the extent that he can no longer play golf or enjoy his hobby of cabinet making. He has been treated with one injection of a corticosteroid and has been compliant with physical therapy for the past three months, but he has not had significant relief of his pain. He has no history of injury to the shoulder. On physical examination, range of motion of the shoulder shows forward flexion and abduction to 75 degrees. X-ray study of the shoulder is shown. Which of the following is the most appropriate next step in management of this patient's condition?

- A. Arthroscopic debridement of the shoulder
- B. Arthroscopic repair of the rotator cuff
- C. Hemiarthroplasty of the shoulder
- D. Open repair of the rotator cuff
- E. **Reverse total arthroplasty of the shoulder**

Content Area: Joint Disorders (20%)

Critique

This question assesses the examinee's ability to correctly interpret an x-ray study, recognize the signs and symptoms of a common musculoskeletal disorder, and select the most appropriate management.

The correct answer is Option (E), reverse total arthroplasty of the shoulder, because this procedure is indicated for chronic rotator cuff arthropathy that has failed multiple nonoperative treatments. The x-ray shown shows an elevated humeral head indicating chronic retracted tear of the rotator cuff.

Option (A), arthroscopic debridement of the shoulder, is incorrect because this intervention is unlikely to improve function or provide significant pain relief in a patient with significant glenohumeral arthrosis, as seen on the x-ray study shown. Option (B), arthroscopic repair of the rotator cuff, and Option (D), open repair of the rotator cuff, are incorrect because the x-ray study indicates a longstanding irreparable tear of the rotator cuff. Option (C), hemiarthroplasty of the shoulder, is incorrect because this intervention is contraindicated in a patient with a large rotator cuff tear.

Question #14

A 56-year-old woman comes to the primary care office because she has had worsening numbness and tingling in her right hand over the past four months. During the past week, she also has had shooting pains from the wrist to the hand that waken her from sleep. On physical examination, results of Phalen and Tinel tests are positive. Which of the following studies of the wrists and hands is most appropriate to confirm the diagnosis in this patient?

- A. CT scan
- B. MRI
- C. Nerve conduction studies**
- D. Ultrasonography
- E. X-ray studies

Content Area: Soft-Tissue Injuries and Disorders (7%)

Critique

This question tests the examinee's ability to review a detailed clinical scenario and determine the most appropriate additional study to confirm the suspected diagnosis. The correct answer is Option (C), nerve conduction studies. This patient's symptoms are consistent with carpal tunnel syndrome. The appropriate study for evaluation of nerve function is a nerve conduction study.

Option (A) CT scan, is incorrect because this study is not indicated for evaluation of a patient with suspected carpal tunnel syndrome, as described in the scenario, because it does not assess nerve function. Option (B), MRI, is incorrect because although this study may be indicated for evaluation of patients with suspected carpal tunnel syndrome due to a suspected anatomic abnormality, it is not considered the most appropriate initial confirmatory study because it does not confirm the diagnosis. Option (D), ultrasonography, is incorrect because although ultrasonography may be indicated for evaluation of suspected carpal tunnel syndrome due to a suspected anatomic abnormality, it is not considered the most appropriate initial confirmatory study because it does not assess nerve function. Option (E), x-ray studies, is incorrect because although x-ray studies may be used to rule out another cause of wrist pain such as arthritis or a fracture, they do not assess nerve function.