



## Orthopedics

Glenn Loomis and William J. Martin

*Things to remember for the test.*

- Which of the following is *not* a function of the human bony skeleton?
  - To serve as a chemical storehouse for calcium and phosphate
  - To provide motor power
  - To serve as a protective shell for underlying soft tissues
  - To serve as a factory for blood production

*Review this!*
- Which of the following statements about greenstick fractures is true?
  - They commonly occur as a result of rotational forces applied to long bones.
  - They are rarely seen among the pediatric population.
  - They are commonly seen among the elderly.
  - They frequently occur when angular force is applied to a long bone.

*Review this!*
- A 35-year-old male patient presents to the emergency room with a chief complaint of a fall from a 12-foot ladder, from which he landed with his right arm extended. He is extremely tender around the distal radius and the ulna. There is marked swelling and what appears to be a small puncture site in the area of the swelling, with minimal active bleeding and no exposed bone. An x-ray reveals that the patient has complete, transverse fracture of the distal third of his ulna, with approximately 20 degrees of angulation. The area of interrupted skin appears to be overlying the fracture site. Which of the following is the most appropriate next step in the management of this patient?
  - Set up an immediate surgical consultation for wound irrigation and debridement.
  - Have the patient rest, ice, and elevate the arm. Place the arm in a short arm splint, and ask the patient to return in 2 weeks for casting.
  - Prescribe 2 weeks of oral antibiotics along with splinting and pain medicine until the swelling subsides enough that the arm may be casted safely.
  - Perform a closed reduction of the fracture with gentle traction. The arm should be placed in a short arm cast with slight radial deviation of the wrist to allow for correct healing of the ulnar fracture.

*Review this!*
- True or false: The epiphyseal plate in growing bone is weaker than the ligaments and tendons that attach nearby.
  - True
  - False

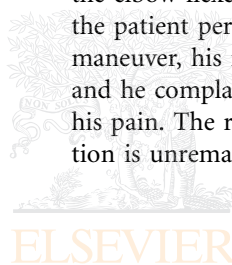
*Review this!*
- Which of the following joints does not contribute to the true functional shoulder joint?
  - The glenohumeral joint
  - The scapuloclavicular joint
  - The acromioclavicular joint
  - The sternoclavicular joint

*Review this!*
- A patient has a single fracture line moving through the distal radial epiphyseal plate and extending into the metaphysis that is visible on x-ray. The periosteum is intact on the concave side of the injury, and there is no angulation or comminution. Classify the injury using the Salter–Harris classification system.
  - Salter–Harris type I
  - Salter–Harris type II
  - Salter–Harris type III
  - Salter–Harris type IV

*Review this!*

7. A mother brings her 8-year-old son to see you in the emergency room during the night. She states that she awoke to hear her son crying in his bedroom. It appeared that he had fallen from the top bunk of his new bunk bed set and landed on his right shoulder. The child was crying and holding his arm at his side, and he was reluctant to move it. Upon examination, you see an otherwise healthy 8-year-old male who is appropriately developed for his age and who is holding his right arm at his side. There is tenderness and swelling at about the middle third of his clavicle, with palpable crepitus. There is no pain directly over the AC or SC joints. The patient is reluctant to allow you to passively manipulate his arm. Neurovascular examination is intact, and the patient has symmetrical radial pulses. Select the most likely diagnosis and the appropriate management from the options below.
- The patient likely has an AC joint separation, and he should have radiographs of the shoulder, including the AC joint.
  - The patient likely has a fracture of his clavicle, and he should have radiographs of the entire length of the clavicle and shoulder to rule out other bony pathology.
  - The patient likely has a torn rotator cuff, and he should have magnetic resonance imaging to rule out both bony and tendinous injury.
  - The patient likely has a shoulder contusion, and he requires no further imaging or workup.
- Review this!*
8. On x-ray, you notice a superiorly displaced distal clavicle without fracture of either the clavicle or the acromion process. The width of the displacement is slightly less than the width of the clavicle itself, and there is no sign of overlying skin interruption. Which of the following is the appropriate grade for this type of AC joint separation?
- Grade 0
  - Grade 1
  - Grade 2
  - Grade 3
- Review this!*
9. During the physical examination of a 45-year-old male with complaints of chronic right shoulder pain, you notice that his right scapula has an asymmetrical appearance with respect to his left scapula and that it appears to “wing” outward during the active protraction of his arms against resistance. Entrapment of which nerve would account for these physical examination findings?
- The spinal accessory nerve
  - The long thoracic nerve
  - The deltoid nerve
  - The median nerve
- Review this!*
10. Which of the following groups of muscles comprise the rotator cuff?
- Supraspinatus, infraspinatus, teres major, and biceps brachialis
  - Subscapularis, infraspinatus, teres minor, and brachioradialis
  - Supraspinatus, infraspinatus, teres minor, and subscapularis
  - Subscapularis, infraspinatus, brachioradialis, and biceps brachialis
- Review this!*
11. In your office, you see a 21-year-old male pitcher for a local collegiate baseball team with a chief complaint of shoulder pain. The patient states that he has had pain in his shoulder exacerbated by repetitive throwing motions for some time. The pain has recently changed, and for the past 4 days, it has been constant. He states that the new pain began during the sixth inning of a game in which he was the starting pitcher. He cannot recall any specific mechanism of injury, but he states that, since that game, his pain has gotten worse and now wakes him from sleep routinely. He denies any numbness or tingling in his hand, but he does describe weakness about the shoulder that he has not noticed before. His examination is remarkable for marked unilateral weakness to resisted abduction of the shoulder as well as external rotation with the elbow flexed to 90 degrees. When the patient performs the “empty can” maneuver, his right arm falls to his side, and he complains of severe worsening of his pain. The rest of his physical examination is unremarkable. What is the most

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appropriate next step in the management of this patient?

- A. The patient likely has rotator cuff tendonitis, and he should be given oral nonsteroidal anti-inflammatory medications and instructions for cuff-strengthening exercises.
- B. The patient likely has rotator cuff impingement, and he should be reassured that the condition will improve with rest and icing.
- C. The patient likely has rotator cuff tendonitis, and he should be given a 5-day course of oral prednisone along with a referral to physical therapy.
- D. The patient likely has a torn rotator cuff, and he should undergo magnetic resonance imaging of the shoulder. He should also be referred to an orthopedic surgeon for possible correction of the defect.

Review this!

12. In your office, you see a 17-year-old female tennis player. She tells you that, during her most recent high school tournament 3 weeks ago, she dislocated her shoulder during a service swing and had to be taken by her assistant coach to the emergency room. She states that the emergency room physician was able to put her shoulder back in place, and her pain has resolved slowly since the incident. She and her parents were very frightened by the incident, and they would like to know about her chances of having the same thing happen again. You tell her that, among young patients with similar histories, the chance of recurrence after a first-time dislocation is which of the following?
- A. 10%
  - B. 50%
  - C. 75%
  - D. 90%

Review this!

13. Which of the following statements about lateral epicondylitis or “tennis elbow” is false?
- A. It is thought to be primarily the result of inflammation surrounding the lateral epicondyle of the ulna.

- B. It is often caused by repetitive overuse of the wrist extension and forearm supinator muscles.
- C. Microtears, chronic granulation tissue, and scar-tissue formation are commonly seen in pathological specimens of surgical cases of “tennis elbow.”
- D. Patients may complain of pain worsened by gripping and lifting exercises, particularly with the palm down.

Review this!

**For Questions #14 and #15, refer to the following clinical scenario:**

In your office, you see a 22-year-old male water polo player for a chief complaint of medial elbow pain. The patient states that his pain began during his most recent match, when he was attempting to throw the ball into the opposing team’s goal. During his throwing motion, he noted pain in the medial aspect of his elbow, along with a loss of throwing velocity. Later that evening, he noted some tingling in his fourth and fifth fingers. He has never had problems of this nature before. On physical examination, the patient has a full range of both active and passive motion about the shoulder. His rotator cuff examination is unremarkable. He has marked tenderness on palpation of the medial aspect of his elbow, and he has tenderness with valgus stress of the elbow. No instability is appreciated, and his neurovascular examination is intact, with the exception of decreased sensation to light touch in the fourth and fifth digits.

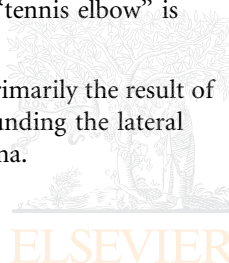
14. Which of the following injuries best explains this patient’s constellation of symptoms and his physical examination findings?

- A. Medial epicondylitis
- B. Lateral epicondylitis
- C. Olecranon bursitis
- D. Ulnar collateral ligament injury

Review this!

15. In the above scenario, the patient asks you how long it will be before he can return to water polo competition. What do you tell him?

- A. After 2 weeks of rest and nonsteroidal anti-inflammatory medication, he will be able to return to play.
- B. When he is pain free on examination and after he has completed rehabilitation



exercises, a slow reintroduction to throwing activities may begin.

- C. There is no need for him to restrict his activities at all, because his condition is not related to water polo.
- D. He has likely suffered a career-ending injury, and, even with surgical correction, his chances of returning to his previous level of sport are less than 10%.

Review this!

16. In your office, you see a 42-year-old female patient with a chief complaint of elbow pain. On questioning, she states that she had taken her niece ice skating the previous day when she fell, landing on her outstretched right arm. She immediately noted pain and swelling in her elbow that was worsened by motion and localized to the lateral aspect of the elbow. You suspect that she may have fractured her radial head. Your clinical suspicion is confirmed when her elbow radiographs (Figure 42-1) demonstrate a single, nondisplaced fracture of the radial head. Her neurovascular examination is fully intact, and dual energy x-ray absorptiometry reveals T scores and Z scores within the normal range. Treatment of this patient's fracture should include which of the following?
- A. Splinting for 14 days or until her swelling has subsided, followed by immobilization in a long arm cast for 4 to 6 weeks

- B. Computed tomography scanning to delineate the fracture more completely, followed by orthopedic referral
- C. Splinting and sling immobilization until pain is controlled, followed by early mobilization
- D. Surgical consultation for complete excision of the radial head

Review this!

17. In your office, you see a 38-year-old female patient with a chief complaint of elbow pain. She tells you that 2 days prior she was rollerblading with her 15-year-old daughter. While doing this, she lost her balance and fell backwards, landing on her right elbow. She was not wearing any protective gear. She immediately felt pain and swelling in the area of her elbow, which has gotten progressively worse. On physical examination, you note pain on palpation of the olecranon and a palpable step-off deformity. You obtain anteroposterior and lateral views of the elbow, which show a 5-mm displaced complete fracture of the olecranon. With flexion of the elbow to 90 degrees, the displacement increases to 6.5 mm. The neurovascular examination is fully intact, and the remainder of the patient's physical examination is unremarkable. What is the most appropriate management for the injury described in the case above?
- A. A long-arm cast with the elbow at 45 to 90 degrees of flexion for 6 weeks

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- B. A long-arm cast with the elbow at 45 to 90 degrees of flexion for up to 3 weeks, followed by gentle range-of-motion activities to avoid excessive stiffness and potential long-term motion loss at the elbow
- C. Referral to an orthopedic surgeon for open reduction and internal fixation or excision of the fracture fragment
- D. Rest, ice, elevation, and pain management for 14 days or until the swelling subsides, followed by 3 weeks of casting and early mobilization

Review this!

**For Questions #18 and #19, refer to the following clinical scenario:**

In your office, you see a 52-year-old male patient with a chief complaint of right wrist pain. The patient states that he is a computer programmer and that he noticed this pain beginning approximately 6 months ago and progressing to this point. Also, for the past 3 weeks, he has noted some pins-and-needles sensation throughout his fingers. On physical examination, you document slightly decreased sensation to light touch over the right thumb and first two digits. You also notice that, when asked to grasp your index and middle fingers in his hands and hold them tightly, the patient loses grip with his right hand and allows your fingers to slip away. This does not happen with his left hand.

18. Which test is not indicated for the patient's condition?
- A. Tapping over the flexor retinaculum of the affected wrist to illicit a pain response
  - B. Magnetic resonance imaging of the patient's distal right extremity, with focus on the carpal tunnel
  - C. Having the patient flex his wrists to 90 degrees, holding the dorsal aspects of the hands back to back, and holding the position for 1 minute or until symptoms develop
- Review this!
19. Which of the following is the most appropriate initial management of this patient?
- A. An injection of 2% lidocaine along with depot corticosteroids under sterile technique into the carpal tunnel

- B. Oral nonsteroidal anti-inflammatory medications and return to previous activity
- C. Surgical decompression of the flexor retinaculum by a qualified hand surgeon, followed by physical therapy
- D. Oral analgesic therapy along with ergonomic changes to his computer station to minimize stress on the wrist

Review this!

20. Pain when the thumb is flexed and abducted, the fingers are closed around the thumb, and the wrist is placed into ulnar deviation is known as \_\_\_\_\_, and it is indicative of \_\_\_\_\_.

- A. Tinel's test; de Quervain's tenosynovitis
- B. Phalen's sign; carpal tunnel syndrome
- C. Finkelstein's test; de Quervain's tenosynovitis
- D. Martin's sign; scaphoid fracture

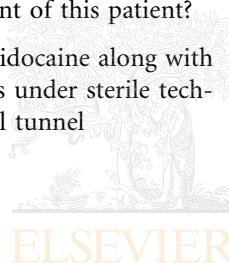
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**For Questions #21 and #22, refer to the clinical scenario below:**

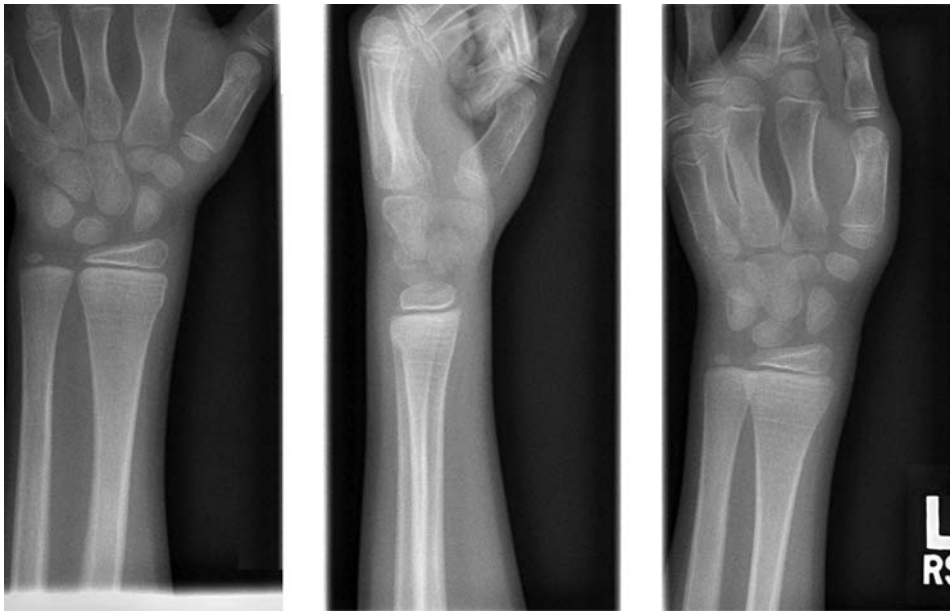
In the emergency room, you see a 16-year-old female patient with a chief complaint of pain in her left wrist. The patient tells you that she is currently running track and that, during today's meet, she fell while running the hurdles. She tripped over one of the hurdles, and, in an attempt to catch herself, she fell on her outstretched left hand. She immediately noted pain and swelling of her left wrist, and she is actively guarding the injury with her right hand. She is extremely reluctant to allow you to examine her because of the severity of her pain. You decide to obtain radiographic images to rule out a fracture before examining the patient.

21. Figure 42-2 shows a three-view radiographic series of the patient's left wrist. Following a review of these images, you examine the patient and find that she is palpably tender over the distal radius and that her pain is worsened with movement. Which of the following should be your diagnosis?
- A. Nondisplaced distal ulnar fracture
  - B. Salter-Harris type III fracture
  - C. Nondisplaced distal radial fracture
  - D. Wrist sprain without evidence of fracture

Review this!







**Figure 42-2** Copyright James L. Moeller, MD. In Raket RE, editor: *Textbook of family medicine*, ed 7, Philadelphia, WB Saunders, 2007.

22. On further examination, you notice that the patient is also tender in the area of the anatomic snuff box. You order another image (Figure 42-3) to include a view of the scaphoid. It clearly shows a transverse fracture through the waist of the scaphoid bone. What is the proper management of this injury?

- A. An orthopedic consultation for percutaneous pinning of the fracture site
- B. Thumb spica casting with close radiographic evaluation to document proper healing of the fracture
- C. Short-arm casting for 3 weeks, followed by early mobilization
- D. Thumb spica splint to be worn at night, with daily mobilization exercises to prevent range-of-motion restriction from developing

Review this!



**Figure 42-3** Copyright James L. Moeller, MD. In Raket RE, editor: *Textbook of family medicine*, ed 7, Philadelphia, WB Saunders, 2007.

23. In the emergency room, you see a 63-year-old male patient with a chief complaint of right knee pain. He has never had pain of this nature before. The pain began with minimal swelling around his knee several days ago. Since that time, his knee has become more painful and more swollen. The patient states that he cannot remember any specific injury taking place or any other event that could explain his symptoms. He

also notes that, when he awoke this morning, he felt warm; when his wife took his temperature, it was 100.3°F. On physical examination, the patient is a slightly obese male with a swollen and red right knee. The

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Things to remember for the test.

patient will not move his knee actively at all, and he is very apprehensive about allowing you to move it. When you palpate the patient's knee, it is exquisitely tender, and it feels warm to your touch. The patient has a history of poorly controlled diabetes mellitus. What is the proper course of management for this patient?

- A. Knee-joint aspiration under sterile technique with fluid analysis, including gram stain, cell count, culture, and crystal evaluation; immediate orthopedic referral
- B. Knee-joint aspiration under sterile technique with fluid Gram stain and culture and 4 weeks of oral antibiotics directed at the suspected offending organism
- C. Serial aspiration of the patient's knee for pain-control purposes and weekly radiographic evaluation
- D. Knee-joint aspiration under sterile technique with fluid Gram stain and culture and 2 weeks of intravenous antibiotics followed by 2 weeks of oral antibiotics directed at the suspected offending organism

Review this!

24. In your office, you see a 13-year-old boy who has been brought by his mother for a chief complaint of bilateral knee pain. She states that her son has constantly complained of pain in both of his knees for the past 3 months. He is a very active athlete, and she is concerned that he may have injured his knees. He has undergone a bit of

a “growth spurt” over the past 6 months or so. The mother believes that her husband's mother had rheumatoid arthritis in her later years. On physical examination, the boy appears to be in generally good health, and he is appropriately developed for his age. The ligamentous examination of his knee is within normal limits and symmetrical. He has full range of motion about the knee, and his only significant clinical finding is palpable tenderness over the tibial tubercle. You tell the mother that her son has which of the following?

- A. Apophysitis of the tibial tubercle, requiring straight-leg braces and 2 weeks of immobilization
- B. Patellar tendons that have been avulsed from their attachment points on the anterior tibia, requiring surgical correction
- C. Possibly an early presentation of juvenile rheumatoid arthritis; blood work can be done to rule this out
- D. Osgood–Schlatter disease, which will most likely improve with rest, flexibility exercises, and gradual return to activity.

Review this!

25. While you are performing the examination shown below, the patient grimaces and reaches for the knee that you are examining (Figure 42-4). This sign is known as \_\_\_\_\_, and it is indicative of \_\_\_\_\_ having taken place at some point in the past.



**Figure 42-4** See Color Insert. Copyright Mark R. Hutchinson, MD. In Rakei RE, editor: *Textbook of family medicine*, ed 7, Philadelphia, WB Saunders, 2007.

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- A. Lachman's sign; medial collateral ligament injury
- B. Apprehension sign; patellar dislocation
- C. Posterior drawer sign; posterior cruciate ligament injury
- D. Apprehension sign; septic arthritis

*Review this!*

26. Which of the following structures is not associated with a twisting or valgus mechanism of injury to the knee?

- A. Posterior cruciate ligament
- B. Medial collateral ligament
- C. Medial meniscus
- D. Anterior cruciate ligament

*Review this!*

27. In your office, you see a 34-year-old female patient who has had a chief complaint of knee pain for 2 weeks after a motor vehicle accident. During the accident, she suffered several injuries, including multiple fractured ribs, "whiplash," and a number of lacerations. After the accident, her right knee was swollen and tender, but she had attributed her symptoms to having struck her leg on her dashboard. Because she was recovering from her other injuries, her knee was not particularly debilitating to her. Since she has returned to walking, however, she has noticed some feelings of instability in her knee. On physical examination, she has firm endpoints with Lachman's testing, varus and valgus stress. On posterior drawer testing, the patient has posterior sagging of her distal lower extremity, no appreciable endpoint, and significant pain. During ambulatory examination, the patient has significant difficulty. Which of the following is the most appropriate course of treatment?

- A. Straight-leg bracing for 4 to 6 weeks with appropriate pain control, followed by rehabilitation
- B. Injection of 2% lidocaine and depot corticosteroids within the knee joint, followed by physical therapy and rehabilitation
- C. Surgical reconstruction of the posterior cruciate ligament by an orthopedic surgeon
- D. Conservative treatment with nonsteroidal anti-inflammatory medications and physical therapy with a focus on quadriceps rehabilitation

*Review this!*

28. Which of the following ligaments of the ankle is the most commonly injured during an ankle sprain?

- A. Anterior talofibular ligament
- B. Calcaneofibular ligament
- C. Posterior talofibular ligament
- D. None of the above

*Review this!*

29. In your office, you see a 17-year-old female who suffered an inversion injury to her ankle during a volleyball match the previous day. Immediately after the injury, she could bear weight for 5 to 6 steps, and she can bear weight for 10 steps with discomfort now in your office. She has experienced swelling and discoloration. On physical examination, she has mild anterior drawer laxity and swelling about the ankle, with no appreciable pain over the distal tip of the fibula. Which of the characteristics suggest that her ankle injury should be x-rayed according to the "Ottawa rules" for ankle injury?

- A. The patient's age
- B. The mechanism of her injury
- C. Her inability to bear weight without pain 24 hours after an acute ankle injury
- D. The laxity noted during the anterior drawer testing by the examiner

*Review this!*

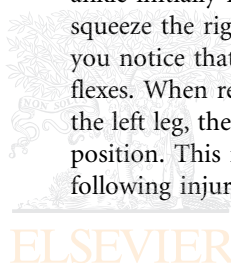
30. Figure 42-5 shows an example of heterotopic ossification. This adverse outcome occurs after 25% to 90% of cases of which of the following types of injury?

- A. Grade 3 ankle sprain
- B. Ankle sprain with syndesmosis sprain
- C. Distal fibular fracture
- D. Ankle mortise fracture

*Review this!*

31. During the examination of a patient who you suspect may have an Achilles tendon injury, you perform the following examination. With the patient lying prone and with his knee flexed to 90 degrees and his ankle initially in the neutral position, you squeeze the right mid gastrocnemius, and you notice that the patient's foot plantar-flexes. When repeating the examination on the left leg, the ankle remains in the neutral position. This is indicative of which of the following injuries?

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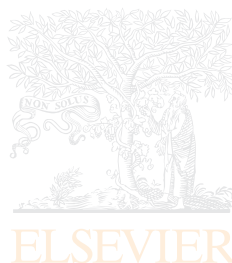


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**Figure 42-5** Copyright James L. Moeller, MD. In Rakel RE, editor: *Textbook of family medicine*, ed 7, Philadelphia, WB Saunders, 2007.

- A. Chronic Achilles tendonitis on the right, with scarring of the tendon  
 B. Gastrocnemius strain on the right, with voluntary guarding  
 C. Probable Achilles tendon rupture on the left  
 D. Leg-length discrepancy causing right-sided Achilles tendonitis  
*Review this!*
32. For which of the following conditions is a cortisone injection typically not recommended?  
 A. Plantar fasciitis  
 B. Achilles tendonitis  
 C. Infrapatellar bursitis  
 D. Trochanteric bursitis  
*Review this!*
33. In your office, you see a 55-year-old female patient with a chief complaint of foot pain. The patient tells you that she runs 10 miles a week and that she has had this pain for several months, without resolution. She describes the pain as being sharp and stabbing in nature, and she says that it is located in her heel. She denies any specific injury that may have led to this problem. The pain seems to bother her more in the morning and then subsequently less throughout the day. As she rises from her chair to move to the examination table, she winces in pain with her first step and states, "That was the pain just then." Which of the following is your tentative diagnosis?  
 A. Calcaneal fracture  
 B. Achilles tendonitis  
 C. Plantar fasciitis  
 D. Avulsion fracture of the calcaneus  
*Review this!*
34. In which of the following patients is a normal-appearing x-ray not sufficient to rule out a fracture?  
 A. A 35-year-old female with a history of fall on an outstretched hand and tenderness in the anatomic snuff box  
 B. A 13-year-old male basketball player with a history of an inversion ankle injury and mild laxity on anterior drawer testing of the ankle  
 C. A 22-year-old female with a history of a fall landing on her flexed elbow and palpable tenderness over the olecranon process  
 D. A 45-year-old retired football player with chronic pain behind his right patella  
*Review this!*
35. Which rotator cuff muscle does the physical examination shown in Figure 42-6 isolate and test?  
 A. Supraspinatus  
 B. Teres minor  
 C. Subscapularis  
 D. Infraspinatus  
*Review this!*





**Figure 42-6** See Color Insert. Copyright Mark R. Hutchinson, MD. In Rakel RE, editor: *Textbook of family medicine*, ed 7, Philadelphia, WB Saunders, 2007.

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36. Which of the following fractures would be least likely to require surgical correction?
- A Salter–Harris type IV fracture of the distal radial epiphysis
  - A nondisplaced fracture through the proximal third of the fifth metatarsal
  - A 0.5-cm superiorly displaced fracture of the middle third of the clavicle
  - A distal fibular fracture with evidence of widening of the ankle mortise
- Review this!*
37. For which of the following fracture types is short-arm casting the most appropriate form of immobilization?
- Distal radial fracture
  - Nondisplaced olecranon fracture
  - Nondisplaced radial head fracture
  - Scaphoid fracture
- Review this!*
38. Which of the following bones is the most commonly fractured in humans?
- Radius
  - Scaphoid
  - Clavicle
  - Femur
- Review this!*
39. Digital flexor tendon tenosynovitis or “trigger finger” is commonly described by which of the following?
- The inability to relax a finger from the flexed position, resulting in the appearance of holding a pistol
  - A nodular growth on the flexor tendon of one of the fingers in the area where the finger would make contact with a trigger
  - A finger that sticks in a partially flexed position and that, with continued attempts at flexion, will finally complete the motion
  - A loss of flexion motion in the index finger as a result of thickening and fibrosis of the flexor tendon
- Review this!*
40. In your office, you see a 14-year-old girl who has fractured her distal radius. The fracture is slightly angulated, and it will require closed reduction. In the area of the fracture, the patient has a tender, swollen, purple discoloration, which is not expanding in size. Before closed reduction of the fracture, you pass a needle under sterile conditions into the swollen area, and you aspirate what appears to be old blood. Without withdrawing the needle, you inject some 2% lidocaine and proceed with the reduction. This procedure is known as which of the following?
- Fracture block
  - Hematoma block
  - Reduction block
  - Bone block
- Review this!*

