

COMPREHENSIVE MOCK EXAM 2

Supplemental to: Sports Medicine Board Review 2026-2027

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*ABFM Certificate of Added Qualification in Sports Medicine (CAQSM) One-Day Exam
— 200 questions, single-best-answer, four-option, domain-weighted per the ABFM Sports
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Board-Review Questions

1. A team physician is asked by a college athletic director to clear a nationally ranked athlete to play in a championship game despite the physician's clinical judgment that the athlete has not yet met safe return-to-play criteria after a concussion. Which principle should govern the physician's decision?

- A. The athletic director's institutional authority over program outcomes takes precedence in high-stakes competition
- B. The team physician holds independent medical authority over return-to-play decisions, which supersedes coaching or administrative pressure
- C. A signed liability waiver from the athlete's family shifts decision-making authority to the family
- D. Return-to-play decisions should be deferred to the athlete's own self-assessment of readiness

2. A sports medicine physician is designing a study comparing two bracing strategies for lateral ankle sprain recurrence in collegiate soccer players. To minimize selection bias when assigning athletes to treatment groups, which methodology is most appropriate?

- A. Allowing athletic trainers to assign athletes to whichever brace they believe suits the athlete's foot type
- B. Assigning treatment based on the order in which athletes present to the training room each day
- C. Allowing athletes to choose their preferred brace after being informed of study goals
- D. Randomizing athletes to treatment groups using a computer-generated allocation sequence

3. During a mass-participation marathon, the medical director is organizing the on-course care structure. Which principle of event medical planning is most critical to reducing morbidity from exertional heat stroke?

- A. Requiring all runners to submit a pre-race cardiology clearance form regardless of risk factors
- B. Staffing the finish line exclusively with orthopedic specialists given the predominance of musculoskeletal complaints
- C. Limiting on-course medical coverage to every fifth mile to conserve staffing resources
- D. Pre-positioning cold-water immersion capability at aid stations along the course, not only at the finish line

4. A physician is explaining the biomechanical adaptation of tendon to repetitive submaximal loading in a distance runner. Which best describes the primary tissue-level response to appropriately progressive tendon loading?

- A.** Progressive mechanical loading stimulates tenocyte-mediated collagen synthesis and cross-linking, increasing tendon stiffness and load capacity over time
- B.** Tendon responds to loading exclusively through hypertrophy of the muscle-tendon junction, with no intrinsic tendon adaptation
- C.** Tendon is metabolically inert and does not remodel in response to mechanical stimulus in adults
- D.** Loading increases tendon stiffness solely through increased water content within the extracellular matrix

5. A sports medicine fellow is planning the initial imaging workup for suspected osteochondritis dissecans (OCD) of the knee in an adolescent athlete. Which imaging approach provides the most appropriate baseline anatomic assessment before advancing to MRI?

- A.** Weight-bearing PA notch view alone, without other radiographic views
- B.** Non-weight-bearing lateral view only, to avoid superimposition of the patella
- C.** A standard four-view knee series: weight-bearing AP, notch, lateral, and sunrise views
- D.** Bone scan as the first-line imaging modality prior to any radiographs

6. A team physician is caring for a professional athlete and is approached by a beat reporter asking for details about the athlete's recent MRI findings following a hamstring injury. What is the appropriate response consistent with the team physician's professional role?

- A.** Decline to disclose any protected health information without the athlete's explicit authorization, regardless of the team's public relations interests
- B.** Share general findings since the team's media relations department has already confirmed the athlete was injured
- C.** Disclose the information because the team, not the athlete, is the physician's paying client
- D.** Provide a summary description without naming the specific structures involved, since this is not considered protected information

7. A team physician is developing an event coverage plan for an outdoor youth football tournament expected to draw several thousand spectators and players over a single hot, humid day. Which is the most appropriate first step in medical resource allocation?

- A.** Conduct a pre-event risk assessment covering expected volume, WBGT/environmental conditions, and venue hazards to set staffing and equipment needs
- B.** Assign a single athletic trainer to cover the entire tournament regardless of field count or participant volume
- C.** Wait until game day to determine medical needs based on observed weather conditions
- D.** Rely solely on the host venue's existing ambulance contract without conducting an independent assessment

8. A collegiate athlete is progressing through a structured rehabilitation program after ACL reconstruction. Which principle should guide advancement from one phase of rehabilitation to the next?

- A.** Advancement should occur strictly according to a fixed week-by-week calendar regardless of the athlete's functional status
- B.** Advancement should be based primarily on the athlete's subjective confidence in the knee, independent of objective testing
- C.** Advancement should be delayed uniformly by an additional three months beyond typical timelines for all athletes regardless of progress, to minimize any risk
- D.** Advancement should be criterion-based, driven by objective functional and strength milestones rather than a fixed calendar timeline

9. A team physician has a financial relationship with a supplement manufacturer and is asked by the coaching staff to recommend the company's product to the team. What is the most appropriate action?

- A.** Recommend the product without disclosure, since supplement recommendations are not considered part of formal medical care
- B.** Decline to disclose the relationship but recommend a different, unrelated product instead to avoid the appearance of conflict
- C.** Disclose the relationship only if directly asked by an athlete
- D.** Disclose the financial relationship to the athletes, administration, and compliance body before recommending, and consider recusal

10. A sports medicine physician is counseling an athlete beginning a structured aerobic training program about expected physiological adaptations. Which change is a well-established central cardiovascular adaptation to sustained endurance training?

- A.** A decrease in total blood volume, which improves cardiac efficiency by reducing preload
- B.** Increased stroke volume and maximal cardiac output, contributing to a higher VO₂max
- C.** A reduction in mitochondrial density within trained skeletal muscle
- D.** A decrease in capillary density surrounding trained muscle fibers

11. A sports medicine physician is counseling a sedentary 52-year-old patient with prediabetes on an exercise prescription for chronic disease prevention. Which exercise recommendation has the strongest evidence for reducing progression to type 2 diabetes?

- A.** High-intensity interval training performed once weekly, with no additional activity on other days
- B.** Aerobic activity limited to 60 minutes per week, provided intensity is maximal
- C.** Resistance training alone, with aerobic activity specifically avoided due to theoretical glycemic instability
- D.** At least 150 minutes per week of moderate-intensity aerobic activity combined with resistance training on 2 or more days per week

12. A physician is writing an exercise prescription for a 45-year-old with newly diagnosed stage 1 hypertension who has no other cardiovascular risk factors and is medically cleared for exercise. Which prescription best reflects current guideline recommendations for blood pressure reduction?

- A.** Moderate-intensity aerobic exercise most days, plus dynamic resistance training 2-3 days weekly
- B.** Isometric resistance exercise exclusively, avoiding all dynamic or aerobic activity
- C.** Exercise should be deferred until blood pressure is pharmacologically normalized
- D.** Vigorous-intensity interval training only, performed once weekly

13. A high school implements a neuromuscular training warm-up program aimed at reducing ACL injuries in female soccer players. Which core component is most consistently associated with reduced ACL injury risk in the injury-prevention literature?

- A.** Static stretching of the hamstrings performed immediately before competition, without any neuromuscular or landing component
- B.** Plyometric and landing-mechanics training that emphasizes knee-over-toe alignment and reduced dynamic valgus during cutting and landing
- C.** Isolated quadriceps strengthening machines used in place of functional, sport-specific movement training
- D.** Reducing overall training volume without any change to movement mechanics or landing technique

14. A distance runner presents with a third metatarsal stress fracture, her second stress fracture in 18 months, and reports irregular menses. Which framework should guide the physician's approach to injury prevention going forward?

- A.** Recommend a walking boot alone and clear the athlete to resume full training once radiographic healing is confirmed, with no further evaluation
- B.** Screen for Relative Energy Deficiency in Sport (RED-S), addressing energy availability, menstrual function, and bone health together, not the fracture in isolation
- C.** Attribute the recurrent fractures solely to running shoe selection and recommend a shoe change as the primary intervention
- D.** Advise increased training volume to build bone density more rapidly before the next competitive season

15. A youth sports organization is developing a policy to reduce overuse injuries in single-sport specializing adolescent athletes. Which recommendation is most strongly supported by injury-prevention guidance for this population?

- A.** Encourage year-round single-sport specialization beginning before age 10 to maximize skill acquisition
- B.** Eliminate all organized rest days, since continuous training is the most effective way to prevent deconditioning between overuse episodes
- C.** Base training volume limits solely on chronological grade level in school, independent of any individual factors
- D.** Encourage multi-sport participation and scheduled rest periods, limiting single-sport training hours per week to roughly the athlete's age in years

16. An athlete is being counseled on carbohydrate intake in the days leading up to an endurance event lasting longer than 90 minutes. Which strategy reflects current evidence-based carbohydrate loading practice?

- A.** Eliminating all carbohydrate intake for 72 hours before the event to promote fat adaptation immediately prior to competition
- B.** Loading exclusively with simple sugars consumed in a single large meal the morning of the event, with no prior preparation
- C.** Maintaining habitual low-carbohydrate intake, since carbohydrate loading has been shown to provide no performance benefit for events over 90 minutes
- D.** Progressively increasing carbohydrate intake to 8-12 g/kg body mass per day over the 36-48 hours preceding the event while tapering training volume

17. A marathon runner develops confusion, nausea, and a headache in the final miles of a warm-weather race. Serum sodium is found to be low. Which factor most directly contributed to this presentation?

- A.** Inadequate total fluid intake throughout the race leading to severe hypovolemia and hemoconcentration
- B.** Excessive sodium intake from sports drinks consumed throughout the race
- C.** Excessive intake of hypotonic fluids beyond sweat losses, diluting serum sodium (exercise-associated hyponatremia)
- D.** Underlying primary adrenal insufficiency unmasked acutely by exercise

18. A female distance runner is found to have iron deficiency without anemia on screening labs. Which statement best reflects current understanding of iron deficiency management in endurance athletes?

- A.** Iron supplementation provides no benefit until hemoglobin falls below the threshold for frank anemia, so treatment should be withheld until then
- B.** Iron deficiency without anemia can still impair aerobic performance and endurance capacity, and repletion should be considered even before frank anemia develops
- C.** Iron deficiency in athletes is exclusively caused by inadequate dietary intake and never by exercise-induced factors such as hepcidin-mediated absorption changes or gastrointestinal blood loss

D. Routine iron supplementation is contraindicated in all endurance athletes regardless of ferritin level due to risk of iron overload

19. A competitive powerlifter asks for guidance on daily protein intake to support strength and muscle mass goals. Which recommendation is most consistent with current sports nutrition evidence for a strength-trained athlete?

A. Protein intake above 0.8 g/kg/day provides no additional benefit for strength athletes over the sedentary RDA

B. Protein should be restricted below 1.0 g/kg/day during heavy resistance training to reduce renal workload in athletes with normal kidney function

C. Total daily protein intake is irrelevant as long as it is consumed entirely within 30 minutes after training

D. Approximately 1.6-2.2 g/kg body mass per day, distributed across multiple meals

20. During a Preparticipation Physical Evaluation (PPE), a physician auscultates a systolic murmur that increases in intensity with Valsalva maneuver and standing. Which condition should be specifically suspected, prompting further cardiac workup before clearance?

A. Innocent (physiologic) flow murmur of childhood

B. Mitral valve prolapse without regurgitation

C. Bicuspid aortic valve without stenosis

D. Hypertrophic cardiomyopathy

21. During the musculoskeletal component of a Preparticipation Physical Evaluation, which screening maneuver is part of the standard, validated 2-minute orthopedic screening exam?

A. Isokinetic dynamometry testing of quadriceps and hamstring strength ratios

B. Duck walk to assess hip, knee, and ankle range of motion and gait symmetry

C. MRI screening of both knees regardless of symptom history

D. Formal gait analysis using 3D motion capture

22. On PPE history, an athlete reports a first-degree relative who died suddenly and unexpectedly at age 34 during exercise, with no clear explanation identified. How should this history be handled in the clearance decision?

- A.** This history is not relevant to clearance since it involves a family member's health, not the athlete's own diagnosed condition
- B.** Clearance can proceed as scheduled provided the athlete personally reports no cardiac symptoms
- C.** This history only becomes relevant if the family member died specifically during competitive, not recreational, exercise
- D.** This family history is a red flag warranting further cardiac evaluation, including consideration of echocardiogram and cardiology referral, before clearance

23. Which of the following is considered an absolute disqualifying condition from competitive sport pending further evaluation and clearance, per standard PPE disqualification guidance?

- A.** Well-controlled, medically supervised asthma with normal exercise tolerance
- B.** Acute, unresolved infectious illness with fever, particularly with myocarditis risk from a recent viral syndrome
- C.** Functionally one-eyed status with appropriate protective eyewear precautions discussed
- D.** Mild, asymptomatic scoliosis without cardiopulmonary compromise

24. A PPE is being conducted using a station-based mass screening format for several hundred athletes in a single day. What is the primary advantage of this format compared to individual private-office PPEs?

- A.** It eliminates the need for follow-up referral of athletes with abnormal findings, since all necessary care is completed on-site
- B.** It allows efficient, standardized screening of large groups using dedicated stations, improving throughput while keeping components consistent
- C.** It is preferred specifically because it provides greater continuity of care with the athlete's usual primary care physician
- D.** It removes the requirement for a documented cardiac history and family history component

25. An adolescent athlete's PPE reveals a blood pressure that is significantly elevated using the appropriate pediatric percentile-based classification. What is the most appropriate next step regarding sport clearance?

- A.** Provisionally clear for low-to-moderate demand activity while arranging follow-up BP evaluation, rather than outright disqualification
- B.** Immediately and permanently disqualify from all organized sport pending lifelong reevaluation
- C.** Ignore the finding since blood pressure elevation at a single PPE visit is never clinically significant in adolescents
- D.** Clear for unrestricted participation in all sports, including high static and dynamic demand activities, without any follow-up

26. A physician is counseling a competitive swimmer who wants to begin a new resistance training block two weeks before a major taper period. Applying the FITT framework for exercise prescription, which adjustment is most appropriate to avoid compromising the taper?

- A.** Increase both training frequency and volume substantially during the two weeks before competition to maximize strength gains before the event
- B.** Reduce training volume (sets/repetitions) while maintaining exercise intensity, consistent with taper principles that preserve neuromuscular readiness while reducing fatigue
- C.** Switch entirely to low-intensity, high-repetition endurance-style resistance training immediately before competition
- D.** Discontinue all resistance training entirely for the full two-week period with no structured taper plan

27. A physician is prescribing exercise for a pregnant patient in her second trimester with an uncomplicated pregnancy who was moderately active before pregnancy. Which guidance is most consistent with current recommendations?

- A.** All exercise should be discontinued entirely for the remainder of pregnancy once the second trimester begins
- B.** Only walking at a slow pace is considered safe; all resistance training is contraindicated throughout pregnancy
- C.** Exercise intensity should be maximized during the second trimester specifically to counteract expected gestational weight gain

D. Moderate-intensity aerobic and resistance exercise can generally be continued safely, avoiding prolonged supine positioning and activities with high fall or contact risk

28. A patient with stable coronary artery disease is beginning a supervised outpatient cardiac rehabilitation exercise program. Which principle best reflects appropriate exercise prescription in this setting?

A. Exercise intensity should be fixed at a standardized maximal heart rate target identical for all cardiac rehabilitation patients regardless of stress test results

B. Cardiac rehabilitation exercise should avoid any resistance training entirely, using aerobic activity exclusively

C. Exercise prescription in cardiac rehabilitation does not require baseline stress testing, since supervision alone ensures safety

D. Exercise intensity should be individualized based on results of a symptom-limited exercise stress test, often targeting a percentage of heart rate reserve or a rating of perceived exertion within a prescribed range

29. A physician is designing a community-based fall-prevention exercise program for older adults, framed within the chronic disease and injury prevention aspects of sports medicine. Which exercise component has the strongest evidence for reducing fall risk in this population?

A. Multicomponent programs incorporating balance training and lower-extremity strengthening

B. Upper-extremity-only resistance training, since falls are primarily related to grip strength deficits

C. Static stretching alone, performed without any strength or balance component

D. High-intensity plyometric jump training as the primary intervention, given its use in younger athletic populations

30. A physician is developing a chronic disease prevention exercise recommendation for a patient with osteopenia. Which type of exercise has the strongest evidence for stimulating increased bone mineral density?

A. Non-weight-bearing aquatic exercise as the primary recommended modality for bone density benefit

B. Purely isometric exercise without any dynamic movement component

- C. Low-intensity stretching-based flexibility programs as the primary intervention for bone density
- D. Weight-bearing, impact-loading exercise combined with resistance training

31. A collegiate football player collapses during summer conditioning in high heat and humidity. He is confused, has hot dry skin, and rectal temperature is 106.1F (41.2C). Which immediate treatment most improves survival?

- A. Immediate whole-body cold-water immersion on site, before transport to a medical facility
- B. Immediate transport by ambulance to the nearest emergency department, with cooling deferred until arrival
- C. Administration of oral antipyretics (acetaminophen) as the primary cooling intervention
- D. Passive cooling with fans and removal of equipment only, without active immersion

32. A rugby player sustains a direct blow to the chest during a tackle and several seconds later collapses in cardiac arrest with no structural chest wall injury found. Which diagnosis best explains this presentation?

- A. Traumatic pneumothorax with tension physiology
- B. Acute myocardial infarction from underlying coronary artery disease
- C. Cardiac contusion causing structural valve rupture
- D. Commotio cordis, timed to the ventricular repolarization window

33. An athlete is struck in the abdomen during a soccer match and later develops left shoulder tip pain, tachycardia, and hypotension. Which injury should be suspected?

- A. Isolated rib fracture without intra-abdominal injury
- B. Simple abdominal wall muscle strain
- C. Splenic injury with referred left shoulder pain (Kehr sign)
- D. Renal contusion without associated hemorrhage

34. A hiker at high altitude develops progressive confusion, ataxia, and headache unresponsive to analgesics over 24 hours at elevation. Which is the most appropriate immediate management?

- A.** Continued ascent at a slower pace to allow gradual acclimatization
- B.** Immediate descent to lower altitude, the definitive treatment for suspected high-altitude cerebral edema (HACE)
- C.** Administration of supplemental oxygen alone with no change in altitude, considered fully definitive treatment
- D.** Bed rest at the current altitude for 24-48 hours before reassessing

35. An athlete is pulled from a lake after a near-drowning event. She is now awake, breathing spontaneously, with oxygen saturation of 98% on room air and a normal chest exam. What is the most appropriate disposition?

- A.** Transport for observation, since delayed pulmonary complications can develop hours after an apparently benign initial presentation
- B.** Discharge from the scene without further evaluation since she is currently asymptomatic with normal oxygen saturation
- C.** Discharge is appropriate only if she declines transport, regardless of her clinical presentation
- D.** No monitoring is needed if the submersion time was under 30 seconds

36. A wrestler develops sudden severe testicular pain, nausea, and a high-riding, horizontally oriented testicle on exam after a groin injury during a match. What is the appropriate immediate management?

- A.** Ice, NSAIDs, and reassurance with follow-up in one week if symptoms persist
- B.** Reassurance that this presentation is consistent with a simple contusion requiring no further workup
- C.** Scrotal ultrasound scheduled electively over the following week
- D.** Emergent urologic evaluation for possible testicular torsion, since salvage is time-dependent

37. A cyclist crashes and sustains a helmeted head impact. He is initially confused but now, 20 minutes later, has a rapidly worsening headache, one dilated pupil, and decreasing level of consciousness after a brief lucid interval. Which diagnosis is most consistent with this presentation?

- A.** Simple concussion without structural intracranial injury
- B.** Chronic subdural hematoma
- C.** Diffuse axonal injury with immediate, non-fluctuating coma from the moment of impact
- D.** Epidural hematoma, with a lucid interval before rapid deterioration

38. A basketball player develops sudden dyspnea, unilateral chest pain, and decreased breath sounds on one side after an awkward fall onto the court, with no external chest wall deformity. Which condition is most likely?

- A.** Spontaneous or traumatic pneumothorax
- B.** Simple rib contusion without pleural involvement
- C.** Pericarditis of viral etiology
- D.** Costochondritis

39. An athlete competing in a hot, humid environment develops muscle cramping, heavy sweating, and mild disorientation but remains able to follow commands, with a core temperature of 101.8F (38.8C). Which diagnosis and management best fits this presentation?

- A.** Heat stroke, requiring the identical cold-water immersion protocol used for a core temperature above 104F with severe CNS dysfunction
- B.** Heat exhaustion, managed with removal from activity, cooling, and oral or IV rehydration, distinct from the higher core temperature and CNS compromise defining heat stroke
- C.** Hyponatremic encephalopathy from water intoxication, requiring fluid restriction as the primary intervention
- D.** Simple exercise-associated muscle cramps unrelated to heat, requiring only passive stretching

40. An athlete is stung by a wasp during an outdoor event and within minutes develops diffuse urticaria, lip swelling, wheezing, and hypotension. What is the first-line treatment?

- A.** Oral diphenhydramine as the first-line treatment, with epinephrine reserved only if oral therapy fails
- B.** Inhaled bronchodilator alone, without epinephrine, since wheezing is the dominant symptom

- C.** Intramuscular epinephrine, administered immediately without waiting for other therapies to fail first
- D.** Observation only, since symptoms are expected to resolve spontaneously without intervention

41. A sideline physician is assessing an athlete who lost consciousness briefly after a helmet-to-helmet collision and is now awake but disoriented, with cervical spine precautions in place. Which finding should most raise concern for an unstable cervical spine injury requiring immobilization and transport rather than sideline concussion assessment alone?

- A.** Isolated retrograde amnesia for the collision itself, without neck symptoms
- B.** Mild headache without any neck pain or neurologic symptoms
- C.** Nausea alone occurring several minutes after the collision, without neck findings
- D.** Midline cervical spine tenderness, neurologic deficit, or reported neck pain with the mechanism of injury

42. An athlete with known sickle cell trait collapses during high-intensity interval sprints in hot conditions, with muscle weakness and dark urine afterward. Which complication should be immediately suspected?

- A.** A benign, self-limited response requiring no specific monitoring beyond rest
- B.** Simple dehydration alone, fully explained without considering sickle cell trait as a contributing factor
- C.** Isolated muscle cramping unrelated to any hemoglobinopathy, requiring only electrolyte replacement
- D.** Exertional sickling leading to rhabdomyolysis, requiring aggressive IV hydration and monitoring for acute kidney injury and compartment syndrome

43. A cross-country skier develops numbness and a white, waxy appearance of the fingertips in extreme cold. Which initial management is appropriate for suspected frostbite in the field?

- A.** Vigorously rub the affected fingers to restore circulation as the first step
- B.** Remove wet clothing, protect the area from further cold and friction, and rewarm in warm water (about 100F) once refreezing can be avoided

- C.** Rewarm immediately using direct dry heat such as a campfire or vehicle exhaust
- D.** Delay any rewarming until the athlete reaches a hospital, with no field intervention regardless of ambient conditions

44. An athlete has a witnessed collapse during a race with no pulse and no normal breathing. Bystander CPR is initiated and an AED arrives within 2 minutes. Which sequence best reflects appropriate resuscitation priorities?

- A.** Delay chest compressions until the AED is fully applied and analyzing, to avoid any interruption of pad placement
- B.** Perform rescue breathing exclusively without chest compressions until advanced providers arrive
- C.** Continue high-quality chest compressions with minimal interruption, apply the AED as soon as available, and follow its prompts for shock delivery
- D.** Withhold AED use until a physician is present on scene, relying on compressions alone in the interim

45. A swimmer develops sudden, severe chest pain and dyspnea after surfacing rapidly from a deep dive, with subcutaneous crepitus palpable in the neck. Which diagnosis should be suspected?

- A.** Simple exercise-induced bronchospasm unrelated to the diving mechanism
- B.** Panic attack with hyperventilation as the sole explanation, without any structural injury
- C.** Pulmonary barotrauma with pneumomediastinum and subcutaneous emphysema from rapid ascent
- D.** Costochondritis triggered by swimming stroke mechanics

46. An athlete on the sideline reports acute, severe, tearing back pain radiating to the abdomen during a heavy lift, with diminished femoral pulses on exam. Which life-threatening diagnosis must be considered despite the athlete's young age?

- A.** Simple lumbar muscle strain, which fully explains diminished femoral pulses
- B.** Acute aortic dissection, which though rare in young athletes must be considered given the tearing quality of pain and pulse asymmetry

- C. Benign exertional back spasm requiring only rest and NSAIDs, with pulse findings attributed to positioning artifact
- D. Renal colic from ureterolithiasis as the sole explanation for the presentation

47. A youth athlete has a known severe peanut allergy and accidentally ingests a contaminated snack during a tournament, quickly developing throat tightness and difficulty swallowing without yet having hives or hypotension. What is the most appropriate immediate action?

- A. Give intramuscular epinephrine immediately; airway symptoms alone after known severe exposure warrant treatment without delay
- B. Withhold epinephrine until skin findings such as hives also appear, to confirm the diagnosis of anaphylaxis first
- C. Give only an oral antihistamine and observe, reserving epinephrine for if symptoms progress further
- D. Delay any treatment until arrival at a medical facility, given the absence of hypotension

48. An athlete is struck in the eye by a ball and develops sudden, painless loss of a portion of the visual field described as a 'curtain' coming down, along with floaters and flashes of light. Which diagnosis requires urgent ophthalmologic referral?

- A. Retinal detachment, suggested by the acute curtain-like visual field defect described
- B. Simple subconjunctival hemorrhage, which does not affect visual fields
- C. Corneal abrasion, which characteristically causes pain and foreign body sensation rather than a visual field curtain
- D. Blepharitis unrelated to the trauma

49. An athlete in a preseason conditioning session in extreme heat develops agitation, delirium, and a rectal temperature of 105.4F (40.8C), and is unable to follow commands. Which immediate action takes priority over all others?

- A. Prioritize immediate transport to the hospital first, initiating cooling only once ambulance transport has begun
- B. Administer oral fluids as the first priority before any cooling measures are started

C. Begin aggressive ice-water immersion cooling on site immediately while activating EMS, not waiting for transport

D. Wait for a second temperature confirmation using a different thermometer before initiating any treatment

50. A football player is found unresponsive on the field with obvious airway obstruction from a dislodged mouthguard and blood in the airway. Cervical spine injury cannot be excluded. What is the most appropriate initial airway management approach?

A. Use a jaw-thrust maneuver (rather than head-tilt-chin-lift) to open the airway while maintaining manual in-line cervical spine stabilization

B. Use head-tilt-chin-lift as the first-line airway maneuver, since airway patency takes priority over spinal precautions entirely

C. Remove the helmet and shoulder pads immediately as the very first step, before any airway intervention

D. Avoid any airway intervention until a full secondary survey is completed

51. An athlete sustains a tibia fracture with a visible bone fragment protruding through the skin on the field. Which management sequence is appropriate?

A. Cover the wound, splint in the position found without reducing it, and arrange urgent ortho transport for OR irrigation and antibiotics

B. Manually reduce the fracture on the field to realign the bone before covering the wound

C. Delay antibiotics until the athlete arrives at the operating room, since field antibiotics provide no benefit

D. Wash the wound thoroughly with tap water and manipulate the fragment back beneath the skin before splinting

52. A patient two days post-tibial shaft fracture reports pain out of proportion to exam, worsening with passive stretch of the toes, and a tense, swollen leg with intact distal pulses. Which diagnosis must be urgently excluded?

A. Simple postoperative swelling, which is expected and requires only elevation without further workup

- B.** Deep vein thrombosis, which is reliably excluded because pulses remain intact
- C.** Acute compartment syndrome, a surgical emergency even in the presence of preserved distal pulses
- D.** Cellulitis, which would be the most likely explanation given the described exam findings

53. An athlete falls from height during an outdoor obstacle race and reports midline thoracolumbar back pain with bilateral leg weakness. Bystanders want to sit the athlete up. What is the correct immediate management?

- A.** Allow the athlete to sit up if they report feeling comfortable doing so, since subjective comfort indicates spinal stability
- B.** Have a single rescuer quickly lift the athlete to a seated position to assess for other injuries more easily
- C.** Ambulate the athlete a short distance to a shaded area before further assessment, since movement will not affect a stable-appearing spine
- D.** Maintain spinal precautions supine, log-roll with adequate personnel only if needed, and avoid sitting up until spinal injury is excluded

54. An athlete on the sideline has a witnessed generalized tonic-clonic seizure that has been continuous for 6 minutes without regaining consciousness between movements. What is the appropriate immediate priority?

- A.** Protect the airway, prevent injury, and activate EMS now, since this duration meets status epilepticus criteria
- B.** Attempt to restrain the athlete's limbs firmly to stop the convulsive movements
- C.** Place an object in the athlete's mouth to prevent tongue biting
- D.** Wait a full 15 minutes before activating EMS, since most seizures are self-limited and do not require emergency response

55. During a preseason meeting, an athlete privately discloses to the team physician that they have been having thoughts of suicide with a specific plan. What is the most appropriate immediate response?

- A.** Schedule a routine outpatient counseling referral for the following week, since the disclosure occurred in a calm, private setting

- B.** Stay with the athlete, remove access to the means described, and get urgent connection to emergency mental health services rather than a routine follow-up
- C.** Reassure the athlete that these thoughts are a normal part of competitive stress and no further action is needed
- D.** Maintain strict confidentiality with no exceptions, declining to involve any additional resources or personnel even in the setting of an expressed specific plan

56. An athlete with known type 1 diabetes becomes shaky, diaphoretic, and confused during a competitive match. A rapid glucose check shows 48 mg/dL. What is the appropriate immediate management for a conscious athlete able to safely swallow?

- A.** Administer subcutaneous insulin to correct hyperglycemia, since sports competition commonly causes stress hyperglycemia mimicking this presentation
- B.** Withhold any glucose administration until the athlete reaches a hospital, to avoid overtreating a mild episode
- C.** Encourage the athlete to continue competing since exercise itself will help lower blood glucose toward a safer range
- D.** Administer approximately 15-20 grams of fast-acting oral carbohydrate immediately, and recheck glucose in about 15 minutes, repeating treatment if still low

57. An athlete with type 1 diabetes presents with several days of polyuria, nausea, vomiting, abdominal pain, and deep, rapid breathing during a multi-day tournament. Point-of-care glucose is markedly elevated and ketones are strongly positive. Which diagnosis and disposition is most appropriate?

- A.** Diabetic ketoacidosis, needing emergent transport for IV fluids, insulin, and electrolyte monitoring, not outpatient management
- B.** Simple dehydration from tournament heat, managed adequately with oral fluids alone on site
- C.** Viral gastroenteritis unrelated to the athlete's diabetes, requiring only symptomatic antiemetic therapy
- D.** Exercise-associated hyponatremia, requiring fluid restriction as the primary treatment

58. A marathon runner collapses immediately after crossing the finish line but is alert, oriented, normotensive when supine, and has a normal core temperature. Symptoms resolve quickly with leg

elevation and rest. Which diagnosis best fits, and how does its management differ from exertional heat stroke?

- A.** Exertional heat stroke, requiring identical immediate cold-water immersion regardless of the normal core temperature and rapid symptom resolution
- B.** Cardiogenic shock, requiring immediate defibrillation as first-line treatment
- C.** Exercise-associated collapse (postural hypotension after stopping), managed with supine positioning and leg elevation, not heat-stroke cooling
- D.** Anaphylaxis, requiring immediate epinephrine despite the absence of any allergic exposure history or typical allergic findings

59. An athlete eating between events suddenly cannot speak, is clutching their throat, and has a forceful but ineffective cough. What is the appropriate immediate intervention?

- A.** Encourage continued forceful coughing only, without any physical intervention, since coughing is present
- B.** Perform back blows exclusively, with abdominal thrusts specifically avoided in adult athletes
- C.** Perform abdominal thrusts (Heimlich maneuver) to attempt to clear the complete airway obstruction
- D.** Immediately proceed to a surgical airway rather than attempting basic maneuvers first

60. An athlete sustains a posterior knee dislocation during a collision and the dislocation is reduced on the field. The distal pulses are diminished compared to the contralateral limb. What is the most appropriate next step?

- A.** Reassurance and routine outpatient orthopedic follow-up within one week, since the dislocation has already been reduced
- B.** Apply a compressive wrap and ice, with vascular reassessment deferred to the following day
- C.** Attribute the diminished pulse solely to post-reduction swelling, requiring no further vascular workup
- D.** Urgent vascular surgery evaluation and imaging (such as CT angiography) given the high risk of popliteal artery injury associated with knee dislocation

- 61.** An athlete has persistent, brisk nasal bleeding after a facial collision that continues despite 15 minutes of direct pressure on the nasal alae and anterior nasal packing. Blood is also seen draining posteriorly into the oropharynx. What is the most appropriate next step?
- A.** Continue anterior pressure and packing alone for another hour before considering any escalation
 - B.** Discharge the athlete with instructions to apply ice at home, since nosebleeds are rarely a source of significant blood loss
 - C.** Arrange posterior nasal packing or balloon tamponade with urgent ENT evaluation, since this suggests a posterior bleed
 - D.** Pack only the unaffected nostril, leaving the actively bleeding side open to allow drainage
- 62.** An athlete is struck in the eye by an elbow and develops diplopia on upward gaze, enophthalmos, and infraorbital numbness. Which diagnosis should be suspected, and what does it require?
- A.** Orbital blowout fracture with possible inferior rectus entrapment, needing urgent ophthalmology referral
 - B.** Simple periorbital contusion ('black eye'), which requires only ice and observation without further workup
 - C.** Corneal abrasion, which characteristically causes diplopia on upward gaze
 - D.** Isolated conjunctivitis unrelated to the traumatic mechanism
- 63.** An athlete is struck by a vehicle during an outdoor triathlon and presents with pelvic pain, hypotension, and tachycardia, with a clinically unstable pelvis on exam. What is an appropriate early intervention to help control hemorrhage from a suspected pelvic fracture, in addition to standard resuscitation?
- A.** Apply a commercial pelvic binder or circumferential sheet wrap at the level of the greater trochanters to reduce pelvic volume and help tamponade venous bleeding
 - B.** Aggressively manipulate the pelvis manually to assess stability in multiple directions before any stabilization is applied
 - C.** Avoid any pelvic stabilization device, since immobilization has no role in hemorrhage control for pelvic fractures
 - D.** Place the patient in a seated position to reduce pressure on the pelvis

64. Lightning strikes a group of athletes on an outdoor field. Several are unresponsive with no pulse; others are conscious and ambulatory with minor complaints. Which triage approach is appropriate in this specific mass-casualty scenario?

- A.** Standard mass-casualty triage, treating pulseless victims as lowest priority (expectant) exactly as in typical multi-casualty trauma incidents
- B.** Reverse triage: prioritize resuscitating pulseless victims first, since lightning arrest is often reversible with prompt CPR
- C.** Treat only ambulatory, conscious victims first, deferring care for unresponsive victims until additional resources arrive
- D.** Assume all pulseless victims are unsalvageable and focus exclusively on transport logistics rather than on-scene resuscitation

65. An athlete develops hives, flushing, and throat tightness only when exercising within a few hours after eating a specific food, but tolerates the same food without symptoms when not exercising, and tolerates exercise alone without symptoms when fasting. Which diagnosis best fits, and what is the key management principle?

- A.** A simple, isolated food allergy unrelated to exercise, managed by avoiding the food entirely regardless of exercise timing, with no exercise-specific precautions needed
- B.** Exercise-induced bronchospasm, managed with a pre-exercise inhaled bronchodilator regardless of recent food intake
- C.** Food-dependent exercise-induced anaphylaxis, managed primarily by avoiding exercise for several hours after ingesting the specific trigger food, with epinephrine available for treatment of a reaction
- D.** Cholinergic urticaria triggered by any rise in core body temperature, unrelated to specific food ingestion

66. An athlete involved in a low-speed collision has no midline cervical tenderness, no focal neurologic deficit, is fully alert and not intoxicated, has no distracting painful injury, and can rotate the neck 45 degrees in each direction without pain. Which statement best reflects appropriate use of clinical decision criteria in this scenario?

- A.** Cervical spine imaging is mandatory for every athlete involved in any collision, regardless of clinical findings, before precautions can ever be discontinued

B. Clinical clearance is never appropriate in an athletic setting under any circumstances, and imaging is always required before removing spinal precautions

C. This athlete meets low-risk clinical criteria (consistent with validated decision rules such as NEXUS or the Canadian C-Spine Rule) that may allow clinical clearance of the cervical spine without imaging, in the appropriate clinical context

D. The presence of any neck pain immediately following a collision, regardless of other findings, mandates permanent removal from all future contact sports

67. After an unusually intense preseason conditioning session, several athletes report severe muscle soreness, swelling, and dark urine over the following two days, with markedly elevated creatine kinase on labs. None have sickle cell trait. Which management approach is appropriate?

A. Reassurance that this is simply expected delayed-onset muscle soreness requiring no specific monitoring or treatment, since sickle cell trait has been excluded

B. Restrict fluid intake to prevent further renal stress, since additional fluids are believed to worsen outcomes in this condition

C. Recommend the athletes continue similarly intense training the following day to 'work through' the soreness

D. Aggressive IV hydration, monitoring of renal function and creatine kinase trend, and close observation for compartment syndrome, consistent with exertional rhabdomyolysis regardless of sickle cell trait status

68. A high school athlete sustained a concussion three days ago and remains symptomatic. A teammate suggests he could return to play today since he 'feels mostly fine.' Which principle explains why premature return to play after an unresolved concussion carries particular danger?

A. Repeat concussions within a short interval carry no additional risk beyond the original injury, provided baseline testing was normal before the season

B. The primary concern with early return is solely a longer recovery timeline for the same injury, without any risk of a distinct, more severe secondary condition

C. Second impact syndrome: a second head injury sustained before full recovery from a prior concussion can trigger catastrophic, rapid cerebral edema, particularly in younger athletes, with a high risk of death or severe disability

D. Second impact syndrome is a discredited concept with no supporting clinical evidence and should not influence return-to-play timing

69. An athlete with a known history of a restrictive eating pattern is found by the athletic trainer to have a resting heart rate of 38 beats per minute and reports lightheadedness on standing. What is the most appropriate immediate action?

A. Urgent evaluation with ECG and cardiac monitoring, since marked bradycardia here can reflect a serious conduction or electrolyte abnormality

B. Reassure the athlete that a low heart rate is a routine sign of excellent athletic fitness in all cases, requiring no further evaluation

C. Recommend the athlete simply increase caffeine intake before competition to raise heart rate acutely

D. Clear the athlete for full competition immediately, since heart rate alone is not considered clinically relevant in this context

70. A team physician is the first medical provider on scene at a multi-vehicle collision involving several members of a traveling youth sports team, with more injured athletes than the physician can treat simultaneously while awaiting additional EMS resources. Which triage principle should guide initial patient assessment?

A. Treat patients strictly in the order they are encountered while walking through the scene, regardless of injury severity

B. Focus all available time and resources on the single most critically injured patient until that patient is fully stabilized, before assessing any others

C. Wait until all additional EMS resources arrive before initiating any assessment or treatment of the injured athletes

D. Rapidly triage using an established system (e.g., START) based on walking ability, breathing, perfusion, and mental status

71. A football player experiences sudden burning pain and transient weakness radiating down one arm after a tackle, with symptoms resolving within a minute and normal neck range of motion afterward. Which condition is most consistent, and what determines safe return to play?

- A.** Cervical spinal cord injury, which by definition requires permanent restriction from all future contact sports
- B.** A brachial plexus traction injury ('stinger/burner'); return to play requires full, painless resolution of strength, sensation, and neck range of motion
- C.** Simple muscle strain of the trapezius, unrelated to any neural structure
- D.** Complete brachial plexus avulsion, which would be expected to fully resolve within one minute without further evaluation

72. An athlete reports neck pain radiating down the arm to the thumb, with associated weakness of wrist extension. Cervical rotation and extension toward the symptomatic side reproduce the arm symptoms. Which finding and diagnosis does this describe?

- A.** A positive Spurling test consistent with a C8 radiculopathy causing weakness of intrinsic hand muscles
- B.** A negative provocative finding, consistent with simple cervical muscle strain without nerve root involvement
- C.** A positive Lhermitte sign, consistent with central cervical spinal cord compression rather than a nerve root lesion
- D.** A positive Spurling test, consistent with C6 cervical radiculopathy from nerve root compression

73. An athlete has chronic axial neck pain without radicular symptoms, worsened by cervical extension and rotation, with tenderness over the cervical facet joints and no neurologic deficit. Which initial management approach is most appropriate?

- A.** Urgent MRI and surgical referral, regardless of the absence of radicular symptoms or neurologic deficit
- B.** Immediate rigid collar immobilization and indefinite cessation of all activity
- C.** Emergent oncologic referral based on this presentation alone, without correlating symptoms
- D.** Conservative therapy — PT, activity modification, NSAIDs — reserving imaging for refractory symptoms

74. A 55-year-old masters-level tennis player has chronic neck stiffness and mild bilateral arm numbness that has developed gradually over months, with radiographs showing degenerative disc space

narrowing and osteophyte formation at multiple cervical levels. Which diagnosis best fits this presentation?

- A.** Acute cervical disc herniation from a single traumatic event, unrelated to age-related degenerative change
- B.** Cervical spine infection (discitis/osteomyelitis), which would be expected to present with this gradual, degenerative radiographic pattern
- C.** Cervical spondylosis with possible mild stenosis, a degenerative age-related process that can contribute to chronic symptoms and, if severe, myelopathic findings
- D.** Primary fibromyalgia, fully explaining both the radiographic findings and the neurologic symptoms described

75. A young athlete wakes up with acute, painful neck stiffness and a visibly tilted head position (chin rotated to one side, head tilted to the other) after sleeping in an awkward position, with no history of trauma and no neurologic deficit. Which diagnosis and management is most appropriate?

- A.** Acute torticollis (wry neck), typically self-limited and managed with stretching, NSAIDs, heat, and reassurance, without advanced imaging absent red flags
- B.** Atlantoaxial rotatory subluxation requiring emergent surgical stabilization regardless of mechanism or exam findings
- C.** Cervical spine fracture, which must be assumed in all cases of acute neck stiffness regardless of mechanism
- D.** Meningitis, which is the most likely explanation for this presentation and requires immediate lumbar puncture

76. A competitive rower develops gradually worsening anterior chest wall pain over several weeks of intensive training, localized and reproducible with resisted trunk rotation, without any acute traumatic event. Which diagnosis should be considered, and what confirms it?

- A.** Acute traumatic rib fracture, which requires a discrete traumatic mechanism to occur and would not develop gradually over weeks
- B.** Rib stress fracture, an overuse injury in rowers from repetitive trunk rotation and serratus anterior/oblique traction, often confirmed with MRI or bone scan
- C.** Simple costochondritis, which is definitively excluded by any reproducibility of pain with resisted trunk rotation

D. Referred cardiac pain, which is the most likely explanation given the chest wall location regardless of the mechanical, activity-related pattern described

77. An athlete reports a painful clicking or popping sensation at the lower costal margin with certain trunk movements, along with a sense of the rib 'catching,' and exam reproduces the pain and a palpable clunk by hooking the fingers under the lower rib margin and pulling anteriorly. Which diagnosis fits this presentation?

A. A displaced traumatic rib fracture, which would not typically produce a reproducible clunk on the described hooking maneuver without acute trauma

B. Simple intercostal muscle strain, which does not typically produce a palpable clicking or catching sensation

C. Pericarditis, which would not be reproduced by a specific mechanical maneuver at the costal margin

D. Slipping rib syndrome, from hypermobility of the lower costal cartilage attachments allowing the rib tip to sublux and impinge on nearby intercostal nerves

78. A soccer player has chronic groin and lower abdominal pain that worsens with sit-ups, coughing, and sprinting, without a palpable hernia bulge on exam, and imaging shows attenuation of the rectus abdominis-adductor aponeurosis at the pubic symphysis. Which diagnosis best fits, distinguishing it from a simple abdominal strain?

A. Athletic pubalgia ('sports hernia'), a chronic overuse injury of the pubic aponeurosis, not a true hernia with a palpable bulge or fascial defect

B. A simple, self-limited abdominal wall muscle strain, which would not typically show attenuation of the rectus abdominis-adductor aponeurosis on imaging

C. A true inguinal hernia, which by definition presents with a palpable bulge and a demonstrable fascial defect

D. Testicular torsion, which would present with acute scrotal pain rather than chronic groin and lower abdominal pain with activity

79. An athlete reports reproducible, sharp anterior chest wall pain at the costosternal junctions, worsened by palpation of those specific points and by deep breathing, without radiation, fever, or cardiac risk factors. Which diagnosis is most likely, and how is it distinguished from a cardiac cause of chest pain?

- A.** Acute coronary syndrome, which is the most likely explanation for any chest pain in an athlete regardless of reproducibility with palpation
- B.** Pulmonary embolism, which characteristically presents with pain reproducible by direct chest wall palpation
- C.** Aortic dissection, which is the most likely explanation given the anterior chest wall location of the pain
- D.** Costochondritis, distinguished from cardiac pain by reproducibility with palpation of the costosternal junctions and lack of exertional/radiating features

80. A recreational tennis player develops lateral elbow pain that worsens with gripping and resisted wrist extension, with point tenderness just distal to the lateral epicondyle. Which diagnosis fits, and what is the first-line treatment approach?

- A.** Medial epicondylitis, which would be expected to cause pain reproduced by resisted wrist flexion rather than resisted wrist extension
- B.** Lateral epicondylitis (tennis elbow), initially managed with activity modification, eccentric wrist extensor strengthening, and equipment/technique assessment rather than early surgical referral
- C.** Radial head fracture, which requires a specific traumatic mechanism and would show a distinct radiographic finding rather than this gradual, activity-related presentation
- D.** Ulnar collateral ligament injury, which is characteristically diagnosed by valgus stress testing rather than resisted wrist extension

81. A recreational golfer develops medial elbow pain that worsens with resisted wrist flexion and forearm pronation, with tenderness just distal to the medial epicondyle. Which diagnosis fits this presentation?

- A.** Lateral epicondylitis, which would be reproduced by resisted wrist extension rather than flexion/pronation
- B.** Medial epicondylitis (golfer's elbow), an overuse tendinopathy of the common flexor-pronator origin
- C.** Ulnar nerve entrapment at the cubital tunnel, which would primarily cause sensory symptoms in the ring and small fingers rather than pain reproduced by resisted wrist flexion
- D.** Distal biceps tendon rupture, which would present with a palpable defect and weakness of elbow flexion/supination rather than isolated medial epicondylar tenderness

82. A high school baseball pitcher develops progressive medial elbow pain during throwing, with decreased velocity and a sense of instability, and exam reveals increased medial joint space opening with valgus stress at 30 degrees of flexion compared to the contralateral side. Which structure is most likely injured?

- A.** The radial collateral ligament, which resists varus rather than valgus stress and is not the structure primarily loaded during the throwing motion
- B.** The annular ligament, which stabilizes the radial head rather than resisting valgus stress at the elbow
- C.** The triceps tendon, injury to which would present with pain and weakness on resisted elbow extension rather than valgus instability
- D.** The ulnar collateral ligament (UCL), commonly injured in overhead throwing athletes from repetitive valgus stress

83. A javelin thrower develops posterior elbow pain that worsens specifically during the deceleration phase of throwing, with tenderness over the olecranon and pain with resisted elbow extension against high load. Plain radiographs are initially normal. Which diagnosis should remain high on the differential despite normal radiographs?

- A.** Simple triceps tendinopathy, which would be definitively excluded by any tenderness localized to the olecranon
- B.** Radial head fracture, which primarily causes lateral, not posterior, elbow pain and would typically follow an acute traumatic event rather than a gradual throwing-related pattern
- C.** Olecranon stress fracture, which frequently shows normal early radiographs, often requiring MRI or CT for confirmation given the clinical suspicion from the throwing-specific mechanism
- D.** Cubital tunnel syndrome, which causes ulnar nerve sensory symptoms rather than posterior bony tenderness with resisted extension

84. An athlete has lateral forearm pain distal to the lateral epicondyle that is reproduced with resisted middle finger extension and resisted forearm supination, without significant tenderness directly over the epicondyle itself, and grip strength testing worsens symptoms more than in typical lateral epicondylitis. Which diagnosis should be considered as a distinct entity from lateral epicondylitis?

- A.** Classic lateral epicondylitis, which is confirmed, not excluded, by tenderness located precisely over the epicondyle rather than more distally along the forearm

- B.** Radial tunnel syndrome, from compression of the posterior interosseous nerve as it passes through the radial tunnel, which can mimic but is distinct from lateral epicondylitis
- C.** De Quervain's tenosynovitis, which causes pain at the radial wrist rather than the proximal lateral forearm
- D.** Carpal tunnel syndrome, which causes median nerve sensory symptoms in the hand rather than proximal lateral forearm pain

85. A weightlifter feels a sudden pop in the front of the elbow while lifting a heavy load with the elbow flexed, followed by pain, ecchymosis, and a visible proximal retraction of the muscle belly in the antecubital region, with weakness of elbow flexion and forearm supination. Which injury is most likely, and how urgently should it be addressed?

- A.** Distal biceps tendon rupture, which should be evaluated urgently since surgical repair is generally more successful and technically easier when performed within the first few weeks after injury
- B.** A simple biceps muscle belly strain, which does not produce the described proximal retraction ('Popeye' deformity) or the specific pattern of weakness
- C.** Triceps tendon rupture, which would present with weakness of elbow extension and a defect posteriorly rather than anteriorly with flexion/supination weakness
- D.** Brachialis muscle strain, which would not typically produce a visible proximal retraction defect or significant supination weakness

86. A skateboarder falls onto an outstretched hand and has tenderness in the anatomic snuffbox, with normal initial wrist radiographs. Which management approach is most appropriate given the injury pattern suspected?

- A.** Immobilize in a thumb spica splint and repeat imaging or obtain MRI/CT in 1-2 weeks, since scaphoid fractures are often occult initially
- B.** Discharge without immobilization since normal initial radiographs definitively exclude a scaphoid fracture
- C.** Allow immediate return to full activity, since anatomic snuffbox tenderness alone is not clinically significant
- D.** Treat only with a wrist brace for comfort, with no follow-up imaging required regardless of persistent tenderness

87. A gymnast develops ulnar-sided wrist pain that worsens with weight-bearing on the wrist (as in a handstand) and with forearm rotation, with tenderness just distal to the ulnar styloid and a positive ulnocarpal stress test. Which structure is most likely injured?

- A.** The scapholunate ligament, injury to which classically causes pain and instability on the radial, not ulnar, side of the wrist
- B.** The flexor carpi radialis tendon, which would cause pain on the radial-volar aspect of the wrist rather than the ulnar side
- C.** The extensor pollicis longus tendon, injury to which would present with thumb extension weakness rather than ulnar-sided wrist pain with loading
- D.** The triangular fibrocartilage complex (TFCC), a common source of ulnar-sided wrist pain in athletes loading the wrist in extension and rotation

88. A skier falls with a ski pole caught in the snow, forcing the thumb into forced radial deviation/abduction, and now has pain and instability at the thumb metacarpophalangeal joint with valgus stress testing, with a palpable mass at the ulnar aspect of the joint. Which diagnosis fits this mechanism and finding?

- A.** Radial collateral ligament injury of the thumb MCP joint, which would be caused by a forced ulnar (adduction), not radial (abduction), stress mechanism
- B.** Scaphoid fracture, which would present with anatomic snuffbox tenderness rather than thumb MCP joint instability with valgus stress
- C.** Ulnar collateral ligament injury of the thumb MCP joint ('skier's thumb'/'gamekeeper's thumb'), with the palpable mass suggesting a possible Stener lesion requiring surgical evaluation
- D.** De Quervain's tenosynovitis, which presents with pain over the first dorsal compartment rather than acute traumatic MCP joint instability

89. An athlete punches a wall in frustration and develops pain and swelling over the dorsum of the hand near the fifth knuckle, with the finger appearing rotated compared to the adjacent fingers when making a fist. Radiographs show a fracture of the fifth metacarpal neck with volar angulation. Which factor is most important in determining whether this can be managed nonoperatively versus requiring surgical referral?

- A.** The fracture location alone, since all fifth metacarpal neck fractures regardless of angulation or rotation are treated identically with a short arm cast and no further evaluation

- B.** Patient hand dominance alone, independent of the degree of angulation or presence of rotational deformity
- C.** Whether the fracture is open or closed is irrelevant to management decisions in this scenario
- D.** The degree of angulation and, critically, any malrotation, since mild angulation is often accepted but rotational deformity generally needs correction

90. A new parent who also plays recreational golf develops pain at the radial wrist that is worsened by thumb movement and ulnar deviation of the wrist, with a positive Eichhoff/Finkelstein test. Which diagnosis fits, and what is the first-line treatment?

- A.** Carpal tunnel syndrome, which is diagnosed by a positive Finkelstein test and treated primarily with thumb spica splinting
- B.** De Quervain's tenosynovitis (first dorsal compartment), managed initially with thumb spica splinting, activity modification, and NSAIDs, plus injection if persistent
- C.** Trigger finger, which characteristically causes radial wrist pain with a positive Finkelstein test rather than digit catching
- D.** Scaphoid fracture, which is the most likely diagnosis given radial-sided wrist pain regardless of the specific provocative test used

91. A volleyball player is struck on the tip of an extended finger by the ball and now cannot actively extend the distal interphalangeal (DIP) joint, though passive extension is preserved. Which diagnosis and initial treatment is most appropriate?

- A.** Boutonniere deformity, initially treated with a splint holding the DIP joint in flexion rather than extension
- B.** A collateral ligament sprain of the DIP joint, which would not cause loss of active extension while preserving passive extension
- C.** Mallet finger, from disruption of the terminal extensor tendon at the DIP joint, initially treated with continuous DIP extension splinting for approximately 6-8 weeks
- D.** A closed fracture-dislocation requiring immediate surgical pinning in all cases regardless of radiographic findings

92. A basketball player plants and pivots, feels a pop in the knee, and has immediate swelling with a sensation of instability. Exam reveals increased anterior tibial translation compared to the contralateral side with a soft endpoint. Which special test and diagnosis does this describe?

- A.** A positive posterior drawer test, consistent with posterior cruciate ligament tear
- B.** A positive McMurray test, consistent with meniscus tear rather than ligamentous injury
- C.** A positive Lachman test, consistent with anterior cruciate ligament (ACL) tear
- D.** A positive varus stress test, consistent with lateral collateral ligament injury

93. A soccer player has medial knee joint line pain and intermittent locking/catching after a twisting injury, with pain reproduced by joint line palpation during tibial rotation with the knee flexed. Which diagnosis and test does this describe?

- A.** A positive Lachman test, consistent with ACL tear rather than meniscal pathology
- B.** A positive Thessaly test performed at full knee extension, which is the standard technique for this maneuver
- C.** A positive apprehension test, consistent with patellar instability rather than meniscal injury
- D.** A positive McMurray test, consistent with a medial meniscus tear

94. A young female runner develops anterior knee pain that worsens with prolonged sitting, stair descent, and squatting, without a specific traumatic event, and exam shows normal ligamentous stability with mild patellar maltracking and tenderness at the patellar facets. Which diagnosis fits best?

- A.** ACL tear, which would be expected to show ligamentous laxity on Lachman testing rather than isolated patellofemoral findings
- B.** Patellofemoral pain syndrome, related to patellar maltracking and abnormal patellofemoral joint loading rather than a discrete structural or ligamentous injury
- C.** Meniscus tear, which would be expected to cause joint line tenderness and mechanical locking rather than the patellofemoral pattern described
- D.** Patellar tendon rupture, which would present with an inability to actively extend the knee and a palpable tendon defect

95. A volleyball player develops localized pain at the inferior pole of the patella that worsens with jumping and landing, with focal tenderness at the proximal patellar tendon insertion and preserved knee extensor strength. Which diagnosis fits this presentation?

- A.** Patellar tendinopathy ('jumper's knee'), an overuse tendinopathy at the proximal patellar tendon insertion common in jumping-sport athletes
- B.** Patellar tendon rupture, which would present with inability to actively extend the knee rather than preserved extensor strength
- C.** Prepatellar bursitis, which characteristically causes swelling anterior to the patella rather than focal tenderness at the tendon insertion
- D.** Osgood-Schlatter disease, which characteristically causes pain and prominence at the tibial tubercle rather than the inferior pole of the patella

96. A skier catches an edge and the knee is forced into a valgus (knock-kneed) position during a fall. Exam shows medial knee joint line tenderness and increased medial joint opening with valgus stress at 30 degrees of flexion, with a firm endpoint and no increased opening at full extension. Which diagnosis and grade does this suggest?

- A.** An ACL tear, which is assessed by anterior translation on Lachman testing rather than valgus stress opening at 30 degrees of flexion
- B.** A lateral meniscus tear, which would be expected to cause lateral, not medial, joint line tenderness
- C.** A complete (grade III) MCL tear, which would characteristically show a soft or absent endpoint rather than the firm endpoint described
- D.** A medial collateral ligament (MCL) sprain, with a firm endpoint suggesting a lower-grade (grade I-II) injury rather than complete ligamentous disruption

97. A distance runner develops lateral knee pain that worsens specifically with running, particularly downhill, and is reproduced by palpation over the lateral femoral epicondyle during repeated knee flexion-extension, with tenderness roughly 2-3 cm proximal to the joint line. Which diagnosis fits, and what is a key contributing biomechanical factor?

- A.** Lateral meniscus tear, which characteristically causes joint line pain and mechanical symptoms rather than pain proximal to the joint line reproduced by repetitive flexion-extension
- B.** Biceps femoris tendinopathy, which would cause posterolateral, not lateral epicondylar, pain

C. Lateral collateral ligament sprain, which would be reproduced by varus stress testing rather than by repeated flexion-extension against the epicondyle

D. Iliotibial band syndrome, related to friction/compression of the IT band over the lateral femoral epicondyle during repetitive knee flexion-extension, often associated with hip abductor weakness and altered running mechanics

98. A 12-year-old basketball player has pain and a bony prominence at the tibial tubercle that worsens with jumping and kneeling, in the setting of a recent growth spurt. Which diagnosis fits, and what is the underlying mechanism?

A. Osgood-Schlatter disease, a traction apophysitis at the tibial tubercle from repetitive quadriceps/patellar tendon pull on the immature, actively growing apophysis

B. Patellar tendon rupture, which would present with an inability to actively extend the knee rather than a chronic, activity-related prominence and pain

C. Osteosarcoma, which is the most likely explanation for any bony prominence at the tibial tubercle in this age group regardless of the activity-related pain pattern

D. Prepatellar bursitis, which causes swelling directly over the patella rather than a bony prominence at the tibial tubercle

99. A basketball player rolls the ankle in inversion while landing from a jump, with immediate lateral ankle pain and swelling. Exam shows increased anterior translation of the talus relative to the tibia with an anterior drawer maneuver, with tenderness over the anterior talofibular ligament. Which diagnosis and grading approach fits this presentation?

A. A high ankle (syndesmotic) sprain, which is classically caused by an external rotation/dorsiflexion mechanism rather than an inversion landing mechanism

B. A Weber C fibula fracture, which is assumed by default in every inversion ankle injury regardless of exam findings

C. Achilles tendon rupture, which would present with a positive Thompson test rather than anterior drawer laxity and lateral ligament tenderness

D. Lateral ankle sprain of the anterior talofibular ligament (most common in inversion), graded by laxity and functional instability rather than imaging alone

100. A recreational runner develops gradually worsening posterior heel pain and stiffness that is worst with the first steps in the morning and improves somewhat with activity, with fusiform thickening and tenderness of the Achilles tendon 2-6 cm proximal to its insertion. Which diagnosis fits, and what is a key element of first-line treatment?

- A.** Achilles tendon rupture, which would present with sudden, acute pain and a positive Thompson test rather than this gradual, activity-related stiffness pattern
- B.** Retrocalcaneal bursitis, which characteristically causes pain and swelling directly at the tendon insertion onto the calcaneus rather than 2-6 cm proximal to it
- C.** Achilles tendinopathy (mid-portion), with eccentric calf-strengthening exercise programs representing a key, evidence-supported first-line treatment component
- D.** Plantar fasciitis, which causes pain at the plantar heel and arch rather than the posterior Achilles tendon

101. A recreational basketball player feels a sudden, sharp pain in the back of the ankle during a jump, described as feeling like being kicked, followed by immediate difficulty walking. Exam shows a palpable gap in the Achilles tendon and no plantarflexion of the foot when the calf is squeezed. Which diagnosis and test does this describe?

- A.** Achilles tendinopathy, which would show a positive Thompson test with preserved plantarflexion on calf squeeze
- B.** A gastrocnemius muscle strain ('tennis leg'), which does not typically cause a palpable tendon gap or absent plantarflexion on calf squeeze
- C.** Posterior ankle impingement, which causes pain with forced plantarflexion rather than a palpable gap and absent plantarflexion response
- D.** Achilles tendon rupture, confirmed by a positive Thompson (calf squeeze) test showing absent plantarflexion

102. A cross-country runner who recently increased training mileage develops diffuse aching pain along the posteromedial border of the mid-to-distal tibia, worse at the start of runs and improving somewhat as she warms up, with tenderness along a several-centimeter length of the tibial border rather than one focal point. Which diagnosis fits, and how is it distinguished from a tibial stress fracture?

- A.** Tibial stress fracture, which is distinguished from medial tibial stress syndrome by diffuse rather than focal tenderness

B. Chronic exertional compartment syndrome, which characteristically causes pain focally reproducible with tibial palpation rather than pain triggered by a specific volume/duration of exertion

C. Popliteal artery entrapment syndrome, which causes pain in the popliteal fossa and calf claudication with exertion rather than diffuse tibial border tenderness

D. Medial tibial stress syndrome ('shin splints'), distinguished from a tibial stress fracture by diffuse tenderness along a length of the tibia rather than a single, focal point of maximal tenderness

103. A military recruit continues training despite medial tibial stress syndrome-type symptoms and later develops focal, sharply localized tibial pain with point tenderness and pain with hopping on the affected leg. Plain radiographs are initially normal. Which diagnosis should be strongly suspected, and what is the appropriate next step?

A. Simple persistence of medial tibial stress syndrome, requiring no change in management or further imaging despite the new focal findings

B. Tibial stress fracture, warranting activity restriction (often non-weight-bearing or reduced load) and further imaging (MRI or bone scan) given the frequently normal early radiographs

C. A benign bone cyst, which is the most likely explanation for focal tibial tenderness in an athlete regardless of the exertional pain pattern described

D. Compartment syndrome, which would be confirmed by normal plain radiographs and requires no further imaging workup

104. A runner develops sharp plantar heel pain that is worst with the first steps in the morning and after periods of rest, improving somewhat with continued walking, with point tenderness at the medial calcaneal tuberosity and pain reproduced by passive dorsiflexion of the toes. Which diagnosis fits, and what is a first-line treatment component?

A. Plantar fasciitis, with first-line treatment typically including plantar fascia-specific stretching, calf stretching, and supportive footwear or orthotics

B. Tarsal tunnel syndrome, which characteristically causes burning/numbness in the plantar foot from posterior tibial nerve entrapment rather than mechanical start-up pain reproduced by toe dorsiflexion

C. Calcaneal stress fracture, which would show diffuse tenderness circumferentially around the heel rather than the focal medial tuberosity point tenderness described

D. Achilles tendinopathy, which causes pain at the posterior tendon rather than the plantar medial heel

105. A football lineman hyperextends the great toe against the ground during a play (foot planted, forced dorsiflexion) and develops pain and swelling at the first metatarsophalangeal joint, with pain on passive dorsiflexion of the toe and difficulty push-off during gait afterward. Which diagnosis fits, and what determines return-to-play timing?

A. Sesamoiditis, which causes chronic, gradual-onset plantar first MTP pain rather than this acute hyperextension injury presentation

B. Bunion (hallux valgus) deformity, which is a chronic structural deformity unrelated to an acute hyperextension mechanism

C. Turf toe (first MTP plantar plate sprain), with return-to-play timing set by injury grade (swelling, ecchymosis, instability) rather than a fixed timeline

D. Gout flare, which is the most likely explanation for any acute first MTP joint pain and swelling regardless of a clear acute traumatic mechanism

106. A soccer player is tackled with the foot planted and forcibly plantarflexed, developing severe midfoot pain, swelling, and inability to bear weight, with plantar ecchymosis noted on the sole of the foot. Weight-bearing radiographs show subtle widening between the first and second metatarsal bases. Which diagnosis fits, and why is plantar ecchymosis a notable finding?

A. A simple midfoot sprain, for which plantar ecchymosis is an expected, nonspecific finding of no particular diagnostic significance

B. A fifth metatarsal avulsion fracture, which characteristically presents with lateral, not plantar, ecchymosis and pain at the base of the fifth metatarsal

C. Hallux rigidus, a chronic degenerative condition unrelated to this acute traumatic mechanism

D. Lisfranc injury; plantar ecchymosis is a specific red-flag finding for this injury and warrants careful evaluation even with subtle radiographs

107. A female distance runner with a history of relative energy deficiency presents with gradually worsening groin/anterior hip pain and a positive fulcrum test, with MRI showing a stress reaction on the superior (tension) side of the femoral neck. Why is this location clinically significant compared to a stress reaction on the inferior (compression) side?

- A.** Tension-side and compression-side femoral neck stress fractures carry identical risk and are managed with an identical, protected weight-bearing-only approach
- B.** Compression-side femoral neck stress fractures are the more dangerous location, carrying higher risk of displacement than tension-side fractures
- C.** The tension/compression distinction described is specific to tibial stress fractures and does not apply to the femoral neck
- D.** Tension-side (superior) fractures carry higher risk of progressing to a displaced fracture and generally need more urgent restriction, often surgery

108. A sprinter feels a sudden sharp pain in the back of the thigh while accelerating out of the blocks, with immediate difficulty continuing to run and localized tenderness and swelling in the posterior thigh. Which structure is most likely injured, and what factor is most associated with recurrence risk?

- A.** Quadriceps strain, which would be expected to cause anterior, not posterior, thigh pain during a sprinting mechanism
- B.** Adductor strain, which would be expected to cause medial groin/thigh pain rather than posterior thigh pain
- C.** Hamstring strain; prior hamstring injury is one of the strongest risk factors for recurrence, so eccentric strengthening before return matters
- D.** Sciatic nerve injury, which would be expected to present with radiating pain, numbness, or weakness distal to the thigh rather than isolated posterior thigh pain and swelling from a sprinting mechanism

109. A young athlete has chronic groin pain, mechanical clicking, and pain reproduced by combined hip flexion, adduction, and internal rotation (FADIR maneuver). Which structure is most likely injured, and what associated bony abnormality is often implicated as a predisposing factor?

- A.** Iliopsoas bursitis, which characteristically causes anterior hip pain with resisted hip flexion rather than pain specifically reproduced by the FADIR maneuver and mechanical clicking
- B.** Piriformis syndrome, which causes posterior buttock pain and possible sciatic-distribution symptoms rather than anterior groin pain reproduced by FADIR testing
- C.** Osteitis pubis, which causes pain localized to the pubic symphysis reproduced by resisted adduction rather than the combined FADIR maneuver

D. Hip labral tear, often associated with underlying femoroacetabular impingement (FAI) morphology (cam or pincer lesions) that predisposes to labral injury with repetitive hip motion

110. A young athlete has anterior hip and groin pain that worsens with prolonged sitting, deep squatting, and pivoting sports, with imaging showing a cam-type deformity of the femoral head-neck junction. Which diagnosis fits, and what is the underlying pathomechanic concept?

A. Hip osteoarthritis as a primary, isolated diagnosis unrelated to any structural cam or pincer morphology

B. Simple hip flexor (iliopsoas) tendinopathy, which is unrelated to any bony femoral or acetabular morphologic abnormality

C. Femoroacetabular impingement (FAI), where abnormal cam or pincer morphology causes repetitive femoroacetabular contact, predisposing to labral injury

D. Avascular necrosis of the femoral head, which is characteristically unrelated to any cam or pincer morphologic finding on imaging

111. A soccer player feels a sharp pull in the front of the hip while kicking forcefully, with pain reproduced by resisted hip flexion with the knee extended and tenderness over the proximal anterior hip. Which structure is most likely strained?

A. The gluteus maximus, which functions primarily as a hip extensor and would not be expected to produce pain with resisted hip flexion

B. The adductor longus, which would be expected to produce pain with resisted hip adduction rather than resisted hip flexion

C. The iliopsoas (hip flexor) muscle-tendon unit, commonly strained in kicking sports from forceful, resisted hip flexion

D. The rectus femoris origin at the anterior inferior iliac spine only, to the exclusion of the iliopsoas, despite the described resisted flexion pain pattern being consistent with either structure but classically taught as iliopsoas in this context

112. A football player is struck directly in the anterior thigh by an opponent's knee, developing a large, painful hematoma. Two weeks later, despite rest, he has a persistent, enlarging firm mass in the same area with restricted knee flexion. Which complication should be suspected, and what does it mean for management?

- A.** Myositis ossificans, a heterotopic-bone complication of muscle contusion; avoid aggressive early stretching, and confirm with imaging over time
- B.** A simple, uncomplicated resolving hematoma, for which no change in management or further evaluation is needed regardless of the firm, enlarging mass and restricted motion
- C.** An acute compartment syndrome, which would be expected to present two weeks after the initial injury rather than in the acute post-injury period
- D.** A soft tissue sarcoma, which is the most likely explanation for any firm thigh mass following trauma, regardless of the clear preceding contusion history

113. An overhead-throwing athlete reports progressive shoulder pain and weakness with overhead activity, with a positive empty can test and weakness of resisted external rotation, without a specific traumatic event. Which structure is most likely injured?

- A.** The long head of the biceps tendon in isolation, which would be better assessed by Speed's or Yergason's test rather than the empty can and resisted external rotation findings described
- B.** The pectoralis major tendon, injury to which would cause weakness of resisted adduction/internal rotation rather than the abduction and external rotation weakness described
- C.** The rotator cuff (most commonly the supraspinatus, given the empty can test finding), from overuse-related tendinopathy or tearing in repetitive overhead athletes
- D.** The axillary nerve, injury to which would cause deltoid weakness and lateral shoulder numbness rather than the specific rotator cuff-pattern weakness described

114. A volleyball player has deep shoulder pain with overhead spiking, a sense of instability, and a positive O'Brien's (active compression) test, with pain localized to the top of the shoulder that improves with the arm pronated compared to supinated during the test. Which structure is most likely injured?

- A.** The acromioclavicular joint, injury to which is best assessed by the cross-body adduction test rather than O'Brien's test in this specific differential pattern
- B.** The subscapularis tendon, injury to which is assessed by the lift-off or belly-press test rather than O'Brien's test
- C.** The suprascapular nerve, injury to which would cause infraspinatus/supraspinatus weakness and atrophy rather than the pain pattern and positive O'Brien's test described
- D.** The superior labrum, consistent with a SLAP tear, given the pain pattern and positive O'Brien's test

115. A rugby player's arm is forced into abduction and external rotation during a tackle, and the shoulder appears deformed with the athlete holding the arm slightly abducted and externally rotated, unable to internally rotate or adduct. Which diagnosis fits, and what associated injury should be assessed before and after any reduction attempt?

- A.** Posterior shoulder dislocation, which classically presents with the arm held in internal rotation and adduction rather than the abducted, externally rotated position described
- B.** AC joint separation, which would present with a deformity and tenderness localized to the top of the shoulder at the AC joint rather than this glenohumeral positional deformity
- C.** Clavicle fracture, which would present with a palpable deformity along the clavicle itself rather than the glenohumeral joint positioning described
- D.** Anterior shoulder dislocation, requiring careful neurovascular assessment — particularly axillary nerve function (deltoid sensation and contraction) — both before and after any reduction maneuver

116. A cyclist falls directly onto the point of the shoulder and develops pain and a visible step-off deformity at the top of the shoulder, with the distal clavicle appearing prominent. Which diagnosis fits, and which joint is involved?

- A.** Sternoclavicular joint dislocation, which would produce a deformity at the medial, not lateral, end of the clavicle near the sternum
- B.** Glenohumeral dislocation, which would present with a more global shoulder deformity and loss of the normal rounded shoulder contour rather than an isolated step-off at the top of the shoulder
- C.** Acromioclavicular (AC) joint separation, from a direct fall onto the shoulder disrupting the AC and/or coracoclavicular ligaments, producing the characteristic step-off deformity at the distal clavicle
- D.** Proximal humerus fracture, which would present with diffuse shoulder swelling and pain with any motion rather than this focal step-off deformity at the distal clavicle

117. A swimmer has anterior shoulder pain localized to the bicipital groove, reproduced by resisted forward flexion of the shoulder with the elbow extended and forearm supinated (Speed's test), without significant weakness. Which diagnosis fits this presentation?

- A.** A complete rupture of the long head of the biceps tendon, which would be expected to show a visible 'Popeye' muscle belly deformity and significant weakness rather than isolated pain without notable weakness

- B.** Biceps tendinopathy (long head of biceps), an overuse condition common in swimmers and other overhead athletes from repetitive shoulder flexion and rotation loading the biceps tendon
- C.** Rotator cuff tear, which is best assessed with the empty can and resisted external rotation tests rather than Speed's test as the primary provocative maneuver described
- D.** Thoracic outlet syndrome, which would present with neurologic or vascular symptoms in the arm and hand rather than isolated anterior shoulder pain localized to the bicipital groove

118. A swimmer reports intermittent numbness and tingling in the hand, along with a sense of arm heaviness and occasional color change, worsened by overhead arm positions and repetitive shoulder use. Which diagnosis and provocative testing approach fits this presentation?

- A.** Carpal tunnel syndrome, which would be expected to cause symptoms localized to the median nerve distribution independent of shoulder or overhead arm positioning
- B.** Cubital tunnel syndrome, which would be expected to cause ulnar nerve distribution symptoms reproduced by elbow flexion rather than overhead shoulder positioning
- C.** Thoracic outlet syndrome, from compression of the brachial plexus/subclavian vessels, often assessed with positional provocative maneuvers
- D.** Simple rotator cuff tendinopathy, which would not be expected to produce the described numbness, tingling, and vascular color-change symptoms

119. A 12-year-old Little League pitcher develops progressive shoulder pain with throwing, localized to the proximal humerus near the growth plate, worse with increased pitch counts, without a specific traumatic event. Radiographs show widening of the proximal humeral physis compared to the contralateral side. Which diagnosis fits, and what is the primary management principle?

- A.** A proximal humerus fracture from a single acute traumatic event, which would not explain the gradual, throwing-volume-related symptom onset described
- B.** Little League shoulder (proximal humeral epiphysiolysis), a repetitive traction/rotational stress injury to the open proximal humeral growth plate, managed primarily with rest from throwing and gradual, structured return once symptoms and radiographic widening resolve
- C.** Adhesive capsulitis ('frozen shoulder'), a condition that occurs almost exclusively in older adults and would not explain physeal widening in a skeletally immature athlete
- D.** Osteosarcoma, which is the most likely explanation for any physeal-region abnormality in this age group regardless of the classic overuse throwing history and symptom pattern described

120. A 15-year-old gymnast develops gradually worsening low back pain that is worse with spinal extension (such as during a backbend), with a normal neurologic exam. Plain radiographs are initially unremarkable, but clinical suspicion remains high given the sport and symptom pattern. Which diagnosis should be strongly suspected, and what is the appropriate next diagnostic step?

- A.** Simple mechanical low back strain, which would not typically warrant further imaging given a benign presentation and would not specifically explain the extension-provoked pattern in this classic at-risk population
- B.** Spondylolysis (pars interarticularis stress fracture), for which further imaging such as MRI or SPECT/CT is often used given the frequent insensitivity of plain radiographs, especially early in the process
- C.** Ankylosing spondylitis, which is the most likely explanation for adolescent back pain regardless of the specific extension-provoked pattern and gymnastics-specific mechanism described
- D.** Lumbar disc herniation, which would classically cause flexion-provoked, radicular symptoms rather than the extension-provoked axial pain pattern and normal neurologic exam described

121. A powerlifter develops low back pain radiating down the leg below the knee, with numbness in the lateral foot and weakness of ankle plantarflexion, worsened by sitting and forward flexion, with a positive straight leg raise test. Which diagnosis and level fits this presentation?

- A.** Lumbar disc herniation at the L5-S1 level causing S1 nerve root radiculopathy, consistent with lateral foot numbness, plantarflexion weakness, and a positive straight leg raise
- B.** L5-S1 disc herniation causing L5 radiculopathy, which would be expected to cause weakness of ankle dorsiflexion and great toe extension rather than plantarflexion weakness
- C.** Lumbar facet-mediated pain, which would be expected to cause axial back pain worsened by extension rather than this radicular pattern with a positive straight leg raise and specific dermatomal/myotomal findings
- D.** Piriformis syndrome, which causes buttock pain and possible sciatic symptoms from extrinsic nerve compression rather than the specific disc-related radicular pattern with positive straight leg raise testing described

122. An older recreational golfer has chronic axial low back pain that worsens with spinal extension and rotation (as in the golf swing) and improves with flexion, without radicular symptoms or neurologic deficit. Which diagnosis fits, and what distinguishes it from disc-related pain?

- A.** Lumbar disc herniation, which is distinguished from facet pain by an extension-provoked, flexion-relieved pattern identical to that described
- B.** Ankylosing spondylitis, which is the most likely explanation for chronic axial back pain in an older recreational athlete regardless of the specific extension/rotation-provoked, non-radicular pattern described
- C.** Lumbar facet joint-mediated pain, distinguished from disc-related pain by its extension/rotation-provoked, flexion-relieved pattern and the absence of radicular or neurologic findings
- D.** Lumbar spinal stenosis, which characteristically causes symptoms that improve with extension and worsen with flexion, opposite to the pattern described

123. A 14-year-old athlete has chronic, gradually worsening thoracic back pain and a noticeably increased thoracic kyphosis on exam, without a specific traumatic event, with radiographs showing anterior vertebral wedging of several consecutive thoracic vertebrae. Which diagnosis fits this presentation?

- A.** Postural (non-structural) kyphosis, which characteristically corrects fully with active extension or lying supine and would not show anterior vertebral wedging on radiographs
- B.** Acute vertebral compression fracture from a single traumatic event, which would not explain the gradual onset and multi-level wedging pattern described
- C.** Scheuermann's kyphosis, a structural, growth-related condition causing anterior wedging of multiple consecutive thoracic vertebrae and a rigid, increased kyphotic deformity
- D.** Ankylosing spondylitis, which characteristically causes a different radiographic pattern (spinal fusion/bamboo spine changes over time) rather than the anterior wedging of multiple thoracic vertebrae described here

124. A physician is explaining muscle strain grading to an athlete after a hamstring injury. Which description correctly characterizes a grade II muscle strain?

- A.** Mild strain with microscopic fiber damage only, minimal swelling, and no significant loss of strength or function
- B.** Partial muscle-tendon unit tear with some fiber disruption, causing pain, swelling, and some loss of strength/function, but without complete loss of muscle function
- C.** Complete tear of the muscle-tendon unit with total loss of function and often a palpable defect

D. No structural damage to the muscle-tendon unit, with pain attributed entirely to delayed onset muscle soreness

125. An athlete begins a new, unaccustomed eccentric-heavy strength training program and develops diffuse muscle soreness and stiffness that peaks approximately 24-72 hours after the session, without a specific injury event, gradually resolving over the following days. Which explanation best fits, and how is it distinguished from an acute muscle strain?

A. Delayed onset muscle soreness (DOMS), a self-limited response to unaccustomed eccentric loading distinguished from an acute strain by its delayed onset (24-72 hours, rather than immediate), diffuse rather than focal distribution, and lack of a discrete precipitating injury event

B. An acute grade I muscle strain, which is distinguished from DOMS by an identical delayed 24-72 hour onset pattern with diffuse distribution

C. A grade III complete muscle tear, which would be expected to cause immediate, severe pain and significant functional loss rather than this delayed, diffuse, self-limited soreness pattern

D. Rhabdomyolysis, which is the expected and typical response to any unaccustomed eccentric exercise program regardless of the presence or absence of dark urine, renal involvement, or markedly elevated creatine kinase

126. A runner develops reproducible anterior lower leg pain and tightness that begins at a predictable point during a run, worsens with continued activity, and resolves within minutes of stopping, with normal exam and pulses at rest between episodes. Which diagnosis fits, and what confirms it?

A. Peripheral artery disease, which would be expected to show abnormal resting pulses and ankle-brachial index findings rather than the normal between-episode exam described

B. Medial tibial stress syndrome, which characteristically causes diffuse tenderness at rest along the tibial border rather than symptoms that are exertion-triggered and fully resolve with rest as described

C. Deep vein thrombosis, which would not be expected to present with this reproducible, exertion-triggered, and rapidly resolving pattern with a normal resting exam

D. Chronic exertional compartment syndrome, confirmed by measuring intracompartmental pressures before and after a symptom-provoking exercise bout, since resting exam and pulses are typically normal between episodes

127. An endurance athlete experiences involuntary, painful muscle cramping in the calves during a long race, occurring even in a cool environment and with adequate hydration, raising doubt about a purely heat/electrolyte-driven mechanism. Which alternative mechanism is increasingly supported as a contributor to exercise-associated muscle cramping in this scenario?

- A.** Cramping in this scenario is explained exclusively by severe dehydration, regardless of the athlete's reported adequate fluid intake and cool environmental conditions
- B.** Altered neuromuscular control from fatigue, involving increased excitatory afferent activity from muscle spindles and decreased inhibitory activity from Golgi tendon organs, favoring sustained motor neuron excitation and cramping, independent of ambient heat or hydration status
- C.** Cramping in this scenario is explained exclusively by profound serum sodium depletion, which is present in essentially all cases of exercise-associated muscle cramping regardless of environmental conditions
- D.** Cramping under these circumstances has no established physiologic explanation and should be considered purely idiopathic with no contributing mechanism identified in the literature

128. A physician is selecting an analgesic for an athlete with an acute grade I ankle sprain and no contraindications. Which consideration is most relevant when choosing between an NSAID and acetaminophen in the acute post-injury period?

- A.** Acetaminophen is absolutely contraindicated in all acute musculoskeletal injuries regardless of patient factors or the absence of any contraindication
- B.** NSAIDs give analgesic and anti-inflammatory effects but carry a theoretical concern about impairing early healing at high early doses, weighed individually
- C.** NSAIDs are entirely free of any theoretical or evidence-based concern regarding tissue healing at any dose or timing after acute musculoskeletal injury
- D.** There is no clinically meaningful difference between NSAIDs and acetaminophen in mechanism of action, since both work identically via inhibition of the same enzymatic pathway

129. A physician is considering a corticosteroid injection for an athlete with chronic lateral epicondylitis that has not responded to several months of conservative therapy. Which statement best reflects current understanding of corticosteroid injection use for tendinopathy?

- A.** Corticosteroid injections are considered the definitive first-line treatment for tendinopathy, recommended before a trial of conservative therapies such as eccentric strengthening

- B.** Corticosteroid injections have been consistently shown to improve long-term tendon healing and structural integrity compared to conservative management alone
- C.** Corticosteroid injections carry no theoretical or evidence-based concerns regarding tendon integrity and can be repeated as frequently as needed without any consideration of cumulative dosing
- D.** Steroid injections give short-term relief but may worsen intermediate-to-long-term tendinopathy outcomes, so avoid repeated or early first-line use

130. A team physician is establishing a return-to-play pain management plan for an athlete recovering from a significant musculoskeletal injury, weighing options that include opioid analgesics for the acute postoperative period. Which principle best reflects appropriate opioid stewardship in this setting?

- A.** Opioids should be prescribed at a standardized, fixed high dose and duration for all postoperative athletes regardless of injury severity or individual pain control needs, to ensure adequate coverage
- B.** Opioids, when used, should be prescribed at the lowest effective dose for the shortest necessary duration, with a clear plan for tapering and transition to non-opioid analgesics, given recognized risks of misuse and dependence in the athletic population
- C.** Opioid stewardship principles do not apply to competitive athletes, since this population is considered to carry no meaningful risk of misuse or dependence given their generally healthy status
- D.** Opioids should be avoided entirely in all postoperative sports medicine scenarios regardless of injury severity or degree of expected postoperative pain

131. An athlete asks about platelet-rich plasma (PRP) injection for chronic patellar tendinopathy that has not responded to a structured eccentric strengthening program. Which statement best reflects the current evidence base for orthobiologic treatments such as PRP in this setting?

- A.** PRP has definitively proven superior efficacy compared to all other treatments for tendinopathy across consistent, high-quality trial evidence, and should be recommended as the clear first-line intervention
- B.** PRP has been conclusively shown to be ineffective and should never be offered or discussed as a treatment option under any circumstances
- C.** PRP carries no risk or downside of any kind, including cost, and should be presented to every tendinopathy patient as an essentially risk-free intervention

D. PRP evidence is mixed and evolving, with some studies showing benefit and others none, so present it as one option, not proven superior

132. A 12-year-old Little League pitcher develops medial elbow pain with throwing, tenderness over the medial epicondyle apophysis, and pain reproduced by resisted wrist flexion, without instability on valgus stress testing. Which diagnosis fits this presentation in a skeletally immature athlete, and how does it differ conceptually from adult UCL injury?

A. Little League elbow (medial epicondyle apophysitis), a traction injury to the still-open medial epicondylar growth plate from repetitive valgus throwing stress, distinct from adult UCL injury which involves the ligament itself rather than the open apophysis

B. Adult-pattern UCL tear, which is the most likely diagnosis in this age group despite the open growth plate and the described tenderness being localized to the apophysis rather than ligamentous laxity on valgus stress testing

C. Osteochondritis dissecans of the capitellum, which characteristically causes lateral, not medial, elbow pain and mechanical catching symptoms rather than this medial, traction-related presentation

D. Simple contusion from ball contact, unrelated to the repetitive throwing mechanism and apophyseal tenderness described

133. A 10-year-old soccer player develops posterior heel pain that is worse with running and jumping, with tenderness at the calcaneal apophysis reproduced by mediolateral squeeze of the heel, occurring during a period of rapid growth. Which diagnosis fits, and how is it generally managed?

A. Achilles tendon rupture, which would present with a sudden, acute injury and a positive Thompson test rather than this gradual, growth-related, squeeze-tender presentation

B. Calcaneal stress fracture, which is the most likely diagnosis in this age group regardless of the classic apophyseal squeeze-test tenderness pattern and growth-related timing described

C. Sever's disease (calcaneal apophysitis), a traction injury to the growing calcaneal apophysis generally managed conservatively with activity modification, heel cushioning/lifts, calf stretching, and reassurance that it resolves with skeletal maturity

D. Plantar fasciitis, which characteristically causes plantar, not posterior, heel pain and is uncommon in this specific age group compared to calcaneal apophysitis

134. An overweight 13-year-old presents with several weeks of vague hip or knee pain and an antalgic gait, with limited internal rotation of the hip on exam, worse with the hip flexed. Which diagnosis must be urgently considered, and why is prompt recognition important?

- A.** Slipped capital femoral epiphysis (SCFE), which requires prompt recognition and orthopedic referral because delayed diagnosis increases the risk of further slippage, avascular necrosis, and long-term hip dysfunction
- B.** Simple transient synovitis of the hip, which can be safely assumed without further evaluation in this specific age and risk-factor profile given the classic overweight adolescent presentation described
- C.** Growing pains, a benign diagnosis of exclusion that would not be expected to cause limited hip internal rotation on exam or a gait abnormality
- D.** Osgood-Schlatter disease, which causes localized tibial tubercle pain and prominence rather than the referred hip/knee pain and limited internal rotation described here

135. A physician is explaining to a parent why their child's growth-plate-adjacent bone injuries are managed differently than typical adult overuse tendon injuries. Which concept best explains the underlying vulnerability specific to skeletally immature athletes?

- A.** Growth plates and apophyses are mechanically stronger than tendons and ligaments in children, which is why children are relatively protected from apophyseal or physeal injury compared to adults
- B.** In growing athletes, the physis/apophysis is often weaker than the adjacent tendon or ligament, so repetitive loading often causes apophysitis instead
- C.** Skeletally immature athletes are not meaningfully more susceptible to traction-related bone injury than skeletally mature athletes, since bone strength is considered equivalent across all ages
- D.** The distinction between adult and pediatric overuse injury patterns described in this scenario is not supported by the current understanding of pediatric musculoskeletal physiology

136. A team physician performs an ultrasound-guided subacromial corticosteroid injection for an athlete with subacromial bursitis. Compared to a landmark-guided (palpation-based) injection, what is the primary clinical advantage of ultrasound guidance in this setting?

- A.** It eliminates the small risk of post-injection corticosteroid flare that can occur with any technique

- B.** It allows the injection to be performed without first identifying surface anatomic landmarks such as the acromion
- C.** It permits use of a larger total corticosteroid dose than would be safe with a landmark-guided technique
- D.** Real-time visualization confirms needle placement within the bursa, improving accuracy and reducing intra-tendinous miss

137. A physician is about to perform a diagnostic knee arthrocentesis on an athlete with an acutely swollen knee. Which finding would be an absolute contraindication to proceeding with the aspiration at that site?

- A.** The athlete is currently taking a daily low-dose aspirin for an unrelated cardiac indication
- B.** Overlying cellulitis at the planned needle entry site
- C.** The effusion has been present for less than 24 hours
- D.** The athlete cannot fully extend the knee due to pain and swelling

138. A previously untrained college freshman joins the football team's preseason conditioning and, after an unusually intense first practice in high heat, develops severe, diffuse muscle pain, weakness, and markedly dark ('tea-colored') urine the next day. Which laboratory finding would confirm the suspected diagnosis?

- A.** A urinalysis showing microscopic hematuria with normal urine myoglobin
- B.** A serum potassium level at the low end of the normal range
- C.** A creatine kinase (CK) level markedly elevated above the upper limit of normal, generally into the thousands
- D.** A normal serum creatine kinase with an elevated erythrocyte sedimentation rate

139. A cross-country runner with a diagnosed tibial stress fracture asks whether it is safe to take ibuprofen regularly for pain control while the fracture heals. What should the physician counsel?

- A.** Regular NSAID use should generally be minimized during stress fracture healing, since NSAIDs can impair bone healing by inhibiting the prostaglandin-mediated inflammatory response needed for osteogenesis

- B.** NSAIDs are the preferred first-line analgesic for stress fractures because they directly stimulate osteoblast activity at the fracture site
- C.** NSAIDs pose no meaningful concern for bone healing and can be used at any dose without restriction until the fracture is fully healed
- D.** NSAIDs are contraindicated in this setting only because of their effect on gastric mucosa, not because of any effect on bone

140. A 24-year-old recreational runner reports pain localized just below and slightly lateral to the L5 spinous process, worse with prolonged standing and transitioning from sitting to standing, without radiation below the knee. The pain is reproduced by a single-leg stance test that loads one side of the pelvis while the exam is otherwise unremarkable for a lumbar radiculopathy. Which diagnosis best fits this presentation?

- A.** Lumbar disc herniation with nerve root compression
- B.** Spondylolisthesis with associated neurogenic claudication
- C.** Piriformis syndrome with sciatic nerve entrapment
- D.** Sacroiliac joint dysfunction, given the SI-loading test findings

141. A collegiate distance runner develops generalized hives, lip swelling, and lightheadedness roughly 20 minutes into a hard interval workout, occurring only when she runs within 2 hours of eating wheat-containing food, and never occurs with wheat ingestion alone or exercise alone. What is the most likely diagnosis?

- A.** Cholinergic urticaria triggered by any rise in core body temperature, unrelated to food intake
- B.** Classic IgE-mediated wheat allergy that would also occur with wheat ingestion at rest
- C.** Exercise-induced bronchoconstriction with cutaneous flushing as an isolated presentation
- D.** Food-dependent exercise-induced anaphylaxis, triggered specifically by the combination of a culprit food and exertion

142. A high school lacrosse player with a known history of severe insect-sting anaphylaxis wants to return to outdoor practice. Which is the most appropriate management step for participation clearance?

- A.** Ensure the athlete carries an epinephrine auto-injector at all practices and games, and confirm coaching staff know its location and use

- B.** Restrict the athlete to indoor sports only, since outdoor insect exposure cannot be adequately mitigated
- C.** Clear the athlete without any specific precautions, since a single anaphylactic episode does not predict recurrence
- D.** Recommend a prophylactic dose of oral antihistamine before every outdoor practice as the primary preventive measure

143. A 19-year-old swimmer with a history of seasonal allergic rhinitis wants to use an over-the-counter oral antihistamine before a sanctioned competition. From a doping-regulation standpoint, what should the physician advise?

- A.** All antihistamines are banned in-competition because of their central nervous system effects
- B.** Non-sedating oral antihistamines such as second-generation agents (e.g., cetirizine, loratadine) are not prohibited by WADA and are appropriate to use
- C.** Antihistamines require a Therapeutic Use Exemption regardless of formulation before they can be used in competition
- D.** Only injectable antihistamines are permitted; oral formulations are prohibited in-competition

144. During a preparticipation physical evaluation, a 16-year-old basketball player is found to have a systolic murmur that increases in intensity with standing from a squatting position and decreases with passive leg raise while supine. Which underlying diagnosis is most consistent with this dynamic murmur pattern?

- A.** An innocent (physiologic) flow murmur of childhood, which becomes louder with any position that increases venous return
- B.** Hypertrophic cardiomyopathy with dynamic left ventricular outflow tract obstruction
- C.** Mitral valve prolapse, in which the murmur is expected to soften rather than intensify with standing
- D.** A fixed, non-hemodynamically significant bicuspid aortic valve murmur

145. A 20-year-old basketball player collapses suddenly on the court and is found unresponsive and not breathing normally. Bystanders begin CPR immediately and an automated external defibrillator (AED)

is applied. Which underlying cardiac cause is most likely if the initial rhythm captured by the AED is ventricular fibrillation following a witnessed chest impact from a thrown ball moments before collapse?

- A.** Commotio cordis, a rhythm disturbance triggered by blunt precordial impact occurring during a vulnerable phase of the cardiac cycle
- B.** Anomalous coronary artery origin causing exertional ischemia unrelated to the chest impact
- C.** Long QT syndrome triggered by the acoustic startle of the impact rather than the mechanical force itself
- D.** Arrhythmogenic right ventricular cardiomyopathy with impact serving only as an incidental, unrelated event

146. A 17-year-old cross-country runner is noted on preparticipation screening to have tall stature, long fingers, and a positive family history of aortic dissection in a parent at a young age. Physical exam reveals pectus excavatum and joint hypermobility. Which additional finding, if present, would most specifically raise concern for a diagnosis requiring cardiology evaluation and possible activity restriction before clearance?

- A.** A resting heart rate in the low 50s consistent with athletic bradycardia
- B.** Mild scoliosis noted incidentally on a prior spine radiograph
- C.** Aortic root dilation on echocardiography
- D.** Flexible flat feet without pain on standing exam

147. A 22-year-old competitive cyclist is found on a screening ECG to have a corrected QT interval (QTc) of 470 ms, along with a family history of unexplained sudden death in a sibling at age 19. What is the most appropriate next step?

- A.** Reassure the athlete that a QTc in this range is a normal training-related adaptation and clear for full participation
- B.** Repeat the ECG in one year only, with no further workup needed given the athlete is currently asymptomatic
- C.** Clear the athlete immediately but recommend avoiding caffeine before competition as the sole precaution
- D.** Refer for formal cardiology evaluation, including consideration of genetic testing for long QT syndrome, before clearing continued competitive participation

148. A masters-level marathoner in her 50s with well-controlled hypertension asks whether it is safe to continue endurance training. Her resting blood pressure is 132/84 mmHg on her current medication, and she has no other cardiovascular risk factors or symptoms. What is the most appropriate guidance?

- A.** Regular aerobic exercise is generally encouraged in well-controlled hypertension and is part of first-line management, as long as blood pressure remains adequately controlled and she has no exertional symptoms
- B.** She should stop all endurance training indefinitely, since any diagnosis of hypertension is an absolute contraindication to vigorous exercise
- C.** She should switch exclusively to resistance training, because aerobic exercise is contraindicated in anyone with a hypertension diagnosis
- D.** She should discontinue her antihypertensive medication before endurance events to avoid exercise-induced hypotension

149. Immediately after a helmet-to-helmet collision in a football game, a player is evaluated on the sideline. He is alert and oriented but reports headache and appears slightly slow to respond to questions. Which action is most appropriate at this point?

- A.** Allow the athlete to return to play if his symptoms resolve within 5 minutes of rest on the sideline
- B.** Permit return to play as long as he passes a brief balance test alone, without further symptom assessment
- C.** Remove the athlete from play immediately and perform a structured sideline concussion assessment; do not allow same-day return to play
- D.** Have the athlete attempt light jogging on the sideline, and clear him if the jogging does not worsen his headache

150. A high school soccer player is diagnosed with a concussion after a collision. Which initial management recommendation is most consistent with current concussion guidelines?

- A.** A brief period (24 to 48 hours) of relative physical and cognitive rest, followed by gradual, symptom-guided return to light activity
- B.** Strict bed rest in a dark, silent room for a minimum of two full weeks regardless of symptom trajectory

C. Immediate resumption of full cognitive workload (school, screens) with no modification, since rest has no evidence of benefit

D. Complete avoidance of any physical activity for a minimum of one month before any graduated return-to-play steps begin

151. An athlete who sustained a concussion 10 days ago is now essentially symptom-free at rest and with cognitive exertion, and school accommodations have been discontinued. What is the most appropriate next step regarding return to sport?

A. Clear the athlete for full-contact practice and competition immediately, since being symptom-free at rest is sufficient for full clearance

B. Begin a graduated, stepwise return-to-play progression, advancing to the next stage only if the athlete remains symptom-free at the current stage for at least 24 hours

C. Require a minimum mandatory 4-week delay from injury before any return-to-play steps can begin, regardless of symptom status

D. Have the athlete skip directly to a full-contact scrimmage to efficiently test tolerance before returning to games

152. A football player sustains a second concussion within the same season, shortly after apparently recovering from a first concussion earlier that season. He now has prolonged, worsening headache and confusion after this second, relatively minor impact. Which concept best explains this presentation, and what is its major clinical significance?

A. Chronic traumatic encephalopathy, a neurodegenerative condition diagnosable during life based on this presentation

B. Second impact syndrome, a rare but potentially fatal loss of cerebral autoregulation and rapid swelling from a second injury before the first has healed

C. Post-concussion syndrome, meaning simply that symptoms from the first concussion never fully resolved and are unrelated to the second impact

D. Vestibular migraine unmasked by head trauma, unrelated to the timing of the two impacts

153. Which of the following factors is most associated with a prolonged (rather than typical) recovery trajectory after a sport-related concussion?

- A.** Male sex, which is consistently associated with slower recovery across studies
- B.** Sustaining the concussion during a non-contact practice drill rather than a game
- C.** Having no loss of consciousness at the time of injury
- D.** A pre-existing history of migraine headaches

154. A parent asks a team physician whether a specific brand of 'concussion-proof' helmet will prevent their child from ever sustaining a concussion while playing football. What is the most accurate response?

- A.** Yes, modern certified helmets are specifically engineered and proven to make concussion essentially impossible when properly fitted
- B.** Helmets have no protective role at all in preventing any type of head injury, including skull fracture
- C.** Only helmets certified for professional-level play can meaningfully reduce concussion risk; youth-level certified helmets provide no protective benefit
- D.** No helmet fully prevents concussion; helmets mainly reduce catastrophic skull fracture and structural injury, and no design eliminates concussion risk

155. A high school wrestler is found on pre-match skin check to have a cluster of grouped vesicles on an erythematous base on his forearm, with mild associated tenderness and no fever. What is the most appropriate management regarding participation?

- A.** Withhold the athlete from wrestling and cover/treat the lesion, since this presentation is consistent with herpes gladiatorum, which is highly contagious through skin-to-skin contact
- B.** Allow participation as long as the lesion is covered with a bandage and sleeve, since coverage alone eliminates transmission risk
- C.** Allow participation without restriction, since grouped vesicles without fever are not concerning for a contagious process
- D.** Withhold the athlete only from practice but clear him for the scheduled match, since match officials will inspect skin beforehand

156. A collegiate football lineman develops multiple painful, fluctuant, erythematous nodules on his thigh after a preseason camp with shared equipment and close contact. He reports the lesions started as

what he thought were spider bites. Which pathogen should be the leading concern, and why does it matter for return-to-play decisions?

- A.** Group A Streptococcus pharyngitis, which has no relevance to skin lesions or contact-sport participation
- B.** Tinea corporis, which typically requires no restriction from contact participation once diagnosed
- C.** Molluscum contagiosum, which poses minimal transmission risk in contact sports and rarely requires withholding from play
- D.** Community-associated MRSA, since it spreads readily in contact-sport settings and needs the lesion covered, drained if indicated, and treated before contact resumes

157. A long-distance runner develops well-demarcated, erythematous, macerated skin in the web spaces between the toes, with an unpleasant odor, after weeks of training in the same pair of shoes. Scraping shows branching hyphae on KOH prep. What is the most likely diagnosis and first-line treatment?

- A.** Erythrasma, treated with a topical or oral macrolide antibiotic rather than an antifungal
- B.** Contact dermatitis from shoe material, treated with a topical corticosteroid rather than an antifungal
- C.** Pitted keratolysis, treated with an oral antifungal rather than a topical one
- D.** Tinea pedis, treated with a topical antifungal and measures to keep the feet dry (moisture-wicking socks, shoe rotation)

158. A 19-year-old female collegiate distance runner presents with fatigue, cold intolerance, and a recent decline in performance despite unchanged training load. She reports amenorrhea for the past 4 months and has lost weight without deliberately dieting. Which combination of conditions should the physician most strongly suspect?

- A.** Primary hyperthyroidism, since cold intolerance and weight change are the dominant explanatory findings
- B.** Normal physiologic adaptation to endurance training, requiring no further evaluation
- C.** Relative Energy Deficiency in Sport (RED-S), reflecting low energy availability affecting menstrual, metabolic, and performance function
- D.** Isolated iron deficiency anemia fully explaining all of the described symptoms

159. A 24-year-old triathlete with well-controlled type 1 diabetes asks how to manage her insulin and nutrition around a 2-hour endurance training session. Which general principle is most appropriate to counsel?

- A.** Prolonged aerobic exercise raises insulin sensitivity and muscle glucose uptake, so insulin dosing and/or carbohydrate intake often need adjustment to avoid hypoglycemia
- B.** Exercise has no meaningful effect on insulin requirements, so her usual non-exercise-day insulin regimen should be used unchanged
- C.** She should take extra rapid-acting insulin immediately before prolonged aerobic exercise to prevent exercise-induced hyperglycemia
- D.** Endurance exercise is contraindicated in type 1 diabetes regardless of how well the condition is otherwise controlled

160. A 27-year-old professional cyclist reports new-onset fatigue, unintentional weight gain, and constipation over several months, despite an unchanged high training volume. Thyroid function testing shows an elevated TSH with a low free T4. What is the most likely diagnosis?

- A.** Overtraining syndrome, which typically produces the same TSH and free T4 pattern as primary hypothyroidism
- B.** Central (secondary) hypothyroidism due to pituitary dysfunction, given the elevated TSH
- C.** Euthyroid sick syndrome, which is expected to show an elevated TSH with a low free T4 in athletes
- D.** Primary hypothyroidism, given the elevated TSH with a low free T4

161. A marathon runner reports recurrent abdominal cramping and urgent, loose stools that reliably occur during the final third of long training runs and races, resolving completely once the run ends, with no symptoms at other times. Endoscopic workup has been unremarkable. What is the most likely diagnosis?

- A.** Inflammatory bowel disease, which is confirmed by the exertional symptom pattern alone without endoscopic findings
- B.** Exercise-associated (runner's) gastrointestinal distress related to exertion-induced splanchnic hypoperfusion and mechanical/thermal bowel stress
- C.** Irritable bowel syndrome unrelated to exercise, since the timing during runs is coincidental

D. Celiac disease, which characteristically presents with symptoms confined specifically to the later stages of endurance exercise

162. A college wrestler, in the process of cutting weight, reports severe fatigue, right upper quadrant discomfort, and is found to have mildly elevated liver transaminases on routine labs. He denies alcohol use but admits to using an over-the-counter weight-loss supplement purchased online. What is the most appropriate next step?

A. Reassure him that over-the-counter supplements cannot cause liver injury since they are not prescription medications

B. Attribute the transaminase elevation entirely to normal muscle breakdown from wrestling training, requiring no further action

C. Instruct the athlete to stop the supplement immediately and evaluate for supplement-induced hepatotoxicity, since many unregulated weight-loss supplements have been associated with liver injury

D. Continue the supplement at a reduced dose while monitoring symptoms, since stopping abruptly could worsen weight-cutting performance

163. A collegiate athlete recovering from acute infectious mononucleosis, now 3 weeks out with resolved fever and improving fatigue, asks when he can safely return to contact sport. Physical exam shows a persistently palpable, mildly enlarged spleen. What is the most appropriate guidance?

A. Clear him for full-contact participation now, since resolution of fever is the only relevant criterion for return to play

B. Clear him for contact sport as soon as fatigue has improved, regardless of spleen exam findings

C. Restrict him only from non-contact conditioning, while clearing him for full-contact practice and games immediately

D. Hold him from contact sport until splenic size returns to normal (confirmed by exam or imaging), given the rupture risk with residual splenomegaly

164. A 22-year-old marathoner presents with gross, painless hematuria noted immediately after finishing a race, with no flank pain, dysuria, or trauma reported, and the hematuria clears within 48 hours. Urinalysis at the time shows red blood cells without significant proteinuria. What is the most likely explanation?

- A.** Acute glomerulonephritis, which is confirmed by this transient, isolated post-exercise hematuria pattern
- B.** Bladder cancer, which should be presumed as the leading diagnosis in any athlete with gross hematuria regardless of context
- C.** Renal calculus (kidney stone) passage, which is expected to occur without any associated flank pain
- D.** Exercise-associated (march) hematuria, a benign, self-limited finding from bladder wall trauma and transient renal hypoperfusion during prolonged running

165. During a preparticipation exam, a male collegiate soccer player is found to have a solitary functioning kidney (confirmed by prior imaging after a childhood diagnosis). He is otherwise healthy and asks whether he can safely play soccer, a contact sport. What is the most appropriate counseling approach?

- A.** Prohibit participation in any contact or collision sport outright, since a solitary kidney is an absolute contraindication with no exceptions
- B.** Clear him for participation with no additional counseling or precautions, since a solitary kidney carries no elevated injury risk
- C.** Use shared decision-making about the individualized risk of losing renal function if injured, and consider protective gear; participation isn't automatically prohibited
- D.** Recommend surgical placement of a prophylactic kidney shield as the only acceptable path to participation

166. A football player is tackled with a direct blow to the flank and reports significant flank pain and gross hematuria afterward. He is hemodynamically stable. What is the most appropriate next step?

- A.** Obtain CT imaging of the abdomen and pelvis with contrast to evaluate for renal injury before any decision about return to play
- B.** Allow him to return to the game immediately if the pain improves with rest on the sideline, since hematuria after a single blow is expected and benign
- C.** Manage with oral hydration and observation only, since gross hematuria after trauma does not require imaging in a hemodynamically stable athlete
- D.** Proceed directly to surgical exploration, bypassing imaging, given the combination of flank trauma and gross hematuria

167. A 20-year-old collegiate gymnast presents with a 6-month history of amenorrhea, low body weight relative to her training demands, and a recent stress fracture of the tibia. Bone density testing shows a Z-score below expected for age. Which triad of findings does this presentation represent?

- A.** Polycystic ovary syndrome, which classically presents with amenorrhea plus low bone density in athletes
- B.** The Female Athlete Triad — low energy availability, menstrual dysfunction, and low bone density — now understood as part of the broader RED-S framework
- C.** Premature ovarian insufficiency, which is unrelated to training load or energy availability
- D.** Turner syndrome, which would first become apparent with new-onset amenorrhea in early adulthood

168. A competitive recreational runner who is 20 weeks pregnant with an uncomplicated pregnancy asks whether it is safe to continue her regular moderate-intensity running routine. She has no obstetric contraindications. What is the most appropriate guidance?

- A.** Continuing moderate-intensity aerobic exercise, including running, is generally safe and recommended in uncomplicated pregnancy, with attention to hydration and heat
- B.** She should stop all aerobic exercise for the remainder of the pregnancy, since running is considered unsafe at any point during pregnancy
- C.** She should switch exclusively to complete bed rest, since any exercise increases risk of preterm labor in a normal pregnancy
- D.** She may continue running only if she avoids all elevation in heart rate above her pre-pregnancy resting heart rate

169. A 26-year-old competitive swimmer reports irregular, infrequent menstrual periods and low libido, and labs show low estradiol with low-to-normal FSH and LH, in the setting of high training volume and relatively low body fat. What is the most likely underlying mechanism for her menstrual pattern?

- A.** Primary ovarian failure, which would be expected to show elevated FSH and LH with low estradiol
- B.** Hyperprolactinemia from a pituitary adenoma, which would be expected to show a markedly elevated prolactin driving this pattern regardless of energy status
- C.** Normal physiologic menstrual variation with no underlying hormonal disturbance requiring further evaluation

D. Functional hypothalamic amenorrhea, driven by energy deficit suppressing hypothalamic GnRH pulsatility, leading to low-to-normal (rather than elevated) gonadotropins

170. A hockey player is struck in the eye by a puck and reports pain, blurred vision, and sensitivity to light. On exam, there is blood visible layering in the anterior chamber of the eye. What is the most appropriate immediate management?

A. Apply a firm pressure patch directly over the eye to tamponade the bleeding and allow return to play once pain subsides

B. Urgent ophthalmology referral, with the athlete kept upright/head elevated and shielded (not patched tightly) to avoid increasing intraocular pressure, given the diagnosis of traumatic hyphema

C. Reassure the athlete that layered blood in the anterior chamber is a normal, self-limited finding after blunt eye trauma requiring no urgent referral

D. Irrigate the eye copiously with saline to clear the visible blood, then clear for play if vision improves

171. A basketball player is elbowed in the face and immediately reports pain and inability to fully open his mouth, with obvious deviation of the jaw and malocclusion (his teeth no longer fit together normally). What is the most likely diagnosis?

A. Mandibular fracture and/or temporomandibular joint dislocation

B. Simple soft-tissue contusion of the cheek, which would not be expected to cause malocclusion

C. Isolated dental avulsion (a knocked-out tooth), which alone would not typically cause jaw deviation

D. Trigeminal neuralgia triggered acutely by the impact, unrelated to any structural jaw injury

172. A wrestler sustains a direct blow to the outer ear during a match and develops a rapidly enlarging, tender, fluctuant swelling of the pinna. What complication is the physician most trying to prevent by draining this promptly and applying a compressive dressing?

A. Cauliflower ear (auricular perichondritis with cartilage necrosis and fibrosis) resulting from an untreated auricular hematoma

B. Tympanic membrane perforation, which is the primary concern with this type of external pinna swelling

- C. Bacterial meningitis, which commonly arises directly from an untreated auricular hematoma
- D. Facial nerve palsy, which is the typical complication of an unaddressed pinna hematoma

173. A collegiate football player with known sickle cell trait collapses during an intense preseason conditioning session in high heat, with muscle weakness, without the classic cramping pain typically described in exertional heat cramps. What underlying process should be most strongly suspected?

- A. Classic exertional heat cramps, which are expected to present identically in athletes with and without sickle cell trait
- B. Exertional sickling, in which extreme exertion, heat, and dehydration trigger red cell sickling and microvascular occlusion, distinct from ordinary heat cramps
- C. Sickle cell disease crisis, which is the expected diagnosis given a positive sickle cell trait screening result
- D. Malignant hyperthermia, a pharmacogenetic reaction unrelated to sickle cell trait status

174. A 17-year-old female cross-country runner reports fatigue and declining performance over 2 months. Labs show a low hemoglobin, low mean corpuscular volume (MCV), and low ferritin. What is the most likely diagnosis and an important consideration specific to endurance athletes?

- A. Anemia of chronic disease, which classically presents with a low ferritin as described here
- B. Sports anemia (dilutional pseudoanemia from plasma volume expansion), which is expected to show a low ferritin and low MCV as described
- C. Vitamin B12 deficiency anemia, which is expected to present with this same low-MCV pattern
- D. Iron deficiency anemia, common in endurance athletes from increased losses (GI microbleeding, foot-strike hemolysis) plus often inadequate dietary intake

175. An athlete taking a stable dose of a direct oral anticoagulant (DOAC) for a prior venous thromboembolism asks about resuming a moderate-contact recreational sport. What is the most important consideration in this discussion?

- A. DOACs have no effect on bleeding risk from sport-related trauma, so no special counseling beyond routine anticoagulant management is needed
- B. All anticoagulated athletes must be permanently excluded from any sport involving physical contact, without individualized assessment

C. Anticoagulation raises bleeding risk from otherwise minor trauma, so weigh sport contact risk against her thromboembolic/bleeding risk with the prescribing physician

D. The athlete should simply stop the DOAC on days of sport participation and resume it afterward without further discussion

176. A collegiate athlete recovering from mild COVID-19 infection, now asymptomatic for one week, asks about returning to intense training. Which consideration is most important before clearing return to vigorous exercise?

A. No specific return-to-play screening is needed after any viral illness, since resolution of symptoms alone is always sufficient for full clearance

B. The athlete should be cleared for full-intensity training immediately upon symptom resolution, since post-viral cardiac risk applies only to influenza, not other viral illnesses

C. Screening for cardiac involvement (such as myocarditis) is an important consideration in the return-to-play decision, given the association between viral illness and myocarditis and the risk of exertion in that setting

D. A chest x-ray alone is sufficient to fully exclude any cardiac involvement before return to vigorous exercise

177. Several members of a wrestling team develop nearly identical clusters of small, umbilicated, flesh-colored papules on the trunk and arms over a period of weeks, with minimal associated symptoms. What is the most likely diagnosis, and how should return to close-contact competition be managed?

A. Verruca vulgaris (common warts), which typically present as umbilicated papules and require no participation restriction of any kind

B. Chickenpox (varicella), which is confirmed by this presentation and requires a full two-week exclusion from all school and sport activity

C. Folliculitis, which is not contagious between teammates and requires no specific skin-covering precautions for continued participation

D. Molluscum contagiosum; lesions should generally be covered, and widespread or exposed lesions may need to be treated/resolved before close-contact participation, since it spreads by direct skin contact

178. A study-abroad collegiate athlete returns from international competition with fever, watery diarrhea, and abdominal cramping beginning 2 days after arrival home. He reports drinking tap water and eating street food while traveling. What is the most likely category of diagnosis, and what is an important initial management consideration?

- A.** Inflammatory bowel disease flare, which is the expected first diagnosis in a previously healthy athlete with this travel history
- B.** Traveler's diarrhea, most often bacterial (e.g., ETEC); management centers on hydration, with antibiotics reserved for more severe presentations
- C.** Viral gastroenteritis exclusively, for which no consideration of bacterial causes or antibiotics is ever appropriate regardless of severity
- D.** Appendicitis, which classically presents with watery diarrhea as its dominant and defining symptom

179. A youth soccer player develops a slowly expanding, annular, red rash with central clearing on the thigh, three days after returning from a camping trip in a wooded area, along with mild fatigue and low-grade fever. What is the most important next step?

- A.** Obtain Lyme serology first and withhold any antibiotic treatment until the test result is available, since clinical diagnosis alone is never sufficient
- B.** Begin appropriate antibiotic treatment for suspected early Lyme disease (erythema migrans) based on this classic clinical presentation, without waiting for serologic confirmation
- C.** Reassure the family that an annular rash with central clearing is a normal post-exposure skin reaction requiring no treatment
- D.** Treat presumptively with a topical antifungal, since annular lesions with central clearing are most consistent with a fungal infection in this context

180. A 19-year-old soccer player reports recurrent episodes of unilateral, throbbing headache with associated nausea and light sensitivity, lasting several hours, occurring both during heavy training blocks and unrelated to exercise. Neurologic exam is normal between episodes. What is the most likely diagnosis?

- A.** Exertional headache exclusively, which by definition should never occur outside the context of physical exertion

- B.** Cluster headache, which characteristically presents as bilateral, throbbing pain with gradual onset over hours
- C.** Idiopathic intracranial hypertension, which is confirmed by this history alone without any additional supporting findings
- D.** Migraine headache, given the recurrent unilateral throbbing pain with nausea and photophobia

181. A tennis player develops numbness and tingling in the thumb, index, and middle fingers, along with weakness of thumb opposition, that worsens with prolonged wrist flexion during play. Tinel's sign is positive over the volar wrist. Which diagnosis best fits this presentation?

- A.** Cubital tunnel syndrome (ulnar nerve entrapment at the elbow), which characteristically affects the same thumb, index, and middle finger distribution described here
- B.** Radial tunnel syndrome, which classically causes the sensory and motor deficits described in this scenario
- C.** Thoracic outlet syndrome, which is confirmed by a positive wrist-level Tinel's sign as described
- D.** Carpal tunnel syndrome, from median nerve entrapment at the wrist, given the distribution and positive Tinel's sign

182. During a summer outdoor practice, a previously healthy 16-year-old collapses and has a witnessed generalized tonic-clonic seizure lasting about 90 seconds, then remains confused for several minutes afterward. Core temperature by rectal thermometer is 105°F (40.6°C). What is the most likely explanation for the seizure?

- A.** A new diagnosis of idiopathic epilepsy, which is the most likely explanation and is unrelated to the measured core temperature
- B.** Simple febrile seizure, which is the expected mechanism in adolescents with any elevated core temperature
- C.** Heat stroke, in which severe hyperthermia itself can directly cause seizure activity as part of CNS dysfunction from the elevated core temperature
- D.** Psychogenic non-epileptic seizure, which is suggested by the combination of a witnessed convulsion and elevated temperature

183. A collegiate athlete subject to drug testing asks whether it is acceptable to use a stimulant medication prescribed for diagnosed ADHD during competition. What is the most accurate guidance regarding anti-doping regulations?

- A.** Prescription status alone automatically exempts any medication from anti-doping regulations, so no additional documentation is needed
- B.** Many stimulant ADHD medications are prohibited, so he should obtain a Therapeutic Use Exemption through the governing body before competing
- C.** Stimulant ADHD medications are never permitted under any circumstances, even with a legitimate diagnosis and a TUE
- D.** TUEs apply only to non-stimulant medications; stimulant ADHD medications cannot be approved through the TUE process regardless of diagnosis

184. A team physician is asked whether beta-blockers are permitted for an athlete in a precision sport such as competitive shooting, given the athlete's history of essential tremor unrelated to any cardiac condition. What is the most accurate statement regarding anti-doping regulation of beta-blockers?

- A.** Beta-blockers are prohibited in-competition in precision sports like shooting and archery, since they reduce tremor and heart rate, so a TUE is required
- B.** Beta-blockers are prohibited in all sports at all times, including out-of-competition training, with no sport-specific distinctions
- C.** Beta-blockers are permitted without restriction in every sport, since they are not considered performance-enhancing in any athletic context
- D.** Beta-blockers require a TUE only for endurance sports, and are entirely unrestricted in precision sports such as shooting

185. An athlete asks about using a high-dose caffeine supplement before competition to enhance performance. From a doping-regulation standpoint, what is the most accurate current guidance?

- A.** Caffeine is a fully prohibited stimulant under current WADA rules and requires a Therapeutic Use Exemption for any competitive use
- B.** Caffeine use is restricted only above a specific urinary concentration threshold that is still actively enforced by WADA as a doping violation
- C.** Caffeine is not on the WADA Prohibited List (it's on the Monitoring Program instead), so ordinary use is permitted, though very high doses raise separate safety concerns

D. Caffeine has been permanently and completely removed from any WADA oversight, including monitoring, due to its ubiquity in the general diet

186. A physician is counseling an athlete on appropriate use of nonsteroidal anti-inflammatory drugs (NSAIDs) during a multi-day tournament with hot ambient conditions and significant sweat losses. What is the most important safety consideration specific to this scenario?

A. NSAIDs have no clinically relevant effect on kidney function in athletes and can be used at any frequency regardless of hydration status

B. Regular NSAID use with exercise dehydration raises acute kidney injury risk, since NSAIDs block the prostaglandin-mediated vasodilation that protects kidney perfusion

C. The primary safety concern with NSAIDs in this scenario is exclusively hepatotoxicity, with no meaningful renal risk in a dehydrated athlete

D. NSAIDs actually protect renal blood flow during dehydration by promoting additional prostaglandin-mediated vasodilation beyond the body's own compensation

187. A physician is asked to counsel a college athlete about the risks of using anabolic-androgenic steroids obtained outside of medical supervision to enhance muscle mass. Which combination of risks is most important to convey?

A. Anabolic-androgenic steroids carry no meaningful long-term health risks beyond temporary acne, making the primary counseling point simply about doping-detection risk

B. The only clinically significant risk of anabolic-androgenic steroid use is short-term mood elevation, with no lasting physical health consequences

C. Anabolic-androgenic steroids are risk-free for cardiovascular and reproductive health as long as use is limited to short competitive cycles

D. Cardiovascular risk (including adverse lipid changes and cardiomyopathy), hepatotoxicity with certain oral formulations, and suppression of the hypothalamic-pituitary-gonadal axis leading to testicular atrophy and infertility

188. A sports medicine physician is evaluating an athlete with exertional dyspnea and wants to distinguish exercise-induced bronchoconstriction from a cardiac cause. Which diagnostic procedure is most appropriate to directly confirm exercise-induced bronchoconstriction?

- A.** Resting spirometry alone, without any exercise challenge component, since resting values reliably reproduce the exercise-induced pattern
- B.** A resting 12-lead ECG, since this is the definitive test for confirming exercise-induced bronchoconstriction
- C.** Chest CT with contrast, since airway narrowing during exercise is best visualized on cross-sectional imaging obtained at rest
- D.** Pre- and post-exercise spirometry, looking for a significant drop in FEV1 after a standardized exercise challenge

189. A physician plans to perform a resting 12-lead ECG as part of a preparticipation cardiovascular screening program for a large group of collegiate athletes. What is an important limitation of this approach that should be discussed with the sports program before implementation?

- A.** Resting ECG screening has no false-positive concerns in athletes, since all training-related ECG changes are indistinguishable from pathologic ones
- B.** ECG screening is completely unable to detect any cardiac abnormality associated with sudden cardiac death risk, making it a low-value test in this context
- C.** ECG screening has a meaningful false-positive rate from normal training-related changes, causing unnecessary testing/anxiety unless read using athlete-specific criteria
- D.** ECG screening eliminates the need for any history or physical exam component of preparticipation cardiovascular screening

190. A collegiate gymnast is noted by her coach to have significant weight loss, preoccupation with body image, and rigid, restrictive eating patterns, along with recent stress fractures. She minimizes concerns when asked directly. What is the most appropriate initial approach by the team physician?

- A.** Immediately disqualify her from the team without any direct conversation, since a coach's observation alone is sufficient grounds for permanent removal
- B.** Take no action since the athlete denies any concerns when asked, and self-report is always fully reliable in this situation
- C.** Address the situation only by giving her a strict caloric intake target to follow, without further evaluation or referral
- D.** Have a private, nonjudgmental conversation expressing specific observed concerns, and involve a multidisciplinary team for evaluation and support

191. A professional athlete reports persistent low mood, loss of interest in training and competition, sleep disturbance, and difficulty concentrating for the past 6 weeks, occurring during the competitive season without an identifiable precipitating injury. What is the most appropriate next step?

- A.** Reassure the athlete that persistent low mood and loss of interest for 6 weeks is a universal and expected part of competitive sport requiring no evaluation
- B.** Recommend only increased training intensity to help improve his mood through additional exercise-related endorphin release
- C.** Screen for major depressive disorder using a validated tool and refer for appropriate mental health evaluation and treatment; these symptoms should not be dismissed as normal fatigue from competition
- D.** Attribute the symptoms entirely to overtraining syndrome without screening for a primary mood disorder

192. A college athlete is being considered for a stimulant medication to treat newly diagnosed ADHD. He also has a history of a well-controlled anxiety disorder. What is the most important consideration before starting the stimulant?

- A.** Stimulants can worsen anxiety and, at times, cardiovascular effects, so individualize the plan around his anxiety history and monitor, coordinating with his physician
- B.** A prior or current anxiety disorder is an absolute contraindication to any stimulant medication under all circumstances
- C.** Stimulant medications have no interaction with anxiety symptoms and require no additional monitoring in a patient with a coexisting anxiety disorder
- D.** The only relevant consideration is anti-doping status of the medication, with no need to consider his psychiatric history at all

193. A collegiate football player is referred for evaluation after teammates report he has been using increasing amounts of an opioid pain medication originally prescribed for a shoulder injury, well beyond the expected treatment course, and has become irritable when access is delayed. What is the most appropriate initial step?

- A.** Continue refilling the original prescription at the same dose indefinitely, since the injury that originally justified it was legitimate

- B.** Conduct a direct, nonjudgmental clinical assessment for opioid use disorder and connect the athlete with appropriate substance use treatment resources, rather than simply refilling or extending the prescription
- C.** Take no action unless the athlete voluntarily raises a concern himself, since third-party reports from teammates are not a valid basis for evaluation
- D.** Immediately and abruptly discontinue the opioid without any medical guidance or taper, since any continued use beyond the original injury timeline is inappropriate

194. A cross-country runner reports cough, chest tightness, and wheeze that reliably develop 5 to 10 minutes into a run, especially in cold, dry air, and resolve within an hour of stopping. Baseline spirometry between episodes is normal. What is the most likely diagnosis?

- A.** Fixed, irreversible airway obstruction from chronic obstructive pulmonary disease, which would be expected given this symptom pattern
- B.** Vocal cord dysfunction, which classically produces symptoms exclusively after exercise ends rather than during exertion
- C.** Exercise-induced bronchoconstriction, given symptoms provoked by exertion and cold air with a normal baseline spirometry
- D.** Normal physiologic breathlessness of exercise, requiring no further evaluation given a normal baseline spirometry

195. A trail runner participating in a high-altitude ultramarathon (starting elevation near sea level, ascending above 10,000 feet) develops progressive dry cough, dyspnea at rest, and decreased exercise tolerance over the second day at altitude, along with reported pink, frothy sputum. What is the most likely diagnosis and appropriate immediate action?

- A.** Simple altitude-related dehydration, which is adequately managed with oral fluids alone and does not require any change in altitude
- B.** High-altitude pulmonary edema (HAPE); immediate descent to lower altitude is the most important treatment, along with supplemental oxygen if available
- C.** Exercise-induced bronchoconstriction from cold air exposure, which should be managed with a bronchodilator alone without any need to descend
- D.** Community-acquired pneumonia, which is unrelated to the altitude exposure and does not require descent as part of management

196. A rugby player is struck directly in the chest and develops sudden severe chest pain and progressive shortness of breath. On exam, breath sounds are absent on the affected side, with tracheal deviation away from that side and distended neck veins. What is the most appropriate immediate action?

- A.** Reassure the athlete and observe on the sideline, since absent breath sounds after chest trauma are a common, benign finding requiring no urgent action
- B.** Obtain a chest x-ray first and delay any intervention until imaging results are available, given the athlete is still conscious and talking
- C.** Apply a fully occlusive dressing that seals air in and out of the chest wall, since this is the definitive treatment for this presentation
- D.** Recognize this as tension pneumothorax and arrange for immediate emergency needle decompression/definitive care, as this is a life-threatening emergency

197. A youth athlete with a known history of asthma reports increasing use of his rescue inhaler during practices over the past 2 weeks, now using it almost daily, though he remains asymptomatic between practices. What does this pattern indicate, and what is the most appropriate next step?

- A.** Daily rescue inhaler use before every practice is expected and appropriate for any athlete with a history of asthma and requires no reassessment
- B.** This pattern indicates the rescue inhaler is no longer effective and should be discontinued entirely without adding any other therapy
- C.** Rising rescue inhaler use signals poorly controlled asthma; reassess and likely adjust controller therapy rather than relying on the rescue inhaler alone
- D.** This pattern is unrelated to asthma control and instead reflects normal, expected exertional breathlessness in any young athlete

198. A 24-year-old recreational runner reports several months of low back pain and morning stiffness lasting more than an hour, improving with activity, along with alternating buttock pain. He also reports a recent episode of eye redness and pain diagnosed as uveitis. Which underlying diagnosis is most consistent with this presentation, distinguishing it from mechanical low back pain?

- A.** A spondyloarthropathy (e.g., ankylosing spondylitis), given inflammatory back pain features plus extra-articular uveitis
- B.** Mechanical (musculoskeletal) low back pain, which characteristically improves with rest and worsens with activity, matching this presentation

- C. Fibromyalgia, which is confirmed by this combination of back pain and a remote episode of eye inflammation
- D. Osteoarthritis of the lumbar spine, which classically presents with prolonged morning stiffness exceeding one hour as its hallmark feature

199. A 45-year-old recreational tennis player has sudden onset of severe pain, redness, and swelling of the first metatarsophalangeal joint (big toe) overnight, without preceding trauma. He reports similar milder episodes in the past that resolved on their own. What is the most likely diagnosis?

- A. Septic arthritis, which is the most likely explanation given the absence of trauma and should always be assumed over any other diagnosis in this joint
- B. Acute gout flare, given the classic overnight-onset podagra with prior similar self-limited episodes
- C. Turf toe (a sprain of the first MTP joint plantar plate), which characteristically occurs without any preceding trauma or athletic activity
- D. Osteoarthritis flare of the first MTP joint, which classically presents with this acute, overnight-onset pattern

200. A collegiate volleyball player with a history of well-controlled ankylosing spondylitis is being managed on a biologic (TNF-inhibitor) medication and wants guidance about training and infection risk. What is the most important counseling point specific to her medication?

- A. TNF-inhibitor therapy raises infection susceptibility, so she should seek prompt evaluation for fever rather than training through it, maintaining relevant screening
- B. TNF-inhibitor medications have no effect on infection risk and require no special counseling beyond standard athlete health advice
- C. She should discontinue the biologic medication entirely before any athletic participation, since ankylosing spondylitis treatment is fundamentally incompatible with competitive sport
- D. The only relevant consideration for her medication is anti-doping status, with infection risk being clinically irrelevant in this context

Answers

- 1. B.** Team physician consensus statements are unambiguous that final medical authority over athlete health and return-to-play decisions rests with the team physician, independent of coaching or administrative pressure, precisely because of the structural conflict of interest in team medicine (the physician is compensated by an entity whose success depends on the athlete competing). An athletic director's institutional interest is not a legitimate basis for overriding clinical judgment; it improperly substitutes non-medical authority for medical authority. A liability waiver addresses legal risk-shifting, not medical decision-making capacity, and cannot make an unsafe return safe. Athlete self-assessment after concussion is unreliable because symptom-reporting and insight are themselves affected by the injury, which is exactly why objective return-to-play protocols exist.
- 2. D.** Computer-generated randomization eliminates selection bias because group assignment becomes independent of any athlete characteristic, investigator preference, or presentation pattern. Trainer-directed assignment introduces bias because trainers may (consciously or not) match brace type to athletes they judge as higher or lower risk, confounding the comparison. Presentation-order assignment can correlate with unmeasured seasonal or scheduling factors. Athlete self-selection introduces bias because motivation, injury history, and risk tolerance likely differ systematically between athletes who choose each option, none of which randomization controls for outside of a true random process.
- 3. D.** Exertional heat stroke outcomes are driven primarily by the time interval between collapse and initiation of aggressive cooling — 'cool first, transport second' — and cold-water immersion is the most effective on-site cooling modality. Because many heat casualties occur before runners reach the finish line, event medical planning literature emphasizes distributing rapid-cooling capability along the course rather than concentrating it only at the end. Universal cardiology clearance for all entrants is not a standard or evidence-supported requirement for mass endurance events. Orthopedic-only finish-line staffing ignores that medical (not just musculoskeletal) emergencies, including heat illness and cardiac events, predominate the acute morbidity/mortality risk at endurance events. Sparse, widely-spaced coverage increases the time-to-treatment interval that heat stroke outcomes are most sensitive to.
- 4. A.** Tendon is a dynamic, mechanosensitive tissue; tenocytes respond to appropriately dosed mechanical strain by upregulating type I collagen synthesis and promoting cross-link formation, which over weeks to months increases the tendon's stiffness and tensile load capacity. This is the physiological basis for progressive and eccentric loading protocols used in tendinopathy rehabilitation. The muscle-tendon-junction-only claim ignores well-documented intrinsic tendon remodeling. The 'metabolically inert' distractor is a common misconception directly contradicted by decades of tenocyte mechanobiology research. Water content changes occur but are a minor, secondary contributor relative to collagen synthesis and cross-linking, not the primary mechanism.
- 5. C.** A complete four-view knee series provides the appropriate baseline: the tunnel/notch view is essential because classic OCD lesions localize to the posterolateral aspect of the medial femoral condyle, an area best visualized in that projection, while the AP, lateral, and sunrise views assess overall alignment, joint space, and patellofemoral anatomy. Relying on the notch view alone or the lateral view

alone risks missing lesion characterization and associated findings. Bone scan has poor spatial specificity compared to radiographs and MRI and is not first-line for this indication; radiographs are obtained first, with MRI reserved for further characterizing lesion stability and cartilage integrity if radiographs suggest OCD.

6. A. Regardless of who compensates the team physician, the athlete remains the patient, and health information — including imaging findings, diagnoses, and prognosis — is protected and requires the athlete's explicit authorization before disclosure to media, coaches, or team administration beyond what is needed for care and legitimate roster/compliance purposes. That the team has already confirmed an injury occurred does not authorize disclosure of clinical detail. Being the payor does not transfer the confidentiality interest away from the patient. Withholding structure names while still describing findings can still constitute a disclosure of protected health information and does not resolve the ethical or legal problem.

7. A. Event medical planning begins with a structured pre-event risk assessment incorporating expected participant and spectator volume, anticipated environmental conditions (using a validated heat-stress index such as Wet Bulb Globe Temperature), and venue-specific hazards (field count, distance to definitive care, terrain), which then determines appropriate staffing levels, equipment (including cooling capability), and emergency action plan design. Fixed, volume-independent staffing and last-minute planning both fail to scale resources to actual risk, and passively relying on an existing ambulance contract without independent assessment risks inadequate capacity for a large multi-field event.

8. D. Contemporary rehabilitation science favors criterion-based progression — advancing an athlete when they meet objective milestones such as strength symmetry indices, hop-test performance, and movement-quality benchmarks — over purely time-based progression, because tissue healing and neuromuscular recovery vary meaningfully between individuals. Rigid calendar-based advancement risks progressing athletes who are not physiologically ready, or unnecessarily restricting athletes who have met functional benchmarks early. Subjective confidence alone is an unreliable and sometimes discordant indicator relative to objective deficits. A uniform blanket delay ignores individual variation and is not an evidence-based rehabilitation principle.

9. D. Conflicts of interest — financial or otherwise — must be proactively disclosed to relevant parties (athletes, administration, and institutional compliance) before the physician makes any recommendation influenced by that relationship; this is a core professionalism obligation regardless of whether the recommendation falls under formal 'medical care.' Withholding disclosure while recommending an unrelated product does not address the underlying transparency obligation and may still represent a conflict if that product carries its own undisclosed relationship. Disclosure only upon direct athlete inquiry is inadequate because it places the burden of discovery on the athlete rather than requiring proactive transparency from the physician.

10. B. Sustained endurance training produces central cardiovascular adaptations including increased left ventricular chamber size and stroke volume, increased maximal cardiac output, and resting bradycardia,

which together raise VO2max. Endurance training increases, not decreases, total blood volume (largely through plasma volume expansion), which augments preload and stroke volume rather than reducing it. Peripheral adaptations to endurance training include increased, not decreased, mitochondrial density and capillary density in trained muscle — both distractors describe the opposite of the true training effect.

11. D. Landmark diabetes prevention trials and subsequent guideline consensus establish that at least 150 minutes/week of moderate-intensity aerobic activity combined with resistance training 2+ days/week produces the greatest reduction in progression from prediabetes to type 2 diabetes, through combined improvements in insulin sensitivity and lean muscle mass. A single weekly HIIT session, while beneficial, does not match the volume shown to reduce progression risk. Limiting total weekly volume to 60 minutes falls well below the effective dose regardless of intensity. Aerobic activity does not cause glycemic instability in this population and omitting it forgoes well-established benefit.

12. A. Guideline-based exercise prescription for blood pressure reduction emphasizes regular moderate-intensity aerobic exercise on most days of the week, with dynamic resistance training as a beneficial adjunct; this combination produces meaningful, sustained reductions in both systolic and diastolic blood pressure. Isometric-only training, while it has some evidentiary support in specific protocols, is not the first-line general recommendation and excluding all aerobic and dynamic activity is not appropriate. Deferring exercise until pharmacologic normalization is incorrect, since exercise itself is a first-line, evidence-based treatment for stage 1 hypertension, not merely an adjunct to be withheld. A single weekly vigorous session falls short of the recommended volume.

13. B. Multi-component neuromuscular training programs that specifically target landing mechanics, dynamic knee valgus reduction, and plyometric control are the most consistently effective intervention for reducing ACL injury risk, particularly in female athletes, because they address the biomechanical pattern (excessive dynamic valgus, reduced knee flexion at landing) most strongly linked to non-contact ACL injury. Isolated static stretching without a neuromuscular component has not shown comparable protective effect. Machine-based isolated quadriceps strengthening does not replicate the functional, multi-planar demands of cutting and landing. Volume reduction alone, without addressing movement quality, does not target the underlying biomechanical risk factor.

14. B. Recurrent stress fracture in an athlete with menstrual irregularity is a classic presentation of Relative Energy Deficiency in Sport (RED-S), in which low energy availability disrupts menstrual and bone health and predisposes to recurrent bone stress injury; the appropriate preventive framework addresses energy availability, nutrition, and menstrual function as a unified problem rather than treating each fracture as an isolated orthopedic event. Focusing only on boot immobilization and radiographic healing ignores the underlying systemic risk factor and predicts recurrence. Attributing recurrent fractures primarily to footwear, absent evaluation for RED-S, misses the more likely systemic driver. Increasing training volume in the setting of likely low energy availability would worsen, not improve, bone stress injury risk.

15. D. Youth sports medicine guidance consistently recommends limiting single-sport specialization, particularly before adolescence, encouraging multi-sport participation, and capping weekly single-sport training hours to roughly the athlete's age in years, alongside scheduled rest periods (including at least one day off per week and extended breaks between seasons), because early single-sport specialization and high training volume are strongly associated with overuse injury and burnout. Encouraging specialization before age 10 runs directly counter to this evidence. Eliminating rest days ignores that rest, not continuous loading, is protective against overuse injury. Grade level alone is not an evidence-based proxy for appropriate training volume.

16. D. Current sports nutrition guidance for carbohydrate loading before events exceeding roughly 90 minutes recommends progressively increasing carbohydrate intake to approximately 8-12 g/kg/day over 36-48 hours while simultaneously reducing training volume (tapering), which maximizes muscle glycogen stores and has demonstrated performance benefit for prolonged endurance efforts. Eliminating carbohydrates before a prolonged endurance event is the opposite of the evidence-based approach and risks depleted glycogen stores at the start line. A single large morning-of meal of simple sugars does not replicate the glycogen-supercompensation effect of multi-day loading and risks gastrointestinal distress. Carbohydrate loading has well-established ergogenic benefit for longer-duration events, contrary to the claim of no benefit.

17. C. Exercise-associated hyponatremia most commonly results from athletes drinking hypotonic fluids (water or dilute sports drinks) in excess of actual sweat and sodium losses during prolonged exercise, diluting serum sodium and producing symptoms ranging from mild confusion and nausea to seizure and cerebral edema in severe cases; overdrinking, not underdrinking, is the typical driver in this classic presentation. Inadequate fluid intake would more typically produce hypernatremia and hemoconcentration, the opposite pattern. Excessive sodium intake would tend to raise, not lower, serum sodium. While adrenal insufficiency can cause hyponatremia, it is a much less common cause than exercise-associated hyponatremia in this classic endurance-race scenario and is not the best answer given the presentation.

18. B. Even in the absence of frank anemia, iron deficiency (reflected by low ferritin) can impair oxidative metabolism and endurance performance, and current sports medicine guidance supports considering repletion at the stage of iron deficiency rather than waiting for anemia to develop, particularly in female endurance athletes who are at elevated risk from menstrual losses, exercise-induced hepcidin elevation reducing gut iron absorption, and foot-strike hemolysis. Iron deficiency in athletes has multiple contributing mechanisms beyond diet alone, including exercise-related hepcidin changes and GI losses. Blanket avoidance of supplementation regardless of ferritin ignores the documented benefit of targeted repletion in deficient athletes and is not standard guidance; iron overload risk is managed by checking levels before and during supplementation, not by withholding treatment from documented deficiency.

19. D. Current sports nutrition evidence supports a protein intake of roughly 1.6-2.2 g/kg body mass per day for athletes engaged in resistance training, distributed across multiple meals (e.g., 3-4 servings of

0.3-0.4 g/kg) to optimize muscle protein synthesis, which is substantially above the sedentary RDA of 0.8 g/kg/day. The claim that intake above the sedentary RDA provides no benefit contradicts well-established evidence for resistance-trained individuals. Restricting protein below 1.0 g/kg/day in athletes with normal renal function is not supported and would likely impair strength and recovery goals; there is no evidence that typical high-protein intakes harm kidney function in individuals without preexisting renal disease. The 'anabolic window' framing that all protein must be consumed within 30 minutes post-exercise overstates the narrowness of that window relative to total daily intake distribution, which matters more.

20. D. A systolic murmur that increases with maneuvers that decrease venous return and left ventricular preload, such as Valsalva or standing from squatting, is a classic finding in hypertrophic cardiomyopathy, because reduced ventricular filling worsens dynamic left ventricular outflow tract obstruction; this finding should prompt echocardiographic evaluation before clearance given HCM's association with exertional sudden cardiac death in young athletes. Innocent flow murmurs classically decrease or disappear with standing/Valsalva, the opposite pattern. Mitral valve prolapse murmurs typically shift timing with maneuvers but the described intensity pattern with Valsalva/standing is the hallmark distinguishing feature specifically taught for HCM. A bicuspid aortic valve without stenosis would not be expected to produce a dynamically Valsalva-accentuated murmur in this manner.

21. B. The standard 2-minute orthopedic screening examination used in PPEs includes functional maneuvers such as the duck walk, single-leg hop, and range-of-motion assessments of major joints, chosen specifically because they are rapid, equipment-free, and reasonably sensitive for detecting asymmetries or limitations warranting further evaluation in a mass-screening setting. Isokinetic dynamometry, MRI, and 3D motion capture are all more resource- and time-intensive tools reserved for focused evaluation of a specific concern identified on history or screening exam, not components of the standard rapid screening PPE.

22. D. A family history of unexplained sudden death, particularly at a young age and during exertion, is one of the specific red-flag findings on PPE history that should prompt further cardiac evaluation, since it may indicate an inherited arrhythmogenic or structural cardiac condition (such as hypertrophic cardiomyopathy, long QT syndrome, or arrhythmogenic right ventricular cardiomyopathy) that the athlete could also carry, even if currently asymptomatic. Family cardiac history is an explicit, standard component of PPE screening for exactly this reason. Athlete-reported absence of symptoms does not rule out an inherited channelopathy or cardiomyopathy, which can be clinically silent before a sentinel event. The distinction between competitive and recreational exercise at the time of the relative's death does not change the relevance of the family history.

23. B. Acute febrile illness, and specifically the concern for myocarditis following a recent viral syndrome, is a recognized reason to withhold clearance for competitive activity until resolution and appropriate evaluation, given the risk of exercise-associated arrhythmia or sudden cardiac events in the setting of active myocardial inflammation. Well-controlled asthma with normal exercise tolerance is compatible with clearance, often with an action plan and access to rescue medication rather than

disqualification. Functionally one-eyed athletes are generally cleared for most sports with appropriate protective eyewear and counseling about risk, rather than disqualified outright. Mild, asymptomatic scoliosis without cardiopulmonary involvement is not a disqualifying finding.

24. B. The station-based mass screening format's principal advantage is throughput: multiple trained personnel staff dedicated stations (history, vitals, cardiac, musculoskeletal, etc.), allowing large numbers of athletes to be efficiently and consistently screened in a single setting, which is valuable for schools or organizations with many athletes needing evaluation before a season. It does not eliminate the need for referral; athletes with abnormal findings are still referred for further workup, often to their own primary physician or a specialist. It generally provides less continuity with an athlete's usual physician than an individual office visit would, which is a recognized limitation of the format, not an advantage. All standard PPE history and physical components, including cardiac and family history, remain required regardless of format.

25. A. A single elevated blood pressure reading at a PPE should prompt further evaluation and confirmatory follow-up rather than either ignoring the finding or issuing an outright permanent disqualification; most guidance supports provisional participation in lower-intensity activities while arranging appropriate follow-up and workup, escalating restriction only if hypertension is confirmed and significant on repeat evaluation, particularly for high-intensity static/dynamic sports. A single reading is not diagnostic of sustained hypertension and should not be dismissed outright, since it may represent a real, actionable finding requiring follow-up. Immediate, permanent disqualification is an overreaction to a single unconfirmed reading. Clearing for unrestricted participation without any follow-up ignores a potentially significant abnormal finding.

26. B. Appropriate taper principles, applying the FITT (Frequency, Intensity, Time, Type) framework, generally call for reducing training volume while maintaining relative intensity in the weeks before competition, which reduces accumulated fatigue while preserving strength and neuromuscular readiness for peak performance. Substantially increasing volume and frequency immediately before competition risks accumulating fatigue that blunts performance at the event. Switching to high-repetition, low-intensity training changes the neuromuscular stimulus away from what supports peak strength/power expression and is not the standard taper approach. Abruptly discontinuing training entirely, without a structured taper, can lead to detraining effects and is not consistent with evidence-based tapering strategy.

27. D. For patients with uncomplicated pregnancies and no contraindications, current guidance supports continuing moderate-intensity aerobic and resistance exercise throughout pregnancy, with specific precautions such as avoiding prolonged supine positioning (which can compress the vena cava) and avoiding activities with high risk of falls, abdominal trauma, or contact. Blanket discontinuation of all exercise is not supported for uncomplicated pregnancies and would forgo well-documented maternal and fetal benefits. Resistance training is not universally contraindicated and can be continued with appropriate modification. Maximizing exercise intensity specifically to counteract weight gain is not an appropriate or evidence-based goal-directed approach during pregnancy.

28. D. Individualized exercise prescription based on a symptom-limited exercise stress test (identifying ischemic threshold, arrhythmia risk, and functional capacity) is central to safe, effective cardiac rehabilitation programming, typically targeting a percentage of heart rate reserve or a prescribed range of perceived exertion below any ischemic or arrhythmic threshold identified on testing. A one-size-fits-all maximal heart rate target ignores individual variation in ischemic threshold and functional capacity and could be unsafe for some patients. Resistance training, appropriately dosed and supervised, is a recommended component of comprehensive cardiac rehabilitation, not an activity to be avoided entirely. Baseline stress testing (or comparable functional assessment) is a standard, important step in individualizing safe exercise parameters, not something supervision alone replaces.

29. A. The strongest evidence for fall-risk reduction in older adults supports multicomponent exercise programs that combine balance training (such as tai chi or structured balance exercises) with lower-extremity strengthening, which together address the primary biomechanical contributors to falls: postural instability and inadequate lower-limb strength/power for recovery from a stumble. Upper-extremity-only training does not address the primary lower-extremity and balance deficits driving fall risk. Static stretching alone lacks the strengthening and balance stimulus shown to reduce falls. High-intensity plyometric training, while useful in younger athletic populations, is not appropriate or well-supported as a primary fall-prevention modality in frail or older adult populations given injury risk and mismatch with the target deficits.

30. D. Weight-bearing, impact-loading activities (such as jogging, jumping, or agility-based training) combined with resistance training provide the mechanical loading stimulus shown to most effectively increase or preserve bone mineral density, consistent with Wolff's law of bone remodeling in response to mechanical stress. Aquatic exercise, while beneficial for cardiovascular fitness and joint-friendly conditioning, provides minimal osteogenic stimulus due to buoyancy-reduced loading and is not the primary recommendation when bone density is the specific goal. Purely isometric exercise without dynamic loading provides a weaker osteogenic stimulus than weight-bearing impact activity. Flexibility-focused programs do not provide meaningful mechanical loading and are not an effective primary intervention for bone density.

31. A. For exertional heat stroke, 'cool first, transport second' is the evidence-based standard: immediate whole-body cold-water immersion on site is the fastest and most effective cooling method and directly improves survival by minimizing the duration of core temperature above the threshold for organ damage. Deferring cooling until ED arrival prolongs the dangerous hyperthermic interval and worsens outcomes. Antipyretics act on the hypothalamic set-point and are ineffective for exertional hyperthermia, which is not fever-mediated. Passive cooling with fans alone cools far more slowly than immersion and is insufficient for this degree of hyperthermia.

32. D. Commotio cordis results from blunt chest wall impact occurring during a narrow, vulnerable window of ventricular repolarization (the upslope of the T wave), triggering ventricular fibrillation in a structurally normal heart; it is a recognized cause of sudden collapse and arrest immediately after chest impact in young athletes, and immediate CPR and AED use are critical. Tension pneumothorax would

typically present with respiratory distress, absent breath sounds, and tracheal deviation rather than immediate arrest from a glancing chest blow without such findings. Coronary artery disease-driven MI is far less likely given age and mechanism. Structural valve rupture from blunt trauma is rare and would typically present with hemodynamic collapse from acute regurgitation rather than sudden arrhythmic arrest immediately after impact.

33. C. Left upper quadrant blunt trauma with subsequent left shoulder tip pain (Kehr sign, from diaphragmatic irritation by intraperitoneal blood referred via the phrenic nerve), tachycardia, and hypotension is a classic presentation of splenic injury with hemoperitoneum, requiring urgent evaluation and hemodynamic monitoring given the risk of ongoing hemorrhage. An isolated rib fracture would not explain the referred shoulder pain and hemodynamic instability. A simple abdominal wall strain would not cause tachycardia, hypotension, or Kehr sign. Renal contusion without hemorrhage would be less likely to produce this specific referred pain pattern and hemodynamic instability.

34. B. Ataxia and altered mental status at altitude are hallmark features of high-altitude cerebral edema (HACE), a life-threatening emergency for which immediate descent is the single most important and definitive intervention; delay significantly increases mortality risk. Continued ascent would worsen HACE and is contraindicated. Supplemental oxygen and dexamethasone can be adjunctive and allow limited stabilization but do not substitute for descent as definitive treatment when descent is feasible. Remaining at the same altitude to 'wait it out' risks progression to coma and death.

35. A. Even athletes who appear well immediately after a submersion event should be observed for several hours, because pulmonary aspiration can cause delayed-onset respiratory compromise that is not apparent on initial exam despite a currently normal oxygen saturation and exam. Discharging from the scene without observation risks missing a delayed deterioration. Disposition should be guided by clinical risk, not solely by the patient's preference to decline transport, given the risk of a life-threatening delayed complication. Submersion duration alone is not a reliable predictor that rules out delayed pulmonary injury.

36. D. Sudden severe testicular pain with a high-riding, horizontally oriented testicle (Angell sign) is a classic presentation of testicular torsion, a true surgical emergency in which testicular salvage rates fall sharply after roughly 6 hours of ischemia; this requires emergent urologic evaluation and typically emergent surgical exploration, not conservative management or elective imaging. Treating this as a simple contusion or scheduling elective ultrasound risks testicular loss due to the time-critical ischemia.

37. D. The classic epidural hematoma presentation is an initial period of altered consciousness, a lucid interval as the hematoma has not yet expanded enough to cause mass effect, followed by rapid deterioration (worsening headache, pupillary asymmetry from uncal herniation, declining consciousness) as the typically arterial hematoma (often middle meningeal artery) expands quickly — a neurosurgical emergency. A simple concussion would not be expected to produce a dilated pupil and progressive decline after a lucid interval. Chronic subdural hematoma develops over days to weeks, not

minutes. Diffuse axonal injury typically presents with immediate, sustained loss of consciousness from the moment of impact rather than a lucid interval followed by delayed deterioration.

38. A. Sudden unilateral dyspnea, pleuritic chest pain, and decreased breath sounds on the affected side following chest trauma are classic for pneumothorax, requiring prompt recognition given the risk of progression to tension physiology with hemodynamic compromise; auscultatory asymmetry with decreased breath sounds is a key distinguishing finding not expected with a simple contusion, pericarditis, or costochondritis, none of which typically cause unilaterally decreased breath sounds.

39. B. Heat exhaustion is characterized by heavy sweating, cramping, and mild symptoms with core temperature typically below 104F and preserved ability to follow commands (no significant CNS dysfunction), distinguishing it from heat stroke, which requires a markedly elevated core temperature (generally above 104F) plus significant CNS dysfunction such as confusion, seizure, or coma; heat exhaustion is managed with rest, cooling, and rehydration rather than the emergency cold-water immersion protocol reserved for heat stroke. This presentation does not fit hyponatremic encephalopathy, which would typically show more significant neurologic compromise and a distinct fluid-intake history, and simple exercise cramps alone would not explain the disorientation and heavy diaphoresis described.

40. C. This presentation (urticaria, angioedema, respiratory symptoms, and hypotension after a likely allergen exposure) meets criteria for anaphylaxis, for which intramuscular epinephrine is the first-line, life-saving treatment and should be given immediately, not delayed for oral antihistamines to be tried first. Diphenhydramine and bronchodilators are useful adjuncts but do not replace epinephrine as first-line therapy for anaphylaxis with hemodynamic and airway involvement. Observation without treatment is inappropriate and dangerous given the risk of rapid progression to airway obstruction or cardiovascular collapse.

41. D. Midline cervical spine tenderness, any neurologic deficit (weakness, numbness, or paresthesias), or reported neck pain in the setting of a significant mechanism such as helmet-to-helmet collision are the key red flags mandating cervical spine immobilization and emergent transport rather than proceeding directly to sideline concussion testing, given the risk of an unstable spinal injury. Isolated retrograde amnesia, headache alone, or delayed nausea without accompanying neck findings are concussion-consistent symptoms that do not, by themselves, indicate cervical spine instability, though the athlete should still be evaluated for concussion using a validated sideline protocol.

42. D. Exertional sickling in athletes with sickle cell trait, particularly during high-intensity, repetitive-sprint activity in heat, can precipitate rhabdomyolysis with dark ('tea-colored') urine, muscle weakness, and risk of acute kidney injury and compartment syndrome; this requires aggressive intravenous hydration, close monitoring of renal function and creatine kinase, and a high index of suspicion specifically because of the trait status, which changes both risk and management compared to a sickle-cell-negative athlete with similar symptoms. This is not a benign, self-limited event, and attributing the

presentation to simple dehydration or isolated cramping without considering exertional sickling would miss a life-threatening, trait-specific complication.

43. B. Field management of frostbite involves removing wet or constrictive clothing, protecting the affected tissue from further cold injury and mechanical trauma, and initiating rapid rewarming in warm (not hot) water once there is no risk of the tissue refreezing, since freeze-thaw-refreeze cycles dramatically worsen tissue damage. Vigorous rubbing causes additional mechanical injury to already fragile, frostbitten tissue and is contraindicated. Direct dry heat sources like a campfire or exhaust risk uncontrolled thermal burns to insensate tissue. While avoiding premature rewarming that could refreeze is important, appropriate field management is not simply 'no intervention until hospital' when safe rewarming conditions can be ensured in the field.

44. C. Current resuscitation guidelines emphasize early, high-quality chest compressions with minimal interruption as the foundation of bystander CPR, with the AED applied and used as soon as it is available, since early defibrillation for a shockable rhythm dramatically improves survival in sudden cardiac arrest; compressions should not be delayed or withheld while waiting for equipment or personnel, and rescue breathing alone without compressions is not the recommended approach for cardiac arrest management. AED use by trained laypersons or first responders should proceed without waiting for a physician to arrive, since AEDs are specifically designed for safe use by non-physician rescuers and early defibrillation is time-critical.

45. C. Rapid ascent from depth without adequate exhalation can cause pulmonary barotrauma, with air escaping into the mediastinum and subcutaneous tissues, producing chest pain, dyspnea, and palpable subcutaneous crepitus (subcutaneous emphysema) in the neck or chest wall; this is a diving-specific emergency requiring prompt evaluation, given risk of progression to pneumothorax or arterial gas embolism. Exercise-induced bronchospasm would not produce subcutaneous crepitus. A panic attack with hyperventilation does not explain palpable crepitus, a hallmark of air in the soft tissues. Costochondritis would not present with sudden onset tied specifically to rapid ascent, nor would it produce subcutaneous emphysema.

46. B. Acute, tearing back or abdominal pain with asymmetric or diminished pulses is a classic presentation of aortic dissection; although rare in young, otherwise healthy athletes, it must be considered — particularly in athletes with connective tissue disorders such as Marfan or Loeys-Dietz syndrome, or uncontrolled hypertension — because missed diagnosis carries very high mortality. A simple muscle strain does not explain diminished femoral pulses, a vascular finding requiring vascular explanation, not a musculoskeletal one. Attributing pulse findings to positioning artifact would be dangerous if dissection is actually present. Renal colic classically causes colicky flank pain without pulse asymmetry and does not explain the tearing quality or vascular exam finding described.

47. A. In a patient with a known severe allergy and a clear exposure, throat tightness and dysphagia (indicating potential airway involvement) meet criteria for immediate epinephrine administration; anaphylaxis management guidelines do not require the presence of hypotension or skin findings before

treating when there is a known high-risk allergen exposure and respiratory or airway symptoms, because airway compromise can progress rapidly and epinephrine is safe and time-critical. Waiting for hives, using antihistamines alone, or delaying treatment until a medical facility all risk life-threatening airway obstruction from a preventable delay in epinephrine administration.

48. A. A painless 'curtain' visual field defect accompanied by new floaters and flashes of light after blunt ocular trauma is a classic presentation of retinal detachment, a true ophthalmologic emergency requiring urgent referral, since delayed treatment risks permanent vision loss. Subconjunctival hemorrhage is a benign finding that does not cause visual field loss. Corneal abrasion characteristically causes significant pain and foreign body sensation, not a painless field defect. Blepharitis is a chronic eyelid margin condition unrelated to acute trauma and would not explain this presentation.

49. C. In exertional heat stroke with altered mental status and a markedly elevated core temperature, immediate on-site cooling (ice-water immersion) takes priority and should begin simultaneously with EMS activation, not be delayed until or replaced by transport, because 'cool first, transport second' is the evidence-based approach shown to reduce mortality — every additional minute at a critically elevated core temperature increases organ damage risk. An altered patient should not be given oral fluids given aspiration risk and inability to safely swallow. Delaying treatment to obtain a second temperature reading wastes critical time in an unambiguous emergency presentation.

50. A. When cervical spine injury cannot be excluded, the jaw-thrust maneuver is the preferred technique to open the airway because it avoids the neck extension involved in head-tilt-chin-lift, thereby minimizing movement of a potentially unstable cervical spine while manual in-line stabilization is maintained; airway management and spinal precautions are addressed simultaneously, not sequentially, in this scenario. Using head-tilt-chin-lift risks worsening a cervical spine injury. Helmet and shoulder pad removal in football-specific protocols is generally deferred and done as a coordinated, equipment-specific process (often removing both together to maintain neutral alignment) rather than as an immediate first step before airway management. Delaying necessary airway intervention until a full secondary survey is completed is inappropriate when the airway is actively obstructed, a true immediate life threat.

51. A. An open fracture is an orthopedic emergency; appropriate field management is to cover the wound with a sterile dressing, splint in the position found without attempting reduction (which risks further contamination and neurovascular injury), and arrange urgent transport, since infection risk rises with time to debridement. Prompt antibiotic administration reduces infection risk and should not be delayed until the OR. Manual reduction or manipulating exposed bone back beneath the skin on the field is inappropriate and increases contamination and further tissue injury; formal irrigation and debridement should occur in a controlled surgical setting.

52. C. Pain out of proportion to injury, particularly pain with passive stretch of muscles within the affected compartment, is the earliest and most sensitive clinical sign of acute compartment syndrome, a surgical emergency requiring urgent fasciotomy; critically, distal pulses often remain intact until very

late because compartment pressures typically exceed capillary and venous pressure long before arterial pressure, so a normal pulse does NOT exclude the diagnosis. Attributing this presentation to expected postoperative swelling risks missing a limb-threatening emergency. DVT is not excluded or suggested by pulse status and does not typically cause pain with passive muscle stretch in this pattern. Cellulitis would not typically produce this degree of pain with passive stretch and tense compartment findings.

53. D. Midline back pain with bilateral leg weakness after a fall from height is highly concerning for an unstable spinal injury; standard management is to maintain the patient supine with spinal motion restriction, using a coordinated log-roll with sufficient trained personnel only if repositioning is necessary, rather than sitting the athlete up or allowing ambulation, since uncontrolled movement of an unstable spine can convert a neurologically intact injury into a complete spinal cord injury. Subjective comfort is not a reliable indicator of spinal stability. A single-rescuer lift does not provide adequate spinal control and risks further injury.

54. A. A convulsive seizure lasting 5 minutes or longer, or recurrent seizures without return to baseline between episodes, meets the working definition of status epilepticus, a neurologic emergency requiring immediate EMS activation and prompt abortive treatment given increasing risk of neuronal injury and systemic complications with prolonged seizure activity; field management should focus on protecting the airway, positioning to prevent aspiration, and preventing injury from the environment, not on restraining limbs (which does not stop seizure activity and risks injury) or placing an object in the mouth (a discredited practice that risks airway obstruction and dental injury). Waiting 15 minutes before activating EMS is dangerously inappropriate once the 5-minute threshold has already been reached.

55. B. An expressed suicidal plan with identified means represents an acute safety emergency regardless of the calm setting in which it is disclosed, and the physician's immediate responsibility is to stay with the athlete, remove or restrict access to the described means where possible, and urgently connect the athlete to emergency mental health evaluation, rather than treating this as routine and deferring care to a later appointment. Confidentiality has well-established, necessary exceptions when a patient poses an imminent risk of serious harm to themselves; declining to involve any additional support in this scenario would be an inappropriate and dangerous application of confidentiality principles. Normalizing active suicidal ideation with a specific plan as ordinary competitive stress fails to recognize a genuine emergency.

56. D. Symptomatic hypoglycemia (glucose 48 mg/dL with neuroglycopenic symptoms) in a conscious athlete able to safely swallow should be treated immediately with 15-20 grams of fast-acting oral carbohydrate, with glucose rechecked in about 15 minutes and treatment repeated if still low ('rule of 15'), because prolonged or worsening hypoglycemia risks seizure, loss of consciousness, and injury. Administering insulin in this scenario would dangerously worsen an already low glucose and reflects a misreading of the presentation as hyperglycemia rather than hypoglycemia. Withholding treatment until hospital arrival unnecessarily prolongs a treatable, time-sensitive emergency. Continuing to compete with untreated hypoglycemia further lowers glucose through ongoing exertion and risks sudden collapse.

57. A. Polyuria, vomiting, abdominal pain, deep rapid (Kussmaul) breathing, marked hyperglycemia, and significant ketosis together are classic for diabetic ketoacidosis, a life-threatening emergency requiring urgent transport for IV fluid resuscitation, insulin therapy, and careful electrolyte (particularly potassium) monitoring, which cannot be safely managed with on-site oral treatment alone. Attributing this constellation to simple heat-related dehydration or viral gastroenteritis would miss a metabolic emergency directly explained by the athlete's known diabetes and confirmed by hyperglycemia and ketosis. Exercise-associated hyponatremia presents with a different mechanism (dilutional low sodium from overhydration) and does not fit markedly elevated glucose and ketones.

58. C. Exercise-associated collapse occurring after crossing the finish line, in an athlete who is alert and normothermic with rapid resolution upon lying supine with legs elevated, is most consistent with postural hypotension from the abrupt loss of the 'muscle pump' effect on venous return once running stops, and is managed conservatively with positioning and monitoring rather than the aggressive cold-water immersion protocol reserved for heat stroke, which by definition involves significant hyperthermia and CNS dysfunction — both absent here. Cardiogenic shock would not resolve this quickly with simple repositioning and would show hemodynamic instability, not normotension. Anaphylaxis requires an allergic trigger and typical findings (urticaria, angioedema, wheezing), none of which are described here.

59. C. An inability to speak with a weak or absent cough in a choking patient indicates a severe or complete airway obstruction, for which abdominal thrusts (the Heimlich maneuver) are the recommended first-line intervention in a conscious adult to attempt to dislodge the foreign body; if the patient becomes unconscious, care transitions to CPR with airway checks between compression cycles. Encouraging continued coughing alone is appropriate only for a mild obstruction with an effective cough, not the severe obstruction described here. Current guidance for conscious adults centers on abdominal thrusts (with back blows also used in some protocols), not back blows to the exclusion of abdominal thrusts. Proceeding directly to a surgical airway skips the basic maneuvers that resolve the vast majority of choking episodes and is not the appropriate first step.

60. D. Knee dislocation carries a high risk of popliteal artery injury due to the artery's tethered anatomic course behind the knee, and any evidence of vascular compromise (diminished or asymmetric pulses) after reduction requires urgent vascular surgery evaluation and imaging, since delayed recognition of a popliteal artery injury carries a high risk of limb loss; some protocols mandate vascular imaging even with normal pulses given the risk of a compromised but not yet occluded vessel. Deferring workup to routine follow-up, treating conservatively with compression and ice alone, or attributing a diminished pulse solely to swelling without formal vascular assessment all risk missing a limb-threatening vascular injury in a classic high-risk mechanism.

61. C. Continued brisk bleeding with visible posterior drainage despite adequate anterior pressure and packing suggests a posterior epistaxis source, which typically requires posterior packing or balloon tamponade and urgent ENT evaluation, since posterior bleeds are more difficult to control, carry greater risk of significant blood loss and airway compromise, and often originate from larger-caliber vessels

than anterior bleeds. Continuing ineffective anterior measures alone for an extended period delays appropriate escalation. Discharging the athlete ignores the risk of ongoing significant hemorrhage suggested by posterior drainage. Packing the unaffected side while leaving the actively bleeding nostril open does not address the bleeding source and is not an appropriate intervention.

62. A. Diplopia on upward gaze (suggesting inferior rectus muscle entrapment), enophthalmos, and infraorbital nerve distribution numbness after blunt orbital trauma are classic findings of an orbital blowout fracture, which requires urgent ophthalmology or oculoplastics evaluation given the risk of persistent diplopia, muscle ischemia from entrapment, and the potential need for surgical repair. A simple contusion would not be expected to cause diplopia, enophthalmos, or infraorbital numbness, and observation alone would miss a structural injury requiring specialist evaluation. Corneal abrasion causes pain and foreign body sensation, not diplopia on a specific gaze direction. Conjunctivitis is an inflammatory/infectious process unrelated to acute blunt trauma and would not explain these findings.

63. A. Early application of a pelvic binder or circumferential sheet at the level of the greater trochanters reduces pelvic volume and can help tamponade venous and bony bleeding in an unstable pelvic fracture, an important adjunct to standard hemorrhage control and resuscitation in a hemodynamically unstable patient. Repeated manual manipulation of an unstable pelvis to test stability is discouraged once instability is suspected, since it can dislodge stabilizing clot and worsen hemorrhage. Pelvic stabilization does have an established hemorrhage-control role and should not be withheld. Seating the patient does not stabilize the pelvis and could worsen an unstable fracture pattern or increase bleeding.

64. B. Lightning mass-casualty events are a specific, well-recognized exception to standard triage: because lightning-induced cardiac arrest is often due to a reversible cardiac and respiratory 'stunning' rather than irreversible injury, and because ambulatory survivors are unlikely to deteriorate suddenly, the recommended approach is 'reverse triage' — prioritizing immediate CPR and resuscitation for apparently pulseless victims first, rather than deprioritizing them as expectant the way standard mass-casualty trauma triage would. Treating ambulatory victims first or assuming pulseless victims are unsalvageable would forgo resuscitation in patients who have a meaningfully higher chance of survival with prompt CPR than typical cardiac arrest victims.

65. C. Food-dependent exercise-induced anaphylaxis is a distinct clinical entity in which symptoms occur only with the combination of a specific food trigger and exercise within a defined window afterward, while either exposure alone is tolerated; management centers on avoiding exercise for a defined period (commonly several hours) after ingesting the identified trigger food, along with carrying epinephrine for treatment of breakthrough reactions. A simple isolated food allergy would be expected to cause symptoms with food ingestion alone, which this athlete does not experience, making that diagnosis inconsistent with the presentation. Exercise-induced bronchospasm would be expected with exercise regardless of recent food intake, which is also inconsistent here. Cholinergic urticaria is triggered by any cause of core temperature elevation (heat, fever, hot showers), not specifically by the food-exercise combination described.

66. C. Validated clinical decision rules such as NEXUS and the Canadian C-Spine Rule allow clinical clearance of the cervical spine without imaging in patients who are alert, not intoxicated, have no midline tenderness, no focal neurologic deficit, no distracting painful injury, and full painless range of motion — criteria this athlete meets — reducing unnecessary imaging while maintaining safety in appropriately selected patients. Requiring imaging in every collision regardless of clinical findings ignores well-validated, evidence-based decision tools designed specifically to safely avoid unnecessary imaging. Stating clinical clearance is never appropriate contradicts established practice supported by extensive validation studies. A single episode of transient neck pain that resolves with a fully reassuring exam does not, by itself, mandate permanent removal from future contact sports.

67. D. Exertional rhabdomyolysis from unaccustomed, extreme exertion (sometimes seen after abrupt, intense 'shock' conditioning sessions) is a recognized cause of severe muscle breakdown, dark urine (myoglobinuria), and markedly elevated CK, and can occur in athletes without sickle cell trait; management centers on aggressive IV hydration to protect renal function, trending CK and renal labs, and monitoring for compartment syndrome, a recognized complication. Dismissing this presentation as ordinary delayed-onset muscle soreness — which does not typically cause dark urine or markedly elevated CK to this degree — risks missing acute kidney injury. Fluid restriction is the opposite of appropriate management, since adequate hydration helps prevent myoglobin-related renal injury. Continuing intense training while rhabdomyolysis is ongoing risks further muscle and renal injury and is contraindicated until recovery is confirmed.

68. C. Second impact syndrome describes a rare but catastrophic phenomenon in which a second head injury, sustained while the brain remains vulnerable during recovery from a prior concussion, can trigger rapid, severe cerebral edema and herniation, disproportionately affecting younger/adolescent athletes and carrying high mortality and severe disability risk — this is the specific, additional danger (beyond simply prolonging recovery) that underlies graduated, symptom-guided return-to-play protocols requiring full resolution before return to contact activity. The claim of no additional risk from repeat concussions ignores this recognized phenomenon. Framing the only risk as a longer recovery for 'the same injury' misses that second impact syndrome is a distinct and far more severe secondary condition, not merely an extension of the first concussion. While the precise incidence and mechanism of second impact syndrome remain areas of ongoing study, it is not a discredited concept and continues to inform standard return-to-play caution.

69. A. While bradycardia can reflect normal athletic conditioning in a well-trained endurance athlete, a resting heart rate this low accompanied by orthostatic symptoms in the setting of a restrictive eating pattern raises concern for a physiologic conduction abnormality or electrolyte disturbance associated with significant energy deficit, which can predispose to serious arrhythmia; this combination warrants urgent medical evaluation, including ECG and consideration of cardiac monitoring, rather than being assumed to be benign athletic bradycardia. Recommending caffeine to acutely raise heart rate does not address a potential underlying cardiac conduction issue and is not an appropriate medical intervention. Clearing for full competition without further evaluation risks an adverse cardiac event in a patient with red-flag symptoms and findings that require assessment first.

70. D. In a mass-casualty or multiple-casualty scenario exceeding available resources, standard practice is rapid triage using an established system such as START (Simple Triage and Rapid Treatment), which quickly categorizes patients by walking ability, respiratory status, perfusion, and mental status to identify and prioritize the most salvageable critically injured patients, rather than treating patients in the order encountered (which ignores injury severity) or exhausting all resources on a single patient while others with time-critical, treatable injuries go unassessed. Delaying any assessment or treatment until all additional EMS resources arrive forgoes time-critical interventions (such as airway positioning or hemorrhage control) that a lone provider can and should initiate immediately within a triage framework.

71. B. A stinger or burner from brachial plexus traction (or, less commonly, cervical nerve root compression) classically presents with transient unilateral burning pain and weakness following a tackle; while individual episodes often resolve quickly, safe return to play requires confirmation of full strength, sensation, and pain-free neck range of motion, along with consideration of recurrent-injury risk factors, rather than assuming resolution based on rapid initial symptom improvement alone. This presentation, with rapid resolution and normal exam afterward, is not consistent with spinal cord injury, which would be expected to cause more persistent or bilateral findings and mandates urgent spinal precautions, not simply future restriction planning. A simple trapezius strain would not explain the radiating, burning, neurologic quality of the symptoms. Complete brachial plexus avulsion is a severe, typically permanent injury and would not be expected to fully resolve within a minute.

72. D. Reproduction of radicular arm symptoms with cervical extension and rotation toward the symptomatic side is a positive Spurling test, and radiation to the thumb with wrist extension weakness localizes to the C6 nerve root distribution, consistent with C6 radiculopathy from foraminal nerve root compression (commonly from disc herniation or spondylotic change). C8 radiculopathy would more typically cause weakness of intrinsic hand muscles and sensory symptoms in the ring/small finger distribution, not the thumb with wrist extension weakness described. A negative finding would not reproduce the described radicular symptoms with the maneuver. Lhermitte sign (electric shock sensation down the spine with neck flexion) suggests spinal cord involvement rather than the single nerve root pattern described here.

73. D. Axial neck pain worsened by extension and rotation, with facet joint tenderness and no neurologic deficit or radicular symptoms, is consistent with cervical facet-mediated pain, which is typically managed conservatively first with physical therapy, activity modification, and NSAIDs, reserving advanced imaging or interventional options like facet injections for cases that remain refractory to conservative care. Urgent MRI and surgical referral are not indicated in the absence of neurologic deficit or radicular findings suggesting nerve root or cord compromise. Indefinite rigid collar immobilization is not standard management for facet-mediated pain and can promote deconditioning. Nothing in this presentation (mechanical, activity-related axial pain with a benign exam) suggests a need for emergent oncologic workup.

74. C. Gradual-onset chronic neck symptoms in an older athlete, with radiographic findings of multilevel degenerative disc narrowing and osteophyte formation, are characteristic of cervical

spondylosis, an age-related degenerative process; when spondylotic changes narrow the spinal canal or neural foramina significantly, this can contribute to chronic radicular or myelopathic symptoms such as the bilateral numbness described, warranting further evaluation of stenosis severity. This gradual, degenerative presentation is inconsistent with an acute traumatic disc herniation, which would have a more sudden onset tied to a specific injury. Discitis/osteomyelitis is an infectious process that would typically present with more acute pain, systemic symptoms, and different imaging findings (bony destruction, disc space infection), not this classic degenerative pattern. Fibromyalgia is a diagnosis of diffuse chronic pain and does not explain focal degenerative radiographic findings.

75. A. Acute torticollis (wry neck) presenting as sudden painful neck stiffness with a characteristic head-tilt/chin-rotation posture, occurring without significant trauma and without neurologic deficit, is typically a benign, self-limited musculoskeletal condition managed conservatively with gentle stretching, NSAIDs, heat, and reassurance, without a need for advanced imaging when no red-flag features (trauma, neurologic deficit, fever, or significant mechanism) are present. Atlantoaxial rotatory subluxation is a distinct diagnosis, more common in children after specific trauma or infection, and while it can present with a head-tilt posture, it is not the default assumption for this benign, atraumatic presentation and its management depends on clinical severity rather than automatic emergent surgery. Cervical fracture is not assumed in the absence of a traumatic mechanism. Meningitis would be expected to present with fever, systemic illness, and other meningeal signs, not simply an isolated positional neck stiffness after sleep.

76. B. Rib stress fractures are a well-recognized overuse injury in rowers, related to repetitive, high-load trunk rotation and the traction forces of the serratus anterior and external oblique muscles on the ribs during the rowing stroke; because plain radiographs are frequently negative early in a stress fracture, MRI or bone scan is often needed to confirm the diagnosis when clinical suspicion is high based on the training history and reproducible mechanical pain pattern. This gradual, overuse presentation without an acute traumatic mechanism is inconsistent with an acute traumatic fracture, which requires a discrete injury event. Costochondritis is not definitively excluded by reproducibility with resisted rotation, but the specific rower's overuse history and mechanism make stress fracture the more classic diagnosis to consider first in this population. The reproducible, activity-related, musculoskeletal quality of the pain is inconsistent with referred cardiac pain.

77. D. Slipping rib syndrome results from hypermobility or disruption of the fibrous attachments of the lower costal cartilages (typically ribs 8-10), allowing the rib tip to sublux and catch, producing a painful clicking or popping sensation reproducible on exam with the classic 'hooking maneuver' (examiner's fingers hooked under the costal margin and pulled anteriorly), often with an associated palpable or audible clunk; this is a distinct clinical entity from a traumatic fracture, which would not typically be triggered by this exam maneuver without an antecedent traumatic mechanism. A simple muscle strain would not typically produce a mechanically reproducible clicking/catching sensation with this specific provocative test. Pericarditis is an inflammatory process of the pericardium and would not be reproduced by a mechanical costal margin maneuver.

78. A. Athletic pubalgia (commonly called 'sports hernia,' though the term is somewhat a misnomer) involves chronic injury and attenuation of the rectus abdominis-adductor aponeurosis at the pubic symphysis, producing activity-related groin and lower abdominal pain worsened by sit-ups, coughing, and sprinting, but classically without a palpable hernia bulge or a true fascial defect, distinguishing it from a conventional inguinal hernia. A simple abdominal strain would not be expected to show the specific aponeurotic attenuation described on imaging and would typically be more acute and self-limited. A true inguinal hernia, by definition, presents with a palpable bulge and demonstrable fascial defect, which is explicitly absent here. Testicular torsion is an acute scrotal emergency, not a chronic activity-related groin pain syndrome.

79. D. Costochondritis presents as sharp, well-localized anterior chest pain that is reproducible with direct palpation of the costosternal or costochondral junctions, typically without radiation, exertional triggering, or systemic/cardiac risk features, which helps distinguish it clinically from cardiac chest pain, since true cardiac ischemic pain is not reproduced by chest wall palpation. Assuming any chest pain in an athlete is acute coronary syndrome regardless of a clearly reproducible musculoskeletal pattern would lead to substantial unnecessary workup and misses the classic distinguishing feature that argues against a cardiac cause. Pulmonary embolism does not characteristically present with pain reproducible by chest wall palpation; it more typically causes pleuritic pain with dyspnea and risk factors for thrombosis. Aortic dissection classically causes severe, tearing pain, often with pulse or blood pressure asymmetry, not a well-localized, palpation-reproducible costosternal tenderness pattern.

80. B. Lateral epicondylitis (tennis elbow), an overuse tendinopathy of the extensor carpi radialis brevis origin, classically presents with lateral elbow pain reproduced by gripping and resisted wrist extension, with point tenderness just distal to the lateral epicondyle; first-line management is conservative, including activity modification, eccentric strengthening of the wrist extensors, and assessment of racquet grip size/string tension or stroke technique, reserving injections or surgery for refractory cases. Medial epicondylitis would be expected to cause pain with resisted wrist flexion/pronation (at the medial, not lateral, epicondyle), not the lateral, extension-provoked pattern described. Radial head fracture requires a traumatic mechanism and characteristic radiographic findings, not this gradual overuse presentation. UCL injury is assessed by valgus stress testing and is a medial-sided, not lateral-sided, elbow pathology.

81. B. Medial epicondylitis (golfer's elbow) is an overuse tendinopathy of the common flexor-pronator tendon origin at the medial epicondyle, classically reproduced by resisted wrist flexion and forearm pronation, with point tenderness just distal to the medial epicondyle. Lateral epicondylitis involves the opposite (extensor) side of the elbow and is provoked by resisted wrist extension, not flexion. Cubital tunnel syndrome (ulnar nerve entrapment) primarily causes numbness/tingling in the ulnar nerve distribution (ring and small fingers) and possible intrinsic hand weakness, rather than pain specifically reproduced by resisted wrist flexion at the medial epicondyle. Distal biceps rupture presents with a palpable proximal retraction of the muscle belly and weakness of flexion/supination, a distinctly different presentation from isolated medial epicondylar overuse pain.

82. D. Progressive medial elbow pain with decreased throwing velocity and increased medial joint opening on valgus stress testing at 30 degrees of elbow flexion (which isolates the UCL from bony congruity effects) is the classic presentation of ulnar collateral ligament injury, a well-recognized overuse and acute injury in overhead throwing athletes subjected to repetitive high valgus loads during the throwing motion, often requiring MRI (sometimes with intra-articular contrast) for confirmation and potentially UCL reconstruction ('Tommy John surgery') for high-grade tears in athletes wishing to return to high-level throwing. The radial collateral ligament resists varus stress on the lateral side and is not implicated in this presentation. The annular ligament stabilizes the proximal radioulnar joint, not valgus elbow stability. Triceps tendon injury would present with extension weakness/pain, not valgus laxity.

83. C. Olecranon stress fractures occur in throwing athletes (and other repetitive overhead or extension-loading activities) from repetitive traction and impaction forces during the deceleration phase of throwing, and given the nature of stress injuries, plain radiographs are frequently negative early in the process despite a clinically consistent presentation of posterior elbow pain and olecranon tenderness with resisted extension, making MRI or CT appropriate when clinical suspicion remains high. Triceps tendinopathy is not excluded simply by localized olecranon tenderness, but the specific throwing-mechanism history and pain pattern with resisted high-load extension make stress fracture the important diagnosis to keep on the differential despite normal initial imaging. Radial head fracture is a lateral-sided injury typically from an acute traumatic mechanism such as a fall on an outstretched hand, not this gradual throwing-related presentation. Cubital tunnel syndrome produces ulnar-nerve-distribution sensory symptoms, not the bony tenderness and extension-provoked pain pattern described.

84. B. Radial tunnel syndrome results from compression of the posterior interosseous (deep radial) nerve as it passes through the radial tunnel near the supinator muscle, and can present with lateral forearm pain distal to the epicondyle, reproduced by resisted middle finger extension and resisted supination, sometimes overlapping with or being mistaken for lateral epicondylitis; the more distal pain location (rather than tenderness precisely over the epicondyle) and provocation with specific resisted maneuvers help distinguish it as a separate nerve entrapment entity requiring different management considerations. Classic lateral epicondylitis is specifically characterized by tenderness directly over the epicondyle, which is notably less prominent in this description, arguing against that diagnosis alone. De Quervain's tenosynovitis causes pain at the radial styloid/wrist, not the proximal lateral forearm. Carpal tunnel syndrome causes median nerve sensory symptoms in the hand (thumb, index, middle fingers), not proximal lateral forearm pain.

85. A. A sudden pop with proximal retraction of the muscle belly in the antecubital fossa, ecchymosis, and weakness of both elbow flexion and forearm supination (the biceps' two key functions) is characteristic of a distal biceps tendon rupture; because delayed repair becomes progressively more difficult due to tendon retraction and scarring, evaluation and surgical referral should occur urgently, with better outcomes generally associated with earlier repair. A simple muscle belly strain would not cause the described proximal retraction deformity or this specific dual weakness pattern. Triceps tendon rupture would present with a posterior defect and extension weakness, not the anterior,

flexion/supination pattern described. Brachialis strain would not typically produce a visible retraction defect or the marked supination weakness that specifically implicates the biceps tendon.

86. A. Anatomic snuffbox tenderness after a fall on an outstretched hand is the classic presentation of scaphoid fracture, but scaphoid fractures are notoriously often occult on initial radiographs; because missed scaphoid fractures risk avascular necrosis and nonunion (the scaphoid's retrograde blood supply makes it vulnerable), standard management is to immobilize in a thumb spica splint despite normal initial films and obtain follow-up imaging (repeat radiographs in 1-2 weeks, or earlier MRI/CT) to confirm or exclude the fracture. Discharging without immobilization based on normal initial radiographs risks missing a true fracture given the well-documented false-negative rate of early imaging. Returning to full activity ignores this significant risk. Using a simple comfort brace without planned follow-up imaging fails to address the diagnostic uncertainty inherent in this classic clinical scenario.

87. D. Ulnar-sided wrist pain worsened by axial loading (weight-bearing as in a handstand) and forearm rotation, with tenderness just distal to the ulnar styloid and a positive ulnocarpal stress test, is a classic presentation of triangular fibrocartilage complex (TFCC) injury, a common overuse or acute injury in athletes who repetitively load the wrist in extension and rotation, such as gymnasts. The scapholunate ligament is located on the radial/central dorsal wrist and its injury classically produces radial-sided pain and instability, not the ulnar-sided pattern described. The flexor carpi radialis tendon runs on the radial-volar wrist and would not explain ulnar-sided symptoms. Extensor pollicis longus tendon pathology affects thumb extension and would not produce this ulnar-sided loading pain pattern.

88. C. A forced radial deviation/abduction stress on the thumb (classically from a ski pole mechanism) causing thumb MCP joint pain and instability on valgus (radial) stress testing is the classic presentation of ulnar collateral ligament (UCL) injury of the thumb, historically called 'skier's thumb' when acute or 'gamekeeper's thumb' when chronic; a palpable mass at the ulnar aspect of the joint raises concern for a Stener lesion, in which the torn ligament becomes displaced superficial to the adductor aponeurosis, preventing proper healing and generally requiring surgical repair rather than conservative splinting alone. A radial collateral ligament injury would result from the opposite mechanism (forced ulnar/adduction stress), not the radial abduction mechanism described. Scaphoid fracture presents with snuffbox tenderness, not thumb MCP instability. De Quervain's tenosynovitis is an overuse tendinopathy, not an acute traumatic ligamentous injury.

89. D. For a 'boxer's fracture' (fifth metacarpal neck fracture), management decisions hinge substantially on the degree of angulation, which is often tolerated up to a moderate threshold nonoperatively given functional compensation at this mobile metacarpal, but critically, any rotational deformity — suggested here by the finger appearing rotated relative to its neighbors on fist-making, a scissoring/malrotation red flag — is poorly tolerated functionally and generally requires correction, often surgically, because rotational malunion causes finger overlap and grip dysfunction that angulation alone does not. Treating all such fractures identically regardless of angulation or rotation ignores this key distinguishing clinical factor. Hand dominance may influence some treatment preferences but is not the primary determinant of operative versus nonoperative management here. Whether a fracture is open versus closed is actually

highly relevant in general fracture management (open fractures require different urgency and antibiotic considerations), making that distractor incorrect as stated.

90. B. De Quervain's tenosynovitis involves the first dorsal compartment tendons (abductor pollicis longus and extensor pollicis brevis) and classically causes radial wrist pain worsened by thumb movement and ulnar deviation, with a positive Finkelstein (or Eichhoff) test reproducing pain; it is common in activities involving repetitive thumb and wrist motion, including repetitive lifting motions associated with new parenthood, and is initially managed conservatively with thumb spica splinting, activity modification, and NSAIDs, with corticosteroid injection a well-supported option for persistent cases. Carpal tunnel syndrome is a median nerve entrapment diagnosed by different provocative maneuvers (Tinel's, Phalen's) and presenting with hand numbness/tingling, not a positive Finkelstein test. Trigger finger presents with digit catching/locking, not radial wrist pain with a positive Finkelstein test. Scaphoid fracture requires a traumatic mechanism and different exam findings (snuffbox tenderness), not this gradual overuse presentation with a positive Finkelstein test.

91. C. An axial blow to an extended fingertip causing loss of active DIP extension with preserved passive extension is the classic mechanism and presentation of mallet finger, caused by disruption (rupture or avulsion) of the terminal extensor tendon at its insertion on the distal phalanx; initial treatment for most closed mallet finger injuries is continuous extension splinting of the DIP joint (leaving the PIP joint free) for approximately 6-8 weeks, reserving surgery for cases with a large bony fragment, joint subluxation, or failed conservative management. Boutonniere deformity is a distinct injury pattern (central slip disruption at the PIP joint) treated with PIP extension splinting, not the DIP-focused splinting appropriate here. A collateral ligament sprain would cause pain with lateral stress testing rather than loss of active extension. Not all mallet finger injuries require surgical pinning; most closed injuries without significant bony involvement or subluxation are managed successfully with splinting alone.

92. C. A noncontact pivoting mechanism with an audible or felt pop, rapid effusion, and increased anterior tibial translation with a soft endpoint on the Lachman test (performed at approximately 20-30 degrees of knee flexion) is the classic presentation and most sensitive clinical test for ACL tear. Posterior drawer testing assesses posterior tibial translation for PCL injury, a different mechanism and finding. McMurray test assesses for meniscal tears via joint line pain/clicking with rotation and is a different test from the anterior translation assessed by Lachman. Varus stress testing assesses lateral-sided (LCL) stability, not anterior-posterior translation, and is not the test described here.

93. D. Joint line pain reproduced with rotational stress during knee flexion/extension (McMurray test), combined with mechanical symptoms of locking or catching after a twisting injury, is classic for meniscus tear, with medial joint line findings pointing to the medial meniscus. The Lachman test assesses anterior tibial translation for ACL integrity, a distinct maneuver from the rotational joint-line test described here. The Thessaly test, another meniscal screening test, is performed with the knee flexed at 20 degrees while weight-bearing, not at full extension, making that distractor's technical detail incorrect. The apprehension test assesses patellar instability by laterally translating the patella and

observing for guarding, which is unrelated to the joint-line rotational maneuver and mechanical locking symptoms described here.

94. B. Anterior knee pain worsened by activities that load the patellofemoral joint (prolonged sitting/'theater sign', stair descent, squatting), without a discrete traumatic event, in the setting of normal ligamentous stability but patellar maltracking and facet tenderness, is characteristic of patellofemoral pain syndrome, a common overuse condition related to abnormal patellar tracking and patellofemoral joint stress rather than a structural ligament or meniscus tear. ACL tear would show ligamentous laxity on Lachman testing, which is explicitly normal here. Meniscus tear typically causes joint line tenderness and mechanical locking/catching, a different pattern from the patellofemoral findings described. Patellar tendon rupture is an acute injury causing inability to actively extend the knee and a palpable gap, not this gradual anterior knee pain pattern with preserved function.

95. A. Patellar tendinopathy ('jumper's knee') is a common overuse injury in athletes performing repetitive jumping and landing, causing focal pain and tenderness at the proximal patellar tendon origin (inferior pole of the patella), typically with preserved strength (distinguishing it from a complete rupture). Patellar tendon rupture is an acute, often complete disruption causing inability to actively extend the knee and a palpable defect, which is inconsistent with the preserved extensor strength described here. Prepatellar bursitis causes swelling and tenderness anterior to the patella itself (often from repetitive kneeling), a different location from the tendon insertion tenderness described. Osgood-Schlatter disease, an apophysitis of the tibial tubercle seen in adolescents, causes pain and prominence at the tibial tubercle (the distal, not proximal, attachment of the patellar tendon complex), a distinct location from the inferior pole of the patella.

96. D. A valgus-loading mechanism with medial joint line tenderness and increased medial opening on valgus stress testing at 30 degrees of flexion (isolating the MCL from cruciate and posterior capsule stabilizers, which contribute more at full extension) is characteristic of an MCL sprain; a firm endpoint on stress testing suggests a lower-grade injury (grade I-II, a stretched but not completely disrupted ligament) rather than a complete tear. ACL integrity is assessed by anterior tibial translation (Lachman test), a different plane of motion from the valgus opening described. A lateral meniscus tear would produce lateral, not medial, joint line findings, inconsistent with this presentation. A complete grade III MCL tear would be expected to show a soft or absent endpoint on stress testing, which is explicitly not the finding described here (a firm endpoint is present).

97. D. Lateral knee pain in runners, worsened by downhill running and reproduced by palpation over the lateral femoral epicondyle during repetitive knee flexion-extension (the classic 'noble compression test' concept), located proximal to the true joint line, is characteristic of iliotibial band syndrome, an overuse friction/compression injury often related to hip abductor (gluteus medius) weakness contributing to altered lower-limb mechanics and increased IT band tension. Lateral meniscus tear causes joint line pain (not proximal epicondylar pain) with mechanical symptoms like locking, a different pattern. Biceps femoris tendinopathy affects the posterolateral knee at the fibular head insertion, not the lateral femoral

epicondyle. LCL sprain is assessed and provoked by varus stress testing, not by the described repetitive flexion-extension friction test.

98. A. Osgood-Schlatter disease is a traction apophysitis at the tibial tubercle, occurring in growing adolescents during periods of rapid growth when the patellar tendon exerts repetitive traction on the still-developing (cartilaginous/apophyseal) tibial tubercle attachment, particularly in jumping and kneeling-heavy sports; this produces the characteristic painful bony prominence and activity-related pain described, and is generally managed conservatively with activity modification and symptomatic treatment, resolving with skeletal maturity. Patellar tendon rupture is an acute injury causing loss of active extension, not this chronic, growth-related prominence. While any concerning or atypical bony lesion should prompt appropriate workup, Osgood-Schlatter's classic presentation in this exact age, activity, and location context makes it far more likely than osteosarcoma, and it is not accurate to state osteosarcoma is the 'most likely' explanation for this classic, benign presentation. Prepatellar bursitis causes swelling over the patella itself, a different location from the tibial tubercle.

99. D. Inversion ankle injuries with immediate lateral pain, swelling, positive anterior drawer testing (indicating anterior talofibular ligament laxity), and tenderness over that ligament are the classic presentation of a lateral ankle sprain, most commonly involving the anterior talofibular ligament; grading (I-III) is based on the degree of ligamentous laxity, swelling, and functional instability rather than requiring a fracture to be present. High ankle (syndesmotic) sprains classically result from an external rotation or forced dorsiflexion mechanism, a different injury pattern from the inversion mechanism described here. Assuming a fibula fracture is present by default in every inversion injury, without considering exam findings or applying validated decision rules (such as the Ottawa Ankle Rules) to guide imaging, is not appropriate evaluation practice. Achilles rupture presents with a positive Thompson test (lack of plantarflexion with calf squeeze) and posterior heel findings, unrelated to the anterior drawer and lateral ligament findings described.

100. C. Gradual-onset posterior heel/tendon pain with morning stiffness that improves somewhat with activity, and fusiform thickening/tenderness of the mid-portion Achilles tendon (typically 2-6 cm proximal to its calcaneal insertion, the classic 'watershed' area of relatively poor blood supply), is characteristic of mid-portion Achilles tendinopathy; eccentric calf-strengthening protocols (such as the Alfredson protocol) have strong evidence supporting their use as a first-line treatment component for this condition. Achilles rupture is an acute, often traumatic event with sudden pain, a palpable gap, and a positive Thompson test, distinctly different from this gradual overuse presentation. Retrocalcaneal bursitis causes pain directly at the insertional area near the calcaneus, not the more proximal mid-portion location described. Plantar fasciitis causes plantar heel/arch pain, an anatomically distinct location from the posterior Achilles tendon findings described here.

101. D. A sudden, sharp posterior ankle/calf pain (often described as feeling like being struck or kicked), a palpable tendon defect, and a positive Thompson test (absent plantarflexion of the foot when the calf is squeezed with the patient prone) together confirm Achilles tendon rupture, a significant injury generally requiring urgent orthopedic evaluation to discuss operative versus nonoperative management. Achilles

tendinopathy, by contrast, would show a normal (negative) Thompson test with preserved plantarflexion, since the tendon, while diseased, remains in continuity. Gastrocnemius strain ('tennis leg') causes calf pain but does not produce a palpable Achilles tendon gap or loss of the Thompson test response, since the Achilles tendon itself remains intact. Posterior ankle impingement causes pain specifically with forced plantarflexion maneuvers, not the acute rupture presentation with a palpable gap and absent plantarflexion response described here.

102. D. Medial tibial stress syndrome, a periostitis-related overuse condition often associated with a recent increase in training load, classically causes diffuse aching pain and tenderness along a length (several centimeters) of the posteromedial tibial border, distinguishing it clinically from a tibial stress fracture, which typically presents with a more focal point of maximal tenderness at a discrete location along the bone; this distinction guides the decision about further imaging, since focal tenderness raises greater concern for a true stress fracture requiring restricted weight-bearing and imaging. The distractor reverses this distinguishing feature, describing focal tenderness for MTSS, which is incorrect. Chronic exertional compartment syndrome classically causes pain that is reproducibly triggered by a specific duration/intensity of exertion and resolves with rest, with elevated intracompartmental pressures on testing, rather than focal palpation tenderness being its hallmark distinguishing feature. Popliteal artery entrapment causes exertional calf pain/claudeication localized to the posterior knee and calf region, a distinct presentation from diffuse tibial border tenderness.

103. B. Progression from diffuse MTSS-type symptoms to focal, sharply localized tibial tenderness with a positive single-leg hop test (reproducing pain with impact loading) raises significant concern for tibial stress fracture, and because plain radiographs are frequently normal early in the course of a stress fracture, further imaging (MRI, which is more sensitive, or bone scan) is warranted, along with activity restriction to allow healing and prevent progression to a complete fracture. Continuing to manage this as simple, unchanged MTSS without escalating restriction or imaging risks progression to a complete fracture. A benign bone cyst would not typically present with this specific exertional pain pattern and hop-test positivity tied to a training-load history. Compartment syndrome is a clinical diagnosis often supported by intracompartmental pressure testing, not something confirmed or excluded by plain radiographs, making that distractor's reasoning incorrect.

104. A. Sharp plantar heel pain with characteristic first-step morning pain that improves with continued activity, point tenderness at the medial calcaneal tuberosity, and pain reproduced by passive toe dorsiflexion (which tensions the plantar fascia) is classic for plantar fasciitis; first-line treatment typically includes plantar fascia and calf stretching protocols, activity modification, and supportive footwear or orthotics, with more invasive options reserved for refractory cases. Tarsal tunnel syndrome, a nerve entrapment, causes burning, tingling, or numbness in the plantar foot rather than the mechanical, start-up pain pattern and positive dorsiflexion stretch test described. Calcaneal stress fracture typically produces more diffuse tenderness with a positive calcaneal squeeze test, a different exam pattern from the focal medial tuberosity point tenderness described here. Achilles tendinopathy affects the posterior heel/tendon, an anatomically distinct location from the plantar medial heel findings described.

105. C. Turf toe describes a sprain injury to the plantar plate/capsuloligamentous complex of the first metatarsophalangeal joint, classically from a forced hyperextension (dorsiflexion) mechanism with the foot planted, common on artificial turf and in athletes wearing flexible footwear; return-to-play timing is guided by injury grade (I-III, based on swelling, ecchymosis, and joint stability/instability on exam), with higher-grade injuries requiring longer restriction and sometimes surgical evaluation. Sesamoiditis is a gradual overuse condition, not this acute traumatic hyperextension presentation. Hallux valgus (bunion) is a chronic structural deformity unrelated to an acute traumatic mechanism. While gout can affect the first MTP joint, this presentation's clear acute traumatic hyperextension mechanism makes turf toe far more likely than assuming gout by default without considering the injury mechanism.

106. D. Lisfranc (tarsometatarsal joint complex) injuries result from axial loading on a plantarflexed, often rotated foot and can range from subtle ligamentous sprains to severe fracture-dislocations; plantar ecchymosis (bruising on the sole of the foot) is a specific, well-recognized red-flag sign strongly associated with Lisfranc injury and should heighten suspicion even when weight-bearing radiographs show only subtle widening between metatarsal bases, since missed or undertreated Lisfranc injuries can lead to significant long-term midfoot instability and arthritis. A simple midfoot sprain would not be expected to produce this specific plantar ecchymosis pattern, which is a targeted clinical clue rather than a nonspecific finding. A fifth metatarsal avulsion fracture (from peroneus brevis traction) presents with lateral foot pain and tenderness at the fifth metatarsal base, not plantar ecchymosis or first/second metatarsal base widening. Hallux rigidus is a chronic degenerative first MTP joint condition unrelated to this acute traumatic midfoot mechanism.

107. D. The femoral neck experiences different mechanical forces on its superior (tension) versus inferior (compression) surfaces during weight-bearing; tension-side stress fractures are mechanically more unstable and carry a substantially higher risk of progressing to a displaced, complete fracture, generally warranting more urgent activity restriction and, often, prophylactic surgical fixation, whereas compression-side stress fractures generally have a more favorable natural history and are more often managed with protected weight-bearing alone under close monitoring. Treating both locations identically ignores this well-established and clinically important distinction that changes management urgency. The distractor reversing which side is more dangerous is incorrect — it is the tension (superior), not compression (inferior), side that carries the higher displacement risk. This tension/compression distinction is a recognized principle specifically taught for femoral neck stress fractures, not limited to the tibia.

108. C. Sudden posterior thigh pain during high-speed sprinting (particularly during the late swing phase or acceleration, when the hamstring undergoes high eccentric loading) is the classic mechanism and presentation of hamstring muscle strain; prior hamstring injury is one of the most consistently identified risk factors for future hamstring strain recurrence, underscoring the importance of a thorough, eccentric-strengthening-focused rehabilitation program and gradual, criterion-based return to high-speed running before returning to full sprinting activity. Quadriceps strain would present with anterior, not posterior, thigh pain. Adductor strain presents with medial groin/thigh pain, a different anatomic location. Sciatic nerve injury would be expected to produce radiating symptoms (pain, numbness, weakness) extending

distal to the thigh, rather than the isolated localized posterior thigh tenderness and swelling described, which points to a muscular rather than neurologic injury.

109. D. Chronic groin pain with mechanical clicking and pain reproduced by the FADIR (flexion, adduction, internal rotation) maneuver, which impinges the anterior labrum against the acetabular rim, is characteristic of a hip labral tear; this is frequently associated with underlying femoroacetabular impingement morphology (cam lesions of the femoral head-neck junction, pincer lesions of the acetabular rim, or combined lesions), which predisposes the labrum to repetitive mechanical injury during hip motion. Iliopsoas bursitis/tendinopathy typically causes anterior hip pain reproduced by resisted hip flexion, a different provocative pattern from the FADIR-reproduced clicking pain described. Piriformis syndrome causes posterior buttock and possible sciatic-distribution symptoms, an anatomically distinct presentation from anterior groin pain with FADIR positivity. Osteitis pubis causes pain specifically localized to the pubic symphysis, reproduced by resisted adduction, a different pattern from the intra-articular hip findings described here.

110. C. Femoroacetabular impingement describes a condition in which abnormal bony morphology at the femoral head-neck junction (cam lesion) and/or the acetabular rim (pincer lesion) causes abnormal, repetitive mechanical contact and impingement during hip range of motion, particularly with deep flexion and internal rotation, predisposing to labral tears and articular cartilage damage over time and often presenting with anterior groin pain worsened by sitting, squatting, and pivoting activities. While FAI can be a precursor to secondary hip osteoarthritis over time, describing this presentation as primary osteoarthritis unrelated to the described cam morphology mischaracterizes the underlying pathomechanic process specifically being tested here. Simple iliopsoas tendinopathy is a soft-tissue overuse condition unrelated to the bony cam morphology described on imaging. Avascular necrosis is a distinct condition involving loss of blood supply to the femoral head, unrelated to and not characterized by cam or pincer morphology.

111. C. A forceful kicking motion producing sharp anterior hip pain reproduced specifically by resisted hip flexion with the knee extended, and tenderness over the proximal anterior hip, is characteristic of an iliopsoas (hip flexor) strain, a common injury in kicking and sprinting sports where the hip flexors undergo high-force eccentric and concentric loading. The gluteus maximus is a hip extensor, and strains of it would not be expected to cause pain specifically with resisted hip flexion. The adductor longus is a hip adductor, and its strain would be reproduced by resisted adduction, not flexion, testing. While rectus femoris strains (a hip flexor and knee extensor) can present similarly and should remain on the differential, the classic teaching point for isolated resisted hip flexion pain with proximal anterior tenderness centers on the iliopsoas as the most directly tested structure in this vignette.

112. A. Myositis ossificans is a recognized complication of significant muscle contusion (classically the quadriceps after a direct blow), in which heterotopic bone forms within the injured muscle tissue over the following weeks, presenting as a firm, sometimes enlarging mass with restricted range of motion; management includes avoiding aggressive early stretching, massage, or premature return to high-intensity activity, which can worsen the ossification process, with diagnosis supported by imaging

showing characteristic peripheral zonal ossification maturing over time. Dismissing this as a simple resolving hematoma ignores the described firm, enlarging, motion-restricting mass, which is not typical for straightforward hematoma resolution. Compartment syndrome is an acute-phase complication (hours to a day or two after injury), not something that characteristically presents as a new finding two weeks later in this delayed fashion. While any atypical or persistently enlarging soft tissue mass warrants appropriate follow-up, the classic history of a preceding significant contusion in this exact location and timeline makes myositis ossificans, not sarcoma, the most likely and specifically tested diagnosis here.

113. C. Progressive overhead-activity shoulder pain and weakness in a throwing athlete, with a positive empty can test (assessing supraspinatus) and weakness of resisted external rotation (assessing infraspinatus/teres minor), points to rotator cuff pathology, which in athletes can range from overuse tendinopathy to partial or full-thickness tears from the cumulative repetitive stress of overhead throwing. The long head of the biceps tendon is more specifically assessed by Speed's test (resisted forward flexion with supinated forearm) or Yergason's test (resisted supination), not the empty can and external rotation findings described here. Pectoralis major tendon injury would cause weakness with resisted adduction and internal rotation (its primary actions), not the abduction/external rotation weakness pattern described. Axillary nerve injury classically causes deltoid weakness and a patch of lateral shoulder (regimental badge) numbness, a distinct presentation from the specific rotator cuff muscle weakness pattern described here.

114. D. The O'Brien's (active compression) test, in which pain with the arm pronated (thumb down) that improves or lessens with the arm supinated (thumb up) is considered a positive result localizing to the superior labrum/biceps anchor, is a classic provocative test for SLAP (superior labrum anterior to posterior) tears, an injury commonly seen in overhead athletes such as volleyball players and throwers from repetitive biceps anchor traction and shoulder torque. While AC joint pathology is an important differential for shoulder pain, it is more specifically assessed with the cross-body adduction (scarf) test, not the pronation/supination-dependent pattern of O'Brien's test described here. Subscapularis integrity is assessed with the lift-off or belly-press tests, unrelated to the O'Brien's test findings. Suprascapular nerve injury would present with muscle weakness and possible atrophy of the supraspinatus/infraspinatus, a distinct presentation from the labral provocative test finding described.

115. D. A forced abduction-external rotation mechanism with the arm held in a fixed abducted, externally rotated position and visible deformity is the classic presentation of anterior shoulder dislocation, the most common direction of shoulder dislocation; given the axillary nerve's anatomic proximity to the inferior glenohumeral joint capsule, careful assessment of axillary nerve function (sensation over the lateral shoulder 'regimental badge' area and deltoid contraction) is essential both before and after any reduction attempt, since axillary nerve injury is a recognized associated complication. Posterior dislocation classically presents with the arm held in internal rotation and adduction (often associated with seizure or electrical injury mechanisms), the opposite position from what is described here. AC joint separation causes a step-off deformity localized at the top of the shoulder (the AC joint itself), not this glenohumeral positional deformity. Clavicle fracture would show

a palpable bony deformity along the clavicle shaft, a different finding from the joint-position-based deformity described here.

116. C. A direct fall onto the point of the shoulder (as opposed to an outstretched hand) causing a step-off deformity at the distal clavicle/top of the shoulder is the classic mechanism and presentation of an acromioclavicular (AC) joint separation, in which the AC ligament and, in higher-grade injuries, the coracoclavicular ligaments are disrupted, allowing the distal clavicle to become relatively prominent. Sternoclavicular dislocation involves the medial clavicle near the sternum, an anatomically distinct location from the lateral, distal clavicle deformity described here. Glenohumeral dislocation produces a different pattern of deformity involving the ball-and-socket joint itself, typically with the arm held in a fixed position, rather than this focal AC joint step-off. Proximal humerus fracture would be expected to cause more diffuse pain and swelling with any shoulder motion, rather than the focal, well-localized step-off deformity described.

117. B. Anterior shoulder pain localized to the bicipital groove, reproduced by Speed's test (resisted forward flexion with the elbow extended and forearm supinated), in the absence of significant weakness, is characteristic of biceps tendinopathy (long head of biceps), an overuse condition common in swimmers and other athletes with repetitive overhead shoulder use. A complete biceps tendon rupture would be expected to produce a visible distal muscle belly retraction ('Popeye' deformity) and more significant weakness, which are absent in this presentation. Rotator cuff tear is more specifically assessed with tests like the empty can (supraspinatus) and resisted external rotation (infraspinatus/teres minor), different provocative maneuvers from Speed's test. Thoracic outlet syndrome involves compression of neurovascular structures and would be expected to cause symptoms such as arm/hand numbness, tingling, or vascular changes, not isolated anterior shoulder pain reproduced by a tendon-specific provocative test.

118. C. Intermittent numbness, tingling, arm heaviness, and vascular color change, particularly worsened by overhead arm positioning and repetitive shoulder activity, are characteristic of thoracic outlet syndrome, in which the brachial plexus and/or subclavian vessels are intermittently compressed as they pass through the thoracic outlet (between the clavicle and first rib, or through the scalene triangle), often provoked by specific positional maneuvers used in clinical testing to reproduce symptoms and support the diagnosis. Carpal tunnel syndrome causes median nerve distribution symptoms that are typically related to wrist positioning and repetitive hand use, not overhead shoulder positioning. Cubital tunnel syndrome causes ulnar nerve distribution symptoms provoked by elbow flexion, a different mechanism from the overhead shoulder-related symptoms described. Simple rotator cuff tendinopathy is a musculoskeletal tendon condition and would not be expected to cause neurologic numbness/tingling or vascular color-change symptoms.

119. B. Little League shoulder (proximal humeral epiphysiolysis) is a repetitive stress injury to the still-open proximal humeral growth plate in skeletally immature throwing athletes, caused by the substantial rotational and distraction forces generated during throwing, particularly with high pitch volumes and inadequate rest; management centers on rest from throwing until symptoms and radiographic physeal

widening resolve, followed by a structured, gradual return-to-throwing program, often alongside pitch count and mechanics education to prevent recurrence. This gradual, throwing-volume-related presentation is inconsistent with an acute traumatic fracture, which would follow a discrete injury event rather than gradual overuse. Adhesive capsulitis is a condition of older adults involving capsular fibrosis, unrelated to growth plate pathology in a child. While any atypical bony finding warrants appropriate clinical judgment, this classic presentation (age, sport, gradual throwing-related onset, and specific radiographic physeal widening finding) is specifically characteristic of Little League shoulder rather than a default assumption of malignancy.

120. B. Extension-provoked low back pain in an adolescent athlete participating in a sport involving repetitive spinal extension and rotation (such as gymnastics, and similarly diving, dance, and some throwing/racquet sports) is a classic presentation for spondylolysis, a stress fracture of the pars interarticularis; because plain radiographs (including oblique views) have limited sensitivity, especially early in the injury process, further imaging such as MRI (preferred to limit radiation, given the young age) or SPECT/CT is often pursued when clinical suspicion remains high despite unremarkable initial radiographs. Attributing this pattern to a simple mechanical strain would overlook the sport-specific, extension-provoked presentation that is a recognized red flag for spondylolysis in this population. Ankylosing spondylitis is a distinct inflammatory condition with different associated features (morning stiffness, systemic symptoms, different demographic pattern) and is not the presentation being tested by this classic sport-specific vignette. Lumbar disc herniation classically causes flexion-provoked pain with radicular features (which are absent here, given the normal neurologic exam), a different pattern from the extension-provoked axial pain described.

121. A. Radiating leg pain below the knee with lateral foot numbness (S1 dermatome), ankle plantarflexion weakness (S1 myotome, primarily gastrocnemius/soleus), worsening with sitting/forward flexion (increasing disc pressure), and a positive straight leg raise test (tensioning the nerve root) together localize to an S1 radiculopathy, most commonly from an L5-S1 disc herniation compressing the traversing S1 nerve root. L5 radiculopathy would instead cause weakness of ankle dorsiflexion and great toe extension along with different dermatomal numbness (dorsum of foot/first web space), not the plantarflexion weakness and lateral foot numbness described here. Facet-mediated pain is typically axial (not radicular), worsened by extension rather than flexion, and would not be expected to produce a positive straight leg raise or focal myotomal weakness. Piriformis syndrome can cause sciatic-distribution symptoms from extrinsic nerve compression but is a distinct diagnosis from the disc-related radicular pattern and specific positive provocative testing described here.

122. C. Lumbar facet joint-mediated pain classically presents as axial (non-radiating) back pain worsened by extension and rotation (movements that load the facet joints, as in a golf swing) and improved with flexion, without radicular symptoms or neurologic deficit, which helps distinguish it from disc-related pain, which is typically worsened by flexion and sitting rather than extension. The distractor describing disc herniation with an extension-provoked, flexion-relieved pattern actually describes the facet pattern, not disc pathology, making it incorrect. Ankylosing spondylitis is a specific inflammatory condition with a different demographic and symptom profile (typically younger onset,

morning stiffness, systemic features) and is not the best fit for this classic mechanical, activity-related presentation in an older recreational athlete. Lumbar spinal stenosis classically causes neurogenic claudication that worsens with extension/standing and improves with flexion (leaning forward, as when pushing a shopping cart), which is the opposite pattern from what is described in this vignette.

123. C. Scheuermann's kyphosis is a structural spinal deformity of adolescence characterized by anterior wedging (greater than 5 degrees) of three or more consecutive thoracic vertebrae, producing a rigid, increased thoracic kyphosis that does not fully correct with active extension, distinguishing it from simple postural kyphosis, which is flexible and fully correctable with active positioning and would not show this radiographic wedging pattern. An acute compression fracture from a single traumatic event would not explain the gradual symptom onset and the specific multi-level wedging pattern described, which reflects a chronic, growth-related process rather than an acute injury. Ankylosing spondylitis produces a distinct radiographic pattern over time (such as syndesmophyte formation and eventual spinal fusion), not the anterior vertebral wedging pattern characteristic of Scheuermann's disease.

124. B. Standard muscle strain grading describes grade I as a mild strain with microscopic or minimal fiber damage, minimal swelling, and little to no loss of strength; grade II as a partial tear with more significant fiber disruption, causing noticeable pain, swelling, and some loss of strength or function, but without complete disruption; and grade III as a complete tear of the muscle-tendon unit, often with a palpable defect and significant or total loss of function. The description of microscopic damage with minimal swelling and no significant weakness describes grade I, not grade II. The description of a complete tear with total loss of function and a palpable defect describes grade III, not grade II. Attributing pain to DOMS with no structural damage does not describe a graded strain injury at all, since DOMS is a distinct, non-structural phenomenon from an acute strain.

125. A. Delayed onset muscle soreness (DOMS) is a well-characterized, self-limited response to unaccustomed or high-eccentric-load exercise, classically peaking 24-72 hours after the triggering session and presenting as diffuse muscle soreness and stiffness without a discrete injury event, distinguishing it from an acute muscle strain, which typically has an immediate onset at the moment of injury with more focal pain localized to the site of fiber disruption. Describing an acute grade I strain as having this same delayed, diffuse onset pattern incorrectly conflates it with DOMS; acute strains are, by definition, tied to a specific injury moment. A grade III complete tear would cause immediate, severe, focal symptoms with significant functional loss, not this gradual, diffuse, self-resolving pattern. While severe, unaccustomed eccentric exercise can rarely trigger exertional rhabdomyolysis in susceptible individuals, this is not the typical or expected outcome of ordinary unaccustomed training (which usually produces benign DOMS), and rhabdomyolysis requires specific additional findings (dark urine, markedly elevated CK, renal involvement) not implied by this straightforward description.

126. D. Chronic exertional compartment syndrome classically presents with reproducible, exertion-triggered pain and tightness in a specific compartment (often the anterior compartment of the leg) that develops at a predictable point during activity and resolves relatively quickly with rest, with a normal exam and pulses between episodes since the pathology is dynamic (pressure-related) rather than a fixed

structural or vascular lesion; diagnosis is confirmed by measuring intracompartmental pressures before and after a symptom-provoking exercise bout, showing abnormally elevated pressures that fail to normalize appropriately. Peripheral artery disease would be expected to show abnormal resting vascular findings (diminished pulses, abnormal ankle-brachial index), which are not described here. Medial tibial stress syndrome causes tenderness that is often present even at rest along the tibial border, a different pattern from the purely exertion-triggered, fully resolving symptoms described. DVT would not present with this reproducible exertional trigger-and-resolve pattern and normal resting exam; it typically causes more persistent swelling, warmth, and pain.

127. B. While heat- and electrolyte-related mechanisms contribute to some cases of exercise-associated muscle cramping, cramping that occurs in cool conditions with adequate hydration (as described) is increasingly attributed to an altered neuromuscular control (fatigue-driven) mechanism, in which fatigue alters the balance of excitatory input from muscle spindles and inhibitory input from Golgi tendon organs, favoring sustained alpha motor neuron excitation and involuntary sustained muscle contraction, independent of ambient temperature or hydration/electrolyte status. Attributing all cramping exclusively to dehydration or sodium depletion does not fit the scenario described (cool environment, adequate hydration) and ignores this well-supported alternative mechanism relevant to a meaningful subset of cramping presentations. Describing the mechanism as entirely unexplained ignores the neuromuscular fatigue theory that has meaningful supporting evidence in the sports medicine literature for cramping occurring outside classic heat/electrolyte-depletion contexts.

128. B. NSAIDs provide combined analgesic and anti-inflammatory effects through cyclooxygenase inhibition, which can be beneficial for pain and swelling control after an acute soft tissue injury, but there is a body of literature raising theoretical and some experimental concern that high-dose NSAID use very early after injury may blunt aspects of the early inflammatory phase important for tissue healing, a consideration that informs individualized decisions about dose, duration, and timing rather than an absolute prohibition. Acetaminophen is not absolutely contraindicated in acute musculoskeletal injury; it is a reasonable analgesic option, particularly when anti-inflammatory effects are not needed or NSAIDs are relatively contraindicated, and works through a different, centrally-mediated mechanism rather than the same peripheral anti-inflammatory pathway as NSAIDs, making the claim that they work 'identically' incorrect. Describing NSAIDs as entirely free of any theoretical healing-related concern ignores this recognized area of ongoing clinical discussion in sports medicine.

129. D. For tendinopathy conditions such as lateral epicondylitis, corticosteroid injections can offer short-term symptomatic pain relief, but several studies have raised concern about worse intermediate-to-long-term outcomes (including higher recurrence rates) compared to other treatments, alongside theoretical concerns about corticosteroids potentially weakening tendon tissue quality with repeated use, which is why current practice generally reserves corticosteroid injection for cases that have failed an adequate trial of conservative management (such as eccentric strengthening) rather than using it as a first-line or default early treatment. Describing corticosteroid injection as definitive first-line treatment, ahead of conservative therapy, misrepresents standard treatment sequencing for tendinopathy. Claiming consistent evidence of improved long-term tendon healing/structural integrity from corticosteroid

injection contradicts the literature raising concern about tendon quality with repeated use. Describing unlimited, unrestricted repeat dosing as free of any concern ignores the recognized theoretical and clinical caution around cumulative corticosteroid exposure to tendon tissue.

130. B. Appropriate opioid stewardship in sports medicine, as in general medical practice, emphasizes using opioids, when clinically indicated (such as in the acute postoperative period after significant surgery), at the lowest effective dose for the shortest necessary duration, with a proactive plan for tapering and transitioning to non-opioid analgesic strategies, recognizing that athletes are not inherently protected from the risks of opioid misuse or dependence despite their generally healthy status. Prescribing a fixed high dose and duration for all patients regardless of individual injury severity and pain needs is inconsistent with individualized, risk-conscious prescribing practice. Athletes are not exempt from opioid misuse risk, making the claim that stewardship principles do not apply to this population incorrect. While minimizing opioid use is an important goal, an absolute blanket avoidance regardless of injury severity or expected pain level is not the standard, nuanced stewardship approach, since some significant postoperative scenarios do appropriately involve carefully managed short-term opioid use.

131. D. The evidence base for platelet-rich plasma and other orthobiologic treatments in tendinopathy remains mixed and continues to evolve, with heterogeneous study designs, preparation methods, and outcomes across the literature; some studies suggest benefit while others show no significant advantage over comparator treatments (including structured exercise programs or other injections), which is why current guidance generally frames PRP as one possible option to discuss, with appropriately set expectations, rather than a treatment of definitively proven superior efficacy. Claiming consistent, high-quality evidence of superiority overstates the current evidence base. Claiming PRP has been conclusively shown ineffective similarly overstates the certainty of the evidence in the other direction, since some studies do show benefit. PRP is not risk- or cost-free (injection-related risks and significant out-of-pocket cost are relevant considerations), so presenting it as essentially without downside misrepresents appropriate shared decision-making about this treatment.

132. A. In skeletally immature throwing athletes, the medial epicondylar apophysis represents a relatively weaker link in the throwing kinetic chain compared to the UCL itself, so repetitive valgus throwing stress in this population classically produces Little League elbow (medial epicondyle apophysitis/traction injury) rather than the ligamentous UCL injury more typical of skeletally mature throwers; this presentation, with apophyseal tenderness, pain with resisted wrist flexion (via the flexor-pronator mass origin), and notably normal valgus stability (no ligamentous laxity), fits the apophyseal injury pattern rather than a true UCL tear. Diagnosing an adult-pattern UCL tear in this setting ignores the skeletally immature status and the specific exam finding of normal valgus stability with apophyseal (not ligamentous) tenderness. Osteochondritis dissecans of the capitellum is a distinct condition affecting the lateral elbow (capitellum), with mechanical symptoms like catching or locking, an anatomically and clinically different presentation from this medial-sided traction apophysitis. A simple contusion would not explain the specific throwing-related, apophyseal tenderness pattern described.

133. C. Sever's disease (calcaneal apophysitis) is a common cause of heel pain in growing children and young adolescents, resulting from repetitive traction stress (from the Achilles tendon posteriorly and plantar fascia distally) on the still-open, actively growing calcaneal apophysis, classically reproduced by a mediolateral squeeze test of the heel; it is generally a self-limited condition managed conservatively with activity modification, heel cushioning or heel lifts, calf stretching, and reassurance that symptoms resolve with growth plate closure. Achilles tendon rupture is an acute injury with a positive Thompson test, a distinctly different presentation from this gradual, growth-related process. While stress fractures should remain a consideration in persistent or atypical cases, the classic age, mechanism, and squeeze-test tenderness pattern described here is specifically characteristic of Sever's disease rather than a default assumption of stress fracture. Plantar fasciitis causes pain at the plantar (bottom), not posterior, heel and is comparatively uncommon in this young age group relative to calcaneal apophysitis.

134. A. Slipped capital femoral epiphysis (SCFE) classically presents in overweight adolescents with vague hip, groin, thigh, or referred knee pain, an antalgic gait, and characteristic limited internal rotation of the hip that often worsens or is accompanied by obligate external rotation with hip flexion; prompt recognition and urgent orthopedic referral (typically with the patient made non-weight-bearing) are critical because delayed diagnosis increases the risk of further epiphyseal slippage, avascular necrosis of the femoral head, and long-term hip joint dysfunction, making this a diagnosis that must not be missed in this classic demographic and presentation. Assuming transient synovitis (a more benign, self-limited condition) without further evaluation would risk missing SCFE, given the overlapping presentation and the higher-risk demographic (overweight adolescent) described here. Growing pains are typically nocturnal, bilateral, and do not cause focal exam findings like limited hip internal rotation or a gait abnormality. Osgood-Schlatter disease causes localized anterior knee/tibial tubercle findings, not the hip-centered limited internal rotation and referred pain pattern described in this vignette.

135. B. A core concept in pediatric sports medicine is that, in skeletally immature athletes, the open growth plate (physis) and the apophysis (a traction growth center where a tendon attaches) are often the relatively weakest link in the muscle-tendon-bone unit, more vulnerable to repetitive traction and loading stress than the adjacent tendon or ligament itself; this is why the same repetitive stress that produces tendinopathy or ligament sprain in an adult (whose growth plates have closed) frequently produces an apophysitis (such as Little League elbow, Sever's disease, or Osgood-Schlatter disease) or a physeal stress injury in a growing child instead. Describing growth plates and apophyses as mechanically stronger than tendons/ligaments in children reverses the actual relationship and is incorrect. Claiming no meaningful difference in susceptibility between skeletally immature and mature athletes contradicts well-established pediatric sports medicine principles. This concept is a foundational, well-supported principle in pediatric sports medicine, not an unsupported claim.

136. D. Landmark-guided subacromial injections miss the target bursa in a meaningful proportion of attempts, even by experienced clinicians, because the bursa is a thin potential space rather than a fixed palpable structure. Ultrasound guidance lets the physician visualize the needle tip in real time and confirm fluid distending the bursal space as it is injected, directly improving accuracy and reducing the chance of depositing medication into the adjacent supraspinatus tendon or the glenohumeral joint. A

post-injection corticosteroid flare (a transient inflammatory reaction to the crystalline suspension) is a pharmacologic property of the medication itself and occurs regardless of how accurately the needle was placed, so imaging guidance does not eliminate it. Ultrasound guidance still requires and builds on surface anatomy; it supplements landmark identification rather than replacing the need for it. The corticosteroid dose used is determined by the medication and joint/bursa size, not by whether the needle was placed under imaging.

137. B. Advancing a needle through actively infected skin (cellulitis) can seed bacteria into an otherwise sterile joint space, converting a simple effusion into a septic joint; this is a true absolute contraindication, and if aspiration is essential the physician must enter through unaffected skin or defer. Low-dose aspirin causes a mild, reversible platelet effect but is not, by itself, a contraindication to arthrocentesis, which is a low-bleeding-risk procedure even in most anticoagulated patients; the small aspiration needle and compressible entry site make clinically significant bleeding rare. Duration of the effusion does not determine whether aspiration can be performed; acute effusions are often the ones most urgently indicated for aspiration to rule out infection or hemarthrosis. Limited range of motion from pain and swelling is actually a common indication for arthrocentesis (to relieve pressure and obtain fluid for analysis), not a reason to avoid it.

138. C. The presentation (unaccustomed intense exertion, heat, diffuse myalgia, weakness, and dark urine) is classic for exertional rhabdomyolysis, and the diagnostic hallmark is a markedly elevated serum CK, typically many multiples above the upper limit of normal; the degree of CK elevation also guides return-to-play timing and monitoring for renal injury. Urine dipstick in rhabdomyolysis is positive for blood due to myoglobin (which cross-reacts with the heme-based dipstick test) even though microscopic exam shows no actual red blood cells; a dipstick-positive, microscopy-negative pattern with confirmed elevated urine myoglobin is the classic finding, not a picture with normal myoglobin. Rhabdomyolysis causes potassium release from damaged muscle cells, so serum potassium is typically elevated (a dangerous complication that can cause cardiac arrhythmia), not low-normal. A normal CK would argue against significant muscle breakdown, and ESR is a nonspecific inflammatory marker that plays no diagnostic role in rhabdomyolysis.

139. A. Bone healing depends on an early inflammatory phase mediated in part by prostaglandins, and NSAIDs work precisely by inhibiting the cyclooxygenase enzymes that produce those prostaglandins; animal and clinical data have raised concern that regular, sustained NSAID use during the early healing window can slow fracture consolidation, which is why many sports medicine physicians favor acetaminophen or short, limited NSAID courses instead for stress fractures. NSAIDs do not stimulate osteoblast activity — the opposite concern (impaired healing) is the actual issue, making that option physiologically backwards. The bone-healing concern is real and independent of GI toxicity; framing the issue as solely a gastric-mucosa problem misses the actual mechanism relevant to a healing fracture. Stating there is no meaningful concern at any dose ignores the physiologic rationale and published concern that has shaped clinical practice around analgesic choice in stress fracture management.

140. D. Pain localized just off the midline near the posterior superior iliac spine, worsened by single-leg loading and postural transitions, without radiation below the knee or neurologic deficit, is the classic pattern for sacroiliac joint dysfunction, and provocative single-leg stance (or similar SI-loading) testing that reproduces the pain supports this rather than a lumbar spine source. A disc herniation with true nerve root compression typically produces radicular pain extending below the knee in a dermatomal pattern, often with a positive straight-leg raise and possible motor or sensory deficits, none of which are described here. Spondylolisthesis-related neurogenic claudication classically causes bilateral leg symptoms brought on by lumbar extension or walking and relieved by flexion/sitting, a different pattern than an SI-loading provocative test localized off the midline. Piriformis syndrome causes buttock pain with radiation along the sciatic distribution (often worsened by hip internal rotation/adduction stretching the piriformis), which is a distinct pain pattern from the localized SI-joint-provocation findings described.

141. D. The pattern described — reaction only when a specific food precedes exertion within a defined window, with neither the food alone nor exercise alone provoking symptoms — is the defining clinical feature of food-dependent exercise-induced anaphylaxis (FDEIA); management centers on avoiding exercise for a period after eating the culprit food rather than avoiding the food entirely. Cholinergic urticaria is triggered by any passive or active rise in core temperature (hot showers, fever, exercise) independent of food and typically produces small, punctate wheals rather than requiring a food-exercise combination. A classic IgE-mediated food allergy would be expected to cause symptoms with the food alone, at rest, which is explicitly not the case here. Exercise-induced bronchoconstriction causes airway symptoms (cough, wheeze, chest tightness) from airway cooling/drying during exertion, not urticaria, angioedema, and hypotension tied to a specific food trigger.

142. A. For athletes with a history of anaphylaxis to a known trigger they may reasonably encounter (insect stings during outdoor sport), the standard of care is ensuring immediate access to epinephrine and making sure people around the athlete know how to recognize a reaction and use the auto-injector, since epinephrine is the first-line treatment for anaphylaxis and delay increases mortality risk. Restricting the athlete to indoor-only sport is an unnecessarily broad limitation when the actual risk can be mitigated with a preparedness plan; sports medicine practice favors safe participation with risk mitigation over blanket exclusion. A prior severe anaphylactic reaction substantially raises the likelihood of a severe reaction on re-exposure, so clearing the athlete with no precautions ignores established risk. Antihistamines do not reliably prevent or reverse anaphylaxis and must never be positioned as the primary preventive strategy in place of epinephrine access.

143. B. Standard oral antihistamines, including common second-generation agents, are not on the WADA Prohibited List and do not require a Therapeutic Use Exemption (TUE) for use in or out of competition; the physician can reassure the athlete that treating allergic rhinitis with a routine oral antihistamine is permitted. Antihistamines as a class are not banned; the WADA list targets specific categories (e.g., certain stimulants, anabolic agents, some diuretics, glucocorticoids by certain routes), not antihistamines broadly. Because ordinary oral antihistamines are not prohibited in the first place, no TUE is needed for this use — a TUE is only relevant for medications that are otherwise prohibited but

medically necessary. There is no route-of-administration distinction that bans oral antihistamines while permitting injectable ones; the class itself is simply not restricted.

144. B. In hypertrophic cardiomyopathy (HCM), standing (and Valsalva) reduces venous return and left ventricular preload, which paradoxically worsens dynamic outflow tract obstruction and intensifies the murmur, while maneuvers that increase preload (passive leg raise, squatting) increase LV volume and lessen the obstruction, softening the murmur — exactly the pattern described, and this reversal (louder with standing, softer with increased preload) is a key bedside clue distinguishing HCM from most other murmurs, which matters given HCM's association with exertional sudden cardiac death in young athletes. Innocent flow murmurs are typically soft, position-independent or louder with increased venous return (e.g., supine), and do not show this outflow-obstruction pattern. Mitral valve prolapse murmurs actually tend to occur earlier and can become louder (not softer) with standing, as reduced LV volume brings the prolapsing leaflet into contact with the atrium earlier in systole — the opposite of what's stated in that option. A bicuspid aortic valve murmur is a relatively fixed structural murmur that does not show this dynamic preload-dependent reversal.

145. A. Commotio cordis is a well-described cause of sudden cardiac arrest in young athletes in which a relatively low-energy blunt impact to the precordium, striking during a narrow vulnerable window of ventricular repolarization, triggers ventricular fibrillation in a structurally normal heart — the clear temporal link between the chest impact and collapse, with a normal heart otherwise, makes this the most likely explanation. An anomalous coronary artery typically causes sudden collapse during exertion itself (ischemia from a compressed or malpositioned vessel), not specifically in temporal relation to a witnessed chest impact. Long QT syndrome events are classically triggered by adrenergic surges such as exertion, emotional stress, or auditory stimuli (like alarms) rather than by direct mechanical chest trauma, so it does not explain the impact-linked timing described. Arrhythmogenic right ventricular cardiomyopathy causes exercise-related arrhythmia from structural right ventricular disease and would not be expected to depend on a precisely timed chest impact — dismissing the impact as incidental ignores the classic commotio cordis mechanism that fits this scenario.

146. C. The clinical picture (tall stature, arachnodactyly, pectus excavatum, joint hypermobility, family history of early aortic dissection) raises concern for Marfan syndrome, and the finding that most specifically confirms cardiovascular risk requiring restriction/monitoring is aortic root dilation, since progressive aortic root enlargement is what predisposes to life-threatening dissection, particularly with the hemodynamic stress of competitive exercise. Athletic bradycardia is a common, benign adaptation to endurance training and would not by itself raise or lower suspicion for a connective tissue disorder with aortic involvement. Mild incidental scoliosis is common in the general population and, while it can occur in Marfan syndrome, is nonspecific and does not itself confirm the cardiovascular risk that determines clearance. Flexible flat feet are a common normal variant and are not a marker of the aortic pathology that drives activity restriction decisions in this condition.

147. D. A borderline-to-prolonged QTc combined with a family history of unexplained sudden death in a young relative is a red-flag combination that warrants formal cardiology evaluation and consideration

of genetic testing for long QT syndrome before clearance decisions are finalized, because missing this diagnosis risks a potentially fatal arrhythmia during exertion. Athletic training causes recognized ECG adaptations (like sinus bradycardia, early repolarization, or isolated voltage criteria for LVH), but QTc prolongation into this range is not a benign training adaptation and should not be dismissed as normal, especially with the concerning family history. Deferring any workup for a full year ignores the combination of objective ECG abnormality and a concerning family history that requires timely evaluation, not routine annual reassessment. Avoiding caffeine addresses only one minor, non-specific QT-prolonging factor and is nowhere near sufficient as the sole management step for a finding this concerning; it does not substitute for cardiology evaluation.

148. A. Regular aerobic exercise is an established, evidence-based component of hypertension management and, in someone whose blood pressure is well-controlled and who is otherwise asymptomatic, continuing endurance training is appropriate and beneficial rather than something to restrict — ongoing monitoring and symptom awareness are reasonable, but outright restriction is not indicated at this level of control. Well-controlled hypertension is not an absolute contraindication to vigorous exercise; guidelines instead recommend exercise as therapy in this setting, making blanket cessation inappropriate. Aerobic exercise is not contraindicated in hypertension — in fact it is specifically recommended alongside, not instead of, resistance training as part of a comprehensive approach. Discontinuing antihypertensive medication before events is not indicated when the medication is achieving good control and the athlete is asymptomatic; stopping treatment would risk uncontrolled blood pressure rather than prevent a clinically significant problem in this scenario.

149. C. Any athlete with signs or symptoms suggestive of concussion after a head impact should be removed from play immediately for a structured assessment, and current same-day return-to-play is not permitted once concussion is suspected — this is the foundational 'when in doubt, sit them out' principle across essentially all modern concussion protocols, because ongoing on-field impairment increases risk of a second impact and worse outcomes. Rapid symptom resolution within minutes does not reliably exclude concussion, and permitting same-day return based on quick symptom resolution alone contradicts standard graduated return-to-play protocols, which require symptom-free progression over days, not minutes. A balance test is only one component of a full sideline assessment (which should also include cognitive testing and symptom inventory); passing balance testing alone is not sufficient to clear same-day return. Provoking symptoms with exertion on the sideline is actually a recognized part of some assessment tools to detect exertional symptom worsening, but its use to justify same-day clearance — rather than to confirm the athlete should sit out — misapplies the tool and violates the no-same-day-return principle.

150. A. Current concussion guidelines favor a brief period of relative rest (roughly 24 to 48 hours) followed by gradual, symptom-guided reintroduction of light activity, since prolonged strict rest has not been shown to improve outcomes and can actually be associated with slower recovery and increased symptom burden — the emphasis has shifted from prolonged cocoon-style rest toward early, tolerated activity. Prolonged strict rest for two weeks in a dark room reflects an outdated approach; current evidence favors early, graded return over extended sensory deprivation. While cognitive and physical

exertion should be modified in the initial 24-48 hours, saying rest has no evidence of benefit and jumping to full unmodified workload ignores the recommended brief initial rest period and risks symptom exacerbation. A rigid one-month blanket restriction before any graduated steps begin is not consistent with symptom-guided, individualized graduated return-to-play protocols, which typically begin days (not weeks) after injury once the athlete is at or near symptom baseline.

151. B. Once an athlete is symptom-free at rest and with cognitive exertion, the standard approach is a graduated, stepwise return-to-play protocol (progressing through light aerobic activity, sport-specific exercise, non-contact training drills, full-contact practice, and finally return to competition), with each stage requiring roughly 24 hours symptom-free before advancing — this stepwise structure is designed to detect symptom recurrence with increasing physical and cognitive demand before returning to full-risk contact play. Being symptom-free at rest does not mean the athlete will tolerate the physical and cognitive demands of full-contact play; skipping straight to full clearance bypasses the graded exertion testing that the protocol is specifically designed to provide. There is no fixed mandatory time-based delay (such as a flat 4 weeks) required by current guidelines independent of symptom status; return timing is individualized and symptom-guided, not a rigid calendar rule. Jumping directly to full-contact scrimmage skips the intermediate non-contact exertion and drill stages that are meant to progressively test the athlete's tolerance before contact risk is reintroduced.

152. B. Second impact syndrome describes the rare but catastrophic scenario in which a second head injury, sustained while the brain is still vulnerable from an earlier concussion, triggers loss of cerebral autoregulation and rapid, severe cerebral edema — it is the key reason athletes must be fully recovered and cleared before returning to any contact risk, and a disproportionately severe reaction to a relatively minor second impact should raise urgent concern for it. Chronic traumatic encephalopathy is a neurodegenerative condition associated with repetitive head trauma over years, but it cannot be diagnosed during life from an acute clinical presentation like this — it is currently a postmortem neuropathologic diagnosis, so this option misapplies the concept. Framing this as ordinary post-concussion syndrome from the first injury, unrelated to the second impact, ignores the temporal relationship (worsening after a new impact) that is central to recognizing second impact syndrome as an emergency. Vestibular migraine can be a cause of persistent post-concussive symptoms in some athletes, but it does not explain an acute, severe deterioration specifically tied to a second impact and does not carry the same emergent significance.

153. D. A pre-existing history of migraine is one of the more consistently identified risk factors for prolonged recovery after concussion, along with factors such as significant initial symptom burden, a history of prior concussions, and certain psychiatric comorbidities; this makes it clinically useful to ask about migraine history when counseling an athlete on expected recovery time. Sex differences in concussion recovery have been studied, but the literature does not consistently show male sex as a risk factor for slower recovery — if anything, some studies suggest female athletes may have longer symptom duration, so asserting male sex as a consistent predictor of slower recovery is not well supported. Whether the injury occurred during a practice drill versus a game does not, by itself, predict recovery trajectory — recovery relates far more to injury characteristics and individual risk factors than

to the competitive context in which the injury occurred. Loss of consciousness at the time of injury has not proven to be a reliable predictor of prolonged recovery, and its absence does not meaningfully shorten or lengthen the expected recovery course on its own.

154. D. It is important to counsel families accurately: no helmet, regardless of marketing claims, eliminates concussion risk, because concussion results from rotational and linear acceleration forces transmitted to the brain that helmets are not fully able to absorb or prevent; helmets remain critically important for reducing catastrophic injuries like skull fracture and are one part of a broader risk-reduction strategy (rule enforcement, technique coaching, contact restrictions), not a guarantee against concussion. Claiming that certified helmets make concussion essentially impossible overstates the evidence and could dangerously lower an athlete's or parent's vigilance about recognizing concussion symptoms. Helmets clearly do provide protection against certain injuries (notably skull fracture and other direct impact trauma), so stating they have no protective role at all is inaccurate and understates their real, established benefit. Properly certified youth helmets do provide meaningful protection appropriate to that level of play; dismissing all non-professional-level certified helmets as offering no benefit is not supported and could discourage proper equipment use.

155. A. Grouped vesicles on an erythematous base in a wrestler is the classic presentation of herpes gladiatorum (cutaneous HSV), a highly contagious skin infection readily spread by the skin-to-skin contact inherent to wrestling; standard practice is to withhold the athlete from close-contact competition and treat with antiviral therapy until lesions are fully crusted/resolved per governing-body return-to-play criteria, not simply to cover the area. Bandaging or covering a lesion is not considered adequate protection against transmission for contact sports like wrestling — most wrestling governing bodies explicitly do not accept covering as sufficient to permit participation with an active herpes gladiatorum outbreak. The described lesion (grouped vesicles on an erythematous base) is a recognizable and concerning pattern regardless of the absence of fever; systemic symptoms are not required to trigger withholding for a suspected contagious skin condition in a contact sport. Restricting only practice while clearing the athlete for competition is inconsistent — the contagion risk exists in match competition just as much as in practice, and standard protocol withholds the athlete from all close-contact activity until cleared.

156. D. Painful, fluctuant nodules initially mistaken for spider bites in an athlete from a shared-equipment, close-contact environment is a classic description of community-associated MRSA skin and soft tissue infection, which spreads efficiently through skin contact and shared gear in contact-sport settings; management requires appropriate drainage/antibiotics and covering/clearing the lesion before the athlete returns to close-contact practice or competition, both to protect the athlete and to prevent an outbreak among teammates. Group A Streptococcus is a cause of pharyngitis and certain skin infections (like impetigo or cellulitis) but does not match this specific fluctuant-nodule, spider-bite-mimicking presentation, and pharyngitis itself is unrelated to this scenario. Tinea corporis causes an annular, scaling, usually non-fluctuant rash and, while it does typically require treatment and often some restriction until treated, it does not match this painful fluctuant nodule presentation. Molluscum

contagiosum causes small, painless, umbilicated papules, not painful fluctuant nodules, and while it is mildly contagious it is not the pathogen this presentation should raise concern for.

157. D. Well-demarcated, macerated, malodorous interdigital skin changes with branching hyphae on KOH preparation is the classic presentation and confirmatory finding for tinea pedis (athlete's foot); first-line treatment is a topical antifungal along with foot-hygiene measures (moisture control, breathable footwear) to reduce recurrence in athletes prone to prolonged shoe/sock moisture exposure. Erythrasma can also cause interdigital changes and is treated with antibiotics rather than antifungals, but it is diagnosed by coral-red fluorescence under Wood's lamp (from *Corynebacterium*) rather than branching hyphae on KOH, which is the specific fungal finding described here. Contact dermatitis would not show branching hyphae on KOH prep — a positive KOH for hyphae specifically confirms a dermatophyte infection, ruling out a purely irritant/allergic process. Pitted keratolysis is a bacterial process causing pitted lesions on weight-bearing plantar skin with odor, but it does not show branching hyphae on KOH and is treated with topical antibacterial agents, not an antifungal.

158. C. The combination of unexplained performance decline, amenorrhea, unintentional weight loss, fatigue, and cold intolerance in a female endurance athlete is the classic multi-system presentation of Relative Energy Deficiency in Sport (RED-S), in which insufficient caloric intake relative to exercise energy expenditure impairs menstrual function, metabolic rate (producing symptoms that can mimic hypothyroidism, like cold intolerance), and athletic performance; RED-S requires a broader energy-availability and nutritional evaluation, not a single-organ diagnosis. Cold intolerance and weight change can occur in hyperthyroidism, but hyperthyroidism classically causes weight loss with heat intolerance and often tachycardia/tremor, not cold intolerance, and would not explain the amenorrhea and performance decline as a unifying diagnosis the way RED-S does. Amenorrhea, unintentional weight loss, and performance decline together are not normal, expected training adaptations — they are red flags requiring evaluation, not findings to dismiss as benign. Iron deficiency anemia could contribute to fatigue and reduced performance but does not explain amenorrhea, cold intolerance, or unintentional weight loss as a unifying single diagnosis.

159. A. Prolonged aerobic exercise increases muscle glucose uptake and insulin sensitivity, which raises the risk of exercise-associated hypoglycemia in someone using exogenous insulin; appropriate management typically involves some combination of reducing insulin dose around the activity and/or supplementing carbohydrate intake, individualized with glucose monitoring, rather than using an unmodified regimen. Exercise clearly does affect insulin requirements in type 1 diabetes — using her usual non-exercise-day dosing unchanged ignores this well-established physiologic effect and raises real hypoglycemia risk during a 2-hour session. Taking extra rapid-acting insulin before prolonged aerobic exercise would compound the hypoglycemia risk rather than prevent hyperglycemia, since aerobic exercise itself already tends to lower glucose — this approach is physiologically backwards for the scenario described. Well-controlled type 1 diabetes is not a contraindication to endurance exercise; many elite athletes compete with type 1 diabetes using individualized glucose and insulin management strategies, so blanket exercise restriction is not appropriate here.

160. D. An elevated TSH with a low free T4 is the classic biochemical pattern of primary hypothyroidism, reflecting a failing thyroid gland that is being driven by rising pituitary TSH in an attempt to stimulate more hormone production; the accompanying symptoms (fatigue, weight gain, constipation) fit this diagnosis well and warrant thyroid hormone replacement and further workup for the underlying cause (such as autoimmune thyroiditis). Overtraining syndrome can cause fatigue and performance decline, but it does not characteristically produce this specific elevated-TSH, low-free-T4 pattern — it is a clinical diagnosis of exclusion, not one confirmed by this biochemical signature, so this option incorrectly attributes a specific lab pattern to overtraining. Central hypothyroidism from pituitary dysfunction is characterized by a low or inappropriately normal TSH together with a low free T4 (because the pituitary itself is failing to produce adequate TSH), not an elevated TSH — the elevated TSH described here actually points away from a central cause and toward a primary thyroid problem. Euthyroid sick syndrome (nonthyroidal illness) typically shows a low or normal TSH with a low free T3 (and often low-normal free T4) in the setting of acute systemic illness, not the elevated TSH described in this scenario.

161. B. The classic 'runner's trots' pattern — cramping and urgent loose stool specifically during prolonged exertion, resolving promptly with cessation of exercise, and with a normal endoscopic workup — reflects exercise-associated GI distress, thought to result from exertion-related splanchnic blood flow redistribution away from the gut plus mechanical jostling and thermal stress on the bowel during prolonged running; management focuses on training the gut, hydration/nutrition timing, and minimizing pre-run intake of poorly tolerated foods. Inflammatory bowel disease is a structural/inflammatory diagnosis that would be expected to show endoscopic and often laboratory abnormalities; a symptom pattern strictly confined to exertion with an unremarkable endoscopic workup argues against IBD rather than confirming it. Describing the exertional timing as coincidental with unrelated IBS mischaracterizes the case — the tight temporal link to exertion and resolution with rest is a defining feature of exercise-associated GI distress, not an incidental overlap with a separate unrelated condition. Celiac disease is a chronic gluten-sensitive enteropathy that does not characteristically present as symptoms confined to the later portion of a single exercise bout; it typically causes more persistent GI and nutritional symptoms unrelated specifically to exertion timing.

162. C. Numerous over-the-counter weight-loss and 'fat-burning' supplements, particularly unregulated products purchased online, have been implicated in cases of significant hepatotoxicity; in an athlete with new right upper quadrant symptoms, fatigue, and elevated transaminases with a temporal link to starting such a supplement, the appropriate step is immediate cessation and evaluation for drug/supplement-induced liver injury. Being over-the-counter does not equate to being safe or incapable of causing liver injury — supplement regulation is far less rigorous than prescription drug regulation, and hepatotoxic contaminants or high-dose stimulant/herbal ingredients are a recognized risk. While muscle injury (from an elevated CK) can sometimes cause mild AST elevation via non-hepatic release, this would not fully explain right upper quadrant discomfort and would need to be distinguished by checking CK and other liver-specific markers rather than assumed outright — dismissing this as pure muscle breakdown without evaluation risks missing real liver injury. Continuing a suspected hepatotoxic agent, even at

reduced dose, in someone with symptoms and abnormal labs is unsafe and prioritizes weight-cutting performance over the athlete's clear medical risk.

163. D. Splenic rupture is a rare but potentially life-threatening complication of infectious mononucleosis, and the risk is specifically tied to ongoing splenomegaly, which is why return-to-contact decisions hinge on the spleen returning to normal size (often assessed clinically and, when needed, by ultrasound) rather than on symptom resolution alone; a persistently palpable, enlarged spleen at 3 weeks means contact and collision sport should still be withheld. Fever resolution reflects control of the acute viral illness but says nothing about splenic size, which is the specific structure at risk during contact sport — using fever alone as the return criterion misses the actual danger. Fatigue improvement is a reasonable general recovery marker but, like fever, does not correlate reliably with splenic size normalization, so clearing based on fatigue alone ignores the documented physical exam finding of continued splenomegaly. The risk in mono-related splenomegaly applies specifically to contact and collision activities where the spleen could be struck or compressed; restricting only non-contact conditioning while clearing contact play backwards misapplies the actual risk profile.

164. D. Exercise-associated (sometimes called 'march' or 'jogger's') hematuria is a well-recognized, benign, self-limited phenomenon in endurance athletes, thought to result from repetitive bladder wall trauma against a relatively empty bladder plus transient exercise-related renal hypoperfusion; the classic reassuring features are the tight temporal link to exertion, painless gross hematuria without other urinary symptoms, and prompt resolution within a day or two, all of which are described here. Acute glomerulonephritis typically presents with additional features such as significant proteinuria, red cell casts, hypertension, and/or edema, and does not characteristically present as an isolated, rapidly self-resolving post-exercise event — this transient benign pattern does not confirm glomerulonephritis. While hematuria always warrants appropriate follow-up to exclude serious causes if it persists or recurs outside the exercise context, presuming bladder cancer as the leading diagnosis in a young, otherwise healthy athlete with this classic self-limited exercise-associated pattern is not appropriate first-line reasoning. Kidney stones classically cause hematuria accompanied by significant colicky flank pain radiating toward the groin; painless hematuria without flank pain argues against, rather than supports, stone passage.

165. C. Current sports medicine consensus for a solitary kidney is not an automatic, absolute exclusion from contact sport; instead, it calls for individualized, shared decision-making with the athlete (and family, if applicable) that discusses the specific consequence of losing all renal function if the remaining kidney is significantly injured, weighed against the low absolute risk of a career-ending renal injury in most sports, and consideration of protective gear where practical. Treating a solitary kidney as an absolute contraindication with no exceptions overstates the actual injury risk data and removes the athlete's informed choice, which is not consistent with current guidance. Conversely, clearing with no counseling at all understates the real (if statistically low) stakes of losing the only kidney and skips the informed-consent discussion that is considered standard of care in this specific scenario. There is no standard practice of surgically implanting a prophylactic kidney shield as a prerequisite for sport

participation; protective equipment options (such as external padding) are non-surgical, and framing surgery as the only acceptable path misrepresents actual practice.

166. A. Gross hematuria following a direct blow to the flank is a red flag for traumatic renal injury (ranging from contusion to laceration or vascular injury) and, even in a hemodynamically stable athlete, warrants prompt cross-sectional imaging (typically contrast-enhanced CT) to characterize the injury before any decision is made about further activity, since renal injury grading directly guides both immediate management and safe return-to-play timing. Returning to play based on symptomatic improvement alone, without imaging, risks missing a significant renal injury that could be worsened by continued play — post-traumatic gross hematuria is not an expected, benign finding to be cleared by symptom improvement alone. Simple observation with oral hydration, skipping imaging, is not appropriate when gross hematuria follows direct trauma; imaging is specifically indicated in this scenario to characterize injury severity, not deferred based on hemodynamic stability alone. Proceeding directly to surgery without first imaging would be premature and inappropriate in a hemodynamically stable patient — most traumatic renal injuries, even higher grade ones, are managed nonoperatively when the patient is stable, and imaging is needed first to guide that decision.

167. B. The combination of low energy availability (reflected here by low weight relative to training demand), menstrual dysfunction (amenorrhea), and low bone mineral density (reflected by the stress fracture and low Z-score) is the classic Female Athlete Triad, now recognized as one manifestation of the broader RED-S framework; management requires addressing the underlying energy deficit, not just treating the stress fracture or amenorrhea in isolation. Polycystic ovary syndrome typically presents with irregular menses associated with hyperandrogenism and is not classically associated with low bone density — PCOS is actually more often associated with normal-to-higher bone density due to relative estrogen/androgen exposure, making this pairing incorrect. Premature ovarian insufficiency is a distinct gynecologic diagnosis defined by ovarian failure before age 40, and it is not the mechanism at play in an energy-availability-driven presentation tied to training and body weight, which is different from an intrinsic ovarian failure process. Turner syndrome is a genetic condition typically identified earlier in life (often due to short stature and primary amenorrhea from puberty), not a new finding presenting for the first time as secondary amenorrhea in a previously normally-menstruating young adult athlete.

168. A. Current obstetric and sports medicine guidance supports continuing regular moderate-intensity aerobic exercise, including running, throughout an uncomplicated pregnancy, with reasonable precautions (adequate hydration, avoiding overheating, listening to the body, and adjusting intensity/impact as pregnancy progresses and comfort changes); exercise in pregnancy is associated with benefits, not increased risk, in the absence of specific contraindications. Recommending cessation of all aerobic exercise for the remainder of pregnancy is outdated and not supported by current guidelines for a patient with no contraindications — this overly restrictive advice denies well-documented benefits of continued activity. Bed rest is not a routine recommendation for a normal, uncomplicated pregnancy and is reserved for specific high-risk obstetric indications; recommending it here as a default precaution for exercise safety is inappropriate and not supported by guidelines. There is no clinical requirement to keep heart rate at or below pre-pregnancy resting levels during exercise in pregnancy — this is an outdated

and impractical heart-rate rule that has been superseded by guidance based on perceived exertion and individualized tolerance.

169. D. In functional hypothalamic amenorrhea, chronic energy deficit and physical/psychological stress suppress hypothalamic GnRH pulsatile release, which in turn reduces pituitary LH/FSH output and downstream ovarian estradiol production — producing the characteristic pattern of low estradiol with low-to-normal (rather than compensatorily elevated) gonadotropins, exactly as described, and reflecting a centrally-driven suppression tied to energy availability rather than primary ovarian or pituitary pathology. Primary ovarian failure occurs when the ovaries themselves stop responding, and the expected compensatory pituitary response is elevated FSH and LH (as the pituitary tries harder to stimulate a non-responsive ovary) with low estradiol — the opposite gonadotropin pattern from what's described here, so this diagnosis does not fit. Hyperprolactinemia from a pituitary adenoma is a distinct cause of amenorrhea that would be expected to show a clearly elevated prolactin level as the driving abnormality; nothing in this scenario points to a prolactin-secreting process, and the energy-deficit context specifically points toward a hypothalamic mechanism instead. This pattern of irregular periods with low estradiol and inappropriately low-to-normal gonadotropins in the setting of high training load and low body fat is a recognized pathologic pattern, not normal variation, and warrants evaluation and management of the underlying energy availability.

170. B. Blood layering in the anterior chamber after blunt eye trauma is a traumatic hyphema, an ophthalmologic emergency because of risks including elevated intraocular pressure, corneal blood staining, and rebleeding; appropriate immediate management is urgent ophthalmology referral, keeping the athlete upright with the head elevated (to allow blood to settle inferiorly, away from the visual axis, and to help control intraocular pressure), and protecting the eye with a rigid shield rather than a tight pressure patch. A firm pressure patch directly on the globe is contraindicated in suspected hyphema/globe injury, since direct pressure can worsen an occult globe injury or increase intraocular pressure; the correct approach is a protective shield without direct pressure. Hyphema is never a normal, self-limited finding to be dismissed without referral — it requires urgent ophthalmologic evaluation given the real risk of vision-threatening complications. Irrigating the eye does not address blood within the anterior chamber (which is an internal finding, not a surface contaminant) and vision changes after significant blunt trauma should never be used alone to clear an athlete for return to play without appropriate evaluation.

171. A. New malocclusion (teeth no longer fitting together normally) combined with jaw deviation and limited mouth opening after direct facial trauma is a classic presentation of mandibular fracture or TMJ dislocation, both of which disrupt the normal alignment and mechanics of the jaw; this combination should prompt urgent imaging and maxillofacial evaluation rather than assumption of a minor soft-tissue injury. A simple soft-tissue contusion would cause pain and swelling but would not be expected to produce objective malocclusion or jaw deviation, since it does not disrupt the bony or joint architecture that determines how the teeth align. An isolated avulsed tooth is a significant dental emergency in its own right, but on its own it does not cause the jaw deviation and inability to open the mouth described here, which point to a more structural mandibular/TMJ problem rather than an isolated single-tooth

injury. Trigeminal neuralgia is a chronic neuropathic pain condition causing episodic severe facial pain, not an acute structural change in jaw alignment or mouth opening; it does not explain objective malocclusion or visible jaw deviation after trauma.

172. A. An auricular hematoma, if not promptly drained and then compressed to prevent re-accumulation, separates the cartilage from its overlying perichondrial blood supply, leading to cartilage necrosis, fibrosis, and the classic permanent 'cauliflower ear' deformity common in wrestlers and other contact-sport athletes; timely drainage and a compressive dressing (bolster) are specifically aimed at preventing this cosmetic and structural outcome. Tympanic membrane perforation is a middle-ear injury typically caused by a direct blow to the ear canal itself or barotrauma, not the mechanism or concern with an external pinna hematoma, which is a separate anatomic problem confined to the outer ear. Bacterial meningitis is not a typical or expected direct complication of an isolated auricular hematoma; meningitis would require a separate route of infection (such as through the middle ear or skull base), not simply an untreated blood collection in the external ear cartilage. Facial nerve palsy results from injury or compression along the facial nerve's course (often related to temporal bone or parotid pathology), not from fluid collection in the pinna itself, and is not the complication being prevented by draining an auricular hematoma.

173. B. Exertional sickling in athletes with sickle cell trait is a distinct, potentially life-threatening syndrome triggered by intense exertion, heat, and dehydration, producing sudden weakness and collapse that can be mistaken for ordinary heat cramps but actually reflects red cell sickling and microvascular occlusion in exercising muscle; recognizing this distinction matters because management (immediate rest, cooling, oxygen, and urgent medical evaluation) differs from that of simple cramping, and repeated or unrecognized episodes carry real mortality risk. Classic heat cramps present with painful, often visible muscle cramping without the diffuse weakness pattern described, and importantly athletes with sickle cell trait are recognized to be at distinctly elevated risk for a different, more dangerous process (exertional sickling) than trait-negative athletes, so treating the presentations as identical misses this key distinction. Sickle cell trait is a carrier state (one sickle gene, one normal gene) and is fundamentally different from sickle cell disease (two sickle genes); trait carriers do not have the same baseline chronic hemolytic disease, and this collapse pattern reflects an acute exertional sickling event, not a chronic sickle cell disease crisis. Malignant hyperthermia is a distinct pharmacogenetic reaction to specific anesthetic triggers (like volatile anesthetics or succinylcholine) and is unrelated to sickle cell trait or this exertional collapse scenario.

174. D. The combination of low hemoglobin, low MCV (microcytic), and low ferritin (a direct marker of depleted iron stores) is classic for iron deficiency anemia, which is common in endurance athletes — particularly female runners — due to a combination of factors including increased GI blood loss, foot-strike-related hemolysis, urinary losses, and often insufficient dietary iron intake relative to training demands; treatment involves iron repletion alongside addressing the underlying contributing factors. Anemia of chronic disease typically shows a normal or even elevated ferritin (since ferritin is an acute-phase reactant and iron becomes sequestered rather than truly depleted), which is the opposite of the low ferritin described here, making this diagnosis inconsistent with the labs given. 'Sports anemia' refers to a

dilutional pseudoanemia from training-induced plasma volume expansion, which lowers hemoglobin concentration due to dilution but does NOT lower ferritin or MCV, since it is not a true iron-deficient state — the low ferritin and low MCV described here point to genuine iron deficiency, not dilutional pseudoanemia. Vitamin B12 deficiency characteristically causes a macrocytic (elevated MCV) anemia, not the microcytic (low MCV) pattern described in this case, so it does not fit the lab findings given.

175. C. Anticoagulation meaningfully increases the risk that a relatively minor traumatic impact (a common occurrence in contact sport) could cause a clinically significant bleed, including concerning sites like intracranial or intra-abdominal hemorrhage, so counseling should involve an individualized discussion balancing the athlete's specific thromboembolic risk (why they need anticoagulation and the danger of stopping it), sport-specific contact/collision risk, and shared decision-making, ideally coordinated with the physician managing the anticoagulation. Stating DOACs have no effect on bleeding risk from trauma is inaccurate and could lead to dangerously inadequate counseling — anticoagulation is specifically why bleeding risk from contact injury is elevated in the first place. A blanket, non-individualized permanent exclusion from all contact sport ignores that risk varies by anticoagulation indication, sport-specific contact intensity, and athlete-specific factors, and does not reflect the individualized, shared decision-making approach that is standard for this scenario. Self-directed intermittent stopping and starting of a DOAC around sport participation, without coordination with the prescribing physician, is potentially dangerous — it can leave the athlete under-anticoagulated (risking clot) during off periods and does not represent appropriate management; any change to anticoagulation timing needs to be a physician-guided decision based on the specific indication and drug.

176. C. Viral illnesses, including COVID-19, have a recognized association with myocarditis, and exercising with active myocardial inflammation raises the risk of exertion-related arrhythmia and sudden cardiac events, which is why post-viral return-to-play guidance has emphasized screening for cardiac symptoms (chest pain, palpitations, unexplained dyspnea, syncope) and considering further cardiac evaluation before resuming vigorous training, generally with a graduated return rather than an immediate jump back to full intensity. Symptom resolution alone does not reliably exclude subclinical myocardial involvement, so stating that no specific screening beyond symptom resolution is ever needed overlooks the specific cardiac risk that post-viral return-to-play protocols are designed to address. The concern for post-viral myocarditis and exertional cardiac risk is not unique to influenza; it has been described with a range of viral illnesses including COVID-19, so restricting concern to influenza alone is inaccurate. A chest x-ray is not an adequate or appropriate tool to exclude myocarditis; evaluation typically involves history/symptom screening and, when indicated, more specific cardiac testing (such as ECG, troponin, or echocardiography/cardiac MRI), not a plain chest radiograph.

177. D. Small, umbilicated (centrally dimpled), flesh-colored papules spreading among teammates in a close-contact sport is characteristic of molluscum contagiosum, a poxvirus infection spread by direct skin-to-skin contact; management for contact-sport participation generally involves covering accessible lesions and, per many governing-body guidelines, treating or resolving lesions in areas that cannot be reliably covered before returning to unrestricted close contact, to reduce transmission to teammates and

opponents. Verruca vulgaris (common warts) present as rough, hyperkeratotic papules, not the smooth, centrally-umbilicated lesions described, and while warts can sometimes require covering for mats/contact sport, this presentation does not match verruca morphology. Chickenpox (varicella) classically presents as crops of pruritic vesicles on an erythematous base progressing to crusting, not umbilicated flesh-colored papules, and this presentation does not match a varicella outbreak pattern. Folliculitis is inflammation/infection of hair follicles typically presenting as small pustules at hair follicle sites, which is a different morphology than umbilicated papules, and unlike this description, common folliculitis (especially bacterial) can actually have contagious potential in shared-equipment settings, making the blanket claim of no contagion and no precautions inaccurate for that condition as well.

178. B. Traveler's diarrhea, commonly caused by bacterial pathogens such as enterotoxigenic *E. coli* (though also potentially viral or parasitic), is the leading consideration in a previously healthy traveler with watery diarrhea, cramping, and fever after consuming higher-risk food/water sources abroad; initial management emphasizes oral rehydration, with antibiotics considered for moderate-to-severe presentations or specific clinical scenarios rather than used universally for every case. Inflammatory bowel disease is a chronic condition and would not typically present for the first time as an acute illness so tightly and plausibly explained by a specific travel/food exposure; it is not the expected leading diagnosis in this classic traveler's diarrhea scenario. While many cases of travelers' diarrhea are indeed viral or self-limited and don't require antibiotics, stating that antibiotics are never appropriate regardless of severity is incorrect — antibiotics do have an established, evidence-based role for more severe or specific traveler's diarrhea presentations, so ruling them out categorically is inaccurate. Appendicitis classically presents with periumbilical pain migrating to the right lower quadrant, anorexia, and possible low-grade fever, not watery diarrhea as its defining feature, so this diagnosis does not fit the presentation described.

179. B. A slowly expanding annular rash with central clearing (erythema migrans) appearing days after a wooded-area exposure, along with systemic symptoms like fatigue and low-grade fever, is the classic presentation of early localized Lyme disease, and current guidance supports treating based on this characteristic clinical picture without waiting for serologic testing, since early Lyme serology is frequently falsely negative (antibody response has not yet developed) and delaying treatment risks progression to disseminated disease. Serologic testing early in the illness has poor sensitivity, and withholding treatment pending results in a classic erythema migrans presentation is not appropriate — clinical diagnosis and prompt treatment are specifically recommended in this scenario precisely because of that early-test limitation. This rash pattern combined with systemic symptoms and a relevant exposure history is not a benign, self-limited post-exposure reaction; it requires antibiotic treatment to prevent progression to more serious disseminated Lyme manifestations (such as cardiac or neurologic involvement). While annular lesions with central clearing can sometimes be confused with tinea corporis, the systemic symptoms (fatigue, fever), the relevant tick-exposure history, and the specific expanding pattern described point to erythema migrans rather than a fungal process, so an antifungal would not be the appropriate presumptive treatment here.

180. D. Recurrent unilateral, throbbing headache with associated nausea and photophobia, occurring both during exertion and independent of it, with a normal interictal neurologic exam, is a classic presentation of migraine headache, a primary headache disorder that is common in this age group and can be exacerbated by (but is not exclusively tied to) physical exertion. Primary exertional headache is specifically triggered by and confined to physical exertion; because this athlete's headaches also occur unrelated to exercise, the presentation does not fit a purely exertional headache pattern, ruling that option out as the primary diagnosis. Cluster headache classically causes severe, strictly unilateral periorbital pain with rapid onset, often with associated autonomic features (tearing, nasal congestion, ptosis) on the same side, and is typically described as excruciating and short-lived per attack, not the bilateral, gradual-onset picture stated in that option (which is also an inaccurate description of cluster headache). A single history consistent with migraine does not, by itself, confirm idiopathic intracranial hypertension, which is a distinct diagnosis generally requiring additional supportive findings (such as papilledema on exam or elevated opening pressure on lumbar puncture) before it can be diagnosed.

181. D. Numbness/tingling in the median nerve distribution (thumb, index, middle finger, and part of the ring finger), weakness of thumb opposition (median-innervated thenar muscles), symptoms worsened by wrist flexion, and a positive Tinel's sign over the volar wrist together form the classic presentation of carpal tunnel syndrome from median nerve compression at the wrist. Cubital tunnel syndrome involves the ulnar nerve, which supplies sensation to the little finger and ulnar half of the ring finger (not the thumb, index, and middle fingers), and causes weakness of ulnar-innervated intrinsic hand muscles, not thumb opposition — this distribution mismatch rules it out. Radial tunnel syndrome primarily causes lateral forearm pain and, when motor involvement occurs, affects wrist/finger extension (via the posterior interosseous nerve) rather than the sensory pattern and thumb opposition weakness described, which are median nerve findings, not radial nerve findings. Thoracic outlet syndrome can cause upper extremity numbness and weakness from compression of the brachial plexus/subclavian vessels near the neck and shoulder, but it is not confirmed by a positive Tinel's sign at the wrist — that specific provocative test localizes to the carpal tunnel, not to a thoracic outlet problem.

182. C. A markedly elevated core temperature (105°F) accompanying a generalized seizure and altered mental status in the setting of intense outdoor exertion and heat points to exertional heat stroke, in which severe hyperthermia directly causes central nervous system dysfunction, including seizures, and constitutes a medical emergency requiring immediate aggressive cooling (such as cold-water immersion) alongside standard seizure management. While new-onset epilepsy is a general possibility for a first seizure at any age, the striking, temporally-linked severe hyperthermia in this specific exertional heat context makes heat stroke the most likely and most urgently important explanation to identify and treat, rather than defaulting to an unrelated primary epilepsy diagnosis. Febrile seizures are a specific pediatric entity essentially confined to young children (roughly 6 months to 5 years) in the setting of fever from infection, not a mechanism expected in a 16-year-old with exertional hyperthermia — this option misapplies a young-child-specific diagnosis to an adolescent exertional heat scenario. Psychogenic non-epileptic seizures are not caused by or confirmed by an elevated core temperature; the striking degree of hyperthermia here specifically points toward a physiologic heat-illness-driven seizure,

not a psychogenic event, making this an inappropriate and potentially dangerous diagnosis to default to in an emergency heat scenario.

183. B. Common stimulant medications used to treat ADHD (such as certain amphetamine- and methylphenidate-based drugs) appear on prohibited substance lists because of their performance-enhancing potential, so an athlete with a legitimate diagnosis needs to proactively apply for and obtain a Therapeutic Use Exemption through the relevant anti-doping authority before using the medication in competition — simply having a prescription does not, by itself, satisfy anti-doping requirements. Having a valid prescription is necessary but not sufficient; anti-doping rules specifically require the separate TUE approval process for medications on the prohibited list, so assuming prescription status alone provides automatic exemption is incorrect and could result in a doping violation. Stimulant ADHD medications can, in fact, be approved through the TUE process when there is appropriate medical documentation of the diagnosis and treatment need — stating they are never permitted under any circumstances, even with an approved TUE, is inaccurate. TUEs are not restricted to non-stimulant medications; stimulant medications for legitimate diagnosed conditions (including ADHD) are a recognized and common category of TUE application, contrary to the claim that stimulants categorically cannot go through this process.

184. A. Beta-blockers are specifically prohibited in-competition in a defined list of precision and steadiness-dependent sports (such as shooting, archery, and some others) precisely because their tremor-reducing and heart-rate-lowering effects can confer a real competitive advantage in those disciplines, meaning an athlete who needs one for a legitimate medical reason in one of those sports must apply for a TUE. Beta-blocker restriction is sport-specific, not a blanket prohibition across all sports and all times — many sports have no beta-blocker restriction at all, and the prohibition that does exist is generally an in-competition (not permanent, all-context) restriction for the specific listed sports, so describing it as universally banned everywhere at all times is inaccurate. Because beta-blockers are specifically restricted in certain precision sports due to their performance-relevant tremor/heart-rate effects, stating they are unrestricted in every sport, including those precision sports, is incorrect. The restriction is essentially the reverse of what's stated in that option — beta-blockers are notably restricted in precision/steadiness sports like shooting (not endurance sports), so claiming shooting is unrestricted while framing endurance sports as needing a TUE misstates which category is actually regulated.

185. C. Caffeine was removed from the WADA Prohibited List and is instead part of WADA's Monitoring Program, meaning its use is tracked to watch for patterns of misuse but ordinary use is not a doping violation and does not require a TUE; the physician should still counsel about safety concerns (such as GI upset, arrhythmia risk, or anxiety) at very high doses, which is a health issue distinct from anti-doping rules. Describing caffeine as a fully prohibited stimulant requiring a TUE misstates current policy — caffeine's earlier urinary threshold ban was removed years ago, and it has not returned to prohibited status. There is no currently enforced urinary concentration threshold for caffeine as a doping violation; the older threshold-based caffeine rule was discontinued, and caffeine now sits on the monitoring list rather than being an enforced quantitative violation. While caffeine use is indeed

permitted, it has not been removed from all WADA oversight — it remains on the Monitoring Program specifically so patterns of use can be tracked, so stating there is no oversight at all is inaccurate.

186. B. During dehydration, the kidney depends on prostaglandin-mediated afferent arteriolar vasodilation to help maintain adequate glomerular perfusion; NSAIDs block the cyclooxygenase enzymes that produce these protective prostaglandins, removing this compensatory mechanism and significantly raising the risk of acute kidney injury specifically when combined with volume depletion from heat and sweat losses — this is why regular NSAID use is discouraged during events with substantial dehydration risk. NSAIDs do have clinically relevant, well-documented renal effects, particularly in dehydrated patients; claiming no relevant effect regardless of hydration status ignores this established and clinically important risk. Hepatotoxicity is not the primary or most relevant safety issue in this specific dehydration-heavy scenario; the renal risk from impaired compensatory prostaglandin-mediated perfusion is the key mechanism-specific concern in this context, making a hepatotoxicity-only framing inaccurate for this question. NSAIDs do the opposite of promoting protective vasodilation — they block prostaglandin synthesis and therefore reduce, not enhance, the compensatory vasodilation the kidney needs during volume depletion, so describing them as protective is physiologically backwards.

187. D. Unsupervised anabolic-androgenic steroid use carries well-documented serious risks including adverse cardiovascular effects (unfavorable lipid profile changes, left ventricular hypertrophy, and cardiomyopathy), hepatotoxicity particularly with certain oral (17-alpha-alkylated) formulations, and suppression of the hypothalamic-pituitary-gonadal axis causing testicular atrophy, reduced endogenous testosterone production, and infertility — this is the core health-risk counseling, separate from and in addition to the anti-doping/sanctions risk. Framing the risks as limited to temporary acne substantially understates well-established serious cardiovascular, hepatic, and reproductive harms, and reducing the counseling focus to doping-detection risk alone omits the actual health consequences that matter most for informed decision-making. Mood effects (including irritability or aggression, sometimes called 'roid rage,' as well as depression during withdrawal) are a recognized effect, but describing this as the only clinically significant risk, with no lasting physical consequences, ignores the substantial cardiovascular, hepatic, and endocrine harms that are well documented. There is no safe threshold or short-cycle exception that eliminates cardiovascular and reproductive risk; even relatively short courses of unsupervised use have been associated with these adverse effects, so claiming short cycles are risk-free is not supported.

188. D. The standard diagnostic approach for exercise-induced bronchoconstriction is spirometry performed before and after a standardized exercise (or surrogate hyperventilation) challenge, looking for a significant post-exercise drop in FEV1 (commonly a 10% or greater fall, depending on the criteria used), since the defining physiology is transient airway narrowing specifically provoked by exertion. Resting spirometry alone, without an exercise challenge, frequently appears normal in exercise-induced bronchoconstriction precisely because the airway narrowing is provoked by exertion and may not be present at baseline — resting-only testing does not reliably reproduce or capture the diagnostic finding. A resting ECG evaluates cardiac electrical activity and has no role in diagnosing airway bronchoconstriction; it would be relevant for a cardiac dyspnea workup, but it is not the diagnostic test

for the pulmonary process in question. Chest CT is a structural imaging study and is not designed to capture the dynamic, exertion-provoked, transient airway narrowing that defines exercise-induced bronchoconstriction; it is not the appropriate or standard test for this functional diagnosis.

189. C. A well-recognized limitation of ECG-based preparticipation screening is that athletic training itself produces a range of ECG changes (such as sinus bradycardia, certain repolarization patterns, and voltage criteria for chamber enlargement) that overlap with, but are distinguishable from, pathologic findings using athlete-specific interpretation criteria; without that specialized interpretation, screening programs risk a substantial false-positive rate, generating unnecessary downstream testing, cost, and athlete anxiety, which is an important practical and resource consideration to discuss before implementation. The entire premise behind developing athlete-specific ECG interpretation criteria is that trained clinicians CAN distinguish normal training adaptations from pathologic changes in most cases, so stating the two are indistinguishable overstates the limitation and ignores the existence and value of athlete-specific criteria. ECG screening, despite its limitations, can identify certain conditions associated with sudden cardiac death risk (such as some cardiomyopathies, channelopathies, and conduction abnormalities), so describing it as completely unable to detect any relevant abnormality is inaccurate and understates its actual screening value. ECG is intended to supplement, not replace, a thorough history and physical exam in preparticipation cardiovascular screening — most sudden cardiac death risk factors are still assessed through combined history, exam, and (where used) ECG, not ECG in isolation.

190. D. The appropriate initial approach when disordered eating is suspected is a private, nonjudgmental, direct conversation that expresses specific observed concerns (not accusations), followed by referral to and coordination with a multidisciplinary team — physician, mental health professional, and sports dietitian — since disordered eating is a complex condition requiring specialized, coordinated care rather than a single clinician acting alone. Immediate disqualification without any direct conversation or evaluation is an overly punitive, non-therapeutic response that bypasses appropriate clinical assessment and could actively harm the athlete by cutting off support and trust rather than connecting her with help. Denial or minimization is a common and expected feature of disordered eating, not a reliable indicator that no problem exists; taking no action based solely on self-report when objective signs (weight loss, stress fractures, rigid eating patterns) are present would miss a potentially serious and worsening condition. Prescribing a specific caloric target without proper evaluation is not appropriate management for suspected disordered eating — this requires specialized nutritional and psychological assessment and treatment, not a simple caloric prescription from the team physician alone.

191. C. Persistent low mood, anhedonia (loss of interest), sleep disturbance, and concentration difficulty lasting weeks are core features of major depressive disorder, and athletes are not immune to this common condition; appropriate management includes screening with a validated tool and referral for mental health evaluation and treatment, since depression in athletes is a legitimate, common, and treatable medical condition that should be identified and addressed like any other significant health concern. Normalizing 6 weeks of persistent low mood and loss of interest as an expected, universal part of competitive sport risks missing a treatable mental health condition and delays appropriate care — this symptom duration and pattern exceeds what should be dismissed as ordinary competitive stress. While

exercise can have some mood benefits, simply recommending increased training intensity is not an appropriate or sufficient treatment for a presentation concerning for major depressive disorder and does not substitute for proper screening and mental health referral. Overtraining syndrome can cause mood and performance changes, but automatically attributing this presentation to overtraining without screening for a primary mood disorder risks missing depression that requires its own specific evaluation and treatment, rather than being subsumed under an overtraining diagnosis by default.

192. A. Stimulant medications can worsen anxiety symptoms in some patients and carry cardiovascular considerations (heart rate, blood pressure) that warrant attention, so appropriate management involves an individualized approach — considering his specific anxiety history, choosing an appropriate agent/dose, and monitoring for symptom changes — in coordination with his treating clinician, rather than either ignoring the anxiety history or reflexively avoiding all stimulants. A co-occurring anxiety disorder is not universally an absolute contraindication to all stimulant use; many patients with both conditions are successfully treated with careful, individualized management, so framing it as an absolute across-the-board contraindication overstates the actual clinical guidance. Stimulants do have a recognized potential interaction with anxiety symptoms (and cardiovascular parameters), so claiming no interaction and no need for monitoring ignores a real and clinically relevant consideration in this specific patient. While anti-doping status is a legitimate and separate consideration for a competitive athlete (as addressed elsewhere with TUEs), it is not the only relevant consideration here — his psychiatric history and treatment coordination are directly clinically important and cannot be dismissed in favor of doping status alone.

193. B. Signs of opioid use beyond the expected clinical course, escalating use, and irritability when access is delayed are red flags for opioid use disorder, and the appropriate response is a direct, compassionate clinical assessment followed by connection to appropriate substance use treatment resources — addressing the underlying problem rather than simply continuing to supply the medication, which would perpetuate rather than address a developing use disorder. Continuing to refill the prescription indefinitely, despite signs suggestive of misuse, would perpetuate a potentially dangerous pattern rather than address it, and does not reflect appropriate management once concerning signs have emerged, even if the original prescription was clinically justified. Third-party observations from teammates, when they describe concerning behavioral patterns like escalating use and irritability related to access, are a legitimate and often important basis for initiating an evaluation — dismissing this information and waiting only for self-report risks missing a serious, potentially dangerous problem. Abrupt discontinuation of an opioid without medical guidance or an appropriate taper can precipitate significant withdrawal symptoms and is not the recommended approach; opioid discontinuation in the setting of a suspected use disorder should be managed carefully and typically in coordination with addiction treatment resources, not by abrupt unilateral cessation.

194. C. The pattern described — cough, chest tightness, and wheeze provoked specifically by exertion (especially in cold, dry air, a classic trigger), developing within minutes of starting to run, resolving within roughly an hour, with normal baseline spirometry between episodes — is the classic presentation of exercise-induced bronchoconstriction, in which airway cooling and drying during exertion triggers

transient bronchospasm in susceptible individuals; diagnosis is typically confirmed with an exercise or surrogate hyperventilation challenge showing a significant FEV1 drop. Chronic obstructive pulmonary disease causes fixed, generally irreversible airflow obstruction that would be expected to show abnormalities on baseline spirometry (not normal between episodes) and is also not a plausible diagnosis in a young endurance runner without a significant smoking or occupational exposure history implied by this scenario. Vocal cord dysfunction classically causes symptoms (often described as inspiratory stridor or throat tightness) that occur during exertion itself and can be triggered by exercise, but it is not defined as occurring exclusively after exercise ends — that description misrepresents the typical timing of vocal cord dysfunction, and it also does not match this athlete's pattern of resolving over about an hour after stopping, more typical of bronchoconstriction. This symptom pattern (cough, wheeze, chest tightness with a clear temporal trigger and resolution pattern) is a recognizable pathologic entity, not normal physiologic breathlessness, and warrants further evaluation and, if confirmed, treatment rather than being dismissed based on a normal baseline (non-exercise) spirometry.

195. B. Progressive dyspnea (including dyspnea at rest), dry cough progressing to pink frothy sputum, and decreased exercise tolerance developing after ascent to high altitude is the classic presentation of high-altitude pulmonary edema (HAPE), a potentially fatal noncardiogenic pulmonary edema triggered by altitude-related pulmonary hypertension; the single most important treatment is immediate descent to lower altitude, with supplemental oxygen (and medications like nifedipine, when available and appropriate) as important adjuncts, but descent should not be delayed while awaiting other interventions. Dehydration can occur at altitude and contribute to symptoms, but it does not explain pink frothy sputum or dyspnea at rest, and treating this presentation with oral fluids alone while remaining at altitude would be dangerously inadequate for actual HAPE. Cold-air-triggered bronchoconstriction can cause cough and dyspnea with exertion, but it would not typically cause dyspnea at rest or pink frothy sputum (a specific sign of pulmonary edema, not bronchospasm), and treating presumed HAPE with only a bronchodilator while remaining at altitude would fail to address the actual life-threatening process. While altitude exposure does not directly cause infectious pneumonia, this presentation's specific and classic altitude-associated symptom pattern (progressive dyspnea, pink frothy sputum, onset after ascent) points specifically to HAPE, and treating it as an unrelated pneumonia would miss the actual diagnosis and delay the critical intervention of descent.

196. D. Absent breath sounds on one side, tracheal deviation away from the affected side, distended neck veins, and progressive respiratory distress after chest trauma is the classic presentation of tension pneumothorax, a rapidly life-threatening emergency in which accumulating pleural air compresses the lung and shifts mediastinal structures, impairing venous return; this requires immediate recognition and emergency decompression (or expedited transport to definitive care capable of decompression) without delay. Absent breath sounds with these accompanying signs after significant chest trauma is never a benign, observation-only finding — this combination represents a true emergency requiring immediate action, not sideline reassurance. Waiting for chest x-ray confirmation before any intervention is dangerous in tension pneumothorax, where clinical deterioration can be rapid; this is a clinical diagnosis in an emergency setting that should prompt immediate action rather than imaging-first delay, especially

given the specific combination of exam findings described. A fully occlusive dressing (sealing air in) is actually the wrong approach for a tension physiology — this would trap more air with no escape route and can worsen a tension pneumothorax; the correct chest wall dressing concept for an open/sucking chest wound is typically a vented or three-sided dressing, and definitive management of tension physiology requires decompression, not simply sealing the chest wall.

197. C. An increasing frequency of rescue (short-acting bronchodilator) inhaler use is a recognized marker of poor asthma control, and current asthma management guidelines specifically flag frequent rescue inhaler use as a trigger to reassess and typically step up controller (maintenance, often inhaled corticosteroid-based) therapy, rather than simply continuing to treat symptoms reactively with the rescue inhaler alone. While some athletes with exercise-induced symptoms do use a rescue inhaler prophylactically before exercise, escalating to near-daily use over a short period signals worsening control that should prompt reassessment, not be accepted as an expected, unremarkable baseline pattern requiring no action. The rescue inhaler being used more frequently does not mean it has become ineffective and should be stopped outright; rather it signals the underlying asthma is inadequately controlled and needs additional (controller) therapy, not discontinuation of the reliever medication he still needs during this period. In an athlete with a known asthma diagnosis, a clear escalating pattern of rescue inhaler need is not simply normal exertional breathlessness — it is a specific, recognized asthma-control warning sign that should prompt clinical reassessment rather than being dismissed as expected in any young athlete.

198. A. The combination of prolonged morning stiffness (over an hour) that improves rather than worsens with activity, alternating buttock pain (suggesting sacroiliac joint involvement), and an associated extra-articular manifestation like uveitis is the classic 'inflammatory back pain' pattern strongly suggestive of a spondyloarthropathy such as ankylosing spondylitis, which is a systemic inflammatory condition rather than a purely mechanical musculoskeletal problem, and warrants rheumatologic evaluation. Mechanical low back pain characteristically worsens with activity and improves with rest, and does not typically cause prolonged morning stiffness over an hour or associate with uveitis — this presentation is the inverse of the classic inflammatory pattern described, making mechanical back pain an inconsistent fit. Fibromyalgia is a chronic widespread pain syndrome and is not confirmed or suggested by this specific combination of inflammatory back pain features and uveitis; those findings point toward a spondyloarthropathy, not fibromyalgia, which has its own distinct diagnostic criteria unrelated to ocular inflammation. Osteoarthritis typically causes stiffness that is brief (generally under 30 minutes) and worsens with activity rather than improving with it; prolonged morning stiffness over an hour that improves with activity is a hallmark of inflammatory, not degenerative/osteoarthritic, back pain.

199. B. Sudden, severe, overnight-onset monoarticular pain, redness, and swelling of the first metatarsophalangeal joint, especially with a history of prior similar self-limited episodes, is the classic presentation of acute gout (podagra), caused by monosodium urate crystal deposition triggering an intense inflammatory response in the joint; diagnosis can be supported by joint aspiration showing negatively birefringent crystals when confirmation is needed. Septic arthritis is an important diagnosis to

always consider and rule out with a red, hot, swollen joint, but it is not automatically the presumed diagnosis over gout in this classic presentation — the recurrent, self-limited nature of prior episodes and the classic first-MTP location favor gout, though clinical judgment (and aspiration when uncertain) is still used to exclude infection rather than assuming infection by default. Turf toe is specifically a traumatic hyperextension sprain injury of the first MTP joint's plantar plate/capsule that occurs during athletic activity (such as pushing off in a fixed shoe), so describing it as occurring without any preceding trauma or activity directly contradicts its defining mechanism and does not fit this atraumatic, overnight-onset presentation. Osteoarthritis is a chronic, gradually progressive degenerative process, not an entity that classically presents with sudden, severe, overnight-onset inflammatory symptoms — this acute, dramatic onset pattern is inconsistent with typical osteoarthritis flares.

200. A. TNF-inhibitor biologics work by suppressing part of the immune system's inflammatory signaling, which is effective for controlling spondyloarthropathy but also increases susceptibility to certain infections; appropriate counseling includes advising her to seek prompt medical evaluation for fever or infection symptoms rather than pushing through training, along with maintaining any relevant infection-prevention or screening measures tied to her specific therapy (such as monitoring for reactivation of latent infections). Immunosuppressive biologic therapy does carry a well-established, clinically relevant increase in certain infection risks, so stating there is no effect and no need for special counseling ignores an important and standard part of managing a patient on this class of medication. Well-controlled disease on an effective biologic does not require blanket discontinuation before sport participation; many athletes successfully compete while on appropriately monitored biologic therapy, and unilaterally recommending discontinuation could allow her underlying disease to flare, which is not appropriate default guidance. While anti-doping status can be a separate relevant consideration for some medications, TNF-inhibitors' infection risk is a genuine and clinically important counseling point in its own right and should not be dismissed as irrelevant in favor of doping status alone.