

## Sports Emergencies: Review Questions

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### QUESTIONS

Choose the single best answer for each question.

- 1. A 19-year-old male basketball player collapses suddenly while jogging down the court during a preseason training session. The team's trainer finds him unresponsive, without pulse or respiration. All attempts at resuscitation are unsuccessful. The coach, who witnessed the incident, said his player "seemed just fine" until he collapsed and had not complained of headaches or other maladies. The player's past medical history is unremarkable. What is this patient's most likely cause of death?**

  - Aortic dissection
  - Commotio cordis
  - Diabetic hypoglycemia
  - Heat stroke
  - Hypertrophic cardiomyopathy (HCM)
- 2. A 31-year-old male football defensive back fails to return to his feet and lies motionless on his back following a play in which he employed a "spear tackle" (ie, an illegal maneuver in which the tackler drives his head into the opponent's body). The team trainer rushes onto the field, and finds the patient unconscious. A pulse is present, but he does not appear to be breathing. What is the next step in the on-field management of this patient?**

  - Remove the mouthpiece (if present) and helmet immediately to reestablish airway and breathing as quickly as possible.
  - Carefully remove the helmet to allow for proper immobilization with a spine board and cervical collar and then begin rescue breathing.
  - Immobilize the player with spine board and cervical collar, gently remove the helmet, and begin cardiopulmonary resuscitation.
  - Remove the mouthpiece (if present) and face mask only, leaving the helmet in place. Reassess airway and breathing and begin rescue breathing, if necessary.
  - Leave the patient in the position in which he lies—any body movement may exacerbate a possible spinal cord injury.
- 3. An 18-year-old man participated in a regional amateur boxing tournament. In his first bout, he sustained several blows to the head and received a standing 8 count from the referee. After the bout, the young man complained of a persistent headache and dizziness; however, he participated in his next bout 2 days later. In the first round, he received a light jab to the head. On the way back to his corner after the first round, he suddenly collapsed and became semicomatose with respiratory failure and fixed, dilated pupils. He died before medical attention could be obtained. What would this patient's head computed tomography (CT) scan likely reveal?**

  - Bilateral frontal lobe atrophy
  - Moderate edema localized to the area of injury
  - Significant cervical spinal canal stenosis
  - Skull fracture and massive epidural hematoma
  - Widespread edema and uncal herniation
- 4. A 23-year-old hockey player is checked and strikes her helmeted head sharply on the boards, hyperextending her neck. She recalls that initially she could not move and had no sensation below the neck. After approximately 5 minutes, sensation and motor function returned, beginning in the fingers and toes and eventually to the extent that she was able to skate off of the ice without assistance. A neurologic examination revealed slightly reduced strength throughout, 1+ upper extremity reflexes, 2+ lower extremity reflexes, and slight sensory**

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deficits for pinprick, vibration, and position sense. Radiographs, CT scans, and magnetic resonance images were obtained, revealing cervical spinal canal stenosis, edema of the spinal cord, and surprisingly, congenital atlanto-occipital fusion. Based on these findings, what is the best recommendation for this patient's return to play?

- (A) Immediate but conditional return to competition
- (B) Individualized counseling for risk assessment leading to eventual return
- (C) Permanent discontinuation of participation in contact sports
- (D) Return following complete cessation of all neurologic symptoms
- (E) Temporary discontinuation and a thorough rehabilitation regimen

#### ANSWERS AND EXPLANATIONS

1. **(E) HCM.** This condition is the most common cause of sudden death in young athletes and is usually clinically silent until the event. HCM is characterized by hypertrophy of the left ventricle and ventricular septum without concomitant chamber enlargement. Sudden death most often occurs during or directly after exertion.<sup>1</sup> While diabetic hypoglycemia and heat stroke are both common during exertion, the lack of neurologic signs prior to collapse and rapid onset make HCM more likely. Commotio cordis is caused specifically by a direct, powerful blow to the chest resulting in cardiac arrest. The absence of any sharp or stabbing pain prior to the event makes the diagnosis of aortic dissection improbable.<sup>2</sup>
2. **(D) Remove the mouthpiece (if present) and face mask only, leaving the helmet in place. Reassess airway and breathing and begin rescue breathing, if necessary.** Mismanagement of a player with an unstable spinal cord injury can result in permanent neurologic deficits. Any athlete who is rendered unconscious or sustains an injury to the neck should be treated as though they have significant spinal cord injury until proven otherwise. An injured player's helmet should always be left in place until he has been properly immobilized. Helmet removal is not usually necessary for rescue breathing. If the player is unconscious, roll him into the supine position (stabilize all segments of the spine), and remove the mouthpiece. If no breathing is detected, only the face mask of the helmet must be removed to facilitate rescue breathing.<sup>3</sup>
3. **(E) Widespread edema with uncal herniation.** The case patient is a victim of second-impact syndrome

(SIS), which occurs when a patient receives a head injury, usually a concussion or cerebral contusion, and then receives a second head injury before the symptoms of the first injury have subsided. Usually an athlete suffering from SIS will collapse suddenly within seconds to minutes of impact. Preliminary signs include fixed, dilated pupils and evidence of respiratory failure. SIS is believed to result from a loss of autoregulation of the brain's blood supply following the first concussion. The second impact therefore causes severe vascular engorgement within the cranium and an increase in intracranial pressure. A thorough head CT scan would reveal massive widespread edema and uncal herniation of the temporal lobe(s) through the foramen magnum. Brainstem compromise results from compression by this uncal hernia, causing respiratory failure, ocular involvement, and coma.<sup>4</sup>

4. **(C) Permanent discontinuation of participation in contact sports.** This athlete experienced transient quadriplegia, an injury that usually occurs with hyperextension or hyperflexion of the cervical spine. The hyperextension causes narrowing of the spinal canal and compression of the spinal cord. Each case of transient quadriplegia must be carefully evaluated to determine the patient's relative risk regarding athletic participation. While the case patient's neurologic symptoms were mild, her radiologic findings revealed 3 absolute contraindications for return to play: spinal canal stenosis, spinal cord edema, and atlanto-occipital fusion. These 3 conditions increase the risk of permanent neurologic deficit and make damage to the spinal cord more likely. One of these findings alone merits immediate termination of contact sport participation; all 3 abnormalities together make this recommendation a necessity.<sup>5</sup>

#### REFERENCES

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