

You Are the Rescuer

Scenario I

On a weekday during the crowded Christmas holidays, a mountain host summons you to the scene of what he describes as a particularly serious accident. In his radio transmission the host warns, "This is really a bad one; you'd better have your gloves ready."

As you begin to ski down from the top, you observe that the crowd at the accident scene must number more than 100. Upon arrival, you immediately note an alarming amount of blood on the snow. You see a male skier, covered with blood, who is sitting up and facing downhill. He's leaning back against another man who is applying pressure with an open palm to a laceration on the left side of the patient's neck. The involved bystander says, "I found this man much like he is now, sitting in the snow and covered with blood."

Another witness standing nearby yells, "Someone skied across that guy's neck after he fell." When you kneel down to speak to the injured skier, you notice air bubbling from the neck wound as he tries to answer, but he is only able to get out a few words at a time. On inspection, you find a 4-centimeter transverse laceration extending from the midline to the left anterior aspect of the man's neck. Bleeding from the laceration is partially controlled by the bystander's palm pressure and is not pulsating. The patient is diaphoretic, and his skin is cold and pale. His heart rate is weak and thready at 136 beats per minute, and his respirations are labored at 30 per minute. You note gurgling sounds and possible aspiration of blood on inspiration. He seems alert but very frightened. The patient denies hitting his head or losing consciousness, and says he has no other injuries. Your rapid body survey confirms this. Specifically, there is no cervical tenderness. A SAMPLE survey is not obtainable.

Questions

1. What probable injuries are portrayed in this scenario?
2. List eight signs and symptoms of compensated shock.
3. Describe, in the order of priority, the emergency care you would provide for this patient. (Discussion points: emergency care, personnel, equipment, transport).

Points to Ponder

Penetrating neck injuries can cause profuse bleeding from laceration of the great vessels in the neck; either the carotid artery or jugular vein. The airway, the esophagus, and even the spinal cord can also be damaged by a penetrating

injury. Air embolism is the phenomenon by which air is either sucked into the body's venous system through an injured vessel or enters the venous system subsequent to an altered pressure gradient at the tissue level (e.g., when a person experiences "the bends" in a diving accident). In this scenario involving the internal jugular vein, ambient air could be sucked into the heart because it adjoins the lacerated vessel. A large amount of air introduced rapidly into the right atrium and right ventricle would lead to a cardiac arrest. You can control vessel hemorrhage and prevent air embolism in this man by 1) applying gentle continuous fingertip pressure over an occlusive dressing and gauze pads to close the vessel laceration and reduce blood loss from the site; and 2) keeping the patient's body flat or lowering the head a little to force the injured vessel to remain as full of blood as possible (*OEC* fourth edition, pages 510 and 545).

Laceration of the trachea is a very serious traumatic event that frequently causes acute and/or delayed life-threatening consequences. Blood from the injured tissue adjacent to the laceration is frequently drawn into and expelled out of the trachea with respiration or coughing, and in so doing produces audible hissing and sucking and visible bubbling, air frothing, and/or bloody sputum. Blood in the trachea also creates an uncomfortable physical irritation. These conditions all contribute to acute dyspnea (shortness of breath). If the bleeding is significant enough to cause aspiration into the bronchioles, serious inflammation of the lung tissue often results. The goal for the emergency field treatment of a tracheal laceration is to seal the traumatic gap in the trachea by applying an occlusive dressing over the injury site (*OEC* fourth edition, page 545).

Uncontrolled hemorrhage of a large vessel, whether vein or artery, quickly leads to hypovolemic shock (one of the three forms of cardiovascular shock). The rapidity with which this potentially devastating complication develops is usually related to the diameter of the vessel in question, the volume of blood it carries, and/or the anatomic area it drains. Hypovolemic shock is also produced by severe dehydration, a consequence of either critical fluid restriction or marked fluid loss.

Since the brain is very vascular and is almost completely drained by the internal jugular vein, the onset of hypovolemic shock would be rapid following a laceration of this vessel. The emergency care in this scenario, and in all cases of hypovolemic shock caused by blood loss, obviously centers on controlling hemorrhage from the bleeding site. With external bleeding, this is accomplished by gentle but firm continuous direct pressure to the segment in question. Other forms of cardiovascular shock include cardiogenic shock (pump failure) and neurogenic shock (vessel dilation). Septic shock and psychogenic shock (fainting) are sub-classes of the latter. Two non-cardiovascular causes of shock are respiratory insufficiency and anaphylaxis (*OEC* fourth edition, pages 268, 269, and 275).

Vital Vocabulary

air embolism The presence of air in the veins, which can lead to cardiac arrest if it enters the heart.

cardiogenic shock Shock caused by inadequate function of the heart or pump failure.

compensated shock The early stage of shock, in which the body can still compensate for blood loss.

decompensated shock The late stage of shock, when the blood pressure is falling.

hypovolemic shock Shock caused by fluid or blood loss.

irreversible shock The final stage of shock, resulting in death.

neurogenic shock Circulatory failure caused by paralysis of the nerves that control the size of the blood vessels, leading to widespread vessel dilation; seen in spinal cord injuries.

occlusive dressing Dressing made of Vaseline® gauze, aluminum foil, or plastic that prevents air and liquids from entering or exiting a wound.

Check It Out

Bleeding Control/Shock Management Skill Guide, Appendix B, *OEC* fourth edition

All Use of Oxygen and Airway Adjuncts Skill Guides, Appendix B, *OEC* fourth edition

Online Outlook

Interested in testing your ability to recognize shock? Go to www.OECzone.com, then click on the link to Chapter 9 in the Online Outlook section.

Scenario II

It is nine o'clock on a Tuesday night—about an hour until hill closure—and the temperature is hovering near zero. You are called to the bottom of an expert run that ends directly above a restaurant, where two people have reportedly been injured. The restaurant is closed. Approaching the scene from below, you see an adult male holding both arms and looking under the wooden deck on the slope side of the restaurant.

As you draw near, the man tells you that he is a local paramedic and that, while skiing, he lost his balance and slid into the deck. He says he extended his arms to brace himself and that although he is certain both wrists are broken he is okay for now and able to self-splint for a while. He then gestures toward the deck and says that seconds after he slid into the landing he saw a second skier lose control and slide under the deck. You then notice a skier beneath the deck, with only his legs protruding.

The deck floor is only about 18 inches off the ground. It is extremely dark, so you pull a small flashlight from your pack and shimmy underneath. Aiming your flashlight's beam into the shadows you see a young boy lying supine. Upon questioning him, you learn—between his sobs—that he is 10 years old and that he “hurts real bad” in his left arm, above the elbow. Further questioning reveals that the injured area feels wet, sticky, and warm. You ask if he hit his head or “passed out” at any time and he says no. He appears alert and oriented, and tells you that he is not hurting anywhere else.

When you are close enough to gently touch his hand and wrist on the injured side, you palpate a strong, rapid pulse. He feels your touch and is able to weakly grasp your hand. Your rapid body survey, albeit limited because of the confined space, fails to reveal any other injury. Specifically there is no cervical tenderness. You gently apply a little downward tension on the injured elbow and slowly place the injured forearm across the patient's abdomen, asking him to stabilize the arm with his opposite hand.

By now, several other rescuers have arrived on the scene, and with their help you extricate the boy from under the deck. When you are finally able to expose and examine the left upper arm, you find what looks to be a very unstable midshaft humerus fracture with blood oozing from a 3-centimeter posterolateral laceration. No other injuries are detected. A SAMPLE survey is noncontributory.

You are now able to check the other patient. He also denies having lost consciousness, is fully oriented, and has swelling of both wrists, which are mildly deformed. Sensation is intact in both hands, although finger motion is limited because of pain in both wrists. His radial pulses are full bilateral. No other injuries are detected. His SAMPLE survey is also noncontributory.

Questions

1. What probable injuries are portrayed in this scenario?
2. How would you extricate the boy?
3. Describe, in the order of priority, the emergency care you would provide for these patients. (Discussion points: emergency care, personnel, equipment, transport, notification of parents and management)

Points to Ponder

Fractures of the humerus occur either proximally, in the midshaft, or distally at the elbow. Fractures of the midshaft humerus occur more often in young patients, usually as the result of a violent direct blow. If circulation, motion, and sensation (CMS) in the hand are normal, apply a padded long-arm wire ladder splint and a

sling and swathe. If CMS functions are abnormal, consider applying gentle longitudinal traction to realign the fracture fragments before splinting them. Check your local area protocol before proceeding with this alignment technique (*OEC* fourth edition, pages 617-618).

Almost all instances of external bleeding can be controlled simply by applying direct local pressure to the bleeding site. Pressure stops the flow of blood and permits normal coagulation to occur. If a wound continues to bleed despite use of direct pressure, try placing additional pressure over a proximal pressure point or pulse point (*OEC* fourth edition, pages 255-256).

Vital Vocabulary

closed fracture A fracture in which the overlying skin is not broken.

crepitus A grating or grinding sensation that occurs when fractured bone ends rub together.

open fracture Any break in a bone in which the overlying skin has been violated.

position of function A hand position in which the wrist is slightly dorsi-flexed and all finger joints are moderately flexed.

Check It Out

Extrication from Difficult Positions (Jams and Pretzels) Skill Guide, Appendix B, *OEC* fourth edition

Management of an Open Fracture Skill Guide, Appendix B, *OEC* fourth edition

Online Outlook

Review material and test your knowledge on fractures. Go to www.OECzone.com, then click on the link to Chapter 25 in the Online Outlook section.

Scenario III

It is a sunny, bitter-cold morning. At 10:15, the patrol dispatcher calls the patrol's top shack to relay details of a call placed via cell phone to the local sheriff's department. Before his cell phone's battery died, the caller said he was with a skier who'd injured his shoulder in Slippery Chutes, a frequently skied area on U.S. Forest Service land about 300 yards slightly uphill of your resort's boundary line. The area is comprised of four steep, narrow chutes, and the injured skier is reported to be in Chute #2. The dispatcher says the sheriff's department lost contact with the caller before they could get any further information. Attempts to reconnect with the reporting party failed.

The first patroller dispatched to the area enters and sweeps Chute #2 but is unable to locate the injured or reporting party. You are dispatched to check adjacent chutes and, shortly thereafter, receive word that a second person on a

cell phone has called to report he is on scene with the injured person, about two-thirds of the way down Chute #3. The caller has confirmed a right shoulder injury but said he was unable to get additional information from the patient, whom he described as being “in a daze.”

When you arrive on scene at 10:40, you find that the patient apparently fell and jabbed his poles into the snow to keep from sliding and is wedged in the middle of the narrowest part of the chute, between two rocky spines. Access is very difficult. Assessment reveals a markedly deformed right shoulder with pain and tenderness. The right forearm is slightly abducted and externally rotated at the shoulder, and the patient is unwilling to move his upper arm (locked shoulder), or bring his forearm toward his chest.

The patient—who tells you he’s 17—is oriented to person, place, and date, but he seems slow to respond to your questions. You do learn, however, that he fell forward on an outstretched arm at the top of the chute during his first run of the day, thinks he has been down for more than an hour, and is unable to get himself down the rest of the chute. Checking his right radial pulse, you find it is 54 beats per minute. Respirations are shallow at 12 breaths per minute. The capillary refill is delayed to three seconds in both hands. A subsequent check of his vital signs at 10:50 reveals the pulse is 58 and respirations remain shallow at 12.

Questions

1. What injuries/illnesses do you suspect in this scenario? Why? List four additional signs or symptoms also associated with each of the injuries/illnesses.
2. Describe, in the order of priority, the emergency care you would provide for this patient.
3. What special considerations are warranted to successfully manage this patient’s care and rescue?
4. Does your resort or area of responsibility have a protocol for initiating an out-of-area rescue (involving, for instance, a skier or snowboarder, snowmobiler, hiker, or victim[s] of a plane crash)? If so, review that protocol and discuss what other resources might be tapped to assist in such a rescue. How would members of your rescue group be involved, if at all?

Points to Ponder

Without the aid of diagnostic equipment, the extent of bone and joint injury is often difficult to determine—but there's still much an emergency care provider can do to help the patient. The principles of care require that the rescuer always consider the mechanism of injury, assess signs and symptoms, stabilize the ABCs, prevent further injury, and transport the patient to subsequent care.

Injury associated with a complex joint, such as the shoulder, may be particularly painful and present great danger to the distal circulation and innervation of the adjacent limb due to the variety of anatomical structures in and around the joint, e.g., tendons, skeletal muscle, ligaments, articular cartilage, nerves, blood vessels, and bone. With an anterior dislocation of the shoulder, because the humeral head sits anterior and inferior to the glenoid of the shoulder, it is anatomically impossible for the forearm to be brought across the chest until the dislocation is reduced. The rescuer must employ ingenuity in packaging the joint to provide adequate stability for transport over irregular terrain (*OEC* fourth edition, pages 576-595; 616-617).

The cold environment always poses a threat to human physiology, which functions best when the body's core temperature is 98.6° F (37° C). Protective structures, such as the skin and fatty tissue; and compensatory mechanisms, such as vasoconstriction, increased metabolism, and shivering, have limited ability to stabilize the core temperature in the narrow range of optimal function. Additional external factors, such as inadequate clothing, moisture, wind, low temperature, cloud cover, and contact with snow, significantly speed heat loss and can overwhelm the body's ability to maintain optimal temperature. Injured, ill, or inactive patients are particularly susceptible to cold injury, with death occurring in more than 50 percent of patients with severe hypothermia. Preventing further heat loss must always be high on the list of winter emergency care priorities, with rewarming of the body core initiated as soon as is safe, practical, and necessary. Remote locations pose particular challenges that must be addressed when planning any given rescue response (*OEC* fourth edition, pages 28-37; 414-422).

Whether in a vast mountain setting or a modest urban resort, frequently the ski patrol is called upon to come to the rescue of injured or ill persons who fall outside the normal purview of patrol activity. The focus of the Scenario III discussion will be on reviewing details of your area's protocol for initiating out-of-area rescue or off-resort response. Where does the responsibility lie for covering such a rescue or response? Is the patrol responsibility limited to maintaining resort coverage? If response is appropriate, who makes the decision for the resort patrol to respond? What safety concerns must be addressed before crossing the area boundary? What specialized equipment is available, e.g., high-angle rescue gear, snowshoes, backcountry litter, snowmobile, etc.? Who is equipped and able to travel outside the area boundary? Which agencies must be notified in the case of initiating an out-of-area rescue? What local resources may be tapped for personnel and/or equipment and how does your patrol contact and mobilize those resources? (*OEC* fourth edition, pages 24-25; 42-43, 50-53).

Vital Vocabulary

abduction Motion of a limb away from the midline.

adduction Motion of a limb toward the midline.

core temperature The temperature of the central part of the body (i.e., the heart, lungs, and vital organs).

dislocation Disruption of a joint, in which ligaments are damaged and the bone ends are no longer in normal contact.

hypothermia A fall in body temperature to below 95°F (35°C).

point tenderness Tenderness that is sharply localized at the site of the injury, found by gently palpating along the bone with the tip of one finger.

Check It Out

Review Skill Drills 24-1, 24-2, 24-4, and 24-5 in *OEC* fourth edition.

Online Outlook

Test your knowledge of the assessment and care of bone and joint injuries by completing the Online Chapter Pretest for Chapter 25 at www.OECzone.com.

Want to know more about hypothermia? Go to www.OECzone.com, then click on the link to Chapter 15 in the Online Outlook section. Also see “Stay Out of the Cold with Facts about Hypothermia” on page 28 of *On Scene: The Journal of Outdoor Emergency Care*.