

Chapter 9: INJURIES TO THE HEAD, NECK, AND FACE

Anatomy Review.

A. Skull. _____ (Slide 2) (see Figure 9.1 on page 118). The cranial bones (cranium) form a protective rigid housing for the brain. _____ (Slide 2).

B. Soft-tissue structures that protect the cranium include the skin, dense connective tissue layer, galea aponeurotica, loose connective tissue, and the periosteum of cranial bone. (See Figure 9.2 on page 118.)

C. The Meninges. _____ (Slide 4).
The meninges are 3 distinct layers of soft tissues that protect the brain.

1. The outermost layer, the *dura mater*, is _____ (Slide 5).
The dura mater transports blood to and from cranial bones.

2. The middle layer, the *arachnoid*, is not as strong as the dura mater and does not have a blood supply. The arachnoid is separated from the dura mater by a small amount of fluid.

3. Beneath the arachnoid is the “sub-arachnoid space” that contains _____ (Slide 5).
CSF cushions the brain and spinal cord from external forces.

4. The innermost meningeal layer is the *pia mater*, _____ (Slide 5) that is attached to the brain and provides a framework for an extensive vasculature that supplies the brain. The pia mater is very delicate tissue, and like the arachnoid, is more susceptible to trauma than the dura mater.

D. The Central Nervous System (CNS). _____ (Slide 6)

1. The CNS is protected by _____ (Slide 6).

2. The CNS consists of two distinct types of neural tissues, _____ (Slide 6).

3. The adult brain weighs 3.0-3.5 lb. and contains approximately 100 billion neurons.

a. The brain has three basic components: _____ (Slide 6).

The cerebrum is the largest component and is involved in intellectual functioning. The cerebellum performs functions related to motor skills. The brain stem connects the brain to the spinal cord.

4. Neural impulses travel to and from the CNS via 12 pairs of cranial nerves and 31 pairs of spinal nerves.

a. The cranial, spinal, and autonomic nerves compose the peripheral nervous system.

5. A brief interruption of blood flow to the CNS can result in loss of consciousness. Neural cells may die when deprived of blood for only a few minutes.

E. The Face. The face is _____ (Slide 7). Subcutaneous muscles, cartilage, and fat deposits provide minor protection from trauma.

1. Facial bones consist of the maxilla, R and L palatine, R and L zygomatic, R and L lacrimal, R and L nasal, R and L inferior nasal concha, the vomer, the mandible, and the hyoid. Some of these bones are shown in Figure 9.1 on page 118.

2. _____ (Slide 7). The orbits of the eyes, particularly the supraorbital regions, are vulnerable to contusions. The nasal bones are centrally located and vulnerable to blows that result in fractures. The mandible is also subject to external forces.

F. The Neck (_____ (Slide 8)). The bones of the neck are 7 vertebrae that _____ (Slide 8) (see Figure 9.4 on page 120).

1. The first cervical (C-1) vertebra (_____ (Slide 9)) articulates directly with the occipital bone to form right and left atlanto-occipital joints.

2. _____ (Slide 9)
that allows for rotation of the head on the neck.

I. Head Injuries in Sports

A. Background Information.

_____ (Slide 10). Brain tissue is unable to repair itself, and any tissue loss results in some level of permanent disability. _____ (Slide 10).

1. With appropriate education, coaches can learn to recognize head injuries and render effective first aid when necessary.

2. A recent 3-year study indicated that high school and college football players experience approximately 300,000 traumatic head or brain injuries annually. Players who sustained a concussion had three times the risk of sustaining an additional concussion when compared to teammates who did not have concussions.

3. Cheerleading is a competitive sport. Cheerleaders are at risk of serious injuries because their routines are becoming increasingly difficult.

4. Recent data from the National Center for Catastrophic Sport Injury Research indicates that a relatively small percentage of injuries result in irreversible damage.

5. There are three general categories of head injuries: concussion, intracranial hemorrhage, and skull fracture.

B. Mechanism of Injury

1. Vast majority of head injuries involve either direct or indirect mechanisms.

a. Direct mechanisms involve a _____ (Slide 11). A *contrecoup* injury occurs when the head is moving and abruptly stops, but the brain keeps moving within the skull, and becomes compressed on the side that's opposite from the initial impact.

b. Indirect injury mechanisms _____ (Slide 11), such as blows to the face. Rapid and violent movement of the cervical spine also may result in indirect injury to the brain.

c. _____ (Slide 11).

C. Concussion (Mild Head Injury). Jordan defines a concussion as _____

_____ (Slide 12).

1. The clinical manifestations can include unconsciousness or other neurologic signs listed in Time Out 9.1 on page 121. Any external blow can cause temporary disruption of neurologic function, and in some cases, structural damage has occurred. Symptoms include but are not limited to: _____ (Slide 12)

a. Brain cells that survive the trauma are vulnerable to subsequent injury.

2. There are various systems for classifying cerebral concussions; most base the level of severity on the duration of unconsciousness as well as the presence or absence of post-traumatic amnesia (PTA).

3. Cantu developed an "evidence-based" system for grading concussion. (See Table 9.1 on page 121 for signs and symptoms of each grade of concussion.)

a. Grade 1 concussions are a common sports injury, and they are the most difficult to identify. Grade 1 (mild) involves _____ (Slide 13)

b. Grade 2 involves _____ (Slide 13)

c. Grade 3 involves _____ (Slide 13). According to Cantu's research, the majority of sports injuries involve less than one minute of unconsciousness, but PTA lasting more than 24 hours, which

indicates most concussions are grade 3.

d. The two types of PTA resulting from head injury are anterograde and retrograde.

Anterograde amnesia is the inability to recall events that transpired since the time of injury. **Retrograde amnesia** is characterized by the inability to recall events that happened just prior to the injury. Retrograde amnesia is thought to be indicative of more severe forms of head injury.

e. Level of consciousness is qualitative and is determined as soon as possible after the head injury occurs.

1. First determine if athlete is alert and will respond to simple questions such as those that evaluate the athlete's recognition of time and place to determine the presence of retrograde amnesia. Two minutes later, repeat the questioning to determine the presence of retrograde amnesia.

2. Unconsciousness is usually identified when the athlete fails to respond to verbal stimuli or is obviously knocked out. Consciousness does not always indicate that a serious head injury has not occurred.

D. Second Impact Syndrome (SIS). Second impact syndrome has raised concern among the sports medicine community that there needs to be a more cautious approach to the care and management of athletes who have sustained concussions.

1. SIS results when _____ (Slide 14).

2. SIS involves a _____ (Slide 14), specifically in the uncus region of the temporal lobes, putting pressure on the brain stem. (Refer to Figure 9.5 on page 123.).

3. Since death can result from SIS, any athlete sustaining a head injury, no matter how minor, should be monitored carefully by a physician before being cleared to return to participation. It may take weeks to recover from concussion.

E. Cranial Injury. Cranial injuries involve _____ (Slide 15). In the majority of cases, these injuries also damage the scalp. Skull fractures can be simple with no damage to underlying tissue, and in many cases, few neurologic problems result.

1. _____ (Slide 15).

F. Intracranial Injury. _____ (Slide 16).

1. Intracranial injuries can result from direct blows to the head, rapid deceleration, and rapid rotational motions of the head. The most common cause is blunt trauma to the head.

2. These injuries involve _____ (Slide 16) that applies pressure to the brain tissues.

3. Major forms of **intracranial injury** are _____ (Slide 17)

a. Epidural hematoma involves arterial bleeding with signs and symptoms of injury usually developing rapidly.

b. Subdural hematoma involves rapid arterial bleeding or more slow venous bleeding. Thus, the development of signs and symptoms can occur more slowly in some cases.

c. Any of these injuries can result in some degree _____ (Slide 17).

II. Initial Treatment of a Suspected Head Injury: Guidelines. Any athlete who sustains a head injury should be treated as if a neck injury is present and every neck injury should be treated as though a head injury is present, because the injury mechanisms for both are similar. At least 50% of all cases of permanent neurologic

consequences from head trauma resulted from inappropriate first aid care.

A. Initial Survey

1. First step in treating suspected head injuries is to determine if the athlete is either in respiratory or cardiac arrest by executing the primary survey.
2. When approaching the athlete, note body position, presence or lack of movement, limb positions, as well as positions of the helmet, face mask, and mouth guard.
3. If the athlete appears to be unconscious, attempt to arouse him or her by placing your hands on the athlete's shoulders, chest, or upper back and speaking loudly, directly at the injured person.
4. If conscious, the athlete will probably have an open airway.
5. If unconscious, make a note of the approximate time of the injury.
6. The coaching staff should be trained and rehearsed with respect to their emergency plan.
7. The head and neck should be immobilized immediately by having a person stationed at the athlete's head to stabilize it with both hands. (See Figure 9.6 on page 124.)
 - a. It is not necessary to remove a helmet from a football player to determine if the athlete is breathing.
 - b. Breathing can be detected by placing your ear near the athlete's face and listening for typical breathing as well as gagging, wheezing, or choking sounds.
 - c. Movements of the thorax and abdomen can also indicate normal breathing.
8. Circulation Assessment. In an unresponsive victim, determine if signs of circulation are present by looking for breathing, coughing, and movement in response to breaths.
 - a. If no signs of circulation are present, begin CPR and summons EMS.
 - b. Following accepted guidelines, logroll the athlete to a supine position while stabilizing the head and maintaining an airway.

B. Physical Exam. Once the initial survey has been completed (*which can be accomplished with practice in around 30 seconds*), and the athlete's vital signs have been ascertained, the coach can perform the physical exam.

1. The physical exam must include assessments of _____ (Slide 20).
2. If head injury is suspected:
 - a. _____ (Slide 21).
 - b. _____ (Slide 21).
 - c. _____ (Slide 21), because the athlete may aggravate a neck injury.
 - d. _____ (Slide 21).
3. To determine if any significant neurologic damage has happened to a conscious athlete, place two fingers in the athlete's hand and ask the athlete to squeeze them as hard as possible. Then test the athlete's other hand and compare grip strength. You can also check bilateral strength by asking the athlete to dorsiflex his or her feet.
4. _____ (Slide 22)
the skin on the insides of the arms, thorax, and legs.
5. Monitor the athlete's eyes by noting the size of the pupils and their responsiveness to light, as well as, their ability to follow a moving object while moving it slowly from side to side. Most people have pupils that are the same size, but some normal persons have pupils that are not equal in size (**anisocoria**).
 - a. _____ (Slide 22).
6. Gently palpate the athlete's neck, beginning at the base of the skull and working slowly down to the bottom of the neck. Note any deformity, such as protrusions or spasms. Ask athlete to indicate if pain

occurs during the evaluation.

7. Based on this assessment, you should be able to determine the level of concussion. Athlete with grade 1 concussion will be able to walk to the sideline or courtside with assistance.

a. _____ (Slide 23).

In these cases, the coach should monitor vital signs and summon EMS.

b. Athlete with grade 1 concussion and normal vital signs can be moved, using great care. If the athlete is lying down, two people assist the athlete into a sitting position by providing support on both sides of the athlete's body. While the athlete is sitting, monitor his or her vital signs and behavior for 1 to 2 minutes.

c. If the athlete's vital signs and behavior are normal, assist him or her into a standing position, providing support on both sides of the athlete's body. Once the athlete is standing, monitor condition for another 1 to 2 minutes. If normal, ask the athlete to walk slowly away from the injury site with the support of emergency team members.

d. When the athlete arrives on the sideline or courtside, assist him or her into a seated position for the next phase of the evaluation.

C. Sideline Assessment. The objective of this assessment is to determine the presence of any signs or symptoms of head injury that may have developed since the initial injury.

1. Although the single most important indicator a head injury's severity is the level of consciousness, in the majority of sport-related head injuries, the athlete never loses consciousness.

2. Even in the case of a grade 1 concussion, the athlete will usually appear dazed, confused, and may report dizziness and have an unstable gait. Additionally, they may have **tinnitus** and memory loss, either anterograde or retrograde.

3. Based on Cantu's guidelines, an athlete who sustains a grade 1 concussion must be pulled from participation and should not return until asymptomatic for at least 1 week.

a. An athlete who sustains any concussion should be removed from play and examined by a physician.

4. Quick neurological tests for the field include the finger-to-nose test and Romberg's test. After administering these tests, allow athlete to rest for 5 to 10 minutes and repeat the tests.

a. An athlete who successfully completes these tests and does not demonstrate any signs of PTA may be cleared to return to participation.

III. Cervical Spine Injuries

A. Background Information. _____ (Slide 25). Injuries meeting the criteria to be classified as "catastrophic" are quite rare: 2 in 100,000 of all neck injuries reported. In the U.S., less than 1 such injury for every 100,000 high school football players has been reported for a number of years.

B. _____ (Slide 26)

1. Neck injuries can occur in almost any sport and can involve a variety of tissues in the region, including bones, ligaments, intervertebral disks, spinal cord, spinal nerve roots, and/or the spinal nerves themselves.

2. Neck strains rarely involve any neurologic damage.

3. _____

(Slide 26).

a. In these situations, the potential for permanent neurologic damage is high.

4. Neurologic symptoms may be absent even when significant damage has occurred to the tissues surrounding the spinal cord. Therefore, the coach must be objective and complete during the initial assessment process.

B. Mechanisms of Injury. _____ (Slide 27)

1. _____ (Slide 27). Axial loading occurs when the head is lowered just prior to impact, which straightens out the normal vertebral curve (extension). Forces applied to the top of the head are absorbed directly into the spinal column bones without the protection of surrounding ligaments and muscles.

a. In 1976 the NCAA enacted a football rule change, which prohibited leading with the head for contact, commonly called “spearing.” This rule resulted in a dramatic drop in the number of cervical spine injuries the following year. Table 9.2 on page 129 shows the annual incidence in cervical spine sports-related injuries that resulted in incomplete recovery since 1977.

b. In 2005, the NCAA updated their tackle football rules in an effort to discourage athletes from contacting an opponent with the top or crown of the helmet, as well as the facemask, and also stated that spearing is not allowed.

c. Young athletes need to be taught not to practice this dangerous maneuver.

C. Brachial Plexus Injuries. Commonly called “burners” or “stingers,” brachial plexus injuries frequently occur in sports where the athlete’s body may be forced in one direction, while an arm may be pulled in the opposite direction.

1. These injuries can result in significant but transient symptoms ranging from an intense burning sensation in the shoulder, arm, and hand to loss of sensation in the same areas.

2. Figure 9.9 on page 126 illustrates the abnormal traction or compression of one or more of the large brachial plexus nerves that occurs in this type of injury.

a. Signs and symptoms of a brachial plexus injury include:

1. Intense burning or stinging sensation radiating into the affected arm.

2. Significant decrease in the voluntary use of the arm (limpness).

3. Normal sensations in the affected arm should occur within a few minutes.

4. In repeat cases, symptoms persist for long periods and muscle atrophy, particularly the deltoid muscle, may occur. Medical evaluation is necessary before the athlete is allowed to return to participation.

b. First aid care:

1. Little can be done other than removing the athlete from play until symptoms subside.

2. Continue to monitor the athlete’s progress while he or she is sidelined, and do not allow him or her to return to participation until grip strength in the affected arm is normal when compared to the unaffected arm.

3) If symptoms are still present after 10 minutes, refer the athlete for medical evaluation and require medical clearance prior to returning to participation.

D. Sprains. Sprains of the cervical spine are common and generally involve the major ligaments that stabilize the vertebrae.

1. The common mechanisms for these injuries are hyperflexion, hyperextension, lateral flexion, and rotation.

a. Such injuries generally involve a significant amount of force and are usually self-correcting and resolve over a period of days. Occasionally the sprain is severe enough to displace vertebrae resulting in more serious neurologic problems.

2. Signs and symptoms include localized pain in the region of the C-spine, point tenderness over the injury site, limited ROM in neck movements, and no obvious neurologic deficits.

3. First aid care involves removing the athlete from practice/competition that day.

a. Crushed ice should be applied to the injury, and the athlete should wear a properly sized commercial cervical collar, if available.

b. Refer the athlete for medical evaluation prior to being allowed to return to participation.

E. Strains. Strains involve the muscles and tendons of the neck and are usually more painful than serious.

1. Whiplash is a serious neck injury that combines joint sprain with musculotendinous strain. Indirect head injury is also possible in whiplash cases. The mechanisms of injury for strains are virtually the same as for sprains.

2. Signs and symptoms include localized pain in the C-spine region, muscle spasm, limited ROM in neck movements, and no obvious neurologic deficits.

3. First aid care involves removing the athlete from practice/competition that day.

a. Crushed ice should be applied to the injury, and the athlete should wear a properly sized commercial cervical collar, if available.

b. Refer the athlete for medical evaluation prior to being allowed to return to participation.

F. Fractures and Dislocations. The most extreme forms of cervical injury occur when the damage involves fractures or dislocations that apply pressure directly on the spinal cord. The spinal cord is extremely sensitive to such trauma; permanent neurologic damage or death can occur.

1. The spinal cord can suffer damage after the initial trauma as a result of circulatory problems that affect its blood supply. When the spinal cord is bruised, bleeding and swelling can occur that result in neurologic problems.

2. Although any mechanism of injury can cause fractures or dislocations, axial loading is associated with more severe injuries. Such injuries are true medical emergencies and the primary objectives are to provide basic life support, stabilize the head and neck, and summon EMS.

3. The signs and symptoms include the following:

a. The athlete reports feeling or hearing something pop in his or her neck at the time of injury

b. Severe pain in the C-spine associated with muscle spasm

c. Difficulty swallowing

d. Deformity in the vertebra, detected by palpation

e. Burning, numbness, or tingling sensations in extremities and/or trunk

f. Weakness in grip strength and/or dorsiflexion

g. Complete absence of sensations in the extremities and/or trunk

h. Complete absence of motor function in the extremities and/or trunk

i. Loss of bowel/bladder control

4. First aid care includes:

a. Complete the primary survey and ascertain vital sign status.

b. Conduct secondary survey, and if any of the signs or symptoms are present, proceed to

the following steps.

- c. Stabilize the head and neck immediately.
- d. The team leader should apply manual spinal stabilization as shown in Figure 9.6. If the player is wearing a helmet, do *not* remove the helmet, but use it to help stabilize the head and neck (see Figure 9.18 on page 131).
- e. If CPR is necessary, open the front of the shoulder pads to allow access. If the decision is made to remove the shoulder pads, the helmet should be removed to maintain proper spinal alignment.
- f. Summon EMS.
- g. Do *not* attempt to move athlete. Assist EMS in placing athlete onto the spine board or other spinal immobilization device.
- h. Continue to monitor vital signs until EMS arrives.

IV. Initial Treatment of a Suspected Neck Injury: Guidelines.

A. It is very important to determine if the athlete is conscious. If the athlete is unconscious, assume that both neck and head injuries have occurred.

1. If the athlete is unconscious, the first priority is basic life support. Does the athlete have an open airway? Is the athlete breathing? Does the athlete have a pulse?

2. If the answer is no to the above questions, then basic life support must be initiated and maintained until EMS arrives.

B. The preplanned emergency protocol for handling head and neck injuries should designate a member of the coaching staff as the “team leader.”

1. Team leader supervises the entire management process and monitors the position of the athlete’s head and neck, making sure the injured player is not moved unnecessarily.

2. There is little support for the need to transport an injured athlete prior to the arrival of EMS personnel.

3. Preventing further injury to the athlete is the most important criterion.

a. When dealing with an unconscious athlete, the team leader should immediately stabilize the head and neck manually and continue to do so throughout the evaluation.

1. Check airway, breathing, and pulse (ABCs).

2. If athlete is breathing and has a pulse, summon EMS while maintaining support of the athlete’s head and continuously monitoring the ABCs.

b. If the arrival of EMS is delayed by more than 30 minutes, it is prudent to place the injured athlete on a properly constructed spine board (see Figure 9.10 on page 128).

1) Use of a spine board requires a coordinated team effort with at least five people.

2) Figures 9.11 through 9.13 on pages 128 and 129 show how team members position the injured athlete on the spine board.

3) The athlete is secured and immobilized using the board’s straps and by using adhesive tape to provide additional immobilization of the head (see Figure 9.14 on page 129).

C. A conscious athlete should be questioned concerning the presence of extremity numbness, **dysesthesia**, weakness, and/or neck pain.

1. If the athlete reports the inability to move a limb or limbs or significant strength loss, the athlete’s head and neck must be stabilized and EMS summoned.

V. Emergency Procedures for the Treatment of Head and Neck Injuries in Football. Injuries in this sport present special problems because of the equipment. Standard equipment includes a helmet with an attached facemask, chinstrap, and mouth guard, which can make dealing with airway problems difficult.

A. The management of an injured player wearing a helmet is a major issue within the sports medicine community. The National Athletic Trainers' Association (NATA) developed guidelines regarding the removal of helmets from injured athletes.

1. According to the guidelines, removing the helmet of a player with a cervical injury may worsen injuries or create new ones. Refer to Time Out 9.2 on page 135. In situations where an airway must be established, removal of the facemask is necessary.

a. Coaching personnel must use extreme caution when making the decisions on immediate care of a helmeted athlete who may have a head or neck injury.

b. Unless executed by a physician or other trained emergency health care provider, removing the helmet should be avoided unless absolutely necessary.

B. _____ (Slide 35).

1. To remove the face mask, cut all plastic clips (usually two upper and two lower) that hold the facemask to the helmet (see Figure 9.15 on page 136).

a. *Keep the head and neck stabilized at all times.*

2. Use a tool called the _____ (Slide 35) (see Figure 9.16 on page 136), anvil pruner, wire cutters, or tin snips to cut the clips. This allows the mask to be rotated up and away from the face (see Figure 9.17 on page 136).

3. A screwdriver may also be used to remove the screws that hold the clips.

C. Do not attempt to move the athlete until the physical exam is completed.

1. An athlete who appears to be fully recovered should be escorted from the field, taken to the bench, and observed for a few minutes to determine if he is developing any signs or symptoms of head injury.

2. If the evaluation reveals some suspicious signs, continue to stabilize the head and neck, summon EMS, and monitor vital signs.

3. In most cases, there is no reason to move the athlete from the field prior to the arrival of EMS personnel. When in place, the helmet provides cervical immobilization (see Figure 9.18 on page 131).

D. *When in doubt about an athlete's head injury, it is best to err on the conservative side and pull the player out of the game until he or she has been properly evaluated.*

VI. Injuries to the Maxillofacial Region. A variety of injuries can occur to this region of the body, which includes _____ (Slide 36). Modern protective equipment, like _____ (Slide 36), has significantly reduced the incidence of maxillofacial injuries.

A. Dental Injuries. The _____ (Slide 37) teeth in adult human jaws are vulnerable to external blows that are common to collision and contact sports. Teeth are firmly secured into the bone sockets of the jaws by way of specialized bone, the cementum. Additionally, the sockets are lined with periosteum that aids in securing the teeth to the jaw.

1. Specific Injuries. _____ (Slide 38).

a. See Time Out 9.3 on page 137 for signs and symptoms of common dental injuries.

2. Initial Evaluation and Treatment: Guidelines. When rendering first aid for a dental injury, avoid exposure to injury-related blood by following pathogen-prevention steps such as wearing latex gloves and, if possible, eye protection.

- a. Collect the history of the accident.
- b. Check to see if athlete can open and close his or her mouth without pain or difficulty.
- c. Look for irregularities visible in adjacent teeth. Examine upper and lower teeth and note any bleeding around the gum line or teeth or obvious chips or fractures.
- d. Treatment involves direct finger pressure with sterile gauze over the bleeding area. Push loose teeth gently back into their normal positions. _____

_____ (Slide 39).

e. Send the athlete to a dentist or physician immediately. If a tooth is out of its socket for more than 2 hours, the prognosis for replantation is poor.

3. Protection Against Injury. The most common method of dental protection is the mouth guard. A properly fitted mouth guard reduces the risk of many dental injuries and can also reduce the likelihood of concussions, dislocations of the temporomandibular joint, and jaw fractures.

a. Mouth guards fall into three basic categories: _____
_____ (Slide 39). Stock versions least expensive and least effective; mouth-formed versions are the most commonly used type. Custom versions are the best but the most expensive.

b. In high-risk sports such as tackle football, a well-fitted mouth guard should be worn to protect an athlete from injuries. Mouth guards were first required for high school football players in 1966; the NCAA followed suit in 1974. Since that time, ice hockey, field hockey, and men and women's lacrosse have been added to the list of sports that require mouth guards at both high school and college levels.

1) The American Association of Oral and Maxillofacial Surgeons and the U.S. Olympic Committee strongly recommend the use of mouth guards for the above mentioned sports as well as rugby, wrestling, boxing, basketball, skiing, shot-putting, discus throwing, and horseback riding.

B. Eye Injuries. The eye is a round, ball-like structure that is located within the orbit of the skull. (See Figure 9.17 on page 138.) The front of the eye consists of a clear tissue, the cornea. Located behind the cornea are the colored iris, pupil, and lens. The vitreous body, a transparent, semi-gelatinous material, fills the globe within the eye. _____ (Slide 40), which contains the specialized neural cells of vision, the rods and cones. _____

_____ (Slide 40).

1. In the United States, eye injuries in sports are on the increase with the leading injury sports being basketball, baseball, and softball, followed by swimming and pool sports. The increasing popularity of racquetball, squash, and badminton has resulted in an increase in eye injuries as well.

2. Specific Injuries.

a. Eye injuries can be grouped into two categories: _____
_____ (Slide 42). Contusional eye injuries result from the blow of a blunt object such as a squash or tennis ball.

1) Contusional injuries vary in severity from simple corneal abrasions to major disruptions of the eyeball that result in rupture of the eye, fracture of the orbit, or combination of the two.

2) Additionally, the retina may be torn away from the inside of the eye (detached retina).

3) _____ (Slide 42), however, they may occur in shooting sports or due to defective eye protection equipment.

b. Signs and symptoms of eye injuries are listed in Time Out 9.4 on page 139.

3. Initial Evaluation and Treatment: Guidelines. _____
_____ (Slide 43); the symptoms for each are nearly identical: pain, irritation, and excessive tearing.

a. The eye should be examined quickly and gently by holding the upper eyelid up and away from the anterior eye (refer to Figure 9.18 on page 139).

b. Small foreign bodies are usually washed away from the center of the eye by tears, and may be located below the lower eyelid or on the side of the eye at the medial canthus.

c. _____ (Slide 43)

d. If an object is imbedded in the eye tissue, cover *both* eyes with clean gauze immediately arrange to have the athlete transported to a medical facility. It is important to cover both eyes because the eyes normally move together.

e. _____ (Slide 44)

Do not allow the athlete to continue participation until the symptoms abate. If symptoms persist or vision is severely impaired, refer the athlete to an appropriate medical specialist.

f. Contusions of the eye may result in hemorrhage of the tissue around the eye. In most cases, this causes a black eye. Immediate care involves periodic application of cold for 24 hours after the injury.

1) _____ (Slide 44). This is a potentially serious sign as it may indicate vascular damage within the eyeball. Additionally, hyphema may indicate a rupture of the eyeball or fracture of the socket (orbital blowout).

2) Symptoms of orbital blowout include _____ (Slide 44)

3) An athlete with any of the above signs or symptoms should be referred immediately for further medical evaluation.

g. Detached retina injuries can occur from any of the above mechanisms, however, the symptoms may not be immediately apparent. Retinal injuries may develop slowly, over a period of days, weeks, or months.

1) Early symptoms include seeing floating particles inside the eye, distorted vision, and abrupt changes in the amount of light seen.

2) Any athlete with a history of blunt trauma to the eye who later complains of the above symptoms should be referred to a medical specialist.

4. Contact Lens Problems. Many athletes will wear contact lenses, either hard or soft. _____ (Slide 46)

a. The biggest problem is having the lens slip out of place or having dust get trapped between the lens and eye. Soft lenses migrate less on the eye surface.

b. _____ (Slide 46)

5. Protection Against Injury. Although not required by the NCAA or high school sports regulatory bodies, protective eyewear is strongly recommended. Protective eyewear such as goggles can prevent 90% of eye injuries. The best products are made of polycarbonate, which protects against impact. Refer to Appendix 8 for examples of protective eyewear.

C. Nose Injuries. The nose is often injured due to its location. _____ (Slide 47). The nose consists of a bone-cartilage framework with skin attached over it. Most of the nose is soft tissue (cartilage and skin) that can absorb significant amounts of force. The nose bones include the L and R nasal bones and frontal processes of the maxilla. The superior portions of the nasal bones meet with the frontal bone between the orbits. _____ (Slide 47)

1. Initial Evaluation and Treatment Guidelines. When an athlete suffers a blow that results in a nosebleed, the nose should be examined for a fracture.

a. The signs of fracture include deformity and swelling of the bridge of the nose. Nasal

bone fractures are the most common fractures of the facial region.

b. _____
_____ (Slide 48)

c. Care of a simple nosebleed includes finger pressure directly against the nostril that is bleeding. Care should be taken to avoid contact with whole blood by wearing latex gloves.

1) If bleeding persists, apply a cold compress against the nasal region and instruct the athlete to lie on his or her side, the same side as the bleeding nostril.

2) If the athlete needs to continue participation, the nostril can be packed with gauze, which should protrude from the nostril for later extraction.

d. Septal injuries present the possibility of later complications. After receiving an external blow, the septum can be bruised and bleeding can occur between the septum and the mucous membrane covering it (septal hematoma). If irritated, a septal hematoma can _____ (Slide 49) if not treated.

1) The signs of septal hematoma are swelling that is usually apparent inside and outside of the nose. The nose may appear red and infected, and the athlete will complain of pain when the nose is gently palpated.

2) Such injuries should be referred to a medical doctor for treatment; the coach or athlete should not attempt to drain a septal hematoma because infection and permanent damage are likely to occur.

D. Ear Injuries. Anatomically the ear is similar to the nose in that it has a cartilaginous framework covered with a layer of skin. The ear has an external opening as well as an extensive internal structure. _____

_____ (Slide 50). The middle ear contains a small group of bones which transmit vibrations to the tympanic membrane; the inner ear contains the labyrinth.

1. Structures of the inner ear also play a role in maintenance of equilibrium, so injuries to this area may affect balance as well as hearing.

2. _____ (Slide 51)

3. Sports such as wrestling involve a great deal of body contact between opponents as well as with the playing surface, resulting in abrasions and contusions to the auricular.

a. Use of ear protection has reduced the incidence of such injuries, but they still occur.

b. The tissues of the auricle have some vascularity and trauma can result in an auricular hematoma between the skin and underlying cartilage. If not treated properly or if it is repeatedly irritated before treatment, a serious cosmetic problem known as “cauliflower ear” can occur.

c. Signs and symptoms of auricular hematoma include skin redness, local increase in tissue temperature, pain, and/or a burning sensation. The ear should be treated immediately with a cold pack.

d. If swelling of the auricula occurs, the athlete should be referred to a physician for removal of the fluid by needle aspiration.

e. Athletes with a history of this injury or those involved in high-risk sports should be required to wear a properly fitting helmet.

4. An athlete sustaining a blow to the ear that is followed by a sudden hearing loss and/or dizziness must be referred immediately to a physician. Such injuries can rupture the eardrum or the round window. In addition to hearing loss and transient loss of balance, the athlete may experience bleeding from the ear and intense ringing in the ear.

5. _____
_____ (Slide 52)

E. Fractures of the Face (Nonasal). Fractures can occur almost anywhere on the face, however, certain

sites are more commonly involved. A relatively common form of facial fracture involves the lower jaw (mandible) and occurs in boxing and other collision sports.

1. _____
_____ (Slide 53)

2. Treatment includes gentle application of a cold pack and immediate referral to a physician. Surgery is necessary to treat severe cases.

3. A related injury is a dislocated jaw, which involves the **temporomandibular joint (TMJ)**. Due to the bony structure of this joint, it dislocates relatively easily.

a. Signs and symptoms include extreme pain and deformity in the region of the TMJ, inability to move the lower jaw, and in some cases, the mouth may be locked in an open position.

1) Treatment is the same as for a fracture. _____
_____ (Slide 54)

4. Other bones of the face that may be fractured include the zygomatic bone.

a. Signs/symptoms of this injury include _____
_____ (Slide 55)

b. An athlete with this type of injury should be referred to a physician for diagnosis and treatment.

F. Wounds of the Facial Region. _____
_____ (Slide 56)

1. Carefully clean the wound with mild soap and warm water; apply a sterile, commercially prepared dressing (not loose cotton). Refer the athlete to a physician.

2. Any facial wound, whether it is a simple **abrasion**, a serious incision, or laceration, should be evaluated for the possibility of long-term cosmetic effects.

3. As a general rule, _____
_____ (Slide 57).

a. Normally athletes can return to play after the wound has been treated. If the wound has been sutured, the decision to return to activity should be made by the physician.