



Hughston Health Alert

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- Concussion Awareness and Education
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Orthobiologics:

QUESTIONS FOR A SPECIALIST

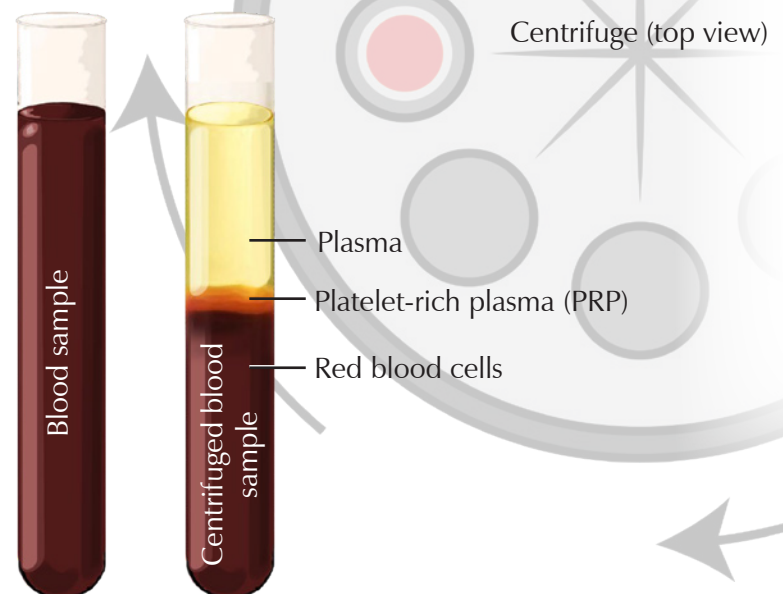
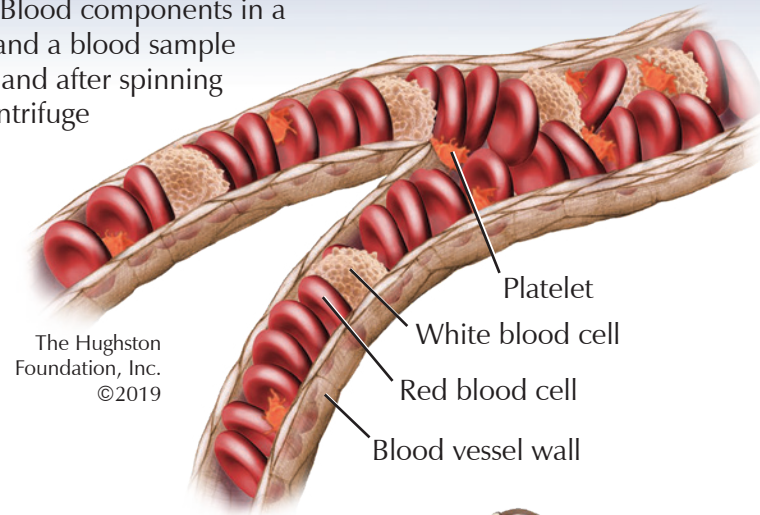
What are orthobiologics?

Orthobiologics are substances naturally found in the body that orthopaedists may use in higher concentrations to help speed up the repair/regeneration process. Natural substances can be bone marrow, blood, fat, or other soft tissues found in the body and they generally come from an autograft (your own tissue) or sometimes donor tissue. In particular, the latest research attention has been on using adipose (fat) tissue, scaffolds, stem cells, and blood component growth factors (**Fig. 1**) in both orthopaedic surgery and nonsurgical treatments.

To face the challenges of healing diseased or injured musculoskeletal tissues, your orthopaedist may employ orthobiologic therapy to build on the human body's innate ability to repair and heal itself. For years physicians have attempted to use diet, exercise, and anti-inflammatory medications, to modify the course and outcomes of illness, injuries, and degenerative conditions in a positive manner. If you want a minimally invasive procedure that allows you to avoid drugs, chemicals, or man-made materials, your physician may recommend orthobiologic therapy.

FOR A HEALTHIER LIFESTYLE

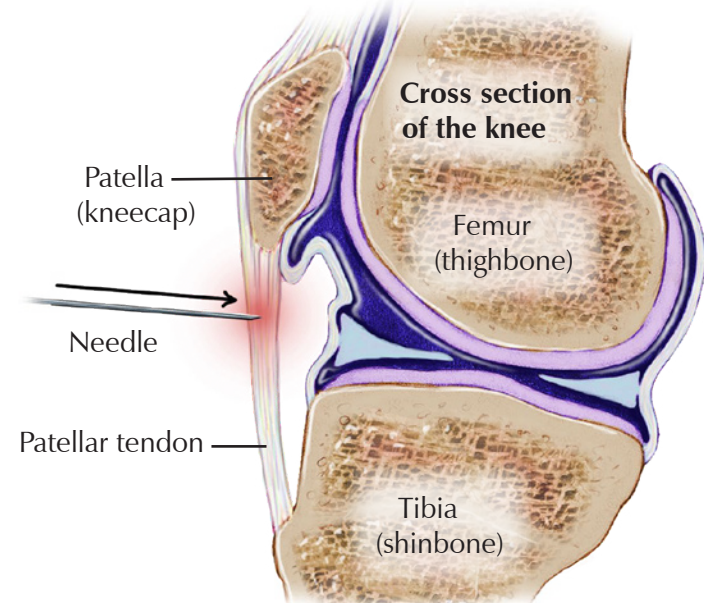
Fig. 1. Blood components in a vessel and a blood sample before and after spinning in a centrifuge



What does orthobiologic therapy treat?

Physicians and researchers have used orthobiologic therapy to treat a multitude of conditions, including golfer's elbow, tennis elbow, Achilles tendinosis, rotator cuff tendinosis, plantar fasciitis, partial tendon and ligament tears (**Fig. 2**), osteoarthritis, muscle tears, and more. Whether your doctor uses orthobiologics as a simple nonsurgical option or part of a surgical procedure, you and your physician can decide what fits best with your lifestyle and current medical situation. Orthobiologics are not a first-line procedure, but rather, may be timely in the care continuum when other options have not been successful. Adding an orthobiologics procedure as a treatment option has given patients another choice when it comes to managing their orthopaedic condition. Ultimately, our goal is to get you back to living life and spending time doing the things that you love.

Fig. 2. Orthobiologics injected into the patellar tendon to treat tendinitis



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How does your body heal itself?

The basis of orthobiologics is to build on the body's inherent ability to repair/regenerate itself. When you are injured or have surgery, blood cells rush to the area. Blood and blood byproducts carry the necessary materials to initiate the cascade of events to start the reparative process.

Inflammation can be both good and bad for you. Each day you experience wear and tear damage to your body that is naturally controlled by inherent inflammatory processes. While excess inflammation can be detrimental, often in response to injury or damage, low-grade inflammation is triggered to start the cascade of cellular events to restore and repair damaged tissue. Therefore, physicians want to promote the low-grade inflammation that is part of the repair process.

Some injuries & conditions treated with orthobiologics

- Joints affected by osteoarthritis
- Rotator cuff tears and labrum tears of the shoulder
- Meniscal (cartilage) tears in the knee
- Sports or overuse injuries to the muscles, tendons and ligaments, such as tennis elbow, plantar fasciitis, and quadriceps and patellar tendon tears

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Some different types of orthobiologics

- Platelet-rich plasma (PRP)
- Adipose (fat) tissue
- Stem cells
- Bone marrow
- Growth factors

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What are the benefits of orthobiologics?

The procedures are minimally invasive, usually take under an hour, and can boost healing after a surgical procedure or physicians can use it as a stand-alone treatment to encourage soft tissue repair. Plus, your doctor can treat multiple joints at one time, such as injecting both knees to reduce pain and swelling. It is also ideal for patients who cannot undergo an extensive surgery due to other health conditions.

How are orthobiologic procedures performed?

Your orthopaedist can perform most of these procedures in the clinic, if they are administered through injections. Sometimes the therapies are done in conjunction with surgery, so the injection or treatment is provided during or right after your planned surgical procedure.

Platelet rich plasma (PRP) injections may be performed in your doctor's office. Your blood is drawn and then placed in a closed centrifuge system that then separates the blood components to create a concentrate of platelets (**Fig. 1**). Your doctor then injects this concentrate into the joint. These platelets adhere to the joint surfaces and release a number of growth factors to activate the body's healing mechanisms.

For Lipogems®, the entire procedure often takes less than an hour and is performed in a hospital setting using local anesthesia (**Fig. 3**). During this procedure, the physician makes a tiny puncture through your skin to collect subcutaneous fat. Then this biologic material is placed in a sterile system that separates the cells to create a concentration of the wanted biologic substance. Next, the physician injects the resulting cells into the treatment site. These cells may positively influence the cellular chemistry at the site of injection to assist and augment the body's healing processes.

Who will benefit from orthobiologics?

Orthobiologics can provide relief if you suffer from an injury or ailment that limits your normal daily functions or physical activity, especially if you have a soft tissue injury such as a partial tear in your tendon, ligament, or a muscle. If you had other treatments such as physical therapy, nonsteroidal anti-inflammatory medications (NSAIDs), or steroid injections that did not provide significant or long-lasting relief, orthobiologics may be a viable solution. You may want to try orthobiologics if you would like to explore a minimally invasive alternative to a major surgery. However, orthobiologics are not suitable for everyone. Your doctor will determine if a procedure will be beneficial to use in addition to your surgery or as a stand-alone treatment.

The treatment is helpful to many people participating in sporting activities. It may provide an alternative for athletes who do not want a more extensive surgery that requires a longer recovery. Furthermore, using orthobiologics during tissue repair surgery, such as a meniscus or labrum repair, may assist healing after surgery.

Many patients suffering from orthopaedic pain are not ready for invasive surgery like a total joint replacement. They are also looking for longer lasting alternatives to cortisone injections and one that has fewer side effects. Patients can become frustrated with the duration of relief of other nonsurgical options, such as medications and physical therapy. This is why using your own tissue to help you heal is appealing, especially since one treatment is sometimes all that is needed.

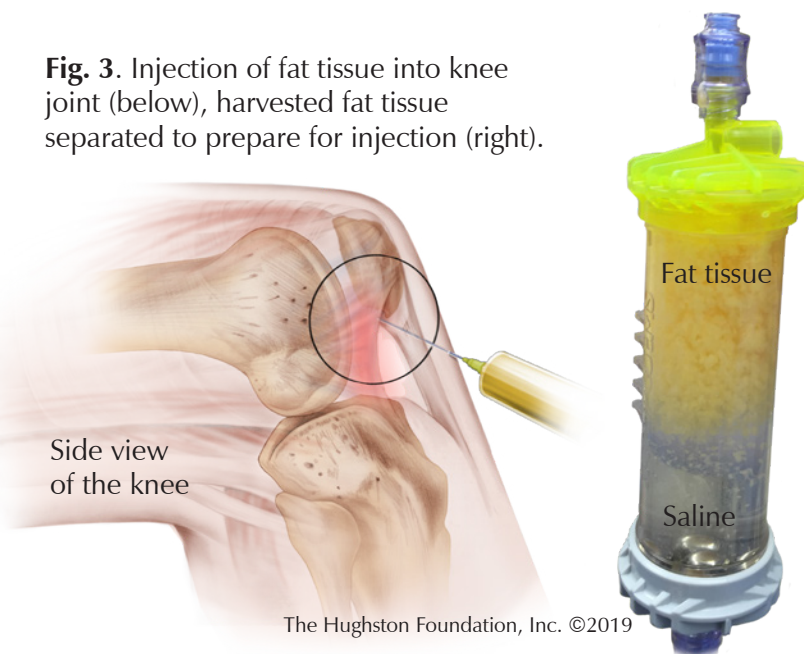
Does the treatment have side effects?

The risk of side effects exists for most medical treatments and orthobiologics are no different. Rare, but possible, complications caused during the tissue harvest include an allergic reaction to the local anesthetic, damage to the underlying structures, infection, and hematoma or seroma (an accumulation of blood or fluid under the skin that may require removal).

How long do I have to wait to resume my daily activities?

Return to work and activity restrictions are dependent upon your treatment and the specific activities you do. Physicians often perform orthobiologic procedures using an injection, which allows the patient to return to work without much loss of time. Depending on the harvest and injection sites, your physician may restrict high-impact and strenuous activities for a couple of weeks. Most patients are able to return to their normal activities within 1 to 2 months. Typically, the recovery from the procedure is minimal when compared to a more invasive surgery.

Fig. 3. Injection of fat tissue into knee joint (below), harvested fat tissue separated to prepare for injection (right).



Does insurance cover this treatment?

At present, your insurance may not cover the newer biologic treatments; however, patients weigh the benefits and often decide to self-pay for their procedure. You should keep in mind that the costs for orthobiologic procedures are often less than the co-pay for many surgical treatments and insurance does cover some specific orthobiologic procedures that have a longer track record.

Does this treatment always work?

There are no promises that an orthobiologic procedure will always work, but keep in mind that no medical treatment has full assurance. Orthobiologics are new and evolving, and researchers are studying the results, but only time from long-term follow-up with patients can tell the true usefulness of the treatments. PRP is the most studied orthobiologic therapy because it has been around the longest. Long-term studies, by definition take time; therefore, it will be years before we know how effective these therapies are. Having a detailed discussion with your physician can help you to understand the process and the specifics as it applies to your problem.

A word of caution

You may have heard or read about cells regrowing or regenerating tissue; however, many of these experiments have been successful in the lab but not in the human body. There is still much to learn. While orthobiologics is an evolving field with many exciting potentials, the basic science must be merged with clinical outcomes. And as with all medical studies, clinical results take time; therefore be wary when you hear a lot of hype about breakthrough treatments that do not have clinical studies to back it up.

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Odontoid Fractures

The odontoid process is a unique peg-like bony structure of the C2 (second cervical) vertebra in the neck that physicians sometimes refer to as the dens (**Fig. 1**). Odontoid fractures can happen at any age, but the injury occurs most often in adolescents or older patients. In young people, the injury typically happens during a high-trauma event, such as a motor vehicle accident, but for older patients, it can occur during low-energy trauma, such as a fall. These fractures can alter the biomechanics (movement) of the cervical spine leading to pain, neurologic problems (numbness in the back, legs, and arms), and decreased stability. Sometimes these fractures are missed or left untreated, and they can be associated with increased morbidity (disease) in older patients. Overall, odontoid fractures are the most common fracture of the C2 vertebra and can account for up to 15% of all cervical spine (neck) fractures.

Anatomy

The second cervical vertebrae, also known as C2 or the axis, in the spine develops from a fusion process by the age of 12. At maturity, the C2 vertebra consists of the odontoid process and the body. The blood supply to C2 is from branches of the internal carotid artery (a main artery in your neck) and vertebral (spine) artery with limited

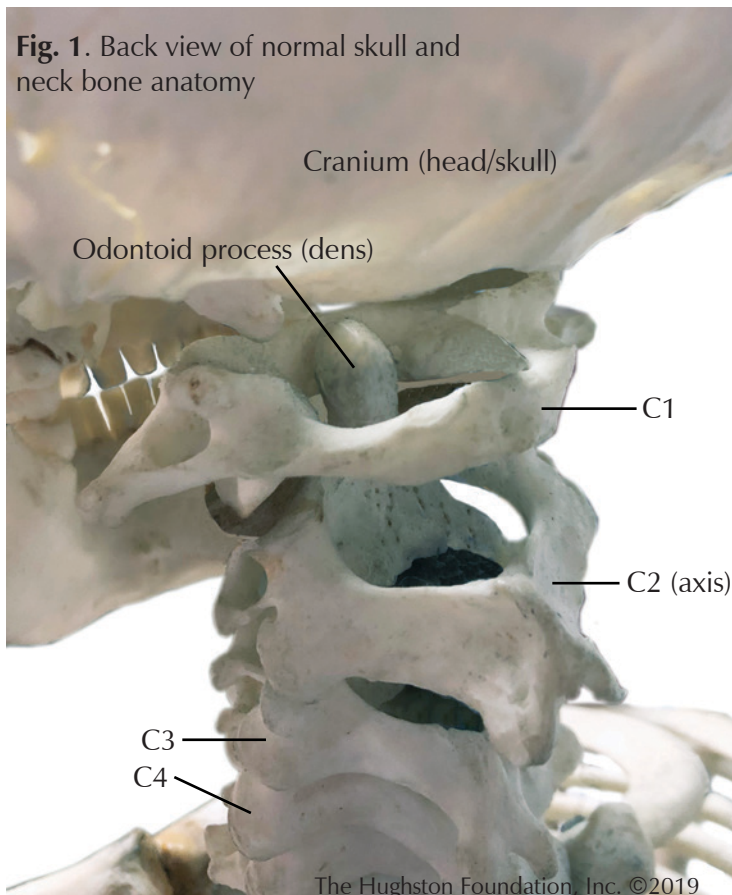
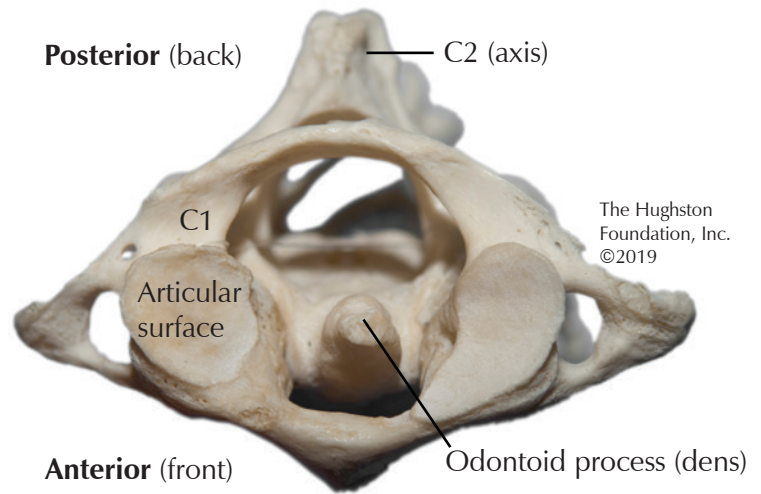


Fig. 2. Top view of normal neck bone anatomy



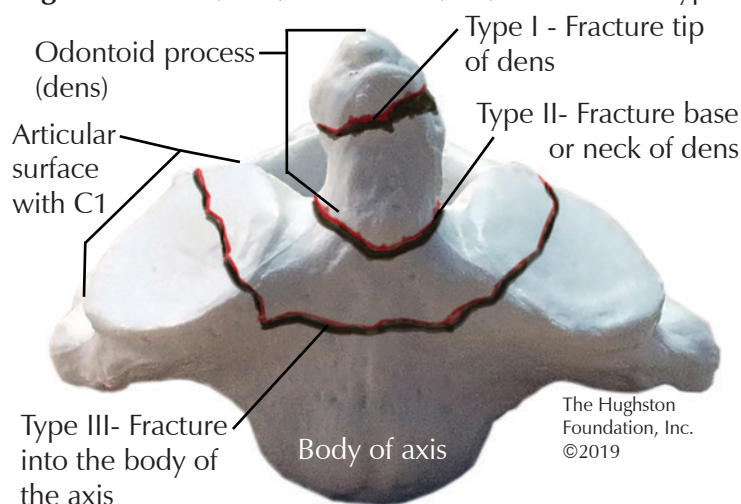
blood supply in a portion of the odontoid, also known as a watershed area. The joint between C1 and C2 is unique in that it allows more movement than the other spinal joints. The dens is the size of your small finger tip, and it sticks up from the front of the C2 vertebra and fits into a groove in the C1 vertebra (**Fig. 2**). The odontoid process is the pivot for the C1 vertebra, which carries the cranium (head). Together C1 and C2 create the joint for side-to-side and up-and-down movement of the head.

Classification of injury

Physicians use a 3-type classification system to diagnose and treat odontoid fractures (**Fig. 3**). With a Type I fracture, the tip of the dens is broken. Type I fractures are usually stable (does not move out of its normal position and alignment), causes pain, but does not create any neurologic problems, such as numbness in the back, legs, and arms. Type II fractures occur at the mid-portion (waist) of the odontoid and are known to have a high nonunion (a fracture that does not unite or heal) rate due to the watershed blood supply. Additionally, Type II fractures are often the least stable of the odontoid fractures; therefore physicians use further classification categories for Type II fractures (A, B, and C types). Type III fractures involve the lower portion of the C2 body at the C1 and C2 articulation.

An associated condition in the same region is an Os odontoides (the dens fails to fuse to the rest of C2 during development), that may be mistaken as a fracture of the odontoid. This condition is typically benign and management consists of continued observation. There are differing opinions on the clinical importance of these findings; however, physicians believe they are due to an old trauma or from the odontoid not completely fusing during maturation.

Fig. 3. Anterior (front) view of C2 (axis) with fracture types



Symptoms

Patients with odontoid fractures can present with a variety of symptoms. Often, patients complain of neck pain and stiffness that is exacerbated during neck movement. Difficulty swallowing, also known as dysphasia, is another common finding and can be associated with bleeding from the fracture site leading to a hematoma (blood collection). In rare instances, patients will have myelopathy (spinal cord injury) symptoms which may include abnormal reflexes, imbalance, and dexterity problems. Patients with neurological symptoms may complain of weakness in the hand and upper extremity and altered sensation.

Screening and diagnosis

When there is suspicion of an odontoid fracture, the first screening involves a series of radiographs. These x-rays include an anteroposterior (front to back) and lateral (side) view of the cervical spine. Physicians sometimes order a specific radiograph, known as the open-mouth odontoid view, to visualize the fracture. Additional radiographs may include cervical flexion (bending) and extension (straightening) views to assess for any instability. Advanced imaging can include a computed axial tomography study (CT scan uses x-ray and computer technology), CT angiogram (CT scan using injection of contrast material), or magnetic resonance imaging (MRI test that shows bones, muscles, tendons, and ligaments). A CT scan helps the clinician better visualize the fracture and assess for any instability. A CT angiogram allows the orthopedic surgeon to assess the location of vascular structures, including the vertebral artery. Localizing the anatomy and variations of the vertebral artery will be vital for surgical planning. The orthopaedist may order a MRI if neurologic symptoms are present and continue to persist, allowing the clinician to evaluate the spinal cord for damage and other soft tissue abnormalities.

Nonsurgical treatment

Orthopaedists determine management options depending on the severity of the fracture and other associated injuries and recommend either nonoperative or operative treatments. Observation and nonsurgical management may be ideal for patients with an Os odontoideum without instability or neurologic symptoms. Other nonoperative modalities include a hard cervical brace or halo vest immobilization. In general, physicians recommend these in stable odontoid fractures, in patients who are not surgical candidates, and in young patients with no risk factors for nonunion. Physicians usually prescribe hard cervical collars for most Type I fractures and often for Type II fractures in patients who are not able to have surgery. Additionally, physicians advocate using halo vest immobilization in Type II fractures in young patients without any risk factors that would predispose them to nonunions. Of note, halo vest immobilization is contraindicated (undesirable or improper treatment) in older patients because of high complication rates.

Surgical treatment

Orthopaedists recommend operative management for the majority of Type II and Type III odontoid fractures. Surgeons perform the surgery through different approaches including anterior (front), posterior (back), and transoral (mouth). Depending on the fracture pattern and associated injuries, the surgeon may perform a combination of these approaches to achieve the desired outcome.

Complications

With odontoid fractures, the most common complication and the most serious is a nonunion of the bones that can lead to an increased mortality rate. The risk factors include significant displacement of the bone, the angle of the fracture line, the spacing between the bones, and comminution (breaks in more than 2 pieces). Nonunions are more likely in Type II odontoid fractures, people older than 50, and those who delay treatment. Additionally, patients who use tobacco are at a higher risk for nonunions.

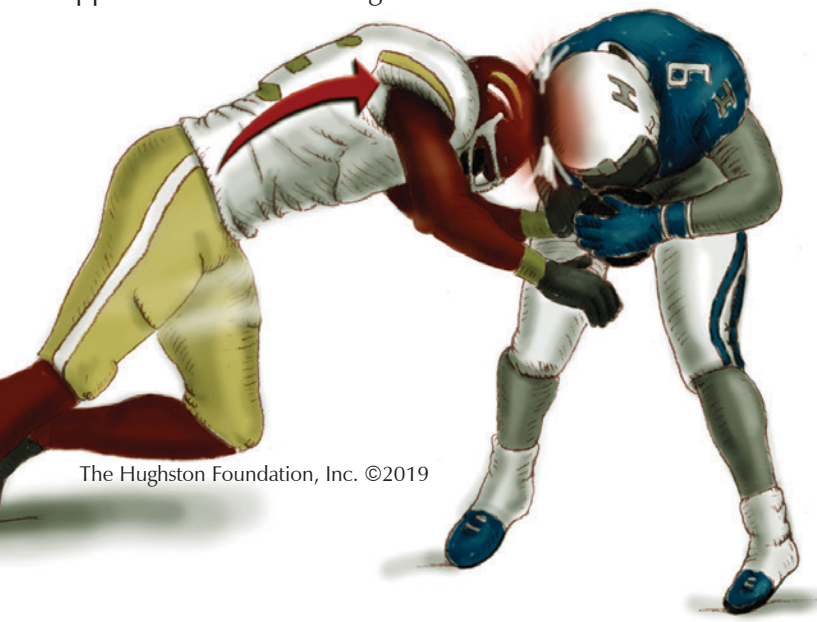
Rest assured

Odontoid fractures are not an uncommon injury of the cervical spine; therefore, you should seek care from an orthopaedic physician who specializes in the spine to ensure proper diagnosis and treatment. Every patient and odontoid fracture is unique, but rest assured that your orthopaedist will treat you with all variables in mind to obtain the best outcome.

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Concussion Awareness & Education

Fig. 1. The momentum of a person hitting a stationary object forces the brain to move in the opposite direction causing a concussion.



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A concussion is a mild traumatic brain injury that results from a blow or sudden movement to the head, neck, or body that causes the brain to shift or shear inside the skull (**Figs. 1 & 2**). This movement of the brain can cause bruising which results in various temporary chemical changes inside the brain which cause the brain to function improperly. A misunderstanding in the past is that loss of consciousness occurs with every concussion. This is a myth. Additionally, we cannot see a concussion on medical imaging such as computed axial tomography study (CT scan uses x-ray and computer technology), or magnetic resonance imaging (MRI test that show bones, muscles, tendons, and ligaments) unless it is accompanied by other physical damage or injury to the brain, such as a hematoma (bleeding in the brain).

Signs, symptoms, & red flags

Sometimes the signs and symptoms of a concussion occur immediately after an impact, while others can take minutes, hours, or days to appear (**Box**). Common signs and symptoms of a concussion that are reported by the athlete are headache, dizziness, nausea, sensitivity to light and sound, ringing in the ears, problems with balance, vision, concentration, and memory. Some athletes may report feeling slowed down, sluggish, or “just not feeling right.” A certified athletic trainer (ATC), parent, or coach may witness the signs and symptoms, such as the athlete appearing dazed, stunned, or confused, losing balance, increased irritability, severe mood changes, or loss of consciousness.

In addition to common signs and symptoms, it is vital to be aware of danger signs or “red flags” when an athlete receives a hit to the head or body or is diagnosed with a concussion. Danger signs include repetitive vomiting; extreme and worsening headache; loss of consciousness; becoming more confused, irritated, or restless; having convulsions or seizures; difficulty walking or talking; weakness, numbness, or tingling of the neck, arms, or legs; and vision problems. If the athlete displays or reports any of these danger signs, contact your certified athletic trainer and immediately refer the athlete to an emergency department for further evaluation.

Box. Signs and Symptoms of a Concussion

Signs observed by staff:

- Appears dazed or stunned
- Confused about assignment
- Forgets plays
- Is unsure of game opponent
- Moves clumsily
- Answers questions slowly
- Loses consciousness (even temporarily)
- Shows behavior or personality changes
- Forgets events prior to hit (retrograde amnesia)
- Forgets events after hit (anterograde amnesia)

Symptoms reported by athlete:

- Headache
- Nausea
- Balance problems
- Dizziness
- Double vision
- Fuzzy vision
- Sensitivity to light or noise
- Feeling sluggish
- Feeling foggy
- Change in sleep pattern
- Concentration problems
- Memory problems

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The importance of recognizing & reporting a concussion

It is crucial to report a concussion or suspected concussion to a coach, parent, athletic trainer, or physician. Youth and pediatric athletes take longer to recover from concussion and are more susceptible because their brains are still developing. Although concussions are not generally life threatening, they can become life threatening if they go unreported and the athlete experiences additional blows to the head or body. Second-impact syndrome is a life-threatening condition that can occur when an athlete sustains a second concussion before the first concussion has completely healed. Severe and permanent brain damage can result due to swelling in the brain from the second impact. This is why it is extremely important to report concussion signs and symptoms to your coach and ATC as soon as they arise and if they return at any point during the progressive return-to-play process.

Individuals who have sustained a concussion may experience post-concussion syndrome, which is characterized by having prolonged symptoms. The symptoms can last from several weeks to several months after the initial concussion. However, there has been no evidence that shows a relationship between the severity of concussion and post-concussion syndrome.

What should I do at home?

If you or your child are diagnosed with or are suspected of having a concussion, there are several home instructions and precautions to consider. Physical and mental rest is the best way to facilitate recovery from a concussion. Symptoms that are present at rest will be worsened when brain and body activity are increased, so the individual should rest as much as possible so the brain can have time to heal. Avoid exercise, physical activity, and driving while still experiencing symptoms. Avoid any activity that makes symptoms worse, such as excessive screen time (TV, cellphone, video games), and loud music. Resting and refraining from activities that worsen symptoms will result in optimal recovery time. Avoid taking anti-inflammatory medications, such as aspirin, Aleve®, ibuprofen, or Advil®. It is safe to take the recommended doses of acetaminophen, such as Tylenol® to help control pain and headache.

Safely returning to sport & activity

Local high schools may employ an athletic trainer full time or have one onsite for certain home events. ATCs

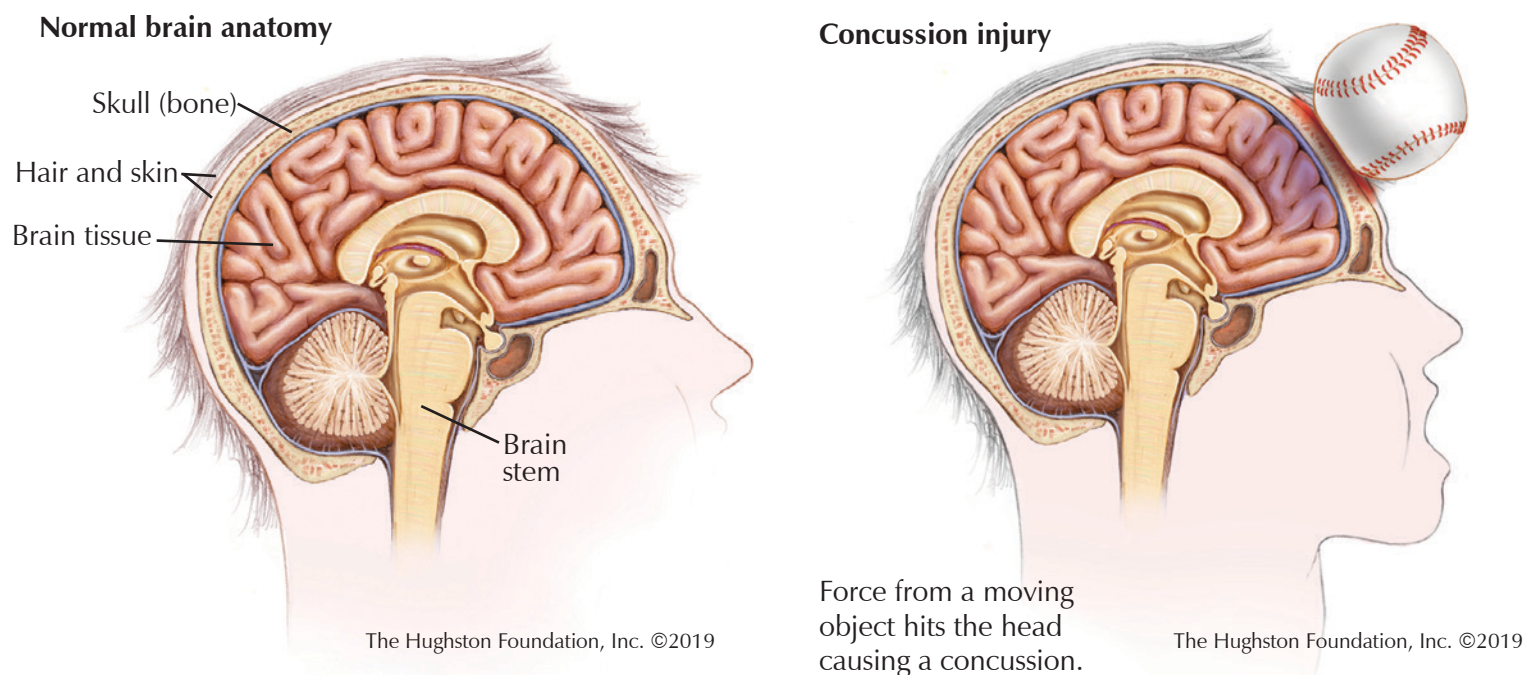
are allied healthcare professionals trained to recognize, evaluate, and diagnose a concussion as well as lead an athlete through the standard progressive return-to-play protocol. The 6-step protocol follows a progressive exercise approach that begins with light physical activity and ends when the athlete is able to participate in full-contact practice of their sport. The athlete only completes one step per day while the ATC monitors for any return of symptoms. The ATC will only permit the athlete to return to their sport or activity, even with physician clearance, once they have successfully completed the progressive return-to-play protocol.

Concussion testing

Some schools use ImPact® or similar software, which is a computerized testing program that measures signs and symptoms, memory, reaction time, and concentration. Athletes take the computerized baseline test prior to the beginning of the season in order to compare post-injury test scores to baseline scores when an athlete is suspected of having a concussion. Overall, the most important aspects of concussion management is for everyone in the athletic community to understand concussions, report signs and symptoms to the appropriate individuals, and returning to sport using a progressive activity approach only after the concussion has healed.

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Fig. 2. The brain before and after a concussion injury.





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