Hughston Health Alert

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Fig. 1. Knee pain associated with osteoarthritis (above) and injection of fat tissue into affected joint (below)

Lipogems: New Advances in Orthopaedic Treatments

QUESTIONS FOR A SPECIALIST

What is Lipogems?

An FDA cleared system, Lipogems is used by physicians to treat patients who experience pain and swelling from an array of orthopaedic conditions and injuries (**Box**). This sterile medical device and closed-loop processing system is used by physicians to remove adipose (fat tissue) from a patient's body and then transfer it via an injection into the patient's injured or diseased joint or soft tissue.

Why not use bone marrow instead?

Your own fat is loaded with reparative cells that can assist with healing orthopaedic conditions that affect your joints, ligaments (tissues connecting 2 bones), tendons (tissues connecting muscle to bones), and muscles (**Fig. 1**). The Lipogems procedure uses fat because it has regenerative properties that can help heal soft tissues or cushion a joint, which may delay a more traumatic treatment, such as total joint replacement. In fact, fat has a great number of reparative cells, they are easier to get to, and the procedure is more comfortable for patients, especially when compared to harvesting bone marrow.

Box. Some injuries and conditions treated with Lipogems:

- Joints affected by osteoarthritis
- Rotator cuff tears and labrum tears of the shoulder
- Meniscal (cartilage) tears in the knee
- Stiffness of the shoulder
- Multiple painful joints treated during a single setting
- Sports or overuse injuries to the muscles, tendons, and ligaments, such as tennis elbow, plantar faciitis, and quadriceps and patellar tendon tears

How is the procedure performed?

The entire Lipogems procedure usually takes less than an hour and is performed in a hospital or doctor's office using local anesthesia. The physician makes a tiny puncture through your skin to harvest a small section of fat from your midsection. The physician then processes the collected fat in the Lipogems device using a sterile saline solution. This occurs through a very gentle process called micro-fragmentation, during which your fat is washed, rinsed, and resized into smaller clusters while maintaining the natural beneficial properties of your fat. The system removes blood, inflammatory cells, and fatty oils, leaving only the desirable concentrated fat. Next, the physician injects the resulting cells into the treatment site. The reason why it works is that the cells inside your own fat stay intact and act harmoniously in the body to repair, cushion, and support the tissue while it heals.

What are the benefits of the procedure?

The procedure is minimally invasive, only takes about an hour, and can boost healing after a surgical procedure or physicians can use it as a stand-alone treatment to encourage soft tissue healing. It can also be used to cushion the joint because the fat tissue tends to stay together; therefore, it can be used as a procedure that delays the need for total joint replacement. This is especially useful for patients who are young and want to delay a total joint replacement to avoid a later need for revision surgery. Additionally, multiple joints can be treated 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.

Who will benefit from Lipogems treatment?

Lipogems can provide relief if you suffer from an injury or ailment that limits your normal daily or physical activity, or if you have a soft tissue defect or tear in your tendon, ligament, or a muscle. If you had other treatments such as physical therapy, NSAIDS, or steroid injections that did not provide significant or long-lasting relief, Lipogems may be a viable solution. You may want to try Lipogems if you would like to explore a minimally invasive alternative to a major surgical intervention. Presently, insurance does not cover Lipogems as well as other new biologic treatments offered today; however, patients have weighed the benefits and have decided to self-pay for the procedure. Lipogems is not suitable for everyone. Your doctor will determine if the 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. Whether you are a young athlete participating in high school sports or a weekend warrior, most athletes want a faster return to sports. It also offers an alternative for athletes who do not want a more extensive surgery that requires longer recovery. Using Lipogems during tissue repair surgery, such a meniscus or labrum repair, can promote healing after surgery.

Many patients suffering from orthopedic 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 an individual's own fat tissue to help them heal is appealing, especially since 1 treatment is usually all that is needed.

Does this treatment have side effects?

The risk of side effects exists for most medical treatments and Lipogems is no different. Rare, but possible, complications caused by the fat transfer 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). Additionally, you can experience a blood clot at the treatment or donor site, changes in sensation, calcification, discoloration, an indentation in the area of the tissue harvest, scar tissue, and unsatisfactory results that may necessitate additional procedures.

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

Return to work and activity restrictions will be dependent upon your treatment and the specific activities you typically do; however, patients often begin to notice an improvement in reduced pain and increased function within 2 to 8 weeks following the procedure. Depending on the harvest and injection sites, your physician may restrict high-impact and strenuous activities for a couple of weeks. Lipogems is often a chosen treatment because it allows the patient to return to work without much loss of time. Most patients are able to return to their normal activities within 1 to 2 months. The recovery from the procedure is minimal when compared to a more invasive surgery.

Whether Lipogems is used as a simple nonsurgical option or part of a surgical procedure, the physician and patient can decide what fits best with their lifestyle and current medical situation. Adding the Lipogems procedure as a treatment option has given patients another choice when it comes to managing their orthopaedic condition. Ultimately our goal is to get the patient back to living life and spending time doing the things that they love.

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Can Children with Seizure Disorders Participate in Organized Sports?

Approximately 1 out of every 2,000 children suffer from a seizure disorder. Because seizures can strike at any time and frequently cause a change in consciousness, falls, bladder incontinence, tongue biting, and muscle soreness, they are often associated with depression, anxiety, and low self-esteem. Finding ways in which a child with a seizure disorder can participate fully in life's every-day activities can foster a better sense of well-being and improve opportunities for success.

What is a seizure?

A seizure is an abnormal electrical discharge in the brain. The brain contains billions of nerve cells called neurons. These neurons produce electrical impulses to send messages to other cells in the body; for instance, when you move your left arm, a subset of neurons in the brain that are responsible for left arm movement send electrical impulses down through the spinal cord and out to the muscles that control your left arm. When the brain records a memory, neurons responsible for storing the new experience are electrically activated in the area of the brain responsible for memory storage. Likewise, there are neurons constantly discharging electricity to control heart rate, breathing, and blood pressure. Because the brain is responsible for every aspect of who we are—consciousness, sleeping, thinking, moving, sensing, etcetera—an electrical "short circuit", called a seizure, can present itself in a variety of ways based on where in the brain the abnormal discharge occurred.

Why do some people have seizures?

Any brain can have a seizure, but some brains are more prone to have seizures than others. Generally, a person has epilepsy if he or she has more than 1 seizure. Many people with epilepsy are born with microscopic abnormalities that cause "short circuits" producing seizures. Others are born with normal brains that are injured by car accidents, falls, stroke, or infection. The risk of seizure and subsequent epilepsy increases if these injuries or abnormalities are located in places where neurons are present.

How can a person with epilepsy decrease the risk of a seizure?

Placing additional stress on the brain can increase the risk of seizures. Some of the stresses are unavoidable, such as a woman's menstrual cycle or becoming ill; however, many potential seizure triggers are manageable. For people who are at risk for seizures, physicians recommend the following:

- Get adequate sleep every night
- Treat fevers aggressively with appropriate doses of acetaminophen
- Get extra rest when feeling ill
- Take anti-seizure medication as prescribed
- Avoid medications that interfere with anti-seizure medication. Read the labels.
- Avoid alcohol

What about sports participation?

Any person with a chronic illness has to alter his or her lifestyle to some degree. The diabetic must avoid sweets. The asthmatic needs to carry an inhaler. Food allergy sufferers must remain vigilant about every item eaten. However, it is important not to limit activity or restrict lifestyle preferences if the associated risks, related to the underlying health problem, can be acceptably managed. Allowing a person with chronic illness to function as independently and as normally as possible is the overall goal. We use the term "acceptably managed" carefully, as each person and his or her loved ones must determine how much risk is acceptable. In the case of epileptics (seizure sufferers), activities that carry minimal risk should not be restricted.

While there are scientific studies that indicate that vigorous sport participation can increase the risk of seizures, other large studies demonstrate the additional risk is quite small. Therefore, the decision about sports participation should not be based on whether a sport increases the risk of seizures, but rather how often the child in question has a seizure and how much injury would be risked if a seizure occurred during participation. For instance, a child participating in most aspects of track and field has little more chance of injury than having a seizure in the classroom, home, or shopping center. Healthy or unhealthy, anyone in the pool should have a person who is attentive and able to help in an emergency. Yet, if a child were having frequent seizures, it would not make sense to put him or her in a position where an urgent rescue would likely be needed. Because driving is the ultimate danger, it is probably unreasonable to restrict sports participation in an athlete who has enough seizure control to drive legally.

When thinking about contact sports, where head trauma is commonplace (football, soccer, boxing, etc.), it does not make sense for anyone to participate. We know that sports like these are unhealthy for the brain. None of us are so overly gifted that losing brain cells from concussion is acceptable. Yet, a person with seizures likely has very little extra risk from participating. Therefore, the decision for a well-controlled epileptic to participate should not be based on the risk of seizure, but rather the overall risk of further damaging the brain by heading the ball, tackling hard, or taking a roundhouse punch to the head. While participating in sports is likely to be acceptable in most reasonably controlled epileptics, the athlete should attempt to remain adequately hydrated, obtain reasonable rest, and have access to his or her normal dosing of anti-seizure medication.

What should you do when a seizure occurs?

- Remain calm.
- Lay the patient on his or her left side, away from objects that can cause injury.
- Do not perform CPR - this is not a heart attack.
- Do not put anything in the patient's mouth - A person cannot swallow his or her tongue.
- Time the episode. If it lasts more than 5 minutes, call 911.
- Observe the patient as the seizure ends to make certain he or she remains safe. However, most sufferers are confused after a seizure and do not want to be hugged or touched.
- Stay with the patient until he or she has fully recovered.

Most sporting opportunities should be open to people with well-controlled seizures if the harm that can occur during a seizure is reasonable. For people with less well-controlled seizures, it is not just the physical risk of having a seizure that should be considered, but also the emotional toll it can take on a fragile ego to have an uncontrolled event in the midst of a crowd. It may make more sense for this type of epilepsy sufferer to participate in sports with small gatherings; in safer environments, where close oversight is possible. The patient and family should discuss these issues when making decisions about sports participation. Once potential problems are identified and appropriate allowances are made to mitigate these issues, it should be possible for most seizure suffers to participate safely in a variety of sports and activities.

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Rhabdomyolysis

Physicians first described rhabdomyolysis in the medical literature during ancient times; however, in our modern era, a notable number of cases were reported during World War I and II in soldiers who sustained crush injuries from bombings and trench collapses. Rhabdomyolysis is a condition that results when damaged muscles release toxic muscular contents (fluids) into the bloodstream. In healthy skeletal muscle, each muscle fiber is enclosed in a thin membrane that controls a number of pumps that regulate and maintain the electrolyte concentration inside and outside the cell. Electrolytes are minerals—the 4 basic are magnesium, calcium, sodium, and potassium—in your blood and other body fluids that carry an electric charge. The proper balance of electrolytes and other nutrients provided by normal blood flow allow muscles to contract and relax in response to nerve stimulation. Any direct or indirect injury to the membrane can cause damage and the breakdown of muscle cells, resulting in toxic muscular contents to leak into the body's circulation (**Fig**).

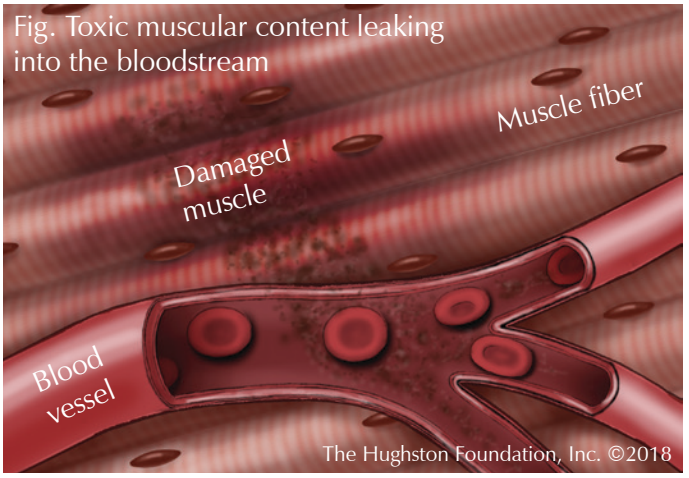

Fig. Toxic muscular content leaking into the bloodstream

What causes rhabdomyolysis to occur?

You can develop rhabdomyolysis from muscle damage in a number of ways, but the most common causes are trauma that leads to muscle compression and crush-type injuries, muscle overexertion from excessive exercise, and the abuse or overuse of drugs, alcohol, and certain medications (**Table**). Regardless of the cause, the results of a muscle injury can cause a cascade of events that leads to the release of toxic muscle byproducts into the bloodstream that not only affects your muscles, but also your organs and the rest of the body. In a crush injury—for example when a patient is trapped in a car or collapsed building—muscle dies when the blood flow is cutoff. When the compression is relieved, fluids from the damaged muscle are released into the bloodstream.

Table. Causes of Rhabdomyolysis

Physical Factors
- Trauma
- Exertional
  - Overexertion in untrained athletes
  - People with sickle cell disease
- Muscle compression
  - Crush injuries
  - Tight dressings, splints, and casts
  - Tourniquets
- Third degree burns
- Immobilization
- Electrocutions
- Ischemic limb

Drugs
- Alcohol
- Recreational drugs
  - Cocaine
  - Amphetamines
  - CNS depressants
  - Ecstasy
  - LSD
- Anesthetics
- Medications
  - Statins
  - Cyclosporine
  - Itraconazole
  - Erythromycin
  - Colchicine
  - Zidovudine
  - Corticosteroids

Infections
- Viral, bacterial or fungal

Metabolic and Endocrine Causes
- Diabetic ketoacidosis
- Electrolyte abnormalities
- Hypothyroidism
- Thyrotoxicosis

Other
- Neuroleptic malignant syndrome
- Malignant hyperthermia
- Polymyositis
- Dermatomyositis
- Hypothermia
- Snake bites
- Heatstroke
- Multiple genetic causes

Additionally, excessive or intense exercise beyond the extent of a person's physical limits can cause exercise-induced rhabdomyolysis. The primary factors that tend to worsen this condition include the level of physical fitness, the intensity, and types of exercise. Exercise-induced rhabdomyolysis tends to occur in individuals who are poorly conditioned, during long durations of exercise, in high humidity and temperatures, and during excessive exercise while taking drugs or drinking alcohol. Physicians have treated exercise-induced rhabdomyolysis in military recruits, and participants of marathons, triathlons, soccer, crossfit, weight lifting, and numerous other sports.

Another cause occurs during prolonged immobilization from anesthesia, coma, or drug- or alcohol-induced unconsciousness when unrelieved pressure on a gravity-dependent body part is present. There are multiple reports of a person developing rhabdomyolysis from drug or alcohol induced comas in which their arm or leg was compressed against a firm object or another body part which decreased blood flow to the extremity for multiple hours causing muscle damage.

Symptoms

Symptoms of rhabdomyolysis can vary depending on the extent of your muscle damage; however, the classic symptoms are severe muscle pain with weakness to the point you will have trouble moving your arms or legs, and you may experience dark red or brown urine or decreased urination. Additionally, local symptoms around the injured area can include muscle pain, weakness, swelling, extreme soreness, stiffness, cramping, bruising, and tenderness. You can also experience an overall sickly feeling with fever, abdominal pain, nausea, and vomiting. Occasionally changes in mental status, such as confusion or loss of consciousness can occur.

Diagnosis

Physicians use laboratory tests that detect excess muscle proteins and enzymes in the blood and urine to diagnose rhabdomyolysis. A careful history and physical exam may reveal the underlying cause or at least aid in the selection of the most appropriate diagnostic workup.

Complications

Complications from rhabdomyolysis can be numerous and severe. As the toxic fluids pour into the bloodstream from damaged muscle tissue it can affect not only local tissue but also organs throughout the body. More locally, compartment syndrome can occur when increased pressure builds up within a muscle compartment resulting in decreased oxygenation to the local tissues. Irregular heartbeats and even cardiac arrest can occur from electrolyte dysfunction as well. For example, a patient may experience high levels of potassium in the blood, which can cause an irregular heartbeat. Muscle byproducts can also cause liver dysfunction, which occurs in approximately 25% of rhabdomyolysis cases. Other complications include increased blood clotting, low blood pressure, and shock. Kidney failure is also one of the most serious complications in the days following the initial presentation of rhabdomyolysis. Permanent kidney injury and even death can occur as a result in very severe cases.

Treatment

After muscle damage has occurred, the main treatment of rhabdomyolysis includes aggressive fluid resuscitation (IV fluids) to avoid kidney injuries. Once in a hospital setting, aggressive fluid resuscitation will continue along with a careful history and physical exam to identify and manage any complications. Management of complications can include cardiac monitoring, medications to correct electrolyte imbalances and irregular heartbeats, surgery to alleviate elevated pressures in an extremity, physical therapy, close monitoring of kidney function, and use of dialysis in severe cases of kidney injury.

Recovery

Recovery from rhabdomyolysis varies and depends on the degree of muscle damage and the specific complications that occurred. If the condition is recognized and treated early, you can avoid most major complications and expect a full recovery. Recovery from exercise-induced rhabdomyolysis, with no major complications, can take several weeks to months for the patient to return to exercise without recurrence of symptoms. More severe complications, such as those often seen in compartment syndrome, can result in multiple operations, months of rehabilitation, and permanent disability. Additionally, the kidney dysfunction that results from rhabdomyolysis often resolves, however, if you experience severe kidney injury it can result in permanent damage and a need for long-term treatments, perhaps even dialysis.

Prevention

Prevention is geared toward avoiding what causes rhabdomyolysis; but you can only avoid what you have control over. You cannot always prevent an accident or injury; however, you do have control over exercise-induced rhabdomyolysis. Exercise-induced rhabdomyolysis can be prevented by initiating a gradual training program with sufficient recovery time included, avoiding extreme exercises, preserving fluid balance, and not exercising in high heat and humidity.

A rare condition

Luckily, rhabdomyolysis is a rare condition, especially since it can have serious and long-lasting complications. While you cannot always avoid an injury, patients can steer clear of the complications by minimizing the risk factors that they can control. If a crush injury occurs or if you experience the symptoms of rhabdomyolysis, the best results will come if a physician promptly identifies and treats the condition.

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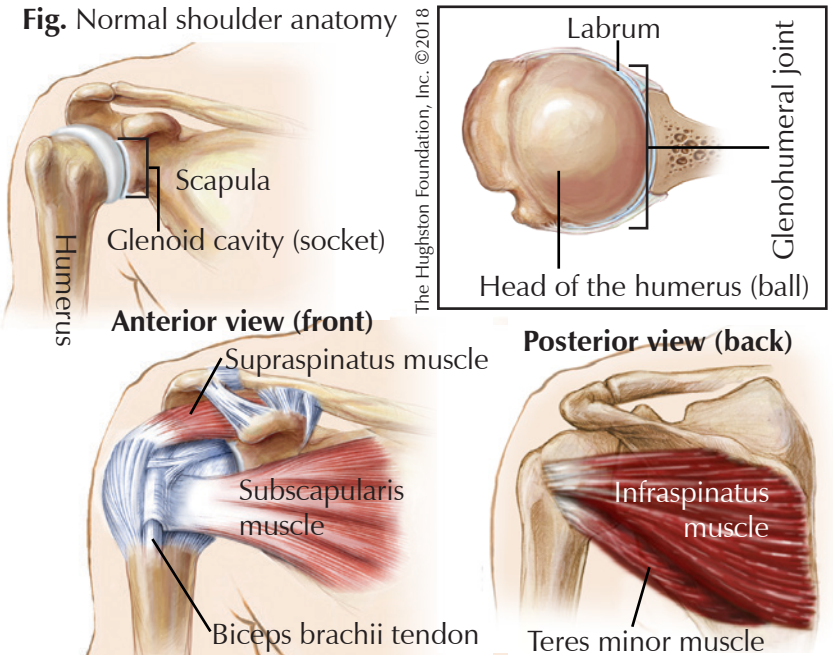
Swimmer's Shoulder

The shoulders produce 90% of the driving force that propels the body through water, which explains why the most common musculoskeletal complaint in swimmers is shoulder pain. The term "swimmer's shoulder" includes a number of painful overuse injuries that often correlates with a sudden increase in training or using poor swimming techniques. Because there are various parts of your shoulder in action during the swimming stroke, you may injure and experience pain at any single or multiple sites about the shoulder. Pain can be the result of 1 or more conditions, such as reduced shoulder stability, muscle or tendon (tissue connecting muscle to bone) strains, nerve irritation, or sprains from stretching or tearing ligaments (tissues connecting bones).

Anatomy

The glenohumeral joint, or shoulder, is a ball-and-socket joint formed by the head (ball) of the humerus, or upper arm bone, with the glenoid cavity (socket) of the scapula (shoulder blade). The shoulder cavity is shallow, which reduces the amount of contact between the bones. This provides increased freedom of motion at the expense of stability. However, the glenoid labrum, a ring of cartilaginous fiber that lines its circumference, deepens the cavity by about 50%, allowing for more surface contact, a better fit, and added stability. In addition, the joint capsule and its ligaments (tissues that connect bone to bone) provide some added stability. The glenohumeral joint is also known as a muscle-dependent joint. It is primarily stabilized by the biceps brachii, or muscle on the anterior (front) side of the upper arm, and the tendons of what are called the rotator cuff muscles. The rotator cuff is made up of 4 muscles, which work together, to help keep your shoulder centered in the socket during motion. These include the subscapularis, supraspinatus, infraspinatus, and teres minor muscles. Each of these muscles originates from the scapula and has a tendon that attaches to the head of the humerus (**Fig**).

Fig. Normal shoulder anatomy



Diagnosis

Identifying the source of pain in swimmer's shoulder is crucial to obtaining the correct diagnosis and best treatment. Your physician will look for the characteristics of your discomfort, such as the location, radiation, timing, and position of pain, as well as the type of swimming stroke used and if you have had any changes in training. Additionally, a thorough health history is essential when identifying the source of shoulder pain. Your physician may order x-rays to rule out any abnormal anatomy and magnetic resonance imaging (MRI scan) to evaluate the shoulder's muscles, tendons, and ligaments. If your physician suspects neuropathy (nerve damage), an electromyography (EMG) test that measures the muscle response to a nerve's stimulation may be ordered as well.

Treatment

In general, nonoperative treatment is the primary approach to swimmer's shoulder. Rest and icing the injury and taking nonsteroidal anti-inflammatory medications, such as aspirin or ibuprofen are the initial recommended management techniques. You should rest your shoulder and stop the movement or activity that caused or reproduces your shoulder pain. Apply ice for 20 to 30 minutes every 2 to 4 hours to help reduce the swelling. It may be difficult for you to lift your arm or to sleep; therefore, you may need to wear a sling or have your shoulder taped for support and you may need to sleep in an upright position or use a pillow for added support. Once you have passed the acute phase of inflammation, you should consider modifying your training regime so that it does not aggravate the injury and cause additional pain.

Depending on the severity of your injury, your physician may recommend a corticosteroid injection into the shoulder that helps to reduce swelling and leads to pain relief. Each patient reacts differently, however the injection can relieve the pain and swelling for weeks or months or alleviate the problem altogether.

Another nonsurgical option is a physical therapy program that focuses on both stretching and strengthening exercises to neutralize any uneven muscle strength. During swim training, a muscle strength imbalance and muscle shortening can occur in the shoulder. Strengthening exercises are used to re-establish a muscular strength balance allowing a more synchronized movement of the shoulder. When performing stretches, the athlete must be mindful to include both anterior (front) and posterior (back) aspect of the shoulder as to not create an imbalance that may exacerbate some injuries. Once you have improved motion and muscle coordination, you can begin a gradual return to training.

When nonoperative treatment fails or if your physician has identified a structural problem, you may need surgical treatment. The type of structural problem present will direct surgery. Common injuries that require surgery in swimmers are multidirectional instability, impingement syndrome, and labral tears. For multidirectional instability, the surgeon tightens the soft tissue structures to increase stability of the joint. However, this procedure can decrease motion in the shoulder and may affect athletic performance afterwards. For athletes that fail therapy or injections for subacromial impingement, surgical treatment with removal of inflamed bursal tissue is an option. The recovery is relatively quick as there is no down time for healing of tissue. In those with a labral tear that have failed conservative treatment either labral repair or debridement can be performed. Returning to swimming after surgery varies according to the procedure preformed. The goals and expectations of the athlete should be examined and considered in relation to expectations after surgery.

Dive in

Of all the joints in the body, the anatomy of the shoulder allows for the greatest range of motion. The demands you place on your shoulders during swimming, coupled with the anatomy can lead to a wide range of injuries. If you experience shoulder pain, stop what you are doing and evaluate your technique and posture. Once you give the shoulder a short rest, restart your training slowly so you do not reinjure the joint. If the pain returns, it may be time for you to have the injury evaluated by a physician. After taking a detailed history and physical exam, your doctor can make an accurate diagnosis and start you on a treatment plan. The correct diagnosis will help guide appropriate treatment and ultimately a successful return to sport.

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