

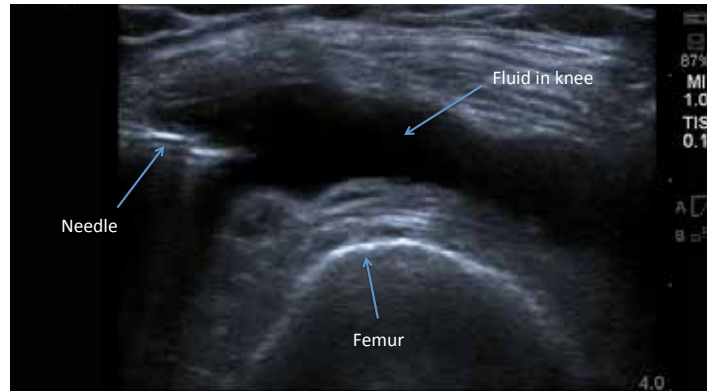
The Benefits of Ultrasound Guided Injections

By Lauren Porras, MD and David Berkoff, MD

Ultrasound, also known as sonography, is an imaging method that uses high-frequency sound waves to produce real-time and dynamic images of the body. Ultrasound is increasingly being used to assist Sports Medicine Physicians, Rheumatologists, Orthopedists, and Primary Care Physicians in performing evaluations and injections of different muscles, tendons, ligaments and joints. With the advancement of this technology, ultrasound machines have become smaller and more portable. This has allowed treating clinicians to be able to use real time, point of care ultrasound, to assist in the diagnosis and treatment of their patients. Although ultrasound is frequently used to identify injuries or abnormalities; it is also used when performing injections into the knee, shoulder and hip.

Injections can be beneficial for both the diagnostic and therapeutic treatment of a variety of problems involving the hip, shoulder, and knee. Typical problems include osteoarthritis, rheumatoid arthritis, labral tears, muscle tears, ligament tears and tendonopathies. Injections have been used in the management of inflammatory and degenerative conditions when rest, ice and anti-inflam-

Knee Joint Injection



matory medications fail to provide adequate relief. The use of ultrasound improves the accuracy of the injection of corticosteroids, hyaluronic acid or other therapies such as Platelet Rich Plasma, Prolotherapy or Stem Cells. Ultrasound can also be used for joint aspirations to rule out joint infection or gout. Lastly, guided injections can be used diagnostically to help determine which structures are generating the patient's pain.

Ultrasound-guided injections allow the practitioner to visualize the needle in real time as it enters the body and traverses to the desired location. This assures that the medication is accurately injected at the intended site. Despite good intentions, even in the most experienced hands, blind (injections performed without imaging) injections are not 100% accurate and in some joints accuracy is as low as 30%-40%. With ultrasound guidance the accuracy of nearly every joint injection exceeds 90% and approaches 100% in many. Additionally, ultrasound guided injections have been shown to be less painful than blind injections. Ultrasound injections also have the advantage of giving "real time" and "dynamic" feedback that the patient and the doctor can see and use immediately. The doctor is able to watch the desired treatment being delivered to the intended target and even visualize surrounding structures both before during and even after the procedure.

Although there are many different types of imaging that can be used to assist with injections, ultrasound has a few distinct advantages.

- 1) Ultrasound has no radiation. Fluoroscopy (a type of real time X-ray) allows the provider to easily visualize the joint making injections easier, however, fluoroscopy is associated with repeated doses of radiation. Additionally with fluoroscopy the providers are unable to visualize surrounding soft tissue structures including tendon, blood vessels or nerves that may be in the path of the needle. This could lead to increased pain or other complications from the injection.
 - 2) Ultrasound allows us to visualize the bony joint as well as all of the surrounding structures. Moving the ultrasound probe the practitioner can visualize what may be in the path of the needle and avoid any unwanted complications before they happen.
 - 3) Ultrasound is able to identify fluid better than conventional radiographs and can see fluid that may have accumulated in and around joints, tendons, muscles, nerves and other soft-tissue structures. CT-guided (or CAT Scan) injections are also frequently used to assist in delivering treatments. With the CT we are able to get a 3-D view of the joint to be injected and can accurately deliver the intended medication, however, these tests come with an increasingly large
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dose of radiation, they are expensive and time-consuming. Ultrasound injections have been shown to be as accurate as these other imaging-modalities with less cost, improved soft tissue visualization and without the associated radiation.

Ultrasound-guided injections have been extensively studied and have been found to have very few complications. The risks associated with these procedures are the same as any type of injection: incomplete reduction of pain, bleeding, damage to surrounding structures and infection. The overall risks for injections are very low and the use of ultrasound guidance may further reduce some of these risks.

Ultrasound is beneficial when performing injections in the knee, shoulder and hip; as well as many other structures throughout the body.

Knee: Ultrasound can help evaluate a variety of structures within the knee

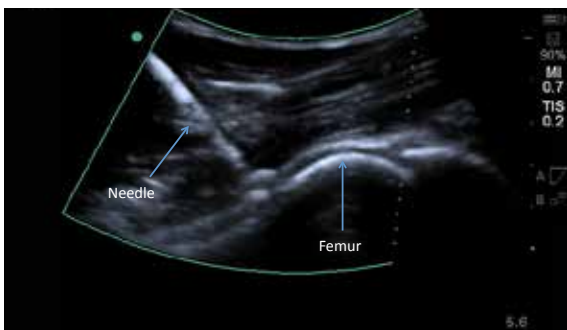
including the quadriceps and patellar tendons, the extra-articular (outside the joint) ligaments, and some meniscus injuries. It can also be used to see if there is fluid within the knee joint. Although knee injections are typically performed without imaging, imaging can be particularly helpful in patients with difficult anatomy or in overweight patients.

Hip: Hip joint injections may be performed for osteoarthritis of the hip and the diagnosis and management of labral tears. Imaging is nearly always used when performing injections into the hip joint due to the deep location of the joint and the proximity of blood vessels and nerves. It is estimated that blind injections are accurate 50% to 80% of the time. Ultrasound allows us to visualize the hip joint, bursa, muscles and tendons surrounding the hip. The use of ultrasound when performing a hip injection increases the accuracy to up to 96%. Whereas in the past, hip injections were mainly per-

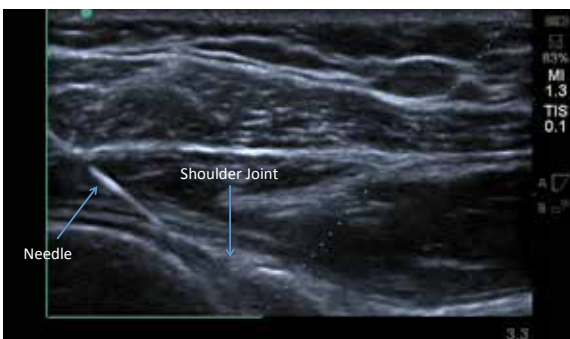
formed using Fluoroscopy, ultrasound-guided injections have become more popular due to its ease of use, lower cost and ease of perform in the office setting.

Shoulder: Studies have shown that Ultrasound of the shoulder is just as sensitive and specific as MRI in the diagnosis of rotator cuff injury. Ultrasound can facilitate the more accurate injection of multiple different structures in the shoulder including the Acromioclavicular (AC) joint, the Glenohumeral joint (the true shoulder joint), the biceps tendon, and the subacromial bursa. All of these can be injected with or without guidance, however, as noted above the accuracy of these injections is significantly improved with the use of ultrasound guidance.

Hip Injection



Glenohumeral Injection



SUMMARY

- Ultrasound allows safe, accurate and inexpensive joint injections with real time visualization of peri-articular soft-tissue structures.
- Ultrasound has several distinct advantages compared to other imaging techniques, such as the lack of ionizing radiation, accessibility, decreased costs to perform and the ability of the treating physician to be able to perform this in real time with their patients watching.

5 Questions to Ask Your Doctor About Sports Ultrasound

By Blake Boggess, DO

1 What is Sports Ultrasound?

Sports Ultrasonography is an imaging technique that utilizes reflected ultrasonic sound waves to obtain images of the musculoskeletal system.

The term "Ultrasound" refers to sound waves that have a higher frequency than what a human can hear.

2 When is it used?

A physician may use sports ultrasound to look for disorders of the following structures:

- Tendons
- Muscles
- Bursae
- Nerves
- Joints
- Cartilage

In addition, ultrasound is used for needle guidance for procedures such as aspiration and injection of bursae and joints.

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3 Are there any side effects?

There are no medical contraindications to the use of sports ultrasound. In fact, it is same imaging technique that is used in obstetrics to evaluate a baby. There has not been any well-documented harmful effects to the fetus from diagnostic ultrasound examination.

4 How can sports ultrasound help?

A physician can use ultrasound during a clinic visit to quickly evaluate a patient and make a diagnosis. The physician would be looking for a tendon tear, fluid in a joint or nerve entrapments, etc. The clinical use of ultrasound is relatively inexpensive and reduces the need for follow up visits after other tests such as an MRI.

When a physician uses ultrasound during an injection, he or she can see exactly where the needle is going for correct placement. Also, the physician can make sure the needle does not go where it is not supposed to such as in a nerve or blood vessel.

Several studies have shown that ultrasound guided procedures are less painful and have better outcomes.

5 What are the limitations of sports ultrasound?

Ultrasound waves do not penetrate bone and so it may show a crack in the cortex of the bone, but ultrasound would not show the extent of the fracture into the bone. A plain X-ray or CT scan would be better test to look at fractures.

Also, ultrasound waves do not penetrate deep into joints to look for tears in structures such as an ACL or meniscus tear. An MRI would be a better test to evaluate this injury.

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Choosing Wisely: Avoid Ordering An Abdominal Ultrasound Examination Routinely in Athletes with Infectious Mononucleosis

By Daren Molina, MD

Choosing Wisely™ is an initiative of the American Board of Internal Medicine and supported by multiple medical societies, including the American Medical Society for Sports Medicine. Each Society was asked to contribute five diagnostic tests or treatments that both physicians and patients should question. The highlight this quarter is the AMSSM's "number two" recommendation:

Infectious mononucleosis (IM) is a common viral illness that is caused by the Epstein-Barr virus, is typically self-limited, and has a peak incidence that occurs in adolescents and young adults. It can be spread easily through saliva and has a long incubation period of about 30-50 days. Severity of symptoms varies greatly and more commonly include: fever, sore throat and fatigue. Other

symptoms that can be seen are rash and jaundice.

Splenomegaly has been noted to occur in 50-100% of patients with IM. Athletes with an enlarged spleen from IM are at risk for rupture, either traumatically or spontaneously. The highest risk of splenic rupture occurs in the first three weeks of illness, but has been documented as *continued on next page...*

Choosing Wisely

An initiative of the ABIM Foundation.

Five Tests and Procedures Physicians and Patients Should Question



far out as seven weeks from symptom onset. The accuracy of physical exam in diagnosing splenic enlargement has been shown to be clinician dependent.

The use of abdominal ultrasound is an excellent, non-invasive method of assessing spleen size in an athlete. Unfortunately, normative values for splenic size in athletes have been notoriously difficult to define. Several studies have shown wide variability in spleen size in athletes making the results of a one-time sonographic measurement during an illness difficult to interpret. Likewise, universal baseline measurements of splenic size for athletes are not feasible.

Therefore, the routine measurement of spleen size by abdominal ultrasound is not recommended as part of the routine management of IM. Return to contact must be individualized and rely on good clinical judgment of the treating physician or sports medicine specialist.



An initiative of the ABIM Foundation

Editor-in-Chief: Jeffrey Bytowski, DO

AMSSM is a multi-disciplinary organization of 2,700 sports medicine physicians dedicated to education, research, advocacy and the care of athletes of all ages. The majority of AMSSM members are primary care physicians with fellowship training and added qualification in sports medicine who then combine their practice of sports medicine with their primary specialty. AMSSM includes members who specialize solely in non-surgical sports medicine and serve as team physicians at the youth level, NCAA, NFL, MLB, NBA, WNBA, MLS and NHL, as well as with Olympic teams. By nature of their training and experience, sports medicine physicians are ideally suited to provide comprehensive medical care for athletes, sports teams or active individuals who are simply looking to maintain a healthy lifestyle. Find a sports medicine physician in your area at www.amssm.org.

COACH'S CORNER

By Corina Martinez, PT, DPT, SCS, LAT, ATC

Last issue we discussed concussions in general. Here we will build on educating coaches to better identify concussions and what information to share with both parents and athletes to safely manage concussions. We also share how athletes should progress through a return to play protocol.



- 1 IDENTIFYING SYMPTOMS.** Concussions may occur after a direct hit to the head or a blow to the body that indirectly shakes the head. Symptoms of a concussion may include headache, dizziness, pressure in head, neck pain, noise/light sensitivity, feeling dazed or foggy, nausea, confusion, personality changes, balance problems or delayed responses. Recognizing these symptoms promptly is important to ensure proper management of concussions.
- 2 ACUTE MANAGEMENT.** If a concussion is suspected, the athlete must be removed from play and may not return to play that day. Symptoms should be monitored and if the symptoms progressively worsen, then the athlete should be taken to the emergency room for further evaluation. Athletes with concussions need to optimize their recovery by limiting cognitive and physical activities that may provoke or prolong their symptoms. Cognitive rest may involve staying home from school, limiting screen time (phones, TV, computers, tablets) and limiting reading activities.
- 3 TREATMENT.** Athletes with concussions should see a physician knowledgeable in concussion management to perform a full clinic evaluation. The physician can help develop a return to learn plan to help the athlete resume school activities without increasing symptoms. If necessary, the physician may refer for physical therapy treatments to help with the resolution of physical symptoms of dizziness or headache. Additionally, in most states, return to play (RTP) clearance must be provided by a physician. One way to find a sports-trained specialist in your area is to go to: www.amssm.org/find-a-doc
- 4 RETURN TO PLAY.** The American Medical Society for Sports Medicine (AMSSM) has published a consensus statement that outlines a standard return to play protocol: [Click here to view consensus statement.](#)
- 5 CERTIFICATIONS.** CDC offers a free online training course for high school and youth coaches available on their website: <http://www.cdc.gov/concussion/headsup/>. Also the American Academy of Neurology provides a Sports Concussion Toolkit on their website which offers resources on concussions for coaches and parents: <https://www.aan.com/practice/sports-concussion-toolkit/>