

We also find US useful for our many patients who have both rheumatoid arthritis and fibromyalgia. When they complain about pain in the joints in their hands we have to determine if pain is secondary to inflammation due to rheumatoid arthritis or if it is another manifestation from fibromyalgia. To determine, we not only use clinical criteria but also we use ultrasound, besides serologic markers for inflammation (ESR and CRP). But, the latter ones are not always elevated and this can make things more complicated. However, if we find Doppler activity, then we can document that pain most likely comes from an active rheumatoid arthritis.

Drs. Black & Chapman:

One of the most useful things about ultrasound from the patient’s perspective is that you are able to actually see what’s going on inside. If a

patient is told, “it’s just a bump, don’t worry about it” that’s exactly what they do is worry about it. Using ultrasound to see things like ganglion cysts and foreign bodies allows us to make accurate and immediate diagnoses. This relieves a lot of stress and worry on the part of the patient.

Would you like to share a case that was especially memorable?

Drs. Black & Chapman:

We had a 28 year old pharmaceutical rep come in once to give us some samples. She was telling us that she had been diagnosed with carpal tunnel syndrome and that she was scheduled for surgery the next week. We used the ultrasound and diagnosed her with tenosynovitis. We gave her an anti-inflammatory and put her in a splint. She came back in 1 week with 90% of her pain gone. She was so relieved. She told us that she had cancelled her surgery.

Dr. Ramos:

An interesting case I had was an older woman who came in with pain in the anterior aspect of her right arm. (She had been moving some furniture that day.) Using ultrasound we detected a hematoma inside the muscle and were able to refer her immediately to orthopedics.

Dr. Nazarian:

One time my daughter injured her foot while running track in high school. I brought my MicroMaxx system home from the office that day and was able to diagnose a stress fracture in her foot.

BUSINESS IMPACT

What has been the impact of US on the business aspects of your practice?

Drs. Black & Chapman:

One of the best things US has done for our practice is that we are able to diagnose so quickly. When the patient is able to point to the area that hurts and you can look directly at the site and make an immediate diagnosis with US, it is very satisfying.

Dr. Ramos:

I know that I am certainly more satisfied and confident about what I am able to provide my patients. I believe the use of ultrasound is truly

“We have recently justified a budget increase for our US service, based on the increased demand.”

Dr. Nazarian

beneficial to my patients and in my experience if you are really in it to help the patients your business will grow.

Dr. Saadeh:

At this point, the US is an important part of our musculoskeletal practice. It is important in intervention because patients who have specific joint complaints can be approached either by the injection of steroids into the joint or doing some specific teasing of the joint. These are specific procedures which are important for the health care and quality care of these patients which we were not able to do without the US.

We really believe that our use of US has improved the quality of care for our patients. And when the quality of care is good, the business will increase. For us, the business impact has been great.

Do you think US helps you retain patients and/or attract new patients?

Dr. Nazarian:

The use of US for musculoskeletal exams and interventions has had an impact. I certainly think it has increased referrals to our hospital, not just for the US, but also for MRI. All of those referrals increase the bottom line for our department. In fact, we have recently justified a budget increase for our US service, based on the increased demand. And I am training some of my colleagues to do musculoskeletal exams and interventions, because currently I am the only one doing them in my department.

Dr. Saadeh:

Our patients love the US. It has certainly attracted new patients to the practice. In 2003 we hired our first US technician to help with exams and our practice is so busy that we now have 3 US techs on staff.

Drs. Black & Chapman:

It is also great to be able to use ultrasound to educate your patients. For example, you can show them and explain, “this is a grade 2 ligament tear and it’s going to take this many weeks to heal”. And if the patient needs physical therapy, you can provide the physical therapist with information that might cut weeks or even months off of their rehabilitation. Gathering diagnostic information and educating the patient and the therapist usually results in better compliance and a faster recovery.

We know that our use of ultrasound helps us to attract and retain patients. We don’t even advertise. People refer their friends and family members to us because they are satisfied with what we provide.

www.sonosite.com/musculoskeletal



Ultrasound training courses available, visit www.sonositelearning.com to register.

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First Hand EXPERIENCE

Beyond injections: expanding the use of ultrasound in the modern MSK practice



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BACKGROUND

Why did you begin using ultrasound (US) and how long have you been using it?

Dr. Nazarian:

As a radiologist, I've been using ultrasound (US) since my residency, but only started using it for musculoskeletal imaging 12 years ago. There are many options for musculoskeletal imaging, but US has a number of advantages over X-ray and MRI. For example, you can get real-time feedback during an examination. If the patient has pain you can use US at that specific site, perform some dynamic maneuvers, and be able to make the diagnosis. There are certain areas where x-ray and MRI can be frustrating, particularly for pathologies that are not present at rest.

Dr. Saadeh:

In 2001, I observed ultrasound being used for musculoskeletal exams and interventions in Europe and it piqued my interest. I was particularly intrigued by what it offers for rheumatoid arthritis patients. These patients present with pain, but bloodwork and x-ray do not show anything. Ultrasound can be used to diagnose these patients as well as to monitor them. X-ray does not show improvement for several months and I wanted a better way of following up my patients.

Dr. Ramos:

In the U.S., the use of US in rheumatology is considered “cutting edge”, but in Europe it is standard practice. It is part of fellowship training in Germany and Italy, so I knew it was the way of the future and that I wanted to be a part of that. The norm here in the U.S. is to do many of the interventional procedures blind,

but accuracy in small joints, like the wrist, is difficult. Thus, many of these procedures are more traumatic because it usually takes several attempts to get the right spot. But with US guidance, these same interventions are faster, more accurate, and often less traumatic.

Drs. Black & Chapman:

We also get a lot of athletes who have been given very nonspecific diagnoses or have undergone a lot of tests and still have no diagnosis. We'll use US to visualize soft tissue and to perform dynamic studies, which allows us to see things like where a nerve is compressed. This would not be possible with static imaging, like MRI.

We originally learned to use ultrasound (US) back in 1993 during our emergency medicine residency. In emergency medicine, one of the many uses of US is to quickly assess the chest and abdominal cavities for blood or fluid in patients who have sustained major trauma and to assist in getting peripheral and venous access. In places like Germany and Austria, they’ve been utilizing US as part of physical exams since the late 1970s. Ultrasound has been proven in so many specialties all over the world, but the use of US by physicians treating the musculoskeletal system is lagging.

EDUCATION & TRAINING

How did you learn to use US and how would you recommend for a new user to become proficient with US?

Dr. Nazarian:

Again, as a radiologist, I am proficient with US and found the SonoSite systems very easy to learn. But for those who are new to US

and would like to use it for musculoskeletal work, I would say that it is mandatory that they attend several courses on US first. They should then supplement the courses by reading textbooks and literature to fill in some of the gaps in knowledge. Lastly, they should purchase a machine (if they don’t already have one) and start using it regularly.

Dr. Saadeh:

I took a 5-day course in Italy first. Then SonoSite recommended a technician in Houston, so I shadowed her for a week. I bought my first US machine and taught myself the rest. I also attended one-on-one sessions with Dr. Nazarian and Dr. Nandkumar Rawool, who are worldwide radiology experts in musculoskeletal US. After 1 year of using it on a daily basis, I felt very comfortable and confident. It is taking much less time now. The SonoSite systems are very user friendly, but the resolution on their first machine was not as good as it is now, so it might take less time to learn. I also continued my education with advanced training at Thomas Jefferson. At national meetings, I would focus on US posters and presentations, and at the same time I had the opportunity to present both oral presentations and poster presentations at EULAR (The European League Against Rheumatism.).

Dr. Ramos:

I went to an US course about three years ago and I agree that anyone who wants to incorporate US into their musculoskeletal exams should start with some formal training. They should attend a course to learn the basics, then get a couple of good textbooks that have the US images coordinated with

the anatomy. Then they should start using US daily – practice, practice, and practice. I would say that within 3 months they will start to feel comfortable. Ultimately, I think US should be included as part of fellowship training for rheumatology. With all of its advantages in this specialty, US should be a standard part of the training program.

Drs. Black & Chapman:

We would also add that they should be sure to learn from a physician (an MD or a DO) who is trained in musculoskeletal diagnosis and interventional procedures.. Don't just go to a generic US course, where none of the faculty are trained in musculoskeletal medicine. Take a course with experienced physicians who specialize in musculoskeletal US diagnosis and intervention. (Refer to the Musculoskeletal section of www.sonositelearning.com for a list of upcoming courses.)

What is the first thing a new user should concentrate on?

Dr. Saadeh:

My recommendation for new users would be to start by attending courses, preferably courses that allow you to actually perform procedures. Next you should shadow someone proficient for 1 week. For example, we do 20-40 procedures a day, including lots of diagnostics, injections and aspirations. That is the kind of shadowing experience you want.

Then you should get a small ultrasound machine and start using it every day. I would recommend starting with hands and wrists, then shoulders and knees. Ankles and elbows can be a bit tricky, so I would recommend doing those once you have some comfort level with the others.

Drs. Black & Chapman:

We started by doing rotator cuff examinations – mainly diagnosing tears and doing injections. There is a protocol for shoulders, so that would be a good place for new users to start. Or start with whatever you see most often, and get used to that first. Shoulders and knees are usually the most common complaints or injuries, so start with those. Then, when you feel comfortable with shoulders and knees you can move on to other things.

Dr. Ramos:

I would agree that they should start with knees, shoulders, hands, and wrists. Once they are comfortable with those they can move on to ankles and elbows, which are a bit more complicated. After that they could move on to nerve entrapments, like carpal tunnel syndrome.

Dr. Nazarian:

They could also start by scanning patients who are already going to have an MRI, and compare their findings to those on the MRI report. It could take a while before they feel really proficient – probably 1-2 years, depending on how often they are using the US and what procedures they are doing. The more complicated exams and procedures obviously take longer to learn.

DAILY USE

Describe the benefits of having an US system in your practice.

Dr. Ramos:

Ultrasound provides a lot of diagnostic information that is difficult to achieve with other exams and imaging. For example, with rotator cuff syndrome, US can identify very small tears as well as full thickness tears, and cortical irregularities (Figure 1.). You can also diagnose impingement, which is difficult to detect with static imaging (e.g. MRI), but much easier to identify with dynamic imaging. Osteophytes are also much easier to see on US than on x-ray.

We use US for all of our interventions as well. We find that interventions are easier, safer, and more accurate, when using US. For example, with tendonitis, US shows a halo of edema around the tendon. You use that halo to guide the injection.



Figure 1. This image shows the patient developing a full thickness tear of the supraspinatus tendon in the shoulder. The split screen image enables visualization in two planes, in this case confirming a rotator cuff tear with a small fiber attached.

Drs. Black & Chapman:

In the past, X-ray has been the gold standard for musculoskeletal imaging, but it only shows bone. Ultrasound provides so much more information. With US you can see ligaments, joints, tendons, muscles, and bones. With musculoskeletal conditions, it's important to see all of this.

We get patients all the time who come in saying that their doctor told them they have a “sprain” or a “strain”, and it's not getting better. With US we can determine the severity of the damage and, if it's a muscle, ligament or tendon tear, we can actually diagnose, locate and measure the tear. Most of our patients are athletes, and they need an accurate diagnosis. If they've been stretching a tear, thinking it was a sprain, they might have actually done more harm than good. With US imaging and a precise diagnosis we can also make recommendations to the trainer or physical therapist – helping patients to heal as quickly as possible and get back to their activities.

What do you find most useful about a hand-carried US system?

Dr. Nazarian:

I actually use the MicroMaxx system more often outside the office. I work with a lot of professional athletes and it's important to have a portable machine that I can take into the locker room or out on the field. I take the MicroMaxx with me to Spring Training every year to examine baseball players.

Drs. Black & Chapman:

We also provide sports medical care on the sidelines for professional and collegiate athletes, so we really have to have a hand-carried US machine. We take it with us to the games and use it right there on the sidelines. When we started using US back in the 1990s, SonoSite was the only company with a hand-carried machine that had good enough resolution for musculoskeletal injuries. And now the resolution on the MicroMaxx is much better than the machines available back then.

Dr. Ramos:

Since we are using US for diagnostics and interventions we needed to have it readily available. We have 14 exam rooms. It would not be feasible to have one of the large US machines available in each room – they are too bulky and too expensive. They are also not necessary for musculoskeletal imaging. The hand-carried machines have great resolution for our needs and we don't need to have one for each room because they are portable.

Dr. Saadeh:

Yes, for our purposes the portable machines are exactly what we need. The resolution is high enough that we can detect synovial proliferation, diagnose rheumatoid arthritis, and perform interventions. With our many exam rooms, the portability is very beneficial. We have a very busy office practice and the

hand-carried ultrasound has proven to be very efficient.

What is your patients' reaction to US?

Dr. Ramos:

Patients are initially surprised to see US in rheumatology. They are used to seeing it with other specialties, like OB/Gyn. But later, after they've experienced it, they want their procedures to be done with US guidance.

Dr. Nazarian:

Patients are usually fascinated by it and impressed that you can make a difficult diagnosis with something that essentially looks like a laptop. I often hear comments like, “Why don't more docs use this instead of MRI.” That is not to say that MRI is not necessary, but most patients would prefer to try the less invasive option first, especially when compared to an MRA, where dye is injected into the joint for the exam.

Drs. Black & Chapman:

Our patients love the US, because they can actually see their injury. We have found that if they can see the damage, they are far more compliant with the recommended treatment regimen. Depending on the severity of the damage, patient compliance could actually keep them from becoming surgical candidates.

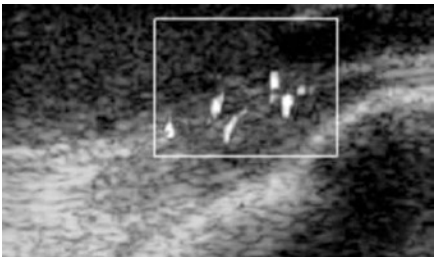


Figure 2. Power Doppler showing neovascularization in infrapatellar tendonosis.

We also see a lot of active pregnant women, and the fact that they don't have to worry about radiation, like with fluoro is important to them. Patients also appreciate the accuracy achieved with ultrasound. It often means that they are only getting one needle stick for an injection or aspiration, as opposed to the possibility of several sticks when doing it blind.

Dr. Saadeh:

Our patients also love it. And it is beneficial to us as well, because we get more feedback from the patient when they see what you are doing. If it is something interesting we will often print it for them and they like that too.

REIMBURSEMENT

Do you routinely get reimbursed for US used for diagnostic imaging and/or for guiding interventions? And do you have any reimbursement tips for other users?

Drs. Black & Chapman:

There are ICD-9 codes and CPT codes for diagnostic US scans of the extremities (non-vascular) and needle placement for interventions'. We've also been really successful with contacting insurance companies to negotiate a price for office-based diagnosis and intervention. When you talk to them, make a case for yourself (e.g. I am the only one in the county who is able to do these procedures.)

Dr. Saadeh:

Reimbursement has been good for us except for a few insurance companies that make it a bit difficult, especially when using US for both diagnosis and intervention. We often send additional documentation explaining the necessity of US for both, but sometimes they only reimburse for one.

Drs. Black & Chapman:

Insurance companies do pay us for ultrasound. It is not experimental – it's proven and the codes exist.

CASES

Give an example of a case for which you found US extremely useful.

Dr. Nazarian:

When I take the MicroMaxx to Spring Training we generally scan all the pitchers in the team's minor league system, which numbered 72 this year. We examine the ulnar collateral ligament of their elbow at rest and under stress

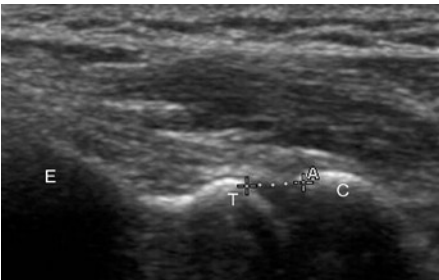


Figure 3. This image is taken from an asymptomatic professional baseball pitcher. It shows the measurement of the ulnohumeral joint (labeled “A”). This joint is measured both at rest and with stress to assess ligamentous laxity. Also labeled are “E” for medial epicondyle, “T” for trochlea of the humerus.

(to determine joint widening). I can then tell the trainers which ligaments are of concern, which helps them to develop the appropriate training regimens. It also gives us a good baseline for all the pitchers, so that when an injury occurs we can compare it to the baseline and determine whether it is a new injury or an

old one. In addition, whenever a pitcher is experiencing some discomfort we can quickly use US to check the elbow out and reassure ourselves that it is okay. An elbow injury is the most common career-threatening injury for a pitcher, so having diagnostic imaging readily available is critical for them.

Dr. Ramos:

One interesting case I had was an elderly gentlemen that presented with pain and swelling over the right shoulder. The swelling was very obvious; however, by physical examination it was not possible to determine if this was just a joint effusion or something else. Well, with ultrasound we were able to document that this was a huge geode cyst, and drained it (60cc). (Figures 4-6) After the procedure, we could notice the difference: his shoulder not only reduced in size, but was bony again.

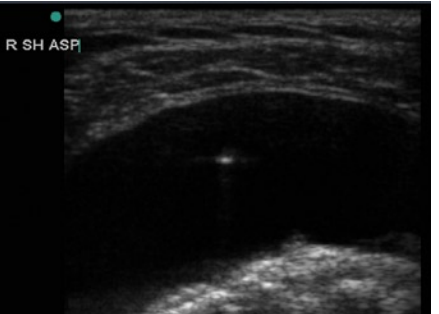


Figure 4. This image shows fluid trapped outside of the shoulder joint anteriorly. The needle used for aspiration is easily visualized. In these procedures, the SonoSite machines are utilized for determining location, depth, and estimated volume measurements.

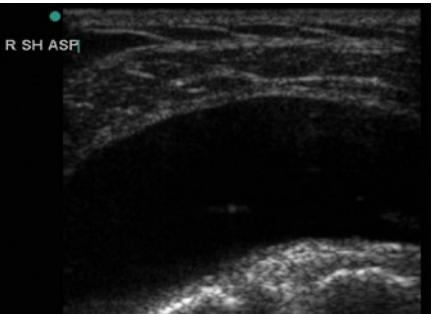


Figure 5. During the aspiration, the needle is observed in good placement, with regard to depth. Progress of the aspiration is viewed to demonstrate the needle being clear of obstruction from loose or free tissues that may clot the needle. If this is observed, then the needle can be observed while maneuvering to relocate and try again without having to access the patient again with another needle stick.

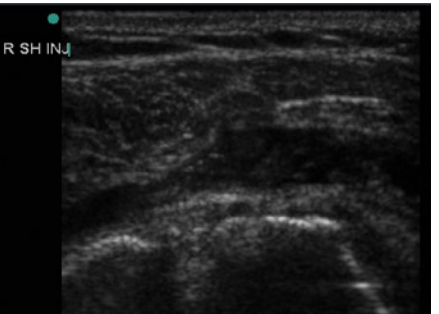


Figure 6. After all the free fluid has been collected, there is a dramatic difference in the surrounding soft tissues, with visible changes in position.

¹ For more information on ICD-9 and CPT codes for the use of US, email reimbursement@sonosite.com or call 1-888-482-9449. Ultrasound images and descriptions for Figures 1, 3, 4, and 5 provided by Daniel Shelton, Katie Skalsky RT[®], and Andi Lambert RT[®] of Allergy A.R.T.S.