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CORR Insights®: Does the Use of Ultrasound Affect Contamination of Musculoskeletal Injections Sites?

R. Michael Gross MD

Where Are We Now?

In his 2004 study, Ziegler [10] described a brief history of orthopedist-performed ultra-

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R. M. Gross MD (✉)
GIKK Orthopaedic Specialists, 7710
Mercy Road, Omaha, NE 68124, USA
e-mail: drgross@gikk.com

sound. His work reviewed the first significant application of ultrasound for the evaluation of rotator cuff pathology, as well as a series of published papers by Middleton and colleagues [6–8] that advanced the use of ultrasound for rotator cuff pathology significantly, including a description of normal ultrasonic anatomy of the shoulder in 1984, criteria for diagnosing rotator cuff damage in 1985, and in 1986, the pitfalls of the use of sonographic technology. In 1985, Mack et al. [5] also contributed to the diagnostic accuracy of ultrasound by describing a dynamic technique of evaluating the rotator cuff. The popularity of the technique has slowly caught on while at the same time the cost, quality, and size of ultrasound units have come within the reach of the community orthopaedist.

There is a great deal of similarity between the evolution of this technology and that of early arthroscopy. The early arthroscopists were perfectly satisfied with the diagnostic ability of the tool. Fortunately, for the patient, as well as the orthopaedist, the visualization and the diagnostic capabilities

of the arthroscope have evolved to incorporate therapeutic interventions. The same evolution seems to be happening with the use of ultrasound. The question is: Will ultrasound be helpful or is it just another technology in search of an application? The current study by Sherman et al. becomes meaningless if the answer is the latter.

Presently, there are potential therapeutic applications of office ultrasound on the horizon. In considering these applications, it is important to keep in mind the economics of medicine. A subacromial injection without ultrasound guidance is much less expensive than with ultrasound. But is there a benefit to the use of ultrasound in this procedure? In this circumstance, the answer to that question appears to be no. One study [4] concerning the accuracy and the efficacy of subacromial injections from three different approaches (anterior lateral, lateral, and posterior) concluded that there was no difference in the accuracy of the three portals, but more importantly, the clinical effectiveness of the injection was the same for all three approaches. This is not the case with ultrasound-

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guided injections of the acromioclavicular joint. Borbas and colleagues [1] reported a 90% accuracy of ultrasound-guided acromioclavicular joint injections versus 70% without ultrasound. Patel et al. [9] reported a 92.5% accuracy of glenohumeral joint injection with ultrasound compared to 72.5% without. Hashiuchi et al. [3] reported 86.7% accuracy of injecting the biceps tendon sheath with ultrasound versus 26.7% without ultrasound. In each of these cases, the use of ultrasound markedly improves the accuracy of the injection. We may find that there is value both therapeutically and diagnostically for this improved accuracy.

A fourth area where ultrasound may be therapeutically useful is in the treatment of calcific deposits. As the techniques improve, ultrasound-guided evacuation of the crystals may very well eliminate the need for surgery. However, a high level of skill is required to use the ultrasound probe with one hand and inject accurately with the other hand. The learning curve is steep, and the risk of contamination seems to be real, at least in part because of the introduction of other variables: The ultrasound probe, gel, and the cumbersome and somewhat-extended procedure. For those reasons, I welcome the paper by Sherman et al. as an important contribution and reason to pause while we

verify that we are doing the best we possibly can: *Primum non nocere*.

Where Do We Need To Go?

No physician wants to suffer a fate similar to those who chose to turn away from arthroscopy. I envision physicians without ultrasound skills getting left behind as techniques continue to evolve. I could also see the logic of insurance companies mandating ultrasound as a less expensive alternative to a MRI as the primary imaging study for rotator cuff pathology. There are several reasons for this, but the one that stands out is that MRI simply sees too much. If the patient's symptoms and signs point to the rotator cuff as the source of the pathology, ultrasound may be much more useful because it isolates just that structure, and eliminates distractions from unrelated (and perhaps unimportant) intra-articular changes. An MRI reports everything that it "sees," much of which is incidental pathology or harmless, age-related changes which, while anatomically correct, may be unrelated to the patient's complaint. This may not only be less costly, but may also alleviate a good deal of unproductive discussion time spent with the physician on the subject of these unimportant findings leaving more time in the office to spend on

more-relevant findings and therapeutic options and it may prevent unnecessary confusion and anxiety on the part of the patient.

Therapeutically, there remains another area on the horizon in which ultrasound may find a home: The treatment of rotator cuff tendinitis. Presently, patients with this diagnosis who failed nonsurgical care typically undergo a subacromial decompression. There have been some attempts at treating this nonsurgically with injectable materials such as platelet-rich plasma (PRP), which have been met with limited success. Recently, a new technology, percutaneous ultrasonic tenotomy, (Tenex Health, Lake Forest, CA), has been used successfully for plantar fasciitis, Achilles and patellar tendinitis, and lateral epicondylitis [2]. There have been some early attempts to use this system in the shoulder to treat rotator cuff tendinitis non-surgically. At the time of this writing, there are simply no studies to document the efficacy of this approach for rotator cuff disease, but no doubt they will come.

How Do We Get There?

The key factors concerning ultrasound that may crowd into areas were MRIs exist today are: Medical economics and the flexibility that ultrasound

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offers the physician. Simply put, what justification is there in using an expensive and inconvenient MRI when a convenient much less expensive ultrasound is available for accurate diagnosis of the pathology? Another factor revolves around the ability to instrument while visualizing with an ultrasound. That simply cannot be done with an MRI. I reflect back to arthroscopy: Once the treating physician could visualize the pathology, the temptation to instrument and correct the pathology took on a momentum of its own. I see that same possibility with ultrasound.

This has already occurred with treatment of tendinitis in several areas and is moving towards the shoulder. There have been some early attempts to use percutaneous ultrasonic tenotomy in the shoulder to treat rotator cuff tendinitis nonsurgically. At the time of this writing, there are simply no studies evaluating the efficacy of this approach for rotator cuff disease, but no doubt they will come. Of note, because of the risk of contamination, this approach calls for a sterile sleeve to cover the probe, perhaps minimizing

this risk. Undoubtedly, there will be more therapeutic applications, and that alone is reason to embrace this technology, making the paper by Sherman et al. all the more timely.

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