

EDITORIAL

Point-of-Care Ultrasonography in Orthopedics: A Helpful Tool to Improve Patient Care

SM Javad Mortazavi, MD¹; Mohammad Hossein Nabian MD¹¹ Joint Reconstruction Research Center, Tehran University of Medical Sciences, Tehran, Iran

Dussik et al. used ultrasonography (US) in musculoskeletal medicine for the first time in 1958 (1). Since then, there have been impressive technological advancements in US devices which has made it possible for the current ultrasounds to provide excellent soft-tissue contrast and high spatial resolution images that allow the detection of many musculoskeletal pathologies (2). Delicate structures that were only detectable by a standard magnetic resonance imaging (MRI) are now visualized by the US with a better axial resolution (3). In comparison to other modalities, such as X-ray, MRI, and computed tomography scan, the US costs less and provides faster and real-time results, higher level of safety, and greater patient satisfaction (2, 4). The flexibility ultrasound devices and their capability to provide real-time results make it suitable for diagnosis, guided intervention, follow-up, and prognostic assessment (4, 5). The use of portable US at the patient's bedside or clinic makes it one of the point-of-care testing tools available for physicians, including orthopedic surgeons.

Currently, point-of-care ultrasound (POCUS) is increasingly utilized for the diagnosis of different pathologies in orthopedics. It has been successfully used for the examination of tendon ruptures, tendonitis, tenosynovitis, muscle, and ligamentous injuries, bursal pathologies, nerve, and vascular injuries, fascial defects, foreign bodies, infections, necrosis, and soft tissue masses (3). Moreover, it is highly valuable for the detection of subtle fractures that cannot be observed in early radiographs (6). Furthermore, it increases the chance of detection of abnormalities by the provision of

a focused probing of the point of maximal tenderness (2).

The POCUS is also a powerful instrument for some orthopedic procedures. It increases the precision and accuracy of local injection for both therapeutic or diagnostic purposes. The use of POCUS for guiding injections in orthopedic patients minimizes local trauma and discomfort. It has been proven that the US improves the accuracy of many routine procedures, such as knee and shoulder intra-articular injection that are routinely performed without any imaging guidance (7-9). The accuracy of US-guided injection is similar or superior to a fluoroscopy-guided injection without any radiation hazard (10). Besides, POCUS could be available in the clinic, while it is not feasible to use fluoroscopy as an orthopedic tool in the clinic. The accuracy of injection is essential since injection in the wrong place may lead to some complications, such as tendon rupture, local tissue atrophy, and necrosis.

It is not far from reality to think that in the near future, a portable ultrasound device will be found in every surgeon's office to provide quick confirmation of diagnosis, complementary evidence to patients, and careful scrutiny of suspected injuries (5). In minimally invasive surgical procedures, the US will be a useful guidance system in both a doctor's office and the operating room. Application of sonography is already the standard care in other non-musculoskeletal subspecialties and it seems necessary for orthopedic surgeons to increase their knowledge and experience of this invaluable tool (4). The lack of confidence in orthopedic surgeons to independently use the US could be a major concern, and to eliminate this negative factor, it is required to invest in

Corresponding Author: Mohammad Hossein Nabian, Joint Reconstruction Research Center, Tehran University of Medical Sciences, Tehran, Iran
Email: Dr.Nabian@Gmail.com

THE ONLINE VERSION OF THIS ARTICLE
ABJS.MUMS.AC.IR

ultrasound training programs.

However, like any other medical device, the US is subject to technical limitations. The lack of entire accessibility to intra-articular structures, high operator dependence, and the steep learning curve are the most notable examples (3). It is expected that in the future, technological advances increase the precision and efficiency of sonography, but the provision of training and increasing awareness regarding its application is our responsibility.

As a part of the national curriculum, the provision of training programs for musculoskeletal ultrasound to

orthopedic residents can encourage and accelerate the use of the US among orthopedic surgeons. We believe that POCUS is going to be a stethoscope for the diagnosis of many musculoskeletal pathologies and an accurate guide for therapeutic intervention in the field of orthopedic surgery. Therefore, it is recommended that the practicing orthopedic surgeons learn the musculoskeletal US in collaboration with radiology colleagues to improve the care of the patients who suffer from different musculoskeletal problems.

References

1. Dussik KT, Fritch DJ, Kyriazidou M, Sear RS. Measurements of articular tissues with ultrasound. *Am J Phys Med.* 1958; 37(3):160-5.
2. Blankstein A. Ultrasound in the diagnosis of clinical orthopedics: the orthopedic stethoscope. *World J Orthop.* 2011; 2(2):13-24.
3. Shah AB, Bhatnagar N. Ultrasound imaging in musculoskeletal injuries-What the orthopaedic surgeon needs to know. *J Clin Orthop Trauma.* 2019; 10(4):659-65.
4. Roberts CS, Beck DJ Jr, Heinsen J, Seligson D. Review article: diagnostic ultrasonography: applications in orthopaedic surgery. *Clin Orthop Relat Res.* 2002; 401(1):248-64.
5. Aparad T. Ultrasonography for the orthopaedic surgeon. *Orthop Traumatol Surg Res.* 2019; 105(1S):S7-14.
6. Carter K, Nesper A, Gharahbaghian L, Perera P. Ultrasound detection of patellar fracture and evaluation of the knee extensor mechanism in the emergency department. *West J Emerg Med.* 2016; 17(6):814-6.
7. Balog TP, Rhodehouse BB, Turner EK, Slevin JM, Bush LA, Grassbaugh JA, et al. Accuracy of ultrasound-guided intra-articular hip injections performed in the orthopedic clinic. *Orthopedics.* 2017; 40(2):96-100.
8. Berkoff DJ, Miller LE, Block JE. Clinical utility of ultrasound guidance for intra-articular knee injections: a review. *Clin Interv Aging.* 2012; 7(1):89-95.
9. Wilson DJ, Scully WF, Rawlings JM. Evolving role of ultrasound in therapeutic injections of the upper extremity. *Orthopedics.* 2015; 38(11):e1017-24.
10. Amber KT, Landy DC, Amber I, Knopf D, Guerra J. Comparing the accuracy of ultrasound versus fluoroscopy in glenohumeral injections: a systematic review and meta-analysis. *J Clin Ultrasound.* 2014; 42(7):411-6.