Editorial

Cite as: Taljanovic MS: Update on current concepts and advances in musculoskeletal ultrasound: Honoring my Teacher Dr. Ronald Adler. J Ultrason 2023; 23: e170–e171. doi: 10.15557/JoU.2023.0041.

Update on current concepts and advances in musculoskeletal ultrasound: Honoring my Teacher Dr. Ronald Adler

Mihra S. Taljanovic

Department of Radiology, University of New Mexico, Albuquerque, New Mexico, USA
Departments of Medical Imaging and Orthopedic Surgery, Banner University Medical Center, Tucson, Arizona, USA

Correspondence: Mihra S. Taljanovic; mihrat@radiology.arizona.edu

DOI: 10.15557/JoU.2023.0041

Keywords
ultrasound; musculoskeletal; advances; teacher; current concepts

Exponential growth in development of ultrasound (US) technology during the past four decades enabled parallel advancement in musculoskeletal (MSK) US, which has become popular and is, in many instances, the imaging modality of choice for the evaluation of numerous MSK conditions due to its low cost, accessibility, and lack of ionizing radiation.

Performing MSK US examinations requires substantial knowledge of complex MSK anatomy as well as technical skills that necessitate adequate and often lengthy training by those who are considered experts in this exciting field. Undoubtedly, we owe a debt of gratitude to our teachers for their gracious dedication of time and expertise in teaching us this essential skill, which benefits our patients in daily radiology practice.

As the author of this Editorial, I am taking an opportunity to thank my teacher, Ronald S. Adler, PhD, MD, who taught me both the first steps and advanced skills in MSK US. It was nearly 30 years ago when I started my training at the University of Michigan Hospitals in Ann Arbor, Michigan, first as a research fellow and then as a clinical fellow in MSK radiology. I was fortunate to observe Dr. Adler performing many MSK US examinations and was amazed by the depth of his medical knowledge, profound understanding of US physics, and masterful technical skills. These qualities resulted in superb clinical MSK US examinations that invariably yielded accurate diagnoses. Currently, Dr. Ronald Adler is a Professor of Radiology at the Grossman School of Medicine at the New York University Langone Medical Center. He is a world-renowned MSK radiologist and a leader in the field of MSK US and US-guided interventions. He has authored over 200 peer-reviewed publications as well as 26 book chapters and books and given numerous scientific and US course presentations. Throughout his distinguished medical career, Dr. Adler has taught MSK US skills to countless residents and fellows, including me. On behalf of all your trainees, thank you, Dr. Adler.

In this special issue of *Journal of Ultrasonography* on current concepts and advances in MSK US, I am happy to introduce 14 superb articles, written by world experts in the field of MSK US. Well-selected images, video loops, and medical illustrations add to the quality of these publications.

The first article in this issue, "Musculoskeletal ultrasound: a technical and historical perspective" written by Dr. Ronald Adler, provides detailed information on the historical development and advances of MSK US over the past several decades. The author compares "old" MSK US images from the early days with those acquired today to illustrate the remarkable and revolutionary advancement of this imaging modality.

In their article, "Role of ultrasound and MRI in the evaluation of postoperative rotator cuff", Drs. Sahu, Moran and Gandikota provide an overview of the current surgical techniques that are commonly used for the treatment of the rotator cuff tear, and the current role of postoperative imaging of the rotator cuff using magnetic resonance imaging (MRI) and US. The authors discuss the advantages and limitations of each imaging modality as well as the normal and abnormal imaging appearance of the repaired rotator cuff tendon.

In the article, "High-resolution ultrasound and MRI in the evaluation of pectoralis major injuries", Drs. Chadwick, Weaver, Shultz, Morag, Patel and Taljanovic review the normal pectoralis major anatomy and the spectrum of injury on MRI and US. The authors emphasize the importance of regional anatomical landmarks in assessing pectoralis major muscle injuries and discuss operative and non-operative management using examples of pectoralis major repair on post-operative imaging.

In their article, "Ultrasound versus MRI in the evaluation of the thumb metacarpophalangeal joint", Drs. Knisely, Noland and Melville review common injuries of the thumb metacarpophalangeal joint, while highlighting the merits, limitations, and pitfalls of the two imaging modalities. They describe how the clear appreciation of each method, paired with anatomic knowledge, will lead to greater confidence and accuracy in the diagnosis of impactful injuries and help guide intervention.

Drs. Probyn, Flores, Rowbotham, Cresswell, and Atinga have authored a superb article, "High-resolution ultrasound in the evaluation of the adult hip", which describes the relevant anatomy of the anterior, lateral, posterior, and medial hip, as well as the use of grayscale and Doppler US and various dynamic maneuvers to help determine the cause of hip pathology in various locations. The article is supported by numerous great ultrasound images and illustrations.

In their article, "Evaluation of the knee joint with ultrasound and magnetic resonance imaging", Drs. Pandya and Melville review the combination of critical anatomic structures, joint abnormalities, and pathologic conditions at the knee joint, while highlighting the merits, limitations, and pitfalls of the two imaging modalities. The authors detail how both modalities can be used to expedite diagnosis and thus treatment for a wide range of knee pathologies.

Drs. Reijnierse and Griffith's review article, "High-resolution ultrasound and MRI in the evaluation of the forefoot and midfoot", addresses the use of US and the added value of MRI in diagnosing various traumatic and pathological conditions of the midfoot and forefoot. This article illustrates the normal anatomy and US and MRI findings of metatarsal stress fracture, Chopart's and Lisfranc injuries, first metatarsophalangeal joint and lesser metatarsophalangeal plantar plate injuries, and common mid- and forefoot masses, such as ganglion cysts, Morton neuroma, gouty tophi, plantar fibromas, foreign body granulomas, and leiomyomas. The authors also show US and MRI findings of the degenerative and inflammatory joint disorders, including rheumatoid arthritis.

In their article, "High-resolution ultrasound in the evaluation of musculoskeletal infections", Drs. Weaver, Omar, Epstein, Brown, Chadwick and Taljanovic emphasize the utility of grayscale and Doppler US in the evaluation of MSK infections that can aid in early diagnosis, allowing for prompt, optimized treatment with decreased risk of complications. The selected images and illustrations demonstrate nicely the characteristic imaging findings of various superficial and deep soft tissue infections, and subperiosteal abscess.

Drs. Sahu, Kataria and Gandikota compare the utility, specific clinical applications, advantages, and limitations of high-resolution US and MRI in the evaluation of various types of rheumatologic diseases in their article, "Added value of high-resolution ultrasound and MRI in the evaluation of rheumatologic diseases". The authors emphasize that by understanding the comparative aspects of high-resolution US and MRI, it is easier for the treating physicians to make informed decisions when selecting the optimal imaging modality for specific diagnostic purposes, effective treatment planning, and improving patient outcomes. They discuss the patterns of soft tissue and joint involvement that help in differentiating between various types of arthritis. The authors also briefly discuss the potential applications of emerging techniques, such as US elastography, contrast-enhanced US, and dual-energy CT, in the field of rheumatology.

In his article, "Practical approach to ultrasound of soft tissue tumours and the added value of MRI: how I do it", Dr. Griffith outlines a practical approach to the everyday assessment of both non-neoplastic and neoplastic soft tissue tumours, focusing on US examination while emphasizing the added benefit of MRI in certain instances. The author discusses US assessment, practical scenarios, reporting, biopsy, and follow-up, as well as the criteria used to distinguish benign from malignant tumours. The potential benefits and current limitations of both US elastography and contrast-enhanced US in the assessment of MSK tumours are also addressed.

Two outstanding articles from the Northwestern University in Chicago, "Role of high-resolution ultrasound and magnetic resonance neurography in the evaluation of peripheral nerves in the upper extremity" by Drs. A. Serhal, Lee, Michalek, M. Serhal and Omar and "The role of high-resolution ultrasound and MRI in the evaluation of peripheral nerves in the lower extremity" by Drs. Lee, A Serhal, M Serhal, Michalek and Omar, provide a comprehensive overview of normal anatomy of the peripheral upper and lower extremity nerves and the current role of high-resolution US and MR neurography in the evaluation of the peripheral nerves of the upper and lower extremities and their associated neuropathies. The authors emphasize that these two imaging modalities are complimentary, and one may be more useful than the other depending on the nerve and location of pathology. They state that the imaging must be interpreted in the context of available clinical information and other diagnostic studies, such as electrodiagnostic tests.

In their article, "Tips and tricks in ultrasound-guided musculoskeletal interventional procedures", Drs. Walter, Burke and Adler review the foundational approach to US-guided MSK interventions, offering tips and tricks that can be employed in many different procedures, including intra-articular, juxta-articular, and perineural injections for a multitude of clinical scenarios. Technical considerations regarding US transducer selection, sonographic technique, as well as common indications, contraindications, and complications of these procedures, are presented. Additionally, a variety of pharmacologic considerations for US-guided injections are discussed.

The research article, "Added value of ultrasound-guided percutaneous needle tenotomy over hydrodissection and physiotherapy in chronic lateral elbow tendinopathy: a pilot randomized controlled trial" by Drs. Koonen, van Amerongen, Smulders, Mangesius, Cerna, Klauser, Mur and Obradov, compares the efficacy of the 1) percutaneous needle tenotomy, hydrodissection, and physiotherapy; 2) hydrodissection and physiotherapy; and 3) physiotherapy alone in 30 patients with chronic lateral elbow tendinopathy. The authors concluded that the patients receiving percutaneous needle tenotomy and/or hydrodissection may show better results in terms of pain but not in their functional outcomes compared to those who received physiotherapy alone. The size of effect, however, was small, and a larger sample size is needed for a future randomized controlled trial to further investigate these results.

As the author of this Editorial, I thank all the authors for writing their superb articles and sharing their knowledge and expertise with the readers of the *Journal of Ultrasonography*. At the end, my special thanks to the Editor-in-Chief of the *Journal of Ultrasonography*, Professor Iwona Sudol-Szopinska, for inviting me and for providing guidance for this journal issue dedicated to current concepts and advances in MSK US. I hope our readership will enjoy and benefit from reading these articles as much as I have.