Ultrasound in Rheumatology: two decades of rapid development and evolving implementation

Esperanza Naredo, MD, PhD

Department of Rheumatology, Hospital GU Gregorio Marañón, Madrid, Spain

Over the last two decades, an increasing number of rheumatologists have progressively incorporated musculoskeletal ultrasound (MSUS) as a valuable diagnostic and monitoring tool in their clinical practice and research [1,2]. This imaging modality has become an established aid incorporated into the clinical management for evaluating the periarticular and the intra-articular structures involved in rheumatic and musculoskeletal disorders. MSUS is routinely available, multiplanar, dynamic, non-invasive, relatively inexpensive, and patient-friendly. Above all, for rheumatologists, MSUS facilitates the scanning of all peripheral joints as many times as required at the time of consultation. It also, allows an immediate correlation between imaging findings and clinical data which improves the management of patients with a wide range of rheumatic diseases from chronic inflammatory arthritis, microcrystalline arthropathies, osteoarthritis, or vasculitis to soft tissue syndromes. In addition, ultrasound is a bedside tool for performing accurate and safe musculoskeletal injections and biopsies [3,4].

In rheumatoid arthritis and other inflammatory arthritis, we have come from roughly detecting joint effusions and Baker's cysts, then finely scoring synovitis and sub-radiographic structural damage [5,6] to a challenging ultrasound-targeted treatment [7]. MSUS B-mode and particularly Doppler mode have demonstrated a consistent and relevant role in optimizing the diagnosis, assessment of the inflammatory activity, monitoring of the therapy response, and prediction of the outcomes in rheumatoid

arthritis and spondylarthritis [8]. MSUS is now also being used in pediatric rheumatologic diseases where its capabilities and advantages can be even greater than in adults [9]. Also MSUS is expanding its applications to new anatomic regions of importance in rheumatologic practice that are readily accessible to US evaluation such as large vessels, salivary glands, ligaments, and peripheral nerves.

In recent years, we have witnessed the first timid attempts to incorporate MSUS findings in rheumatologic disease classification or diagnostic criteria such as rheumatoid arthritis, polymyalgia rheumatica, gout, calcium pyrophosphate deposition disease and Sjögren syndrome [10-14]. Codreanu et al [15] described the rationale and the long process which was required to include MSUS in the classification criteria of polymyalgia rheumatic and gout in an elegant article published in this journal. Furthermore, Scientific Rheumatology societies such as the European League Against Rheumatism (EULAR) and the American College of Rheumatology (ACR) have produced evidence and expert opinion-based recommendations on the use of MSUS in the clinical management of rheumatoid arthritis [8,16].

In the first decade of the 21st century, the above described increasing utility of MSUS in rheumatology has lead to a great demand for appropriate education in this technique among rheumatologists worldwide. As MSUS is the most operator-dependent imaging modality, mainly because of the intrinsic real time nature of image acquisition, appropriate training is highly important to ensure skilled and safe use of this technique by rheumatologists. A thorough knowledge of sectional anatomy, US physics and technology, joint scanning method, pattern of normal and pathological MS tissues, artifacts, and definitions and diagnostic criteria for abnormalities are all necessary to perform MSUS correctly. Many countries have promoted MSUS education among rheumatologists. Scientific soci-

Received Accepted
Med Ultrason
2015, Vol. 17, No 1, 3-4

Corresponding author: Esperanza Naredo
Department of Rheumatology,
Hospital General Universitario Gregorio
Marañón, Doctor Alvarez Sierra 4
28033 Madrid, Spain
E-mail: enaredo@ser.es

eties and universities have developed a variety of training programs in MSUS for rheumatologists. EULAR and the European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB) have facilitated for many years successful courses on MSUS for rheumatologists and other specialists in MS disorders. This educational offer has culminated in the development of competency assessment systems for rheumatologic MSUS that aim at ensuring the correct performance and appropriate use of this technique in rheumatology [17].

In conclusion, MSUS is becoming a relevant part of current and future rheumatology practice and research because it substantially enhances our disease management capability. A MSUS structured educational programme and an efficient competency assessment system both integrated in rheumatology education would facilitate full implementation of MSUS in rheumatology practice worldwide.

References

1. Naredo E, D'Agostino MA, Conaghan PG, et al. Current state of musculoskeletal ultrasound training and implementation in Europe: results of a survey of experts and scientific societies. *Rheumatology* 2010; 49: 2438-2443.
2. Micu M, Alcalde M, Collado Pet al. Impact of musculoskeletal ultrasound in an outpatient rheumatology clinic. *Arthritis Care Res Arthritis Care Res (Hoboken)* 2013; 65: 615-621.
3. Koski JM. Ultrasound-guided injections in rheumatology. *J Rheumatol* 2000; 27: 2131-2138.
4. Kelly S, Humby F, Filer A, et al. Ultrasound-guided synovial biopsy: a safe, well-tolerated and reliable technique for obtaining high-quality synovial tissue from both large and small joints in early arthritis patients. *Ann Rheum Dis* 2013 Dec 13, doi: 10.1136/annrheumdis-2013-204603
5. Mandl P, Naredo E, Wakefield RJ, Conaghan PG, D'Agostino MA. A systematic literature review analysis of ultrasound joint count and scoring systems used to assess synovitis in rheumatoid arthritis, according to the OMER-ACT filter. *J Rheumatol* 2011; 38: 2055-2062.
6. Iagnocco A, Naredo E, Wakefield R, et al. Responsiveness in Rheumatoid Arthritis. A report from the OMER-ACT 11 Ultrasound Workshop. *J Rheumatol* 2014; 41: 379-382.
7. Wakefield R, D'Agostino MA, Naredo E, et al. After Treat-to-Target: Can a targeted ultrasound initiative (TUI) improve RA outcomes? *Ann Rheum Dis* 2012; 71: 799-803.
8. Colebatch AN, Edwards CJ, Østergaard M, et al. EULAR recommendations for the use of imaging of the joints in the clinical management of rheumatoid arthritis. *Ann Rheum Dis* 2013; 72: 804-814.
9. Roth J, Jousse-Joulin S, Magni-Manzoni S, et al. Definitions for the sonographic features of joints in healthy children. *Arthritis Care Res (Hoboken)* 2015; 67: 136-142.
10. Aletaha D, Neogi T, Silman AJ, et al. 2010 Rheumatoid arthritis classification criteria: an American College of Rheumatology/European League Against Rheumatism collaborative initiative. *Ann Rheum Dis* 2010; 69: 1580-1588.
11. Zhang W, Doherty M, Bardin T, et al. European League Against Rheumatism recommendations for calcium pyrophosphate deposition. Part I: terminology and diagnosis. *Ann Rheum Dis* 2011; 70: 563-570.
12. Dasgupta B, Cimmino MA, Maradit-Kremers H et al. 2012 provisional classification criteria for polymyalgia rheumatica: a European League Against Rheumatism/American College of Rheumatology collaborative initiative. *Ann Rheum Dis* 2012; 71: 484-492.
13. Fodor D, Nestorova R, Vlad V, Micu M. The place of musculoskeletal ultrasonography in gout diagnosis. *Med Ultrason* 2014; 16: 336-344.
14. Takagi Y, Sumi M, Nakamura H et al. Ultrasonography as an additional item in the American College of Rheumatology classification of Sjogren's syndrome. *Rheumatology* 2014; 53: 1977-1983.
15. Codreanu C, Enache L. Is ultrasound changing the way we understand rheumatology? Including ultrasound examination in the classification criteria of polymyalgia rheumatica and gout. *Med Ultrason* 2015; 17: 96-102.
16. McAlindon T, Kissin E, Nazarian L, et al. American College of Rheumatology Report on Reasonable Use of Musculoskeletal Ultrasonography in Rheumatology Clinical Practice. *Arthritis Care Res (Hoboken)* 2012; 64: 1625-1640.
17. Terslev L, Hammer HB, Torp-Pedersen S, et al. EFSUMB Minimum Training Requirements for Rheumatologists Performing Musculoskeletal Ultrasound. *Ultraschall in Med* 2013; May 21, DOI: 10.1055/s-0033-1335890.