ACN
ANNALS OF CLINICAL NEUROPHYSIOLOGY

INVITED EDITORIAL
Ann Clin Neurophysiol 2017;19(2):77-78
https://doi.org/10.14253/acn.2017.19.2.77

Is ultrasonography a main armament or just a supplement for evaluating patients with neuromuscular disorder?

Ye-Ji Kwon and Byung-Jo Kim

Department of Neurology, Korea University Anam Hospital, Korea University College of Medicine, Seoul, Korea

Received: June 23, 2017
Revised: June 23, 2017
Accepted: June 23, 2017

Correspondence to
Byung-Jo Kim
Department of Neurology, Korea University Anam Hospital, 73 Inchon-ro, Seongbuk-gu, Seoul 02841, Korea
Tel: +82-2-920-6619
E-mail: nukbj@korea.ac.kr

"Here are her five fingers. Let's see her face…such an adorable baby! Her nose is just like yours."

This three-dimensional image of my baby girl was obtained using an ultrasonography (US) probe and presented me with "a whole new world," with "a new fantastic point of view" as quoted in the lyrics of Aladdin.

Society is now exquisitely dependent on high technology. There is no doubt that recent developments in medical technology have significantly improved health and the quality of life. By the 26th gestational week it is possible to use a small ultrasound probe to see your baby's face both simply and safely—what a surprise present from such a magnificent device.

The use of US in medicine began during and shortly after World War II in countries around the world. Since then it has developed into an advanced imaging tool in various medical fields due to its myriad advantages—it is now widely available, noninvasive, and relatively inexpensive, and can be utilized with a short learning curve.

Since the first studies related to neuromuscular ultrasonography (NMUS) were published in the early 1980s,[1] the application of US in neuromuscular disorder has broadened. This was not only due to technological developments in the equipment, but also the many researches performed to improve the feasibility and reliability of US for assessing disease-specific morphological changes of the neuromuscular system.

NMUS can provide anatomical information in addition to the neurophysiological information obtained through electrodiagnostic studies, which are still the gold standard when evaluating the neuromuscular system. Previous reports indicate that NMUS is useful in the diagnosis of entrapment neuropathies, nerve trauma, inflammatory and hereditary neuropathies, amyotrophic lateral sclerosis (ALS), muscular dystrophies, and other neuromuscular conditions.[2] Moreover, some recent studies have indicated that NMUS findings might be a useful biomarker of disease progression in ALS and chronic inflammatory demyelinating polyneuropathy.[3]

Standardizing the data collected and establishing the normal reference values in NMUS

http://www.e-acn.org
pISSN 2508-691X
eISSN 2508-6960

studies are of paramount importance for defining pathological states. However, it is challenging to determine more accurate reference values in large studies that include people of different ethnicities, genders, ages, and sizes.[2]

The paper by Seok et al.[4] in this issue of Annals of Clinical Neurophysiology provides the opportunity to examine how NMUS is modifying the approach to evaluating a specific part of the body, the diaphragm, which is closely associated with several neuromuscular diseases, including phrenic neuropathy, motor neuron disease, neuromuscular junction disorders, and myopathy. These authors measured the thickness of the diaphragm and the diaphragm thickening fraction of 80 healthy patients in order to establish the normal reference value for use when evaluating diaphragm pathologies. Many of the published studies on NMUS have focused on the broad application of neuromuscular diseases, whereas the study by Seok et al. is notable in demonstrating that NMUS is applicable to certain specific categories of neuromuscular diseases.

Moreover, NMUS is not just used for making diagnosis. Many neurologists already apply this method in their clinical practices for predicting the prognosis of the patients after the surgical treatment of traumatic or compressed nerve injury and for monitoring treatment responses in autoimmune or degenerative neuromuscular disorders.[5]

Some people consider NMUS to be highly subjective, being dependent on both the operator of the device and the person who interprets the findings. They consider that neuromuscular diseases can only be accurately evaluated using electrodiagnostic studies, including electromyography and nerve conduction studies. However, the enormous potential of NMUS makes it a powerful armament for making diagnoses and planning appropriate treatments. Recent advances in NMUS have resulted from concurrent developments in the high-technology software industry.

While it is unlikely that NMUS will replace electrodiagnostic studies, it will remain a powerful main armamentarium as well as a useful bedside technique supplementing physical examinations. We are now expecting "a whole new world" in the future of NMUS.

REFERENCES

1. Heckmatt JZ, Leeman S, Dubowitz V. Ultrasound imaging in the diagnosis of muscle disease. J Pediatr 1982;101:656-660.
2. Hobson-Webb LD, Cartwright MS. Advancing neuromuscular ultrasound through research: Finding common sound. Muscle Nerve 2017 Feb 18. doi: 10.1002/mus.25621. [Epub ahead of print].
3. Schreiber S, Dannhardt-Stieger V, Henkel D, Debska-Vielhaber G, Machts J, Abdulla S, et al. Quantifying disease progression in amyotrophic lateral sclerosis using peripheral nerve sonography. Muscle Nerve 2016;54:391-397.
4. Seok JI, Kim SY, Walker FO, Kwak SG, Kwon DH. Ultrasonographic findings of the normal diaphragm: thickness and contractility. Ann Clin Neurophysiol 2017;19:131-135.
5. Hobson-Webb LD, Padua L. Small steps ... and leaps ... toward big science: multicenter studies in neuromuscular ultrasound. Clin Neurophysiol 2014;125:2326-2327.