

Foreword

Ultrasound imaging (USI) is probably most well known for examining the developing foetus, and is used as a diagnostic and guiding tool in many branches of medicine. Its potential use in rehabilitation was first indicated in the late 1960s and then highlighted by research on quadriceps muscle wasting in the 1980s. The technique has since been shown to provide an accurate, reliable, non-invasive means of evaluating muscles in terms of their size, shape and architecture, and the effects of different pathologies and interventions have been documented. Muscle size is related to the force it exerts, giving an indirect measure of strength, although the closeness of this relationship varies between muscles.

Muscles studied to date include: the lumbar multifidus, antero-lateral abdominal, posterior cervical spine, pelvic floor and anterior tibial muscles, as well as gastrocnemius, masseter, trapezius and the diaphragm. Much of the exploratory work has provided normal reference ranges and established the validity and reliability of the technique as a research tool.

Advances over the past decade in understanding the mechanisms of motor control and neuromuscular dysfunction, particularly of the stabilising muscles around joint complexes, prompted clinical interest in USI, as it provides a non-invasive means of detecting activity of deep muscles. Clinical application has been mainly for biofeedback to provide visual evidence of contraction to aid rehabilitation. There is particular interest in imaging the antero-lateral abdominal and multifidus muscles in the lumbopelvic region in association with low back pain, while pelvic floor imaging is a promising adjunct to the management of urinary incontinence in women's health.

For adoption of USI into routine physical therapy practice to be successful, guidelines and formal training are needed, using standardised protocols. A Symposium in San Antonio, Texas, in May

2006 was set up to develop practice guidelines and an international collaborative research agenda. Leading researchers in the field agreed definitions and guidance on imaging the abdominal, pelvic and posterior paraspinal muscles. The term Rehabilitative Ultrasound Imaging (RUSI) was formed and a consensus statement defined it as '*. . . a procedure used by physical therapists to evaluate muscle and related soft-tissue morphology and behavior during physical tasks . . . This includes providing feedback to the patient and physical therapist to improve clinical outcomes.*' This event was an important turning point in the field, clearly establishing RUSI as a recognised part of physical therapy practice. The outcomes of the Symposium are due to appear in a special issue of the *Journal of Orthopaedic and Sports Physical Therapy* in 2007, and the abstracts are already available (Teyhen 2006).

The definition of RUSI distinguishes it clearly from diagnostic musculoskeletal USI, which assesses ligament, tendon and muscle injuries, requiring different skills and training. In North America, physical therapists are not permitted to use USI for diagnosis of musculoskeletal conditions, while in other locations, such as the UK, therapists can undertake specific training. Since RUSI requires knowledge of functional anatomy of the muscular system and is integral to physical management of patients, by aiding evaluation and treatment, it does not encroach on the work of established imaging disciplines. Respecting professional boundaries and avoiding confusion with diagnostic musculoskeletal imaging will help ensure the acceptance by other disciplines of RUSI becoming part of routine physical therapy practice.

This book is the first practical guide on RUSI and is urgently needed. It outlines the background physics and then focuses on imaging the muscles of the lumbopelvic region and the bladder. Its author, Jackie Whittaker, is a highly skilled clinician and educator, who integrates research with clinical application, acknowledging throughout the book that much of the theoretical basis of existing clinical approaches requires further evidence. Some of the practical details of RUSI have yet to be standardised to minimise inconsistencies between groups and countries, and aligned as far as possible with established sonography practice. The author is one of the RUSI Symposium delegates still developing the international practice guidelines, so is well placed to offer her expertise. This informative, clearly presented reference guide provides an excellent introduction to RUSI and should prove to be a valuable resource to support training programmes.

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REFERENCE

Teyhen D 2006 Rehabilitative Ultrasound Imaging Symposium, San Antonio, Texas, May 2006 *Journal of Orthopaedic & Sports Physical Therapy* 36(8):A1–A17