

Preface

The increasing availability of ultrasound and magnetic resonance (MR) imaging equipment has, over the last decade in particular, triggered a renewed interest in diagnostic imaging in female urology and urogynecology. Although MR provides excellent resolution and contrast and is a wonderful tool for describing anatomy (as Lennox Hoyte will show), ultrasound has found more widespread use. This is attributable to cost and access issues, but also because ultrasound offers a degree of dynamic imaging that is not currently achievable by MR. Ultrasound, at least in the form of two-dimensional (2D) B mode real-time sonography, is almost universally available and provides for real-time observation of maneuvers such as Valsalva and pelvic floor muscle contraction. This is of great importance when assessing pelvic floor anatomy and function because maneuvers enhance the visibility of structures and help uncover defects.

A number of different sonographic approaches have been used for lower urinary tract and pelvic floor imaging. From the 1980s onward, transabdominal,^{1,2} perineal,^{3,4} transrectal,⁵ and transvaginal ultrasound⁶ have been investigated for use in women with urinary incontinence and prolapse. Because of its noninvasive nature, ready availability, and the absence of distortion, perineal or translabial ultrasound is currently used most widely. However, most of the text in this volume (and many of the images) will also apply and be useful to colleagues more familiar with introital ultrasound, a method that generally uses transducers designed for intravaginal use, by placing them in the vestibule of the vagina.

One of the advantages of translabial or perineal ultrasound is that it allows the use of standard curved array transducers designed for abdominal and obstetric imaging. Another is the fact that the characteristics of such transducers usually permit imaging of the entire levator hiatus. This includes the anorectum, allowing us to finally see beyond the confines of our respective specialties. Pelvic floor morbidity encompasses urologic, gynecologic, and colorectal abnormalities, and modern imaging may well come to be a factor that leads to a closer integration of those three specialties. Colorectal pelvic floor imaging is still in its infancy, with sphincter assessment the only area that has developed beyond the experimental stage

at present, but hopefully Anneke Steensma's chapter will help demonstrate the potential of sonography in this field.

The development of 3D ultrasound has opened up entirely new diagnostic possibilities in pelvic floor imaging, not the least because it has given us access to the axial plane, i.e., the plane of the levator hiatus. First attempts at producing 3D-capable systems go back to the 1970s when the processing of a single volume of data would have required 24 hours of computer time on a system large enough to fill a small room. Such data processing is now possible on a laptop computer, and in real time. The advent of volume ultrasound has also allowed the use of rendering techniques for contrast enhancement and speckle reduction. As a result, resolutions in all potential planes have improved markedly over the last few years and we have made great progress in evaluating pelvic floor function and trauma. Transvaginal and translabial techniques of 3D ultrasound allow higher frequencies, and although they suffer from a restricted field of view, resolution can potentially be much higher. It is likely that there will be significant development of this field in the next few years.

We have no evidence that modern imaging techniques improve patient outcomes in pelvic floor medicine, and it would be a major challenge to try to conduct a trial to prove or disprove such a hypothesis. However, this is also the case for the other main diagnostic method in urogynecology, i.e., multichannel urodynamics. In the meantime, it is evident that any diagnostic method is only as good as the operator behind the machine, and we all know that diagnostic ultrasound is particularly operator dependent. We all carry a responsibility to ensure that diagnostic methods are used appropriately, and for a field as recent as pelvic floor ultrasound, this implies that teaching is of paramount importance.

The volume you hold in your hands is designed with these thoughts in mind. We would like it to be a resource for all those using or intending to use ultrasound in the investigation of women with pelvic floor and lower urinary tract dysfunction, i.e., with urinary incontinence, voiding dysfunction, recurrent urinary tract infections, and prolapse, and it may also be of interest to those dealing with anorectal dysfunction. Its original purpose was to provide a companion volume for courses in pelvic floor imaging. The integration of 4D View software and volume data for offline analysis, made possible by the support of GE Medical Ultrasound, should provide the beginner with a simple and convenient means to train pattern recognition and quantitative analysis.

We have taken great care to provide as much original imaging material as was possible within the limits of the format, but it is recognized that this field is in rapid development. There is no doubt that we will be able to do much better in the future, and the authors would like to invite all readers to accompany us on this journey.

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