III.1. Introduction

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The imaging of pelvic floor structures is presently of great interest. In the last two decades, growing attention has been dedicated to increasing both understanding on the pelvic floor anatomy (particularly related to physiology and pathophysiology) and improving technologies for diagnosis. Endoluminal ultrasonography (EUS) and magnetic resonance imaging (MRI) have become an important part of the diagnostic workup in pelvic floor dysfunction [1, 2]. Their contributions should be effectively integrated with other techniques (i.e., endoscopy, anorectal manometry and electromyography, evacuation proctography) for a complete assessment of the main pathologic conditions of the pelvic floor and to plan the best form of treatment.

The advantage of EUS is that it is inexpensive and widely available; however, similar to all ultrasound methods, EUS is operator dependent. Despite the fact that intraobserver and interobserver agreement has been reported in the literature as good or very good [3], measurement of the different anal structures did not provide homogeneous morphometric results [4, 5]. Many debates have centered around who should perform EUS examinations: colorectal surgeons, gastroenterologists, or radiologists. We are persuaded that the operator's experience is the most relevant factor, irrespective of specialty.

The current 360° rotating endoprobe, specifically designed for anorectal scanning, has provided important information to a detailed understanding of the anatomy of this region [6]. The increasing interest in endoanal (EAUS) and endorectal (ERUS) ultrasonography, accomplished with a wider spread in using these procedures, has allowed the definition of clinical indications and the field of applications. The ambitious aim of this diagnostic tool is to correctly identify very small and thin structures, with no precise interfaces and limits with the adjacent structures, which often cannot be visualized or measured with conventional techniques. The influence of age, gender, parity, obstetric trauma, body weight, height, and a number of other incompletely understood factors on variability of anorectal anatomy has for a long time led to significant confusion and conflicting results. Both EUS and MRI have contributed to modify previous knowledge of anorectal anatomy and adequately correlate imaging with pelvic floor dysfunction [7–9]. Significant improvement in reducing investigational problems has been recently obtained by using more sophisticated devices [i.e., three-dimensional (3-D) acquisition systems, probe pull-through systems, and the newer probe with integrated 3-D and pull-through devices], which allow evaluation of the anal canal and rectum in a variety of projections, including the transverse, sagittal, and coronal planes, and all the possible diagonal views. Measurement of linear distance, thickness, and volume are readily available.

However, considering both diagnostic applications and potential pitfalls of EAUS and ERUS, it is mandatory to standardize as much as possible the equipment used, technique of examination, manner of performing measurements, and definitions and subjective interpretations. By minimizing the effect of these confounding variables, different investigators will be able to communicate and compare results.

The purpose of this section is to describe the normal anatomy of the anal canal and rectum by means of EUS and MRI. Attention will be given to the more recent acquisition in pelvic floor imaging.

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