Chapter 3.2(ii)
Ultasound in Coloproctologic Practice: Dynamic Transperineal Ultrasound and Transvaginal Sonography

Marc Beer-Gabel, Andrea Frudinger, and Andrew P. Zbar

A. Dynamic Transperineal Ultrasonography (DTP-US)—A New Aid to Clinical Proctological Practice

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Introduction

Dynamic transperineal ultrasonography (DTP-US) is a recently developed and studied novel and simple means for the real-time assessment of component parts of the anterior, middle, and posterior pelvic compartments and their interaction during provocative maneuvers such as straining and simulated defecation. Although it potentially rivals axial endoanal ultrasonography in the quality and resolution of images that it provides statically for the assessment of the integrity of the internal and external anal sphincters, it also may be most useful in dynamic mode for the assessment of patients primarily presenting with evacuatory dysfunction or those with defecation difficulty following pelvic surgery.

There is generally a poor correlation between the symptoms attributed to pelvic floor dysfunction and radiologically demonstrated anatomical findings (1), and studies have shown that the vast majority of patients presenting with evacuatory disorders have a multiplicity of pathology (2). The traditional assessment of these patients often involves a fairly poorly tolerated "extended" defecographic technique requiring opacification of the small bowel, bladder, vagina, and even the peritoneal cavity to determine pathology of the pelvic floor compartments (3) with a presumptive decision-making process to define what represents the dominant pathology in such patients (4). Recently, static DTP-US has been used to assess the morphology and integrity of the anal sphincter components in nullipara (particularly where expensive endoluminal probes are not available), producing images that are as accurate as axial endoanal ultrasonography (5,6).

Dynamic real-time TP-US is a new noninvasive technique simply performed (and learned) that assesses the anterior, middle, and posterior perineal and pelvic compartments, providing clear high-resolution images of the anal canal, anal sphincters, puborectalis sling, bladder base, urethra and urethrovesical angle, vaginal vault, and the rectovaginal (rectogenital) septum, which recently has been reported by our group in an unselected group of patients presenting with a variety of anorectal disorders (7). This first part of the chapter describes the basic technique, advantages, and limitations in specific pelvic floor disorders and accuracy in those select patients presenting to a pelvic floor dysfunction unit with primary disorders of rectal evacuation.

Technical Aspects of DTP-US

No preparation is required for the examination. The procedure is videotaped for orthograde and retrograde scrolling of dynamic images, and static representative images may be used for clinical measurement. Dynamic transperineal ultrasonography is performed with a 7.5 megahertz curvilinear transducer (C 4-7 and C 8-12), as well as a linear-array transducer (L 5-10 ATL: HDI 3000; Advanced Technology Laboratories, Bothell, WA, USA). A latex condom is used for protection of the transducer head, and for best visualization, the patient's rectum is filled with 50 milliliters of ultrasonographic coupling gel (Ultra-Gel: Aquarius 101; Medilab USA) using a standard Luer syringe and a soft-end rubber catheter. A similar volume of acoustic gel is instilled into the vagina (without distending the vaginal vault), and gel is liberally applied to the perineum. For the complete procedure, 50 milliliters of Gastrografin (Schering UK) diluted one to one with tap water is ingested by the patient one hour prior to the procedure to visualize the small bowel.

The perineum of the patient generally is examined in the left lateral position with systematic examination where the probe is placed first in a midsagittal plane on the perineal body to outline a general view of the pelvic floor and viscera and then rotated posteriorly onto the anus to define the posterior perineal structures. The anterior perineum is examined next by placing the probe at (but not in) the vaginal introitus. With this technique, images of the infralevator viscera, soft tissues, and the pelvic floor musculature are obtained at rest, during maximal straining, and with the patient asked to squeeze in order to prevent evacuation. Posterior perineal images show the anus and distal rectum, and the anal sphincters are visualized using coronal images of the anal canal and sphincter musculature, which are identified by holding the transducer head in a transverse plane at the introitus. Sagittal examination of the anterior perineum shows the distal vagina, bladder, and urethra, and it is used to identify contrast-filled enteric loops—if present—between the rectal and vaginal walls in the territory of the rectovaginal septum should the patient have an enterocele. This approach is also desirable in patients who have evacuatory difficulty following a hysterectomy and who may have vaginal vault prolapse consequent upon poor sacrospinous fixation. Towards the end of the procedure, patients are encouraged to evacuate as much of the intrarectal acoustic gel as possible.

Although the measurement of rectal morphologic parameters is of no clinical use, we have assessed this technique for the measurement of anorectal angles (ARAs) and anorectal junction (ARJ) movement in an attempt to compare it with defecography at rest and during maximal straining in an effort to validate the new modality (8). Real-time movement of the anterior and posterior pelvic floor elements during sustained straining and squeezing are clearly seen with DTP-US and provide an opportunity for measurement of several parameters, including the perimeters of the puborectalis muscle, as well as calculation of both the anorectal and posterior urethrovesical angles. These measurements correspond to those normally obtained during defecography and voiding cystourethrography, respectively.

The dynamic function of the puborectalis muscle can be examined and measured by this method during evacuation and straining. In the sagittal view, the distance between the posterior margin of the pubis and the posterior limit of the ARJ defines the perimeters of the puborectalis, with the difference in length between rest and squeeze representing normal shortening of the muscle during contraction. This measurement is shown schematically as D1 in Figure 3.2(ii).1 and is comparable to measurements

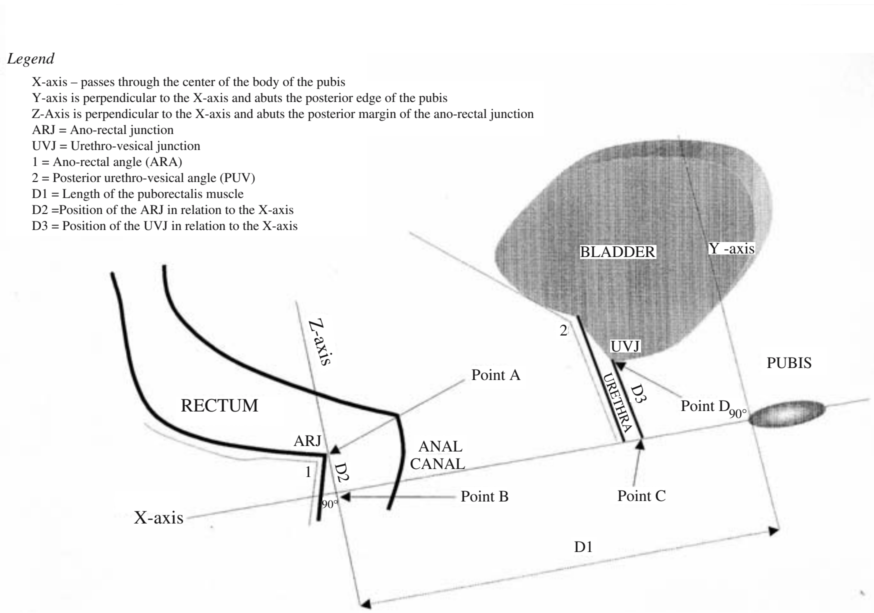

FIGURE 3.2(ii).1. Schematic representation of the pelvic floor at rest using sagittal DTP-US (vagina not shown). (Reprinted with permission from Beer-Gabel M, Teshler M, Barzilai N, Lurie Y, Malnick S, Bass D, and Zbar AP. Dynamic transperineal ultrasound in the diagnosis of pelvic floor disorders. Pilot study. Dis Colon Rectum. 2002;45:239–48.)

obtained with dynamic magnetic resonance imaging (MRI) (9). This measurement directly connects two lines (the *y* and *z* axes) that both lie perpendicular to a line passing through the mid point between the superior and inferior borders of the pubic symphysis. This equatorial line—designated as the *x* axis—is defined more easily by this technique than by conventional defecography because both cortical margins of the symphysis are more frequently readily visible. The *y* axis lies at the posterior limit of the pubis and the *z* axis crosses the posterior aspect of the ARJ. The ARA is measured easily at the confluence of a line forming the longitudinal axis of the anal canal with that of the posterior border of the rectal wall, and the movement of the ARJ is calculated in a coordinate system defined by the axes described above. The point where the *z* axis touches the posterior margin of the ARJ is called Point A and the point where the *z* axis crosses the *x* axis is called Point B. The distance between Points A and B is measured at rest and during sustained squeeze and strain, representing the vertical movement of the ARJ during these maneuvers. This measurement is shown as D2 in Figure 3.2(ii).1. Strict comparisons between these measures at defecography and during DTP-US cannot be made because there is a tendency for the ARJ to lie higher at rest in the left lateral position and for the ARJ to descend more precipitously during straining or attempted gel evacuation in the seated position.

The motion of the soft tissues of the anterior perineum is assessed using a similar coordinate reference system. The position of the urethrovesical junction (UVJ), which is important in the diagnosis of urinary stress incontinence and cystocele, is determined in relation to a perpendicular line drawn from the *x* axis (Point C) to the anterior margin of the bladder base (Point D) with the patient at rest, as described by Schaer et al. (10). Measurements are made and static images taken with a full bladder, although the extent of filling may affect the exact measurement of UVJ movement. The motion of the UVJ during maximal straining (i.e., the distance between Point C and Point D) represents the amount of bladder neck mobility and is shown as measurement D3 in Figure 3.2(ii).1. The posterior urethrovesical angle (PUV), as described by Green et al. (11), also may be measured accurately using DTP-US, where it is defined as the angle created by a line joining the urethral axis to the posterior margin of the bladder base.

When a rectocele is evident, its depth also may be measured accurately using the DTP-US technique; this is schematically shown in Figure 3.2(ii).2. This measurement is made by constructing two axes; the *v* axis (drawn perpendicular to the *x* axis already described and that passes through the anterior aspect of the anal canal) and the *w* axis (which is parallel to the *x* axis and that passes through the most anterior part of the rectocele). Point E is defined then as the point where the *w* axis crosses the most anterior part of the rectocele, and Point F is the point where the *v* and the *w* axes meet. The distance between Point E and Point F (designated as D4 in Figure 3.2(ii).2) is the measurable depth of the rectocele.

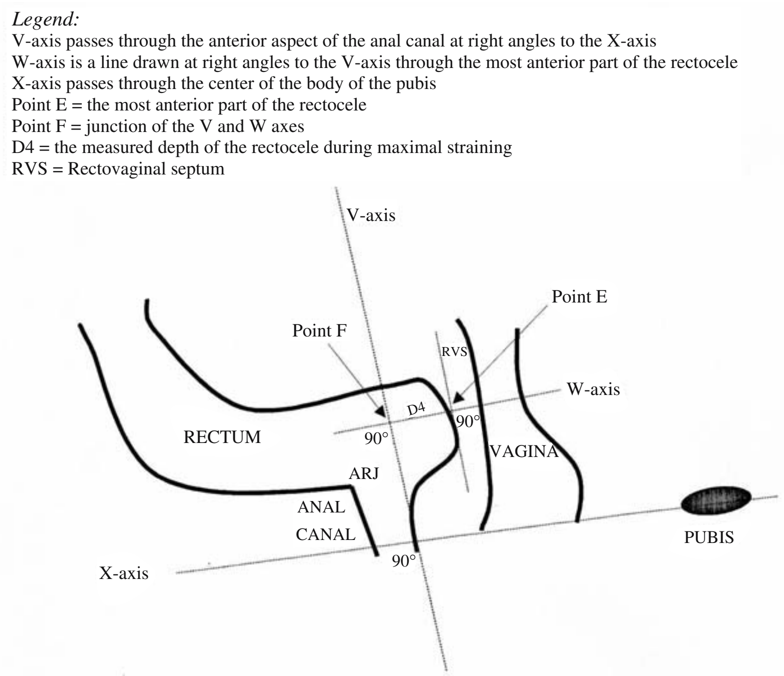

FIGURE 3.2(ii).2. Rectocele depth measurement using DTP-US. Schematic sagittal view of the rectum during maximal strain (bladder and urethra not shown). (Reprinted with permission Beer-Gabel M, Teshler M, Barzilai N, Lurie Y, Malnick S, Bass D, and Zbar AP. Dynamic transperineal ultrasound in the diagnosis of pelvic floor disorders. Pilot study. Dis Colon Rectum. 2002;45:239–48.)

DTP-US in Health and Disease

Axial images with static TP-US rivals those obtained with conventional endoanal probes (Figure 3.2(ii).3). Longitudinal (sagittal) views provide images of the rectoanal junction and an end-on view of the puborectalis bundle (Figure 3.2(ii).4), as well as providing high-resolution images of the perineal structures and the rectovaginal septum. The mucosa in the axial images is well recognized with a hyperechoic uncompressed image, having the potential of diagnosing hemorrhoids and rectal mucosal prolapse. Real-time dynamic imaging corresponds to the movement of the anterior and posterior perineal and infralevator compartments, with variation from the resting position during maximal straining providing evidence of a rectocele (Figure 3.2(ii).5), rectoanal intussusception (Figure 3.2(ii).6), and full-thickness rectal prolapse (Figure 3.2(ii).7). Specialized images may confirm the presence of unusual perirectal mesenchymal masses, which result in evacuatory difficulty (Figure 3.2(ii).8) and assist in the differentiation of a peritoneocele (defined as a widened rectovaginal septum alone) and an

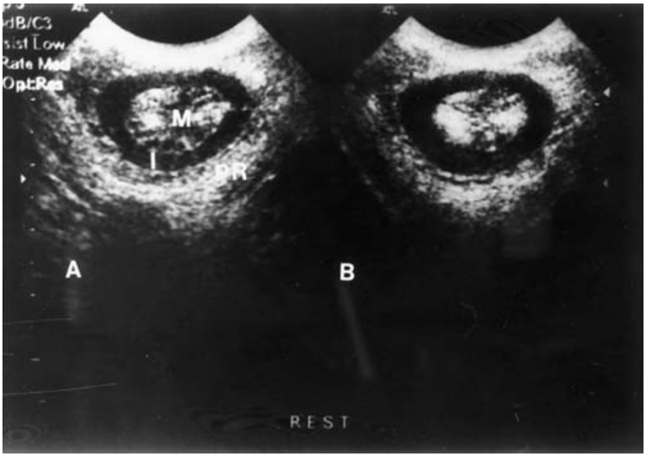

FIGURE 3.2(ii).3. Transverse dynamic transperineal ultrasound of the anal sphincters at the proximal sphincter level. A. The internal anal sphincter (designated as I) is seen as a hypoechoic ring and the puborectalis/external sphincter complex (at the left) appears as an echogenic U-shaped sling posterior to the internal anal sphincter (PR). The mucosa and submucosa (M) is seen as a central echoic luminal structure. B. A similar transverse image through the midsphincter scanned below the puborectalis level. (Reprinted with permission from Beer-Gabel M, Teshler M, Barzilai N, Lurie Y, Malnick S, Bass D, and Zbar AP. Dynamic transperineal ultrasound in the diagnosis of pelvic floor disorders. Pilot study. Dis Colon Rectum. 2002;45:239–48.)

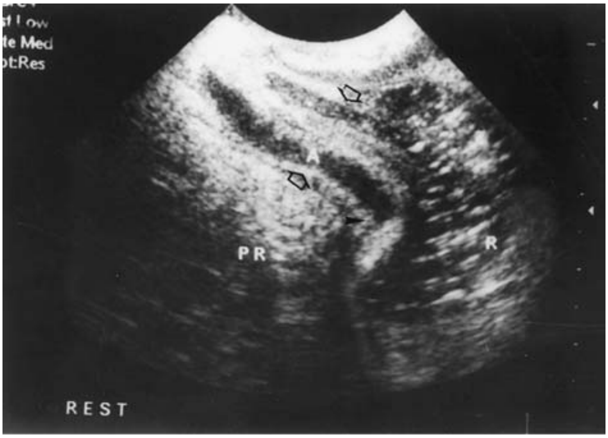

FIGURE 3.2(ii).4. Sagittal dynamic transperineal ultrasound of the anal canal and distal rectum. The internal anal sphincter (A) is seen as two longitudinal hypoechoic parallel layers (open arrows) lying on both sides of the lumen against the hyperechoic mucosa and submucosa. The puborectalis muscle (PR) is seen as a hyperechoic bundle posterior to the anorectal angle (arrowhead). The rectum (R) is filled with echogenic acoustic gel. (Reprinted with permission from Beer-Gabel M, Teshler M, Barzilai N, Lurie Y, Malnick S, Bass D, and Zbar AP. Dynamic transperineal ultrasound in the diagnosis of pelvic floor disorders. Pilot study. Dis Colon Rectum. 2002;45:239–48.)

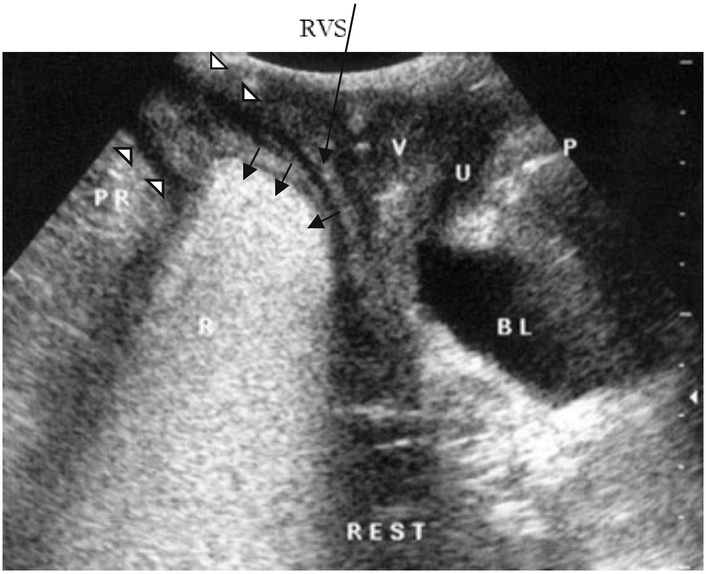

FIGURE 3.2(ii).5. Rectocele on DTP-US (short arrows). PR, puborectalis; R, rectum; BL, bladder; U, urethra; P, pubis; V, vagina; RVS, rectovaginal septum. Arrowheads point to the internal anal sphincter seen in mid-sagittal plane. (Reprinted with permission from Zbar AP, Lienemann A, Fritsch H, Beer-Gabel M, and Pescatgori M. Rectocele: pathogenesis and surgical management. Int J Colorectal Dis. 2003;18:369–84.)

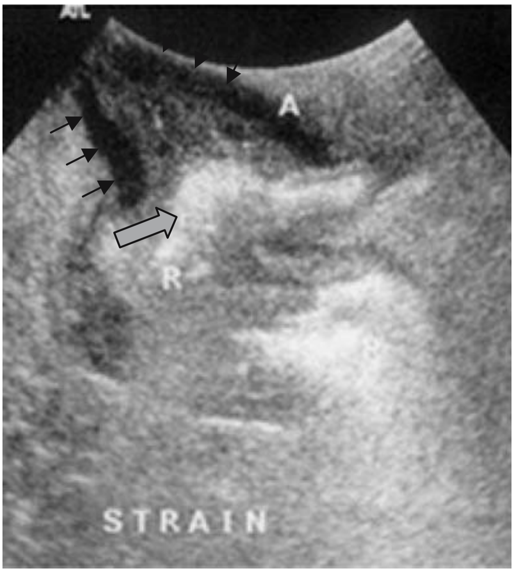

FIGURE 3.2(ii).6. Dynamic transperineal ultrasonography of rectoanal untussusception. The contrast-filled rectum can be seen to contain an intussuscepting leading edge (intussusceptum; black arrow) infolding into the apex of the anal canal. The hypoechoic IAS is marked by white arrows.

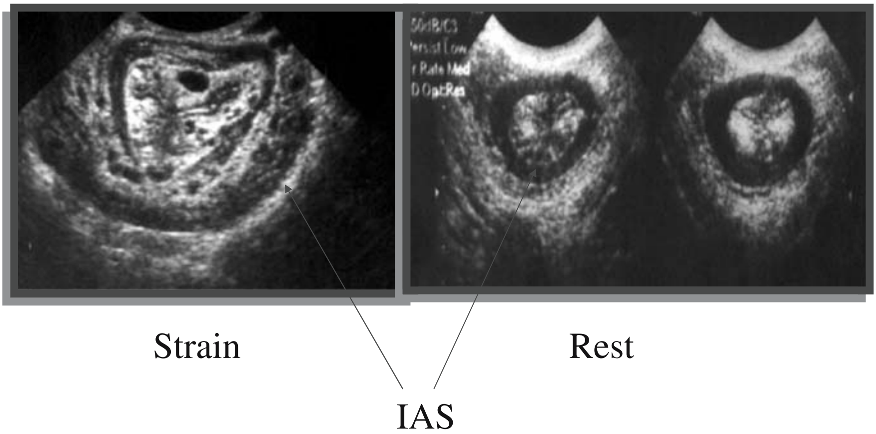

FIGURE 3.2(ii).7. Axial DTP-US image of a rectal prolapse showing edema of the rectal mucosa with vascular congestion.

enterocele (Figure 3.2(ii).9). The anterior compartment may be assessed for abnormal widening of the urethrovesical angle (somewhat dependent upon the filling status of the bladder during dynamic imaging), as well as in the diagnosis of a cystocele (Figure 3.2(ii).10).

In a recently published study from our group, we assessed 33 women who presented with long-standing difficulty in evacuation, comparing blinded assessment of defecography with DTP-US (8) where evacuation difficulty exceeded six months in duration, where there was less than one bowel movement every four days (or longer), or if 25% or greater of bowel

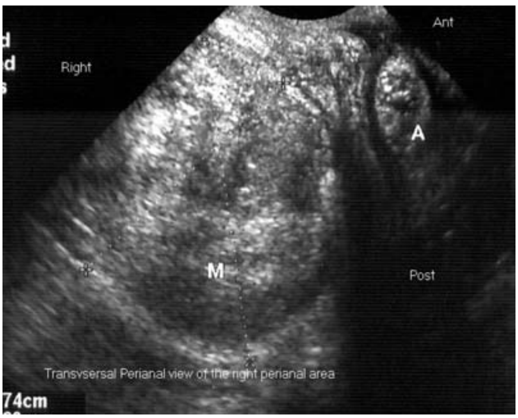

FIGURE 3.2(ii)8. Sagittal view of a perirectal mesenchymal mass (M) causing defacation difficulty. The anal canal is labeled as A.

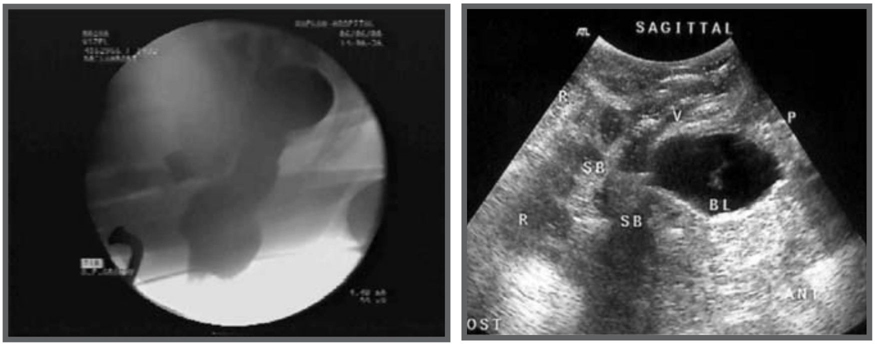

FIGURE 3.2(ii).9. The left-hand figure shows a defecating proctogram with an enterocele. This is also evident on the DTP-US (right-hand figure) where small bowel loops (SB) are seen distending the rectovaginal septum. BL, bladder; R, rectum; V, vagina; P, pubis.

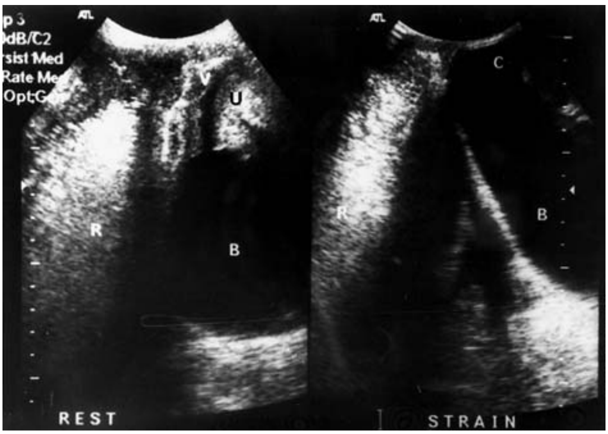

FIGURE 3.2(ii).10. Sagittal dynamic transperineal ultrasound at rest and during straining showing a cystocele. The rectum (R), vagina (V), urethra (U), and the bladder (B) are well seen. At rest, the bladder is seen as an anechoic structure distended with urine with the urethra appearing as a hypoechoic channel. Posteriorly, the vagina is outlined by contrast and is seen as a hypoechoic line. The rectum is filled with echogenic contrast. During straining, the anterior part of the rectum moves anteriorly to form a small rectocele. The anechoic bladder prolapses downward to form a large cystocele (C). (Reprinted with permission from Beer-Gabel M, Teshler M, Barzilai N, Lurie Y, Malnick S, Bass D, and Zbar AP. Dynamic transperineal ultrasound in the diagnosis of pelvic floor disorders. Pilot study. Dis Colon Rectum. 2002;45:239–48.

movements were accompanied by excessive straining as previously reported and defined (12,13). Comparisons were made with a standard proctographic technique where comparative measurements were recorded of the ARA (at rest and during straining) and of displacement of the ARJ during maximal straining from a position of rest.

The overall diagnostic categorization with both techniques showed good agreement for the main diagnoses of rectocele, enterocele, rectoanal intussusception, and rectal prolapse. In general, more enteroceles are diagnosed with DTP-US, particularly when there is a coincident rectocele and in the post-hysterectomy patient—a point of considerable import when the surgeon is contemplating operating on the patient presenting with evacuation difficulty and where the dominant finding is that of a sizeable rectocele. Dynamic transperineal ultrasonography also tends to show a greater multiplicity of pelvic pathologies when compared with defecography in this unselected patient group. Our group has demonstrated a high correlation between resting and straining ARA and measured displacement of the ARJ on maximal straining, validating this technique (Table 3.2(ii)-1).

What is clear is that the technique is simple, easily trained, inexpensive, and well tolerated. It dynamically provides useful information concerning the anterior, as well as the posterior, pelvic floor and perineal structures where there is frequent coincident pathology of note, and it appears to provide more information than transintroital US, which has been used in

Table 3.2(ii)-1. Measurements of the anorectal angle (ARA) at rest and during maximal straining and the position at rest and movement during maximal straining of the anorectal junction (ARJ) as calculated using defecography and DTP-US (mean difference value obtained by DTP-US subtracted from the value measured at defecography, CI 95% confidence interval).*

	Mean ± SEM	Mean difference	95% CI	*P*
ARA at rest				0.92
Defecography	102.9 ± 3.75	–0.39	–8.29 to +7.5	
DTP-US	103.3 ± 2.86		—	
ARA during straining				0.09
Defecography	123.3 ± 4.32	+6.91	–0.75 to +14.57	
DTP-US	116.4 ± 3.32		—	
ARJ position at rest (mm)				0.72
Defecography	14.17 ± 4.9	1.23	–5.89 to +8.35	
DTP-US	12.94 ± 3.4		—	
ARJ movement during straining (mm)				0.49
Defecography	34.73 ± 10.6	2.78	–5.63 to +1.19	
DTP-US	31.94 ± 5.14		—	

* Reprinted with permission from Beer-Gabel M, Teshler M, Schechtman E, and Zbar AP. Dynamic transperineal ultrasound vs. defecography in patients with evacuatory difficulty a pilot study. Int J Colorectal Dis. 2003. e-pub DOI 10.1007/s00384-003-0508-x.

urinary stress incontinence, transvaginal delineation of the anal sphincter (vide infra), and transintroital balloon sonography (14–16). In this regard, DTP-US appears to result in less perineal distortion than any of these other described techniques. At present, the full potential of this technique is unclear. Sagittal views afforded by DTP-US may assist in the definition of the rostral extent of sphincteric defects and transsphincteric fistula-in-ano without requiring the complex software necessary for three-dimensional (3D) endoanal sonography or of its comparatively difficult image interpretation. Moreover, the images provided of the undistorted mucosa and submucosal space may assist in the delineation of the course of fistulae and their internal openings so necessary for successful mucosal advancement anoplasty.

It should be recognized, however, that there are some inherent problems with this new technique. It has a significant learning curve and requires considerable dedication. In some patients, there is reticence to carry out either provocative maneuvers of full straining (perhaps because of the proximity of the probe or the position of the operator's hand to the perineum), resulting in the risk of under diagnosis. The position of these patients in left lateral is certainly not physiological, and straining of gel can only represent, at best, a simulated attempt at defecation, which may fail to diagnose conditions where maximal straining is a physiological posture at the end of "defecation" is important. These conditions notably include full-thickness rectal prolapse and rectoanal intussusception, which cluster in such patients. The newer techniques discussed in this book, such as dynamic MRI, are more expensive and are not as readily allocated or available for functional anorectal disorders (17), and they too do not represent true physiological simulation of defecation unless open architecture units are available (18).

Summary

The wide availability of such technology and its ease of use, patient tolerance, and low cost make this an attractive imaging modality in patients presenting with specialized and complex complaints presenting to a pelvic floor unit. Dynamic transperineal ultrasonography necessitates further prospective evaluation in specific subgroups of patients and in the prospective assessment of the effects hysterectomy imposes on the pelvic floor and perineal structures. The avoidance of complex software programs and computerized algorithms (as part of 3D endoanal ultrasonography or dynamic MRI) or of radiation exposure (particularly in extended defecographic procedures) are significant advantages of this modality (19).

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B. Transvaginal Endosonography in the Assessment of the Anorectal Sphincter

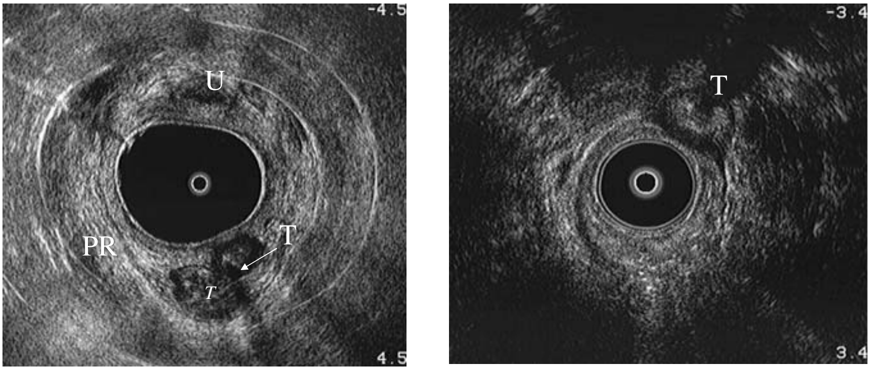
Andrea Frudinger and Andrew P. Zbar

Introduction

There are comparatively few reports in the literature concerning this technique, and it has not gained an established place in coloproctology because of relatively poor resolution of the anterior external anal sphincter, the perineal body, or rectovaginal fistulae (1,2). Many pelvic floor units combine the use of endoanal and transvaginal ultrasonography in the assessment of their patients, and it is unclear how much (if anything) the transvaginal examination either demonstrates or contributes to the anorectal assessment or to specific decision making. The technique has largely not been adopted by the colorectal fraternity because it has been considered relatively inaccurate in the assessment of the anterior EAS, as there are anatomical limitations imposed on the axial images (3), although it may be used in units where there is the requirement for post-obstetric assessment of the anal sphincters when there is no available endoanal probe. Here, only the grossest anterior EAS defects will be visualized. Moreover, the hoped-for delineation by transvaginal ultrasound of the sonographic appearances of the perineal body structure (and definition of what may represent a perineocele) has been disappointing (4,5).

Technical Details

Standard probes as used either for endoanal or prostatic scanning may be employed for this technique (6), or one may use dedicated endovaginal probes as typically used by gynecologists for the assessment of ovarian pathology (7), latterly with 3D transvaginal reconstruction (8) or recently by our group in the diagnosis of acute pelvic appendicitis (9). The probe needs to be inserted at least three centimeters into the vagina; therefore, the procedure is different from transintroital ultrasonography (10). Moderate balloon distension is required for adequate acoustic coupling and reasonable resolution of the anal sphincter on probe withdrawal. Examinations may be made either in the left lateral or the supine (dorsal) position. Adequate probe movement with the probe tip directed posteriorly beyond the hymenal ring will define the cross-sectional appearance of the anal canal, the perineal body, and the puborectalis sling. Inherent differences exist between the transvaginal and endoanal ultrasonographic approaches. With transvaginal sonography, there is no closed EAS ring in the most proximal part of the anal canal. Here, the fibers of the sphincter move forwards and downwards to form a ring only in the lower part of the anal canal so that

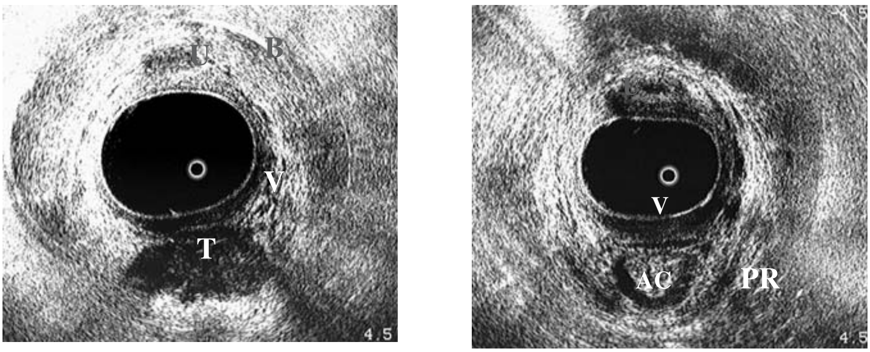


A *B*

FIGURE 3.2(ii).1. A. Sixty-seven year old female with a palpable benign expression (T) in the rectovaginal septum seen on transvaginal ultrasound using a B&K 360 degree rotating 10 megahertz probe. Orientation: U, urethra; PR, puborectalis sling. B. The same, well-delineated expansion (T) on endoanal ultrasound, compressing the external anal sphincter.

this effect cannot be visualized with the transvaginal technique, making the interpretation of EAS defects unreliable.

Figures 3.2(ii).1 and 3.2(ii).2 show the value of the transvaginal technique in the delineation of the extent of infiltration of masses invading the rectovaginal space.



A B

FIGURE 3.2(ii).2. A. A 75-year old female with an ill-defined malignant expansion (T) involving the posterolateral vaginal wall and infiltrating the rectovaginal septum. The image was taken above the anorectal verge using a B&K 360 degree rotating 10 megahertz probe. Orientation: U, urethra; B, bladder; V, vaginal wall. B. The same 75-year old female. The transvaginal image was taken at the anorectal verge (PR) using a B&K 360 degree rotating 10 megahertz probe. Orientation: U, urethra; V, vaginal wall; AC, anal canal; PR, puborectalis sling.

Published Results

In this technique, the rectum is collapsed with visualization of the mucosal folds and submucosa and the hemorroidal plexus/cushions as is seen with transperineal ultrasound. Withdrawal of the probe after identification of the puborectalis sling shows the anorectal junction as a change in diameter of the hyperechoic shadow as it moves from a larger flattened rectum to a well-defined annular anal canal. Transvaginal endosonography does not provide adequate separation of the puborectalis from the deep component of the EAS (11). The appearance of the EAS as a complete or incomplete ring (defining anterior EAS defects) is akin to that obtained with conventional endoanal ultrasonography. The delineation of an inferomedial slope of the anterior EAS in women needs to be defined using this modality, and the appearance can be difficult to appreciate, limiting the use of the technique in subtle and incomplete EAS tears (12).

The diagnosis and calibration of hemorrhoids with transvaginal ultrasound has not been reported adequately, although it is possible because of the lack of mucosal distortion with directional color Doppler (13). In their original study, Sultan and colleagues assessed 10 healthy females and 10 patients presenting with fecal incontinence using transvaginal endosonography (1) and were able to define sphincter defects in all cases, each of which was confirmed at surgery. The limited value of this small study was confirmed by Alexander et al. (2), where 28 women were assessed with a side-fire transrectal probe modified for transvaginal use. These authors also reported accurate diagnosis of low rectovaginal fistulae and anovaginal fistulae, particularly in patients presenting with fecal leakage after unsuccessful primary repairs of fourth degree obstetric-related perineal lacerations. For the diagnosis of rectovaginal fistula, supplementation of the image may be provided by the ultrasonic identification of water flow following transrectal instillation into the vaginal vault using a 10 Fr. catheter positioned at the anorectal junction. In a publication by Frudinger et al. (3), comparison of transvaginal and endoanal ultrasound in 47 patients presenting with fecal incontinence proved comparatively disappointing, showing sphincter defects in only one-half of the cases examined, where multiple attempts at transvaginal scanning were required in some cases because single-shot scanning proved too limited.

However, this view was refuted in a study by Stewart and Wilson (5) with 50 patients in all examined with the two techniques (32 presenting with fecal incontinence), where although both types of ultrasound were in agreement in 40 of 44 cases; there were four patients who had normal endoanal ultrasounds with an anterior defect of the EAS demonstrated by transvaginal endosonography and who subsequently had operative confirmation of a sphincter defect. This study calls into the question some of the image interpretation. In general, the measured IAS thickness using endoanal ultrasound appears to be less than that obtained with transvaginal endosonography, which may have to do with the luminal distortion exerted on the anal canal by the endoanal probe.

Summary

In theory, transvaginal ultrasonic imaging of the anal sphincters has several advantages. The anus lays undisturbed, providing accurate determination of IAS damage and thickness, definition of the subepithelial space for determination of the internal opening of fistulae, and potential categorization of hemorrhoids and what could constitute the normal perineal body. It would appear that defects of either the IAS or the EAS, which are of critical importance in operative decision making for patients presenting with fecal incontinence, are not readily demonstrated using this technique where transvaginal imaging is particularly limited in showing the proximal anal canal and in definition of the perineal soft tissues (and their integrity) below the introital level. This may arise as the vaginal axis diverges from that of the anal canal because the latter cannot be adequately scanned in a plane parallel to its longitudinal axis. Moreover, although oblique views of the puborectalis sling are accurately defined with the transvaginal probe, the posterior wall of the anal canal and the distal anterior anal canal are incompletely viewed because of poor acoustic contact. Any attempt to assist in contact appears to distort the perineum, creating reverberation artifact, and resulting in a non-anatomical alignment of the rectovaginal space and its soft-tissues.

As a result in practice, extensive distal IAS and EAS defects will tend to be missed using this technique. This view, as experienced by Frudinger and colleagues (3), may be partly obviated by a more dedicated transvaginal biplane probe and by gentle pressure on the perineal body with the patient supine as the probe is withdrawn. For these reasons, the technology has not advanced over the years and it is hardly used in colopropctologic practice except to confirm the findings noted either on endoanal or transperineal sonography. In theory, it may have a place in the delineation of a high anterior EAS defect in a patient with an attendant anal canal stenosis that does not permit the placement of a standard endoanal probe and in the occasional patient with complex perianal Crohn's disease and an anovaginal fistula where it may complement transperineal sonography in documentation of the course of the fistulous track. It is certainly a valuable tool for the visualization of the rectovaginal space and expansions involving this part of the pelvic structures.

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