Dynamic Transperineal Ultrasound in the Diagnosis of Pelvic Floor Disorders

Pilot Study

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PURPOSE: Defecating proctography and more recently, magnetic resonance imaging have both been used for diagnosis in patients with pelvic floor dysfunction. This pilot study assessed the feasibility of dynamic transperineal ultrasound in a range of specific disorders affecting evacuation. METHODS: A protocol of sagittal and transverse transperineal imaging was established defining the infralevator viscera and soft tissues and the margins of the puborectalis muscle. Dynamic measurements were possible for the extent of puborectalis shortening, the anorectal angle, and the movement during straining of the anorectal junction. Calculations were made of the depth of demonstrated rectoceles, the posterior urethrovesical angle, and the movement of the urethrovesical junction. Diagnoses were confirmed by proctography (where appropriate) and clinical examination. RESULTS: Transverse images of the anal sphincter were comparable with those obtained using endoanal ultrasonography. Sagittal images permitted the measurement of puborectalis contraction and the anorectal angle comparable with those obtained during defecography. Cystoceles were able to be diagnosed during closure of the posterior urethrovesical angle and abnormal urethrovesical junction descent during straining. Rectoceles, peritoneoceles, enteroceles, and rectoanal intussusception were readily identified using dynamic transperineal ultrasonography. CONCLUSION: Dynamic transperineal ultrasound is a simple, noninvasive way to assess dynamically the interaction of the pelvic viscera and their relationship to the pelvic floor musculature in patients with evacuatory disorders and pelvic floor dysfunction. [Key words: Perineal ultrasound; Defecography; Pelvic floor; Rectocele]

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The symptoms of pelvic floor disorders are varied and often do not correlate well with demonstrated anatomic findings.[1] It is therefore important to examine the entire pelvic floor anatomy and function even when the main symptoms seem to suggest pathology isolated to a specific region. Currently, such an assessment relies either on defecography[2] or dynamic fast-field magnetic resonance (MR) imaging.[3,4]

Defecography may require multiorgan opacification and exposes the patient to relatively high-level radiation to demonstrate the interaction of rectal evacuation with the other pelvic viscera and their presumed relationship to the musculature of the pelvic floor.[5] Dynamic MR imaging, although providing high-resolution images of the pelvic structures, is expensive and not widely available and employs provocative maneuvers in relatively nonphysiological positions.[6]

Recently, static transperineal ultrasound has been used to assess the appearance of the anal sphincter components in normal nulliparous individuals without anorectal disease, providing images that1 resemble those obtained using conventional endoanal techniques.[7] Dynamic transperineal ultrasound (DTP-US) is a new, noninvasive technique designed to investigate the anatomy of the female pelvic floor and perineum with clear definition of the anal canal and sphincters, the puborectalis sling, the urethra, the bladder base, and the vaginal vault; both at rest and during straining. We describe this novel ultrasonographic technique, which provides an overall view of the infralevator perineopelvic compartment in real time, giving our initial experience in patients referred with specific disorders of evacuation.

PATIENTS AND METHODS

Subjects

Forty-three adult female patients who were referred to the hospital's pelvic floor clinic with evacuatory disorders were assessed. These included 16 patients with chronic constipation and outlet obstruction, 12 patients with fecal and/or urinary incontinence, 11 patients with clinical rectocele, and 4 with clinical cystocele.

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Patients underwent standard investigation consisting of defecography, anorectal manometry, and (where appropriate) endoanal ultrasonography. All patients provided informed consent for DTP-US and its use in subjects was approved by the local hospital ethics committee. Patients with a prior history of pelvic surgery were excluded from this preliminary report.

Imaging Technique

No preparation was required for the examination. The procedure was videotaped for orthograde and retrograde scrolling of dynamic images, and static representative images were used for clinical measurement. DTP-US was performed using 7.5-MHz curvilinear transducers (C 4–7 and C 8–12) and a linear-array transducer (L 5–10 ATL, HDI 3000, Advanced Technology Laboratories, Bothell, WA). A latex condom was used for protection of the transducer head. The transperineal approach routinely visualized the positions of the pubis, urethra, bladder, vagina, anus, distal rectum, and the puborectalis muscle for recording by the examiner. All examinations were performed by the same clinician (MB-G).

Before commencement of the procedure, the patient's rectum was filled with 50 ml of ultrasonographic coupling gel (Ultra-Gel®, Aquarius 101, Medilab) using a standard Luer's syringe and a soft-end catheter. A similar volume of acoustic gel was instilled into the vagina and liberally applied to the perineum. Patients were advised to avoid micturition for a minimum of two hours before the procedure. Fifty milliliters of Gastrografin® (Schering, Berlin, Germany) diluted 1:1 with tap water was ingested by the patient one hour before the procedure to visualize the small bowel.

The perineum of the patient was examined in the left-lateral position with the probe placed in a midsagittal plane on the perineal body to outline a general view of the pelvic floor and viscera. Images of the infralevator viscera and soft-tissues and the pelvic floor musculature are obtained at rest, during maximal straining, and with the patient asked to squeeze to prevent evacuation. Posterior perineal images show the anus and distal rectum. The anus is examined with the probe placed in a sagittal plane and then rotated through 180° to assess the anal sphincters. Coronal images of the anal canal and sphincter musculature 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 is used to identify contrast-filled enteric loops if present between the rectal and vaginal walls in the territory of the rectovaginal septum.

Parameters Measured

The 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. This study aimed at this stage to assess the feasibility of measurement of the parameters rather than their overall accuracy. The latter is the subject of an ongoing study.

The dynamic function of the puborectalis muscle is examined and measured during evacuation and straining. In the sagittal view the distance between the posterior margin of the pubis and the posterior limit of the anorectal junction 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 (as defined) in Figure 1 and is comparable to measurements obtained with dynamic MR imaging.[8] This measurement directly connects two axes which both lie perpendicular to a line passing through the midpoint between the superior and inferior borders of the pubic symphysis (designated as the X-axis).

The anorectal angle (ARA) is measured at the confluence of a line forming the longitudinal axis of the anal canal with that of the posterior border of the rectal wall. The movement of the anorectal junction (ARJ) is calculated at rest and during sustained squeeze and strain in a coordinate system defined by the axes and measurement designated D2 in Figure 1.

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 to the anterior margin of the bladder base with the patient at rest, as described by Schaer *et al.*[9] Measure-

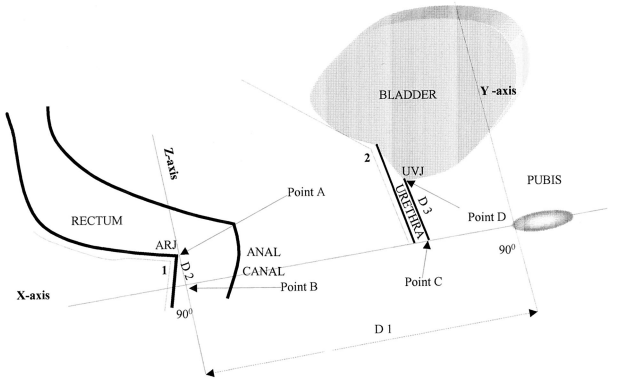

Figure 1. Schematic representation of the posterior pelvic floor compartment at rest using sagittal dynamic transperineal ultrasound. The X-axis passes through the center of the pubis; the Y-axis is perpendicular to the X-axis and abuts the posterior limit of the pubis; the Z-axis is perpendicular to the X-axis and abuts the posterior margin of the anorectal junction (ARJ). Measurement D1 represents the length of the puborectalis muscle (at rest or during straining). Measurement D2 is the distance between points A and B, representing the movement of the ARJ. Measurement D3 is the distance between points C and D and represents the bladder neck mobility (*i.e.*, movement of the urethrovesical junction; UVJ).

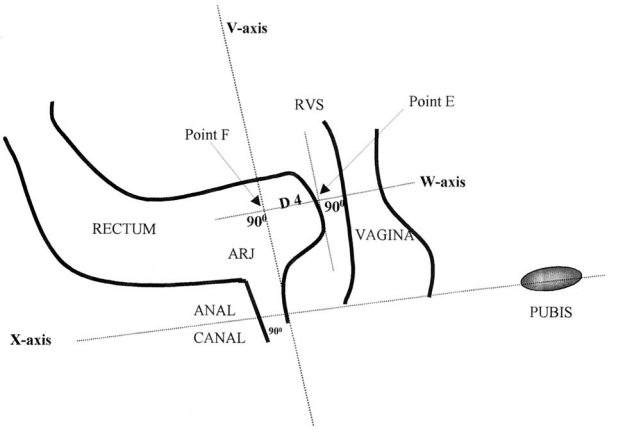

Figure 2. Schematic representation of measurement of the depth of a rectocele as demonstrated by dynamic transperineal ultrasound. The V-axis passes through the anterior aspect of the anal canal perpendicular to the X-axis. The W-axis passes at right angles to the V-axis through the most anterior part of the rectocele. Measurement D4 is the distance between points E and F, representing the rectocele depth. ARJ = anorectal junction; RVS = rectovaginal septum.

ments 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 is shown as measurement D3 in Figure 1. The posterior urethrovesical angle (PUV), defined as the angle created by a line joining the urethral axis to the posterior margin of the bladder base, may also be measured accurately using this technique.[10] The depth of a rectocele (when present) may also be determined and is schematically shown in Figure 2. This measurement is made by constructing two axes joining the projected anterior line of the anal canal and the most anterior part of the rectocele (designated as D4; Fig. 2).

RESULTS

The anal sphincter was routinely visualized in both the transverse and longitudinal axes (Figs. 3 and 4). Classical images of the anal sphincters comparable with endoanal ultrasonography are shown, with hypoechoic representation of the internal anal sphincter (IAS) and a relatively hyperechoic external anal sphincter (EAS). The puborectalis muscle is seen in accordance with endoanal images as a hyperechoic sling embracing the IAS in transverse views and as a

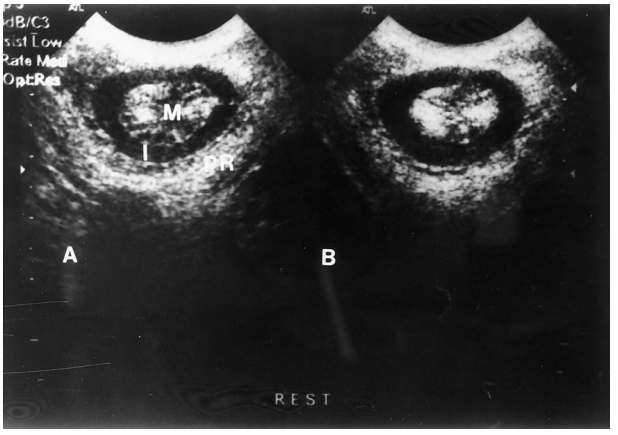

Figure 3. Transverse dynamic transperineal ultrasound of the anal sphincters at the proximal sphincter level. A. The internal anal sphincter (designated as I) is seen as a hypoechoic ring and the puborectalis/external sphincter complex (at the left) appears as an echogenic U-shaped sling posterior to 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.

distinct soft tissue bundle in sagittal views. Both the mucosa and the submucosa are seen as a central undistorted echoic structure internal to the IAS, outlined by luminal contrast.

Real-time imaging shows the movement of the anterior and posterior perineal and infralevator visceral elements and their relationship to the pelvic floor.

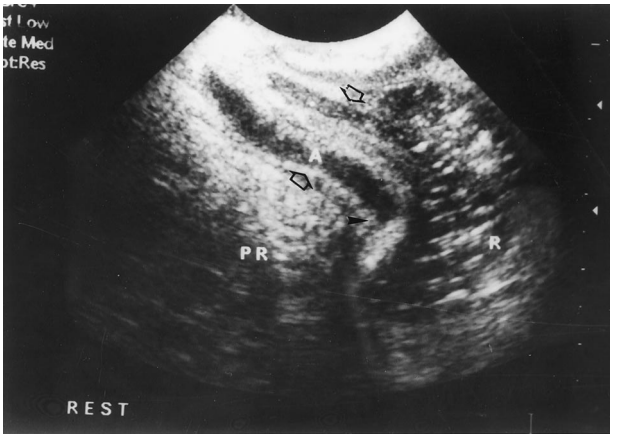

Figure 4. Sagittal dynamic transperineal ultrasound of the anal canal and distal rectum. The internal anal sphincter (A) is seen as two longitudinal hypoechoic parallel layers (open arrows) lying on both sides of the lumen against the hyperechoic mucosa and submucosa. The puborectalis muscle (PR) is seen as a hyperechoic bundle posterior to the anorectal angle (arrowhead). The rectum (R) is filled with echogenic acoustic gel.

Figure 5 represents a sagittal scan, (at rest and during straining), of a patient with a small rectocele showing the perimeters of D1 (the amount of puborectalis shortening), as described in the Subjects and Methods section. During evacuation there is a characteristic widening of the posterior anorectal angle (ARA), which is comparable with that seen on defecography.[11,12]

Figure 6 shows an example of a cystocele, where the PUV closes during maximal straining. All cases of cystocele were confirmed by independent clinical examination by a coloproctologist (AZ) who was unaware of the DTP-US findings. Distinct posterior compartment clinical entities such as a rectocele, enterocele, and rectoanal intussusception are well demonstrated by DTP-US, which preceded defecography in all patients. A rectocele is defined by the presence of a bulging of the anterior rectal wall into the posterior vaginal vault (Fig. 5), and measurement of its depth is described in the Subjects and Methods section. Full-thickness internal rectal prolapse is readily identified during straining, with contrast visible in the rectum and trapped between the intussusceptingsegment and the outer rectal wall. (Fig. 7) Ultrasound diagnosis of rectoanal intussusception was confirmed in all patients by defecography, with agreement of intussusception grade between DTP-US and proctography in 70 percent of referred cases (17 patients). All cases of complete rectal prolapse as diagnosed on DTP-US were confirmed by proctography.

The position of the vagina is easily recognized because of intravaginal gel. The luminal content produces a central hyperechoic band with the vaginal walls appearing hypoechoic. Dynamic real-time ultrasound shows vaginal wall movement with straining, and the rectovaginal septum is readily identified. A peritoneocele may be diagnosed by DTP-US, being recognized as an enlargement of the rectovaginal septal width of more than 2 cm, containing hyperechoic small-bowel mesentery. (Fig. 8A) In the case of an enterocele, a portion of peristaltic small intestine distended with hypoechoic luminal contrast is evident. (Fig. 8B)

DISCUSSION

To the best of our knowledge, this is the first report of dynamic transperineal ultrasound for assessment of the posterior perineal soft tissues and viscera in patients having evacuatory disorders. Recent use of a similar technique has been reported by Kleinübing *et al.*[7] for assessment of static images of the anal sphincter, which resemble those obtained using conventional endoanal probes. These authors used a 5-MHz probe in the dorsal position for static image interpretation without either intrarectal or intravaginal acous-

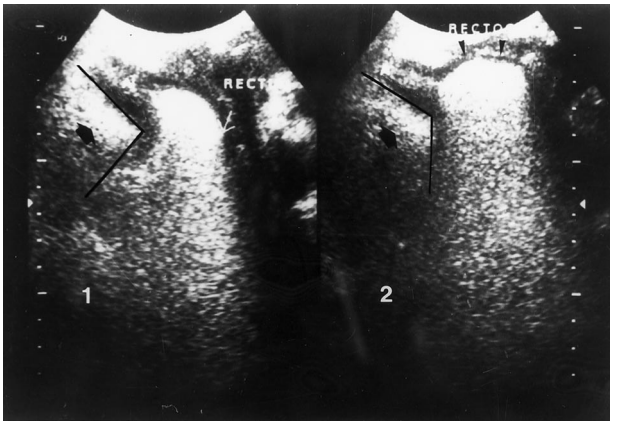

Figure 5. Sagittal dynamic transperineal ultrasound at rest and during straining of a patient with a rectocele. At rest, the anal canal is recognized by the two hypoechoic parallel layers. The puborectalis muscle is seen as an echoic structure posterior to the anorectal junction (large arrow). The rectum is filled with contrast. During straining, the anterior portion of the rectum is displaced to form a rectocele (arrowheads). The anorectal junction, defined by the posterior border of the confluence of the anus and the rectum, widens on straining.

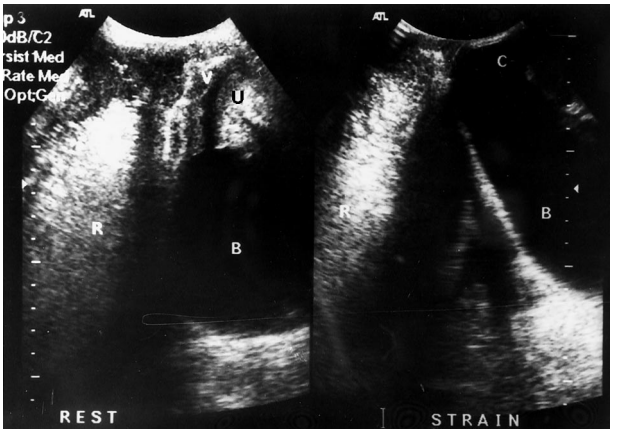

Figure 6. Sagittal dynamic transperineal ultrasound at rest and during straining showing a cystocele. The rectum (R), vagina (V), urethra (U), and the bladder (B) are well seen. At rest, the bladder is seen as an anechoic structure distended with urine with the urethra appearing as a hypoechoic channel. 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).

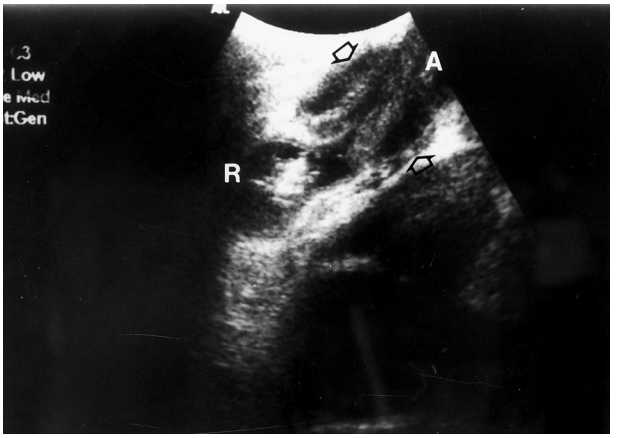

Figure 7. Sagittal dynamic transperineal ultrasound of a patient with rectoanal intussusception. The anal canal is evident at the top of the image (A). The intussuscepted segment extends into the anal canal and is shown by the open arrowheads. Within this intussusceptum there is a double hypoechoic line of rectal mucosa and submucosa with central echogenicity. The latter represents intraluminal contrast material. R = rectum.

tic gel. DTP-US provides comprehensive static and dynamic visualization of the interaction of the pelvic floor and viscera in patients with anorectal dysfunction, providing more information than standard defecography or static transperineal ultrasound. It also delivers important information regarding the anterior perineopelvic soft tissues and viscera, where there is frequent coincident pathology.[13]

Static imaging of the anal region has been described previously using transperineal ultrasound for the assessment of perirectal sepsis,[14] low anorectal tumors, and selected cases presenting with fecal incontinence.[15] This technique also compares with other recently described ultrasonographic techniques such as transintroital ultrasound, which has been used for the examination of patients with urinary incontinence,[16] transvaginal US delineation of anal sphincter defects,[17,18] and transintroital balloon sonography.[19] The transperineal technique as described in this article is less invasive and less likely to distort the perineal and pelvic soft tissues.

The anal sphincters were well visualized in both their longitudinal and transverse axes by DTP-US, producing images in the transverse plane that equated with those observed using endoanal ultrasonography. The sagittal views afforded by DTP-US may be of value in defining sphincteric defects and transsphincteric fistulous tracks, and the images of the undistorted mucosa and submucosa may be used to grade hemorrhoidal disease and to define the submucosal course of anal fistulas.

The clinical significance of specific measurements either during defecography or ultrasound is unclear.[20] Akin to conventional proctography, measurement of the anorectal angle (ARA) and descent of the anorectal junction (ARJ) is possible in the posterior compartment at rest and during straining and squeeze, although these values need to be compared prospectively with those obtained during defecography and dynamic MR imaging. Precise and reproducible measurements can only be made if the probe is held lightly on the perineum without exercising any undue pressure. This can be difficult during straining and squeezing (particularly if the patient is very obese) or if the surface is distorted by extensive previous surgery.

Equally, assessment of the anterior compartment permits the measurement of the posterior urethrovesical angle (PUV) and the movement during straining of the urethrovesical junction (UVJ). Although accurate measurement of anterior compartment movement during straining is somewhat dependent on the amount of bladder filling, there seems to be a good diagnostic comparison between DTP-US and independent clinical examination for the diagnosis of cystocele. These measurements are valuable in the diagnosis of urinary stress incontinence and in the

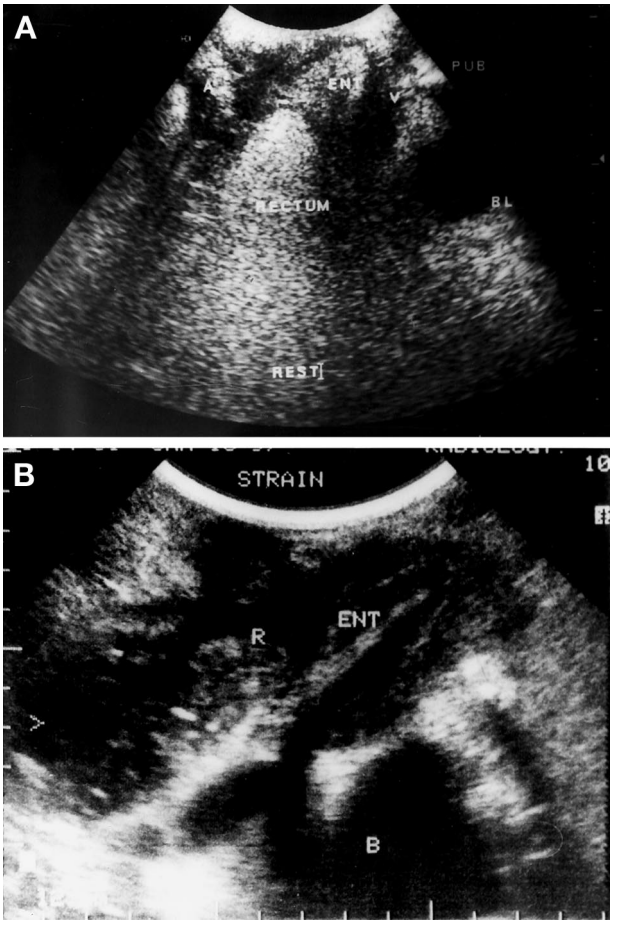

Figure 8. A. Sagittal dynamic transperineal ultrasound of the pelvic floor of a patient at rest with a peritoneocele. There is widening of the space between the rectum and the vagina (V; the rectovaginal septum). This space is filled with a soft-tissue mass of fatty echogenic density corresponding to the mesentery of small bowel. The anal canal (A) contains echogenic contrast. The bladder (BL) is partially seen at the right border of the picture. B. Parasagittal dynamic transperineal ultrasound of the pelvic floor of a patient straining, with an enterocele. A U-shaped mass (ENT) is evident bulging between the rectum (R) and the bladder (B). The mass is hypoechoic with an echogenic edge, corresponding to an intestinal loop filled with Gastrografin® contrast. The echogenic area in the middle of the loop represents the small-bowel mesentery. PUB = pubic bone.

characterization and grading of cystocele, however, they need to be validated prospectively against voiding cystourethrography.[21]

DTP-US relies on the use of significant volumes of intravaginal and intrarectal acoustic gel, which was tolerated by most but not all patients. The contrast outlines the variations in shape of the viscera and their deformation during maximal straining and squeeze, permitting the diagnosis of rectoceles, genital prolapse, cystoceles, peritoneoceles, and enteroceles. In some cases there may be reticence by the patient to completely evacuate the rectum because of the proximity of the operator's hand to the perineum and this may affect the assessment of rectocele emptying as well as some of the specific measurements already described. The change of vaginal position and relative vaginal fixity during straining is also well seen with DTP-US. The rectovaginal septum is easily identified with differentiation between peritoneoceles and enteroceles defined by the detection of hyperechoic small-bowel mesentery or intestinal fluid in this region on real-time imaging. Moreover, the size of a rectocele, when present, is measurable with DTP-US as well as a qualitative impression of its emptying efficiency in the elimination of rectal contrast.

CONCLUSIONS

In summary, DTP-US represents a simple and relatively noninvasive assessment of pelvic floor dysfunction. It is well tolerated by patients and has the advantage of dynamically assessing the complex interaction of the pelvic floor and viscera in a multiplanar capacity during evacuation. It avoids the problem encountered with defecography of prolonged irradiation as well as the cumbersome need for multiorgan opacification and interpretative inference of the relationship between the viscera and the pelvic floor. Like MR imaging, there is high soft-tissue resolution for the diagnosis of enteroceles; however, there is no need for complex dynamic computer algorithms.[22] The evaluation provided by DTP-US at present suffers from the same problems with the physiological positioning during simulated defecation as does MR imaging, particularly since open-architecture MR imaging units are not widely available.[23] We are at present developing an upright system for side DTP-US access that will undergo prospective evaluation, because measurements made in the left lateral position may be relatively inaccurate.

The wide availability of ultrasound, the ease of training in its use, and its minimal cost make this modality very attractive for clinical use in patients with pelvic floor dysfunction. DTP-US along with conventional endoanal US is at present, however, not part of the training program for coloproctologic residents in our department and at this stage is only conducted by those who have a specialized interest in the field of pelvic floor dysfunction. It is anticipated that DTP-US

will become part of the colorectal residency program in the future.

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Invited Commentary

To the Editor—This pilot study has used perineal ultrasound to study pelvic floor disorders. To visualize the rectum and vagina, 50 ml of ultrasound gel were injected, and the bladder was examined filled. There are several concerns with this technique: will filling the bladder, vagina, and rectum affect the findings; does examination in the supine position matter; is rectal evacuation essential; what findings are significant; and how does the method compare to other established techniques? The authors make some attempt to answer these questions, but rather surprisingly there was no correlation with the defecography that was performed in all patients.

The presence of a distended bladder or vagina does affect other structures. The pelvic cavity is of limited volume, and if one structure such as the bladder is full, the rectum may not reveal a rectocele, which will only become apparent when the bladder is empty. This concept of the "crowded pelvis"[1] and the need to visualize the bladder separately from the rectum is important if the examination is being performed to

show rectoceles or cystoceles. Both dynamic fluoroscopic and MRI studies of the pelvic floor need to be performed in stages, with and without a full bladder or rectum.[2] The same would apply to dynamic transperineal ultrasound (DTP-US).

The influence of posture on DTP-US has been investigated recently[3] with reference to the bladder neck. The bladder neck was higher at rest in the supine position than on standing but during straining reached the same position. The same changes have been shown with MRI.[4] All this really tells us is that at rest in the supine position, the lack of weight from the abdominal contents allows the pelvic floor to assume a higher position than when erect and weight bearing. The movement will be greater with the patient supine, but the endpoint during maximal straining should not be different.

Dynamic rest/stress views have been popularized with MRI,[5] but experience from proctography suggests that internal intussusception is a terminal event as the rectum empties. Rectoceles are not *per se* significant, and the most important feature is trapping of contrast in the rectocele, again seen only when the rectum has emptied.[6] Simple stress views are inadequate to make these diagnoses reliably.[7] The anorectal angle is not really helpful and is not used. The dynamic measurements of the puborectalis are interesting, but the significance of any change needs evaluation.

The authors have described an interesting variation in perineal US, where acoustic markers have been used to highlight vaginal and rectal configuration. Rest and stress views may be adequate for bladder base assessment, but evacuation is needed to investigate rectal dysfunction. Greater clarity is required in matching the examination to rectal dynamics and taking into account the effects of space limitation in the pelvic cavity; otherwise the technique may become relegated to the "interesting but not definitive in management" category, and a potentially useful nonionizing radiation examination will not find a place in clinical practice.

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The Authors Reply

To the Editor—We thank Professor Bartram for his comments regarding our article. With respect to the specifics included in his invited commentary, it should be pointed out that our technique is not only dynamic in the traditional sense but temporally dynamic. The patients often present for examination with a partially filled bladder, which has proved useful for the delineation of cystoceles and where the influence of bladder distention on other pelvic structures can be observed over time. We agree that the extent of bladder filling affects the determination of specific measurements (such as the posterior urethrovesical angle) as well as the position of the urethrovesical junction, but provided that the patient is comfortable during the procedure with a partially filled bladder, it does not seem to influence the diagnosis of specific pelvic disorders either of the bladder or of the rectum.

The vagina is normally a potential space in this type of examination. The use of this small amount of contrast does not distend the vagina (as shown afterward by transvaginal ultrasound) and alters vaginal conformation less than a tampon, which is frequently used in conventional defeocography[1]. Its design is for provision of the vaginal lumen as a landmark for diagnosis and for delineation of the rectovaginal space, a necessary requirement for the diagnosis of enteroceles. Equally, the very small volume of acoustic contrast used in the rectum (less than one-third of the amount normally recommended for the diagnosis of rectoceles during defecography) does not seem to influence diagnostic acumen and highlights the ability

to demonstrate varying grades of rectoanal intussusception. We accept that actively attempting to distend the rectum (which is not the purpose of intrarectal acoustic contrast in dynamic transperineal ultrasound) will affect the diagnostic ability as it applies to rectal conformation in patients with pelvic floor dysfunction.[2] Suffice it to say at present that varying these small intrarectal volumes has not altered the clinical diagnosis in any patient of which we are aware. Having conducted this examination in a large number of patients during the past three years, we have never experienced patients becoming uncomfortable with the need for rectal evacuation during the procedure, because the volume of acoustic gel used is small in most cases, being slightly above the first perceived volume of rectal distention.

All patients in this pilot study had the diagnosis of rectocele confirmed with conventional defecating proctography. We have just completed a prospective study blindly comparing defecography with dynamic transperineal ultrasound in a cohort of patients with evacuatory dysfunction, showing an extremely high sensitivity and accuracy for specific diagnoses with the new technique as well as a high correlation of anorectal angle measurement and anorectal junction movement between the two techniques (unpublished data). The aim of our article was to present the technical aspects of dynamic transperineal ultrasonography in the hope that other units might adopt this relatively simple and accurate examination in their coloproctologic practice. There is much room for prospective clinical evaluation of the technique, particularly in specific disorders that normally require somewhat cumbersome technology for their demonstration.

We certainly agree with the comments of the reviewer regarding posture. It is unphysiological to expect that straining in the left lateral position is equivalent to either straining or defecation in the sitting or squatting positions, and this has been noted before by other groups using defecography.[3,4] Our preliminary work has shown that the locale of the anorectal junction is higher in the left lateral position at rest during dynamic ultrasound and that anorectal junction movement and the anorectal angle during maximal straining are slightly greater in the sitting position during defecography (unpublished data). We believe that these effects are largely a result of posture during the particular examination. This issue of straining is, however, more complex than mere posture, because if the patient does not understand the straining request, it may be accompanied by ineffective buttock clenching and thigh contractions. Moreover, with the dynamic ultrasound technique the proximity of the transducer and the presence of the examiner in the room may inhibit gel evacuation.

One of the advantages of the technique over magnetic resonance examination in particular is the demonstration of intrarectal pathology specifically evident during straining and terminally during rectal emptying as suggested by Professor Bartram, notably, rectoanal intussusception and rectal prolapse. Comparisons with defecography for these specific diagnoses have shown a high accuracy with the new technique in our patients. We agree that simple stress views may be inadequate for the diagnosis of rectocele. In our technique patients are asked to evacuate the gel from their rectums, and rectocele or intussusception is evaluated at the end of this maneuver. However, the amount of contrast retention at the end of evacuation, which can be qualitatively evaluated with our technique, is only one factor in the need for rectocele surgery.

Dynamic measurements that we have made have been specifically designed for studies quantitatively assessing different techniques, and this is why details concerning their calculation have been included in our article. We are aware that they are of limited (if any) clinical value, but they provide some validation of the new technique when compared with standard examinations such as defecating proctography, videocystourethrography and dynamic magnetic resonance imaging.[5] The latter follows the design of one of the reviewer's own recent papers.[6]

Dynamic transperineal ultrasonography is simple to perform, well tolerated by almost all of our referred patients, and avoids high-intensity radiation, which is of particular advantage in young females presenting with evacuatory disorders. It provides valuable information regarding the anterior perineal structures in these complex patients as well as diagnosing enteroceles, where it has been estimated that up to 20 percent of patients with enteroceles may be missed by conventional defecography.[7] This is of vital significance to avoid "recurrence" in those patients coming to surgery for symptomatic rectocele or attendant vaginal vault prolapse. It must be remembered that many of these patients have a multiplicity of pelvic pathology, and it is advisable that these conditions are diagnosed preoperatively so as to delineate clinically which patients are most likely to benefit from rectocele surgery.[8]

Far from being purely a research tool in our unit or being "relegated to the interesting category" of tech-

nology unused in our clinical practice as suggested, we have found it to be an integral part of the patient examination, along with endoanal and transvaginal ultrasonography.

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