Correlation Between Echodefecography and 3-Dimensional Vaginal Ultrasonography in the Detection of Perineal Descent in Women With Constipation Symptoms

Sthela M. Murad-Regadas, Ph.D.1–3 • Francisco Sergio Pinheiro Regadas, Ph.D.1 Lusmar V. Rodrigues, Ph.D.1 • Adjra da Silva Vilarinho, M.D.1 • Guilherme Buchen, M.D.1 Livia Olinda Borges, M.D.3 • Lara B. Veras, M.D.3 • Mariana Murad da Cruz, M.D.3

1 Department of Surgery, School of Medicine of the Federal University of Ceará, Fortaleza, Ceará, Brazil
2 Unit of Pelvic Floor and Anorectal Physiology, Clinical Hospital, Federal University of Ceará, Fortaleza, Ceará, Brazil
3 Unit of Pelvic Floor and Anorectal Physiology, Department of Colorectal Surgery, Sao Carlos Hospital, Fortaleza, Ceará, Brazil

BACKGROUND: Defecography is an established method of evaluating dynamic anorectal dysfunction, but conventional defecography does not allow for visualization of anatomic structures.

OBJECTIVE: The purpose of this study was to describe the use of dynamic 3-dimensional endovaginal ultrasonography for evaluating perineal descent in comparison with echodefecography (3-dimensional anorectal ultrasonography) and to study the relationship between perineal descent and symptoms and anatomic/functional abnormalities of the pelvic floor.

DESIGN: This was a prospective study.

SETTING: The study was conducted at a large university tertiary care hospital.

PATIENTS: Consecutive female patients were eligible if they had pelvic floor dysfunction, obstructed defecation symptoms, and a score >6 on the Cleveland Clinic Florida Constipation Scale.

RESULTS: Of 61 women, 29 (48%) had normal perineal descent; 32 (52%) had excessive perineal descent. Endovaginal ultrasonography identified 27 of the 29 patients in the normal group as having anorectal junction displacement ≤1 cm (mean = 0.6 cm; range, 0.1–1.0 cm) and a mean anorectal junction position of 0.6 cm (range, 0–2.3 cm) above the symphysis pubis during the Valsalva maneuver and correctly identified 30 of the 32 patients in the excessive perineal descent group. The κ statistic showed almost perfect agreement (κ = 0.86) between the 2 methods for categorization into the normal and excessive perineal descent groups. Perineal descent was not related to fecal or urinary incontinence or anatomic and functional factors (sphincter defects, pubovisceral muscle defects, levator hiatus area, grade II or III rectocele, intussusception, or anismus).

LIMITATIONS: The study did not include a control group without symptoms.

CONCLUSIONS: Three-dimensional endovaginal ultrasonography is a reliable technique for assessment of perineal descent. Using this technique, excessive perineal descent can be defined as displacement of the anorectal junction >1 cm and/or its position below the symphysis pubis on Valsalva maneuver.
KEY WORDS: Constipation, Fecal incontinence; Pelvic floor; Rectocele; Ultrasound.

Perineal descent is a complex pelvic floor dysfunction with 2 progressive phases. In the initial phase, protrusion of the anterior rectal wall into the rectum and toward the anal canal may be caused by excessive straining, resulting in incomplete defecation, which in turn can induce additional excessive straining, impaired defecation, and a sensation of incomplete evacuation. In the second phase, weakening of the pelvic floor because of the excessive and repetitive straining frequently results in fecal incontinence and other symptoms.1–3

Defecography is an established method of evaluating dynamic anorectal dysfunction and is performed with the patient in a seated position. However, conventional defecography does not allow for visualization of anatomic structures, such as the sphincter muscles, vagina, and rectal wall. Furthermore, it can cause discomfort in some patients and involves exposing patients to radiation.4–6 Several studies have used dynamic ultrasonography7–12 and dynamic MRI13–15 to evaluate pelvic dysfunction, demonstrating a high degree of concordance with defecography. Echodefecography is a technique developed by Murad-Regadas et al11,12 that uses dynamic 3-dimensional (3D) anorectal ultrasonography to evaluate posterior pelvic floor dysfunction related to obstructed defecation and to assess perineal descent. Echodefecography was standardized and validated through comparison with conventional defecography to establish reference range values for perineal descent.11,12 The results demonstrated almost perfect agreement between the 2 methods with regard to the detection of perineal descent.

The 3D modality with automatic scanning and high-resolution imaging has the advantage of making it easier to perform the examination. Anorectal and endovaginal approaches can be combined with different techniques, making it possible to identify the anatomic and functional pelvic floor abnormalities using 1 image modality. The aim of this prospective study was to describe the use of dynamic 3D endovaginal ultrasonography for assessment of perineal descent in comparison with echodefecography and to study the relationship between perineal descent and symptoms and anatomic and functional abnormalities of the pelvic floor.

PATIENTS AND METHODS

Patients
The study was conducted between January 2014 and September 2015 at the Walter Cantidio University Hospital of the Federal University of Ceara. Consecutive female patients were offered participation in the study if they had pelvic floor dysfunction, obstructed defecation symptoms (excessive straining, vaginal descent, and sensation of incomplete evacuation) despite having increased intake of dietary fiber (<30 g/day for 3 months), and a score ≥6 on the validated Cleveland Clinic Florida Constipation Scale.16 Patients were excluded if they had organic pathology of the colon or rectum detected by clinical examination or colonoscopy. The clinical protocol was approved previously by the research ethics committee of the Walter Cantidio University Hospital, and all of the patients gave written informed consent.

Procedures
Each patient underwent both echodefecography and dynamic 3D endovaginal ultrasonography to evaluate posterior pelvic floor dysfunction related to obstructed defecation syndrome. Each procedure was performed by 1 colorectal surgeon. Both surgeons had experience in evaluating pelvic floor anatomy with dynamic imaging methods, such as echodefecography and 3D endovaginal ultrasonography. Echodefecography was performed by Dr da Silva Vilarinho, and patients were classified as having normal or excessive perineal descent based on the results. Normal perineal descent was defined as puborectalis muscle displacement ≤2.5 cm, and excessive perineal descent was defined as puborectalis muscle displacement >2.5 cm. Dynamic 3D endovaginal ultrasonography was then performed by Dr Murad-Regadas, who was blinded to the results of echodefecography and the clinical situation of the patient. The results of endovaginal ultrasonography were compared with echodefecography regarding classification of normal and excessive perineal descent, and agreement between the 2 methods was evaluated.

The patients were assessed both for fecal incontinence, defined as the uncontrolled passage of feces or gas over at least 1 month’s duration in an individual ≥4 years of age who had previously achieved control,17,18 and for urinary incontinence, defined as any involuntary leakage of urine; leakage on effort, exertion, sneezing, or coughing; and/or leaking or losing urine associated with an urge to urinate.19

Echodefecography (3D Dynamic Anorectal Ultrasonography)
Echodefecography was performed with a 3D ultrasound device (Pro-Focus, endprobe model 2052, B-K Medical, Herlev, Denmark) placed in the rectum, with proximal-to-distal 6-cm automatic scans. By moving 2 crystals on the extremity of the transducer, axial and longitudinal images were merged into a single cube image, recorded, and analyzed in multiple planes. Patients received a rectal enema and were examined in the left lateral position. Images were acquired by 4 automatic scans and analyzed in the axial, sagittal, and, if necessary, oblique plane by an examiner blinded to endovaginal ultrasonography findings.

Scans 1, 2, and 4 used a section width of 0.25 mm and lasted 55 seconds each. Scan 3 had a section width of...
0.35 mm and lasted 30 seconds. Scan 1 (resting) evaluated the anatomic integrity of the anal sphincters and identified sphincter defects.

In scan 2, the transducer was positioned at 6 cm from the anal verge, and the patient was asked to rest during the first 15 seconds, strain maximally for 20 seconds, and then relax again, with the transducer following the movement. The purpose of the scan was to evaluate the movement of the puborectal muscle and the external anal sphincter during straining, identifying normal relaxation, nonrelaxation, or paradoxical contraction (anismus).

In scan 3, the transducer was positioned proximally to the puborectal muscle (anorectal junction). The scan started with the patient at rest (3 seconds), followed by maximum straining with the transducer in a fixed position. When the puborectal muscle became visible distally, the scan was stopped. Perineal descent (puborectal muscle descent) was quantified by measuring the distance between the position of the proximal border of the puborectal muscle at rest and the point to which it was displaced by maximum straining (Fig. 1A, perineal descent ≤2.5 cm classified as normal; Fig. 1B, perineal descent >2.5 cm classified as excessive).

In scan 4, 60- to 120-mL ultrasound gel was injected into the rectal ampulla, and the transducer was positioned at 7.0 cm from the anal verge. The scanning sequence was the same as in scan 2. The purpose of this scan was to visualize and quantify all of the anatomic structures and functional changes associated with evacuating, including rectocele depth (grade I, II, or III), intussusception, and sigmoidocele/enterocele (grade II or III).

Three-Dimensional Dynamic Endovaginal Ultrasonography

All of the patients were previously instructed as to how to perform the Valsalva maneuver. They were examined in the dorsal lithotomy position with the same 3D ultrasound endoprobe as for echodefecography (Pro-Focus 2052, B-K Medical), with 9- to 16-MHz and 2.8- to 6.2-cm focal distance. The endoprobe was introduced above the bladder neck. Images <6 cm long were captured along the proximal-distal axis for <55 seconds by 2 crystals (axial and longitudinal) rotating on the extremity of a stationary transducer. Images acquired at rest and during the Valsalva maneuver were displayed as 3D cube images and recorded and analyzed in multiple planes.

The study parameters included the integrity of the levator ani. In this report, we use the term pubovisceral muscle as synonymous with pubococcygeus/puborectalis because the 2 components cannot be distinguished on endovaginal imaging. The pubovisceral muscle was identified at the point where the inferior branches of the pubis bones join at the symphysis pubis as a hyperechoic sling lying posteriorly to the anorectal junction and anal canal and attaching to the pubic bone (Fig. 2). Pubovisceral muscle defects were defined as detachment (discontinuity) of the pubovisceral muscle from its insertion on the pubic rami as measured in the axial plane (Fig. 3). Complete de-
attachment of the pubovisceral muscle involved the entire muscle (whole length of the muscle compromised); partial detachment (partially compromised length of the muscle) was either unilateral (involving just 1 side) or bilateral (both sides).

The area of the levator hiatus was delimited by the internal margin of the pubovisceral muscle and the internal margin of the symphysis pubis as measured in the axial plane. The position of the anorectal junction was measured in the sagittal plane from the anorectal junction to the lowest margin of the symphysis pubis (Fig. 4). Perineal descent was determined in the midsagittal plane on the basis of the position of the anorectal junction below the symphysis pubis during the Valsalva maneuver and/or the displacement value of the anorectal junction position between at rest and the Valsalva maneuver (Figs. 4 and 5).

**Normal vs Excessive Perineal Descent**

Women with normal perineal descent (normal PD group) were compared with those with excessive perineal descent (excessive PD group) with regard to symptomatic factors, such as fecal and urinary incontinence and anatomic and functional factors, such as sphincter defects, pubovisceral muscle defects, area of the levator hiatus, rectocele, intussusception, and anismus. The correlation between the extent of the perineal descent and the severity of constipation symptoms by Cleveland Clinic Florida Constipation Scale, as well the number of vaginal deliveries, was evaluated.

**Statistical Analysis**

Differences between groups were assessed by means of the Student t test for continuous variables and the Fisher exact test for categorical variables (fecal incontinence and urinary incontinence symptoms, sphincter muscle defects, pubovisceral muscle defects, grade II or III rectocele, intussusception, and anismus). The Spearman rank correlation coefficient (ρ) was calculated to evaluate the relationship between extent of the perineal descent and severity of constipation symptoms by Cleveland Clinic Florida Constipation Scale and the number of vaginal deliveries. Agreement between the 2 methods was estimated with the κ statistic (<0 = less than chance; 0–0.19 = slight agreement; 0.20–0.39 = fair agreement; 0.40–0.59 = moderate agreement; 0.60–0.79 = substantial agreement; 0.80–0.99 = almost perfect agreement). The level of statistical significance was set at p < 0.05. Data were analyzed using SPSS software (version 14.0 for Windows, IBM-SPSS Inc, Chicago, IL).

**RESULTS**

**Patients**

A total of 61 women with pelvic floor dysfunctions were included in the study. All 61 had obstructed defecation...
syndrome, 30 (49%) had fecal incontinence, 12 (20%) had urinary incontinence, and 58 (95%) had undergone a vaginal delivery. A sphincter defect was identified in 34 patients (56%); a pubovisceral muscle defect was identified in 13 patients (21%), all of whom had undergone vaginal delivery.

Normal vs Excessive Perineal Descent Assessed by Echodefecography

Of the 61 women, 29 (48%) had puborectalis muscle displacement $\leq 2.5$ cm on echodefecography (normal PD group), and 32 (52%) had puborectalis muscle displacement $>2.5$ cm (excessive PD group). The characteristics of the 2 groups are shown in Table 1. Age and history of vaginal delivery did not differ significantly between groups, and no significant correlation was observed between extent of the perineal descent and the number of vaginal deliveries ($\rho = 0.21; p = 0.11$). There were no significant differences regarding fecal or urinary incontinence or anatomic and functional factors (sphincter defects, pubovisceral muscle defects, levator hiatus area, grade II or III rectocele, intussusception, and anismus), and no significant correlations were observed between extent of the perineal descent and severity of constipation symptoms by Cleveland Clinic Florida Constipation Scale ($\rho = 0.57; p = 0.67$).

Of the women who had undergone vaginal delivery, 15% (4/27) of those in the normal PD group and 29% (9/31) of those in the excessive PD group had a pubovisceral muscle defect. In patients with fecal incontinence, the frequency of a sphincter and/or a pubovisceral muscle defect was 79% (11/14) in the normal PD group and 94% (15/16) in the excessive PD group. In patients with anal sphincter defects, 64% (9/14) of patients in the normal PD group had a partial external defect, and 36% (5/14) had a combined external and internal anal sphincter defect, whereas 90% (18/20) of the excessive PD group had a partial external defect and 10% (2/20) had a combined external and internal anal sphincter defect. In patients with pubovisceral muscle defects, 2 patients in the normal PD group had unilateral and 2 had bilateral defects; 5 patients in the excessive PD group had unilateral and 4 had bilateral defects.

Agreement Between Endovaginal Ultrasonography and Echodefecography

In the normal PD group, endovaginal ultrasonography identified 27 of the 29 patients as having normal perineal descent, with anorectal junction displacement of $\leq 1$ cm (mean = 0.6 cm; range, 0.1–1.0 cm) and a mean anorectal junction position of 0.6 cm (range, 0–2.3 cm) above the symphysis pubis on Valsalva maneuver. In the remaining 2

![FIGURE 4. Three-dimensional endovaginal ultrasonography showing excessive perineal descent measured on the basis of the displacement of anorectal junction position $>1$ cm compared between at rest (A) with the Valsalva maneuver (B) in the midsagittal plane. Line 1 shows the distance from the anorectal junction to the lowest margin of the symphysis pubis. The anorectal junction position is above the symphysis pubis at rest and during the Valsalva maneuver. AC = anal canal; ARJ = anorectal junction; BI = bladder; R = rectum; SP = symphysis pubis.](image-url)
patients, the anorectal junction displacement was 1.3 cm, and the anorectal junction position was 0.4 cm below the symphysis pubis on Valsalva maneuver.

In the excessive PD group, endovaginal ultrasonography correctly identified 30 of the 32 patients. In 24 of these patients, the mean displacement of the anorectal junction was 1.4 cm (range, 0.4–3.6 cm), and the mean anorectal junction position was 0.4 cm (range, 0.3–2.4 cm) below the symphysis pubis on Valsalva maneuver. In 6 patients, the displacement of the anorectal junction was >1 cm (mean, 1.3 cm; range, 1.2–1.7 cm), and the mean anorectal junction position was 0.4 cm (range, 0–0.8 cm) above the symphysis pubis on Valsalva maneuver. In 2 patients, the displacement of the anorectal junction was ≤1 cm, and the

FIGURE 5. Three-dimensional endovaginal ultrasonography showing excessive perineal descent measured on the basis of the anorectal junction position in the mid sagittal plane. A, At rest. B, During the Valsalva maneuver. Line 1 shows the distance from the anorectal junction to the lowest margin of the symphysis pubis. The anorectal junction position is above the symphysis pubis at rest and below during the Valsalva maneuver. AC = anal canal; ARJ = anorectal junction; BI = bladder; R = rectum; SP = symphysis pubis.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Normal (N = 29)</th>
<th>Excessive (N = 32)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD), y</td>
<td>59 (11.7)</td>
<td>62 (13.7)</td>
<td>0.43</td>
</tr>
<tr>
<td>Parity, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal delivery</td>
<td>27 (93)</td>
<td>31 (97)</td>
<td>0.60</td>
</tr>
<tr>
<td>Nulliparous</td>
<td>2 (7)</td>
<td>1 (3)</td>
<td></td>
</tr>
<tr>
<td>Symptomatic factors, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fecal incontinence</td>
<td>14 (48)</td>
<td>16 (50)</td>
<td>&gt;0.99</td>
</tr>
<tr>
<td>Urinary incontinence</td>
<td>6 (21)</td>
<td>6 (19)</td>
<td>&gt;0.99</td>
</tr>
<tr>
<td>Anatomic and functional factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphincter defect, n (%)</td>
<td>14 (48)</td>
<td>20 (63)</td>
<td>0.30</td>
</tr>
<tr>
<td>Pubovisceral muscle defect, n (%)</td>
<td>4 (14)</td>
<td>9 (28)</td>
<td>0.20</td>
</tr>
<tr>
<td>Levator hiatus area, mean (SD), cm²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At rest</td>
<td>17 (3.0)</td>
<td>18 (3.0)</td>
<td>0.07</td>
</tr>
<tr>
<td>Valsalva maneuver</td>
<td>19 (4.9)</td>
<td>20 (4.5)</td>
<td>0.26</td>
</tr>
<tr>
<td>Rectocele (grade II or III), n (%)</td>
<td>9 (31)</td>
<td>13 (41)</td>
<td>0.59</td>
</tr>
<tr>
<td>Intussusception, n (%)</td>
<td>11 (38)</td>
<td>15 (47)</td>
<td>0.60</td>
</tr>
<tr>
<td>Anismus, n (%)</td>
<td>12 (41)</td>
<td>12 (38)</td>
<td>0.79</td>
</tr>
</tbody>
</table>
anorectal junction position was above the symphysis pubis in both patients. The $\kappa$ statistic showed almost perfect agreement ($\kappa = 0.86$) between the 2 methods for categorization into the normal and excessive PD groups.

**DISCUSSION**

This study described and standardized a 3D endovaginal ultrasonography technique for the assessment of perineal descent using the symphysis pubis and anorectal junction as landmarks and comparing it with the previously published echodefecography technique. We found a high degree of agreement between 3D endovaginal ultrasonography and echodefecography in classifying excessive perineal descent. Although the study did not include a control group without symptoms, the results for patients without perineal descent (mean displacement of the anorectal junction, 0.6 cm; mean position above the symphysis pubis on Valsalva, 0.6 cm) were consistent with those of our previous study, which described 3D endovaginal ultrasonographic anatomic and functional measurements of the pelvic floor in asymptomatic nulliparous women. However, although 3D endovaginal ultrasonography appears to be accurate, we cannot exclude the possibility that bias might result in a greater degree of agreement than actually exists.

Various diagnostic tests and reference points have been used to measure perineal descent, including abnormal perineal position at rest, perineal descent as a dynamic measure, and variations in the anatomic structures used to calculate descent. Common landmarks used with conventional defecography include the distance between the pubococcygeal line and the anorectal angle and perineal descent as a dynamic measure. The landmark used with endovaginal ultrasonography in our study was the position of the anorectal junction in relation to the symphysis pubis. Although the learning curve for this use of 3D ultrasonography has not been investigated, the use of the symphysis pubis and anorectal junction as landmarks in 3D endovaginal ultrasonography confers an advantage because of the relative ease of identifying these structures at rest and during the Valsalva maneuver. Once the landmarks have been recognized, the puborectalis muscle displacement can be quantified. An important advantage of 3D ultrasound is the acquisition of volumetric images (cubes) that can be evaluated as many times as is necessary, allowing for consultation with an expert.

Although defecography is still the standard for evaluating evacuatory disorders and measuring perineal descent, dynamic ultrasound offers a useful means of visualizing the morphology and function of the anal canal and pelvic floor. Since 2000, good correlations with defecography have been shown for various dynamic ultrasonography techniques for evaluating posterior pelvic floor dysfunction, for example, dynamic anorectal endosonography with an endorectal linear probe, transperineal or translabial ultrasonography, and echodefecography (3D anorectal ultrasonography) with the patient in the lateral position or lithotomy position. Murad-Regadas et al described, standardized, and validated echodefecography in a multicenter study comparing it with defecography. That study determined values for perineal descent and rectocele grades and established reference range values by comparing echodefecography findings with defecography. With echodefecography, perineal descent is measured by determining the difference in the position of the puborectal muscles at rest and during maximum straining, and the cutoff value for differentiating normal and excessive displacement of the puborectal muscles was 2.5 cm. The results of the previous study by Barthet et al using the displacement of the puborectal muscles (perineal descent) also demonstrated good correlation between dynamic anorectal endosonography and defecography.

On the basis of results from these studies, we decided to compare endovaginal ultrasonography with echodefecography. The use of echodefecography instead of defecography meant that patients were submitted to only 1 examination modality. Furthermore, this comparison made it possible to evaluate the anal canal and pelvic floor in multiple planes and at high resolution, as well as to identify the anal sphincter and pubovisceral muscle defects and to measure hiatal dimensions. Complete evaluation of the anal sphincter and pubovisceral muscles is needed to accurately identify lesions and to determine potential correlations with symptoms of fecal incontinence. In previous studies, the incidence of pubovisceral muscle injuries ranged from 15% to 50% after vaginal delivery as diagnosed by MRI or transperineal and endovaginal ultrasound examination. In our current study, of the women who had undergone vaginal delivery, 22% (13/58) had a pubovisceral muscle defect, that is, 15% (4/27) of the group with normal perineal descent and 29% (9/31) of the group with excessive perineal descent.

We did not find a relationship between excessive perineal descent with number of vaginal deliveries and clinical severity of obstructed defecation, fecal incontinence, urinary incontinence, morphologic abnormalities (sphincter or pubovisceral muscle defects and size of the levator hiatus area), or dynamic dysfunctions related to obstructed defecation syndrome (grade II or III rectoceles, intussusception, and anismus) as diagnosed on echodefecography or 3D endovaginal ultrasonography. Consistent with our results, Alves-Ferreira et al reported that abnormal perineal position on defecography was not related to the severity of symptoms or worsened quality of life. Other studies have yielded conflicting results. Broekhuis et al found that the degree of descent of the perineum on dynamic
magnetic resonance was associated with pelvic organ prolapse symptoms but not with the symptoms of anorectal dysfunction or urinary incontinence. Chang and Chung33 reviewed defecography findings in 201 women and found that perineal descent was not significantly related to symptoms. These authors also found that rectoceles and intussusceptions were associated with resting perineal descent, and sigmoidoceles correlated with dynamic perineal descent. Mellgren et al34 reviewed defecography examinations and found that rectoceles, but not rectal prolapse, rectal intussusception, or enterocele, were related to degree of perineal descent.

The lack of correlation between perineal descent and clinical symptoms in our study may be related to the fact that a score >6 on the Cleveland Clinic Florida Constipation Scale was 1 of the inclusion criteria. Also, patients in the 2 groups were similar in age and number of vaginal deliveries. All of the patients included in our study had more than 1 symptom, and they may have been related to other dysfunctions in addition to perineal descent. Because abnormalities of the different pelvic compartments are frequently associated, many patients have multiple defects. Failure to recognize all defects, even those that are asymptomatic at the initial evaluation, may affect treatment success. Thus, thorough diagnostic characterization of all abnormalities is mandatory to plan a management approach, which may include a multidisciplinary surgical approach.

Combining different 3D dynamic ultrasound approaches and techniques may increase diagnostic capability and overcome the limitations of individual techniques, especially in situations where the diagnosis is uncertain, thus resulting in improved management of pelvic floor dysfunctions. Ultrasonography is also cost-effective, because it can be performed in the office, without exposing the patient to radiation. In our experience, the ability to obtain patient cooperation with correct performance of straining and the Valsalva maneuver is of great importance for achieving good results. Additional studies should compare both echodefecography and endovaginal ultrasonography with defecography and/or dynamic MRI to demonstrate the correlation between these methods. In addition, a multicenter study should be performed to validate these new techniques.

CONCLUSION

On the basis of the comparison with echodefecography in this study, we conclude that 3D endovaginal ultrasonography is a reliable technique for the assessment of perineal descent. It was possible to quantify perineal descent with this technique, and excessive perineal descent was defined as displacement of the anorectal junction >1 cm and/or its position below the symphysis pubis. Excessive perineal descent was not related to the presence of fecal or urinary incontinence, defects of the sphincter and/or pubovisceral muscles, enlargement of the levator hiatus area on Valsalva maneuver, rectocele, intussusception, or anismus.

REFERENCES


学霸图书馆
www.xuebalib.com

本文献由“学霸图书馆-文献云下载”收集自网络，仅供学习交流使用。

学霸图书馆（www.xuebalib.com）是一个“整合众多图书馆数据库资源，
提供一站式文献检索和下载服务”的24小时在线不限IP图书馆。
图书馆致力于便利、促进学习与科研，提供最强文献下载服务。

图书馆导航：
图书馆首页 文献云下载 图书馆入口 外文数据库大全 疑难文献辅助工具