Posterior compartment prolapse on two-dimensional and three-dimensional pelvic floor ultrasound: the distinction between true rectocele, perineal hypermobility and enterocele

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ABSTRACT

Objectives Posterior compartment descent may encompass perineal hypermobility, isolated enterocele or a ‘true’ rectocele due to a rectovaginal septal defect. Our objective was to determine the prevalence of these conditions in a urogynecological population.

Methods One hundred and ninety-eight women were clinically evaluated for prolapse and examined by translabial ultrasound, supine and after voiding, using three-dimensional capable equipment with a 7–4-MHz volume transducer. Downwards displacement of rectocele or rectal ampulla was used to quantify posterior compartment prolapse. A rectovaginal septal defect was seen as a sharp discontinuity in the ventral anorectal muscularis.

Results Clinically, a rectocele was diagnosed in 112 (56%) cases. Rectovaginal septal defects were observed sonographically in 78 (39%) women. There was a highly significant relationship between ultrasound and clinical grading ($P < 0.001$). Of 112 clinical rectoceles, 63 (56%) cases showed a fascial defect, eight (7%) showed perineal hypermobility without fascial defect, and in three (3%) cases there was an isolated enterocele. In 38 (34%) cases, no sonographic abnormality was detected. Neither position of the ampulla nor presence, width or depth of defects correlated with vaginal parity. In contrast, age showed a weak association with rectal descent ($r = -0.212$, $P = 0.003$), the presence of fascial defects ($P = 0.002$) and their depth ($P = 0.02$).

Conclusions Rectovaginal septal defects are readily identified on translabial ultrasound as a herniation of rectal wall and contents into the vagina. Approximately one-third of clinical rectoceles do not show a sonographic defect, and the presence of a defect is associated with age, not parity. Copyright © 2005 ISUOG. Published by John Wiley & Sons, Ltd.

INTRODUCTION

Rectocele is traditionally regarded as the archetypal traumatic pelvic floor lesion. It is assumed that fascial defects in the rectovaginal septum are the result of childbirth, occurring as the fetal head crowns. This appears plausible since the levator hiatus has to distend from a resting area of 6–18 cm$^2$ in young nulligravid women to an area of 70–90 cm$^2$ in order to admit passage of a term-sized fetal head. In this process, it is thought that the lateral insertion of the rectovaginal septum may be shorn off the puborectalis muscle, and that transverse tears open up in the septum itself during crowning, or that the septum is physically detached from the perineal body.

Rectocele does exist in nulliparous women however, and in these women it is attributed to longstanding abnormal defecation habits. There is little information on prevalence and etiology, the investigation of which is complicated by the fact that a clinically apparent rectocele may be due to perineal hypermobility or a true defect of the rectovaginal septum, and occasionally may even be due to an isolated enterocele. While defecation proctography is regarded by some as the ‘gold standard’ in the diagnosis of rectocele, it is relatively costly, unpleasant and involves radiation exposure. Consequently, this diagnostic modality is rarely used by gynecologists and urogynecologists. There is a clear need for other, simpler diagnostic modalities. Ultrasound can replace defecation proctography with little cost and
minimal discomfort to the patient\textsuperscript{8,9}, correlates well with this older technique\textsuperscript{9} and delivers superior information on surrounding soft tissues at the same time\textsuperscript{10}. The advent of three-dimensional (3D) ultrasound now means that fascial defects can be sought in all three primary planes (axial, sagittal and coronal), and that rendered volumes can graphically demonstrate the site and extent of fascial defects (Figure 1).

The objective of this study was to determine the prevalence of all potential causes of posterior compartment descent in a group of women seen with symptoms of pelvic floor dysfunction such as incontinence, voiding dysfunction and prolapse. In addition, the observed anatomical alterations were correlated with age and parity in an attempt to gain insights into etiology.

**METHODS**

Two hundred and seven women attending urogynecological clinics for a first visit were evaluated for prolapse according to a modified Baden–Walker classification. They were then examined by translabial ultrasound, supine and after voiding, using 3D capable equipment (GE Kretz Voluson 730, GE Kretztechnik GMBH, Zipf, Austria and Medison SA8000, Medison, Seoul, South Korea) with a 7–4-MHz volume transducer. Volumes were obtained at rest, on levator contraction and on maximal Valsalva, with the effectiveness of maneuvers assessed on two-dimensional (2D) imaging in the sagittal plane. The 3D ultrasound methodology used for this study has been described in greater detail in a recent review article\textsuperscript{11}. Evaluation of volumes was later performed by the second author, blinded against all clinical data, with the help of specialized software (4D View, GE Kretztechnik GMBH, Zipf, Austria). Measurements obtained by analysis of volume ultrasound data have recently been shown to be comparable to those obtained on live examination\textsuperscript{12}.

Downwards displacement of a rectocele on Valsalva, or in its absence, of the rectal ampulla or its contents, was used to quantify posterior compartment prolapse. A defect of the rectovaginal septum was rated present if there was a sharp discontinuity in the ventral contour of the anorectal muscularis, and if the resulting herniation measured $\geq 10$ mm in depth (Figure 2). This low cutoff was chosen due to the fact that many defects of the rectovaginal septum measure less than $20$ mm in depth, the figure used for defecation proctography\textsuperscript{13}. The measurement of rectocele depth on translabial ultrasound has been reported by others\textsuperscript{8}, is similar to techniques used on defecation proctography and correlates well with measurements obtained by that technique\textsuperscript{9}.

If there was displacement of ampullary contents (hyperechogenic stool or air) below a reference line

**Figure 1** A translabial, three-dimensional ultrasound image (7–4-MHz volume transducer) of the pelvic floor showing a rectocele viewed from caudally, i.e. as if the patient was examined in lithotomy. The space of the levator hiatus is largely taken up by a third degree rectocele. There is also a suburethral tape anteriorly.

**Figure 2** Quantification of a true rectocele on translabial ultrasound (mid-sagittal plane, with the transducer surface resting on the perineum). Measurements indicate width (3.3 cm) and depth (1.9 cm) of a true rectocele which is apparent as a discontinuity in the anorectal muscularis. Left image is at rest; right image is maximal Valsalva.
Posterior prolapse

Figure 3 Rectal and/or perineal hypermobility without true rectocele as imaged on translabial ultrasound. The line of reference signifies the level of the inferior margin of the symphysis pubis. There is descent of the rectal ampulla below this level, without formation of a herniation into the vagina, as there is no discontinuity of the anterior wall of the anorectum similar to that seen in Figure 2. The transducer has been pushed off the symphysis pubis by the posterior compartment descent. This is admissible and will not alter measurements as long as the transducer is not angled.

Figure 4 Distinguishing enterocele and rectocele on translabial ultrasound (left image is at rest; right image is maximal Valsalva). It is evident that the contents of an enterocele appear generally more homogeneously iso- to hyperechogenic compared with a rectocele that is filled with stool and air, resulting in strong echoes with distal shadowing and occasionally reverberations.

As all data in this study were obtained on routine urodynamic testing (which in our unit comprises 3D pelvic floor imaging), the project was deemed exempt from formal ethics committee approval. Statistical analysis was performed after Normality testing (histogram analysis and/or Kolmogorov–Smirnov testing), using Minitab V13 (Minitab Inc, State College, PA, USA). Pearson’s correlations were used to compare normally distributed continuous variables. Analysis of variance, Student’s t-test and Chi-squared test statistics were also employed. \( P < 0.05 \) was considered statistically significant.

RESULTS

Of 207 datasets, seven were excluded due to incomplete clinical data, and two could not be evaluated due to poor image quality. All data therefore refer to the remaining 198 patients. Mean age was 54 (range, 25–87) years. Median parity was 2 (range, 0–7). Clinically, a rectocele was diagnosed in 112 (56%) cases (Grade 1, \( n = 88 \); Grade 2, \( n = 22 \); Grade 3, \( n = 2 \)).

A test-retest series conducted by both authors reviewing the volume datasets of 50 women, while blinded against clinical data and the other author’s findings, yielded a Cohen’s kappa of 0.72 for the diagnosis of a defect of the rectovaginal septum. The intraclass correlations between measurements of ampullary descent was 0.75, of rectocele depth 0.93 and of rectocele width 0.91.

The rectal ampulla descended on average to 5.3 mm above the symphysis pubis on Valsalva. True defects of the rectovaginal septum were observed sonographically in 78/198 (39%) women. These defects were 23 mm wide and 16 mm deep on average. Table 1 shows ultrasound data stratified for clinical rectocele grading. There was a statistically significant relationship between all ultrasound data and clinical assessment (all \( P < 0.001 \) on ANOVA).
In 16 (8%) women, we diagnosed an enterocele which was most often combined with a ‘true rectocele’ or fascial defect (n = 11). In four women, the enterocele was isolated, i.e. there was neither perineal hypermobility nor a true rectocele, and in one case the enterocele was so large as to preclude assessment of the anorectum altogether.

Women who had delivered vaginally were more likely to be diagnosed with a clinical rectocele (P = 0.008 on Chi-squared testing). However, neither position of the rectal ampulla on ultrasound, nor presence, width or depth of rectovaginal septal defects correlated with parity or vaginal childbirth. In contrast, the presence of a fascial defect (r = −0.258, P = 0.02) and descent of the rectal ampulla (r = −0.212, P = 0.003). The sonographic diagnosis of enterocele (n = 16) was associated with a history of hysterectomy (P = 0.02) and age (64.8 (SD 10.3) vs. 53 (SD 13.3) years; P < 0.001), but again there was no significant association with parity.

Of those 112 women who were clinically diagnosed with a rectocele, only 63 (56%) showed a true defect of the rectovaginal septum. In 38 (34%) women, no sonographic abnormality was detected, in eight (7%) we found an isolated enterocele.

**DISCUSSION**

The current situation with regard to the diagnosis and treatment of ‘rectocele’, i.e. a protrusion of the posterior vaginal wall, is nothing short of confusing. Generally, gynecologists rely on the clinical diagnosis of rectocele. Whilst some practitioners postulate the presence of a fascial defect, most techniques described for the repair of rectocele do not attempt to identify a defect and very likely fail to close such a defect when one is present. Hence, it is not surprising that even in major textbooks of vaginal surgery bear little resemblance to actual reality as documented on imaging.

Fortunately, the technical means for accurate diagnosis of posterior compartment prolapse are available in virtually all gynecology departments in the developed world. The sonographic diagnosis of rectocele was first described more than 10 years ago, and it has been known for a number of years that translabil ultrasound can distinguish between rectocele and enterocele. Over the last few years, colorectal investigators have begun to realize the potential of this simple technique in the investigation of anorectal disorders. Most recently, it has become clear that translabil ultrasound can define the presence and extent of a defect of the rectovaginal septum, and that such defects are not uncommon even in young nulliparous women.

True defects of the rectovaginal septum can be identified in the mid-sagittal plane as herniations of the rectal wall and contents into the vagina at the level of the anorectal junction. A test-retest series conducted by the two authors showed very good repeatability, with most disagreements in results due to findings close to our arbitrarily defined cut-off of 10 mm. Because a very small defect of a depth of 9 mm will not be rated as a defect, but one measured at 10 mm will be, such discrepancies are not surprising.

The depth and width of a herniation can be determined on maximal Valsalva, and the repeatability of this measurement in this series was very high, with intraclass correlation coefficients (ICCs) of over 0.9 determined in a blinded test-retest series. The measurement of downwards displacement of the rectal ampulla also seems highly reproducible, with an ICC of 0.75. However, it is recognized that bowel filling and stool consistency may alter appearances, and in order to define the magnitude of this confounder further test-retest studies may be necessary. Another confounder is transducer displacement with higher degrees of prolapse. Clearly, any ultrasound method of prolapse assessment is of limited usefulness in assessing the precise extent of third degree anterior, central or posterior compartment descent, total vault eversion or procidentia. However, even if there is major prolapse, one can often observe the development of a fascial defect at lower Valsalva pressures before it becomes obscured by artifact.

Rendered volumes at the level of the levator hiatus, i.e. in the axial plane, can show the total extent of the defect and demonstrate asymmetries, which incidentally, seem rather uncommon. Downwards displacement of the rectal ampulla without actual development of a herniation can be diagnosed as rectal or perineal hypermobility (Figure 3), and an enterocele is clearly evident as a downwards herniation of (usually iso- to hyperechogenic) abdominal contents anterior to the anorectal junction (Figure 4).

Defects of the rectovaginal septum are common. In this group of 198 women seen for urodynamic assessment, defects of 10 mm or more in depth were observed in 39% of cases. This compares with data obtained by radiological means, and is in contrast to a recently determined prevalence of 12% in young nulliparvae. However, it is rather surprising that in this series, all
ultrasound measures of posterior compartment descent and presence/depth of a true rectocele correlated weakly with age, not parity. It appears likely that childbirth plays less of a role in the pathogenesis of rectocele than previously assumed. From the ultrasound data presented here and elsewhere\textsuperscript{16}, one can hypothesize that defects of the rectovaginal septum may be congenital or acquired over long periods of time, rather than caused by the single event of traumatic childbirth. This also raises interesting questions for other forms of female pelvic organ prolapse – although the situation for cystocele or uterine prolapse may well be much more complex than in the case of the ‘true rectocele’.

As regards the clinical finding of posterior vaginal wall descent, our results show that very different entities may cause the impression of a rectocele. Whilst the most common ultrasound finding was a defect of the rectovaginal septum (56%), in about one-third of patients, no significant downwards displacement of rectal ampulla or pouch of Douglas was observed. In many women, the appearance of a rectocele may be due to perineal deficiency rather than abnormalities of the anorectum, a so-called ‘pseudorectocele’\textsuperscript{1}. Less frequently, we observed defects in the diagnosis and surgical management of enterocele. In the clinical diagnosis of rectocele. Overall, it is evident that the clinical diagnosis of posterior compartment descent may encompass a number of different conditions, a finding that strongly supports the use of preoperative diagnostic imaging.

Clearly, if a clinical ‘rectocele’ can be due to at least four different anatomical situations in any particular patient, then one ought to individualize treatment according to the anatomical situation. A defect of the rectovaginal septum should be closed, an enterocele opened and ligated. Perineal hypermobility is most likely to respond (if at all) to a levatorplasty, and a deficient perineum perineoplasty. It has to be acknowledged, however, that the clinical relevance of any new diagnostic method has to be shown in intervention trials. In the case of ultrasound for posterior compartment descent, this would require a randomized controlled trial to test the effect of preoperative ultrasound for surgical planning on functional and anatomical cure rates.

In conclusion, translabial ultrasound can distinguish between different forms of posterior compartment prolapse. The technique will likely assist the further research into pathophysiology and treatment of this condition, and help in the clinical management of posterior compartment prolapse. The etiology of defects of the rectovaginal septum, hitherto assumed to be due to intrapartal trauma, may have to be re-examined.

REFERENCES