Original Article

Defect-specific rectocele repair: medium-term anatomical, functional and subjective outcomes

Rodrigo GUZMÁN ROJAS,[1,2,⋆] Ixora KAMISAN ATAN,[3,4] Ka Lai SHEK[3,5] and Hans Peter DIETZ[3]

[1]*Departamento de Ginecología y Obstetricia, Facultad de Medicina, Clínica Alemana – Universidad del Desarrollo,* [2]*Departamento de Ginecología y Obstetricia, Hospital Clínico de la Universidad de Chile, Santiago, Chile,* [3]*Department of Obstetrics and Gynaecology, Sydney Medical School Nepean, University of Sydney, Penrith, NSW, Australia,* [4]*Universiti Kebangsaan Malaysia Medical Centre, Kuala Lumpur, Malaysia and* [5]*Department of Obstetrics and Gynaecology, Liverpool Hospital, University of Western Sydney, Sydney, NSW, Australia*

Background: Rectocele is a herniation of the anterior wall of the rectal ampulla through a defect in the rectovaginal septum causing protrusion of the posterior vaginal wall. Common symptoms include symptoms of prolapse and obstructed defecation.

Aims: To describe subjective, anatomical and functional results of defect-specific rectocele repair.

Materials and Methods: This is an internal audit of 137 women who underwent defect-specific rectocele repair. Pre- and post-operative assessment included a standardised interview, clinical examination and 3D/4D transperineal ultrasound. Outcome measures were symptoms of obstructed defecation, recurrent prolapse symptoms, clinical posterior compartment recurrence and rectocele recurrence on ultrasound.

Results: At a mean follow-up of 1.4 years, 117 (85%) of women considered themselves cured or improved. Thirty-four (25%) complained of recurrent prolapse symptoms and 47 (34%) symptoms of obstructed defecation, a significant reduction ($P < 0.0001$). Clinical recurrence (Bp ≥ -1) was seen in 19 women (14%) and recurrence on ultrasound in 27 (20%). The mean depth of recurrence was 16.6 mm (10.3–25.1). We tested multiple potential predictors of recurrence, including age, BMI, vaginal parity, previous hysterectomy and/or prolapse surgery, follow-up time, pre-operative clinical and ultrasound findings. Only hiatal area on Valsalva (OR 0.95 for sonographic recurrence, $P = 0.01$) and enterocele (for clinical and sonographic recurrence, OR 4.03, $P = 0.01$ and OR 2.72, $P = 0.02$, respectively) reached significance.

Conclusion: Defect-specific rectocele repair is effective both in restitution of normal anatomy and in resolving prolapse and obstructed defecation symptoms at a mean follow-up of 1.4 years.

Key words: 3D/4D ultrasound, obstructed defecation, prolapse, rectocele, transperineal ultrasound.

Introduction

Rectocele is a herniation of the anterior wall of the rectal ampulla through a defect in the rectovaginal septum (RVS), causing protrusion of the posterior vaginal wall.[1] It is common in parous women, but may also be seen in nulliparae.[2] Common symptoms include symptoms of prolapse and obstructed defecation (straining at stool, vaginal/perineal digitation and incomplete bowel empting[3]). Different surgical techniques have been described for management of symptomatic rectocele. These include transperineal,[3] endoanal,[4–6] transabdominal[7] and transvaginal[8] approaches. In 1993, Richardson described the defect-specific posterior repair,[9] to anatomically correct RVS defects. This technique appears more anatomically sound compared to transanal and transabdominal techniques as it appears that a symptomatic rectocele almost always results from a high transverse RVS defect.[10]

To date, there are limited data on objective anatomical cure by surgical means, that is, imaging appearances before and after rectocele repair.[11] While results by transanal and transperineal repair techniques have been reported,[12–14] there is a paucity of data in the world literature on imaging outcomes after defect-specific rectocele repair. This may be due to the cost, limited availability and invasiveness of defecation proctography (DP), the standard imaging method, to diagnose rectocele.

Correspondence: Rodrigo Guzmán Rojas, Clínica Alemana de Santiago, Avenida Vitacura 5951, Vitacura, Santiago 7650568, Chile. Email: Rodrigoguzman.66@gmail.com

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Transperineal ultrasound, on the other hand, is easily accessible, cheap, and noninvasive and can be used as an alternative to DP[15] for diagnosing rectoceles.[2] Hence, we undertook this study to describe subjective, anatomical and functional results of defect-specific rectocele repair.

Materials and Methods

This was an internal audit of 140 women who had undergone a defect-specific posterior repair at a tertiary urogynaecological unit between May 2005 and November 2012, by or under the direct supervision of the senior author. All patients were symptomatic of prolapse and/or obstructed defecation, that is straining at stool, vaginal or perineal digitation or incomplete bowel emptying, associated with finding of posterior compartment prolapse of ICS POPQ stage 2 or above and/or a true rectocele of at least 10 mm in depth on transperineal ultrasound.

Pre- and post-operative assessment included a local nonvalidated standardised interview, clinical examination (ICS POP-Q)[16] and 3D/4D transperineal ultrasound (US) using GE Kretz Voluson 730 expert and Voluson I systems with RAB 8–4 Mhz transducers.[17] Volume analysis was done for pelvic organ descent and levator morphobiometry, including assessment for levator avulsion and hiatal area on Valsalva. Downward displacement of the rectocele or rectal ampulla was used to quantify posterior compartment prolapse. A true rectocele, that is a diverticulum of the rectal ampulla, was diagnosed if there was a discontinuity in the anterior contour of the anterior anorectal muscularis resulting in a diverticulum of the ampulla, measuring ≥10 mm in depth[18] (Figs 1 and 2). All ultrasound volume analysis was performed offline using proprietary software (GE Kretz 4D View 10.0, Kretz Medizintechnik, Zipf, Austria) as previously described[19] blinded against all clinical data.

To perform a defect-specific rectocele repair, 10–20 mls of diluted Bupivacaine (20 mls of 0.5% Bupivacaine diluted with 60 mls of normal saline) is used for hydrodissection. A midline longitudinal incision is made over the posterior vaginal wall with the incision extended once careful dissection has separated vaginal muscularis and rectovaginal septum. At this time, it is important to avoid inadvertently incising the RVS. Once the defect, that is the cranial margin of the RVS, is identified, it is sutured to the pericervical ring or vaginal vault in a transverse fashion, using 5–7 interrupted Prolene sutures (Fig. 3). A perineoplasty was performed routinely. All patients remain in hospital until bowel movement. Aperient is prescribed if needed. Women are advised against constipation and straining at stool.

Main outcome measures were symptoms of obstructed defecation (straining at stool, vaginal or perineal digitation, incomplete bowel emptying), recurrent prolapse symptoms (feeling of a bulge or lump/dragging sensation), recurrence on clinical examination (define as $Bp \geq -1$) and true rectocele recurrence on US as defined above.

Statistics were performed using SPSS v21 (IBM Corp, Armonk, NY, USA) and SAS V9.2 (Cary CR: SAS institute INC, USA) for PC. A test–retest series of 20 patients was performed between RG and IA to determine interobserver agreement using Cohen's kappa and intraclass correlations (single measurements, absolute agreement definition). Normality was assessed using the Kolmogorov–Smirnov method. Linear regression was used to test for predictors of clinical and sonographic recurrence. Analysis for continuous and categorical data was performed using linear regression and chi-squared test, respectively. A $P < 0.05$ was considered statistically significant. The study was approved by the local ethics committee (reference SWAHS HREC 09/3).

Results

A test–retest series of 20 ultrasound volume data sets showed good interobserver agreement in regard to the rectocele presence (Cohen's kappa, 0.694) and rectocele depth (ICC 0.73 [0.44–0.89]).

Of 140 cases, 138 women were seen at a minimum follow-up of three months (range, 0.25–5.7 years, mean 1.4 years). One post-operative volume data set was unavailable, leaving 137. The following analysis pertains to these 137 women, of which seven had had a previous posterior colporrhaphy. Mean age was 58.4 (standard deviation [SD] 11.8, range 27.8–87.9) years, median parity was 3 (range 0–10), and mean body mass index

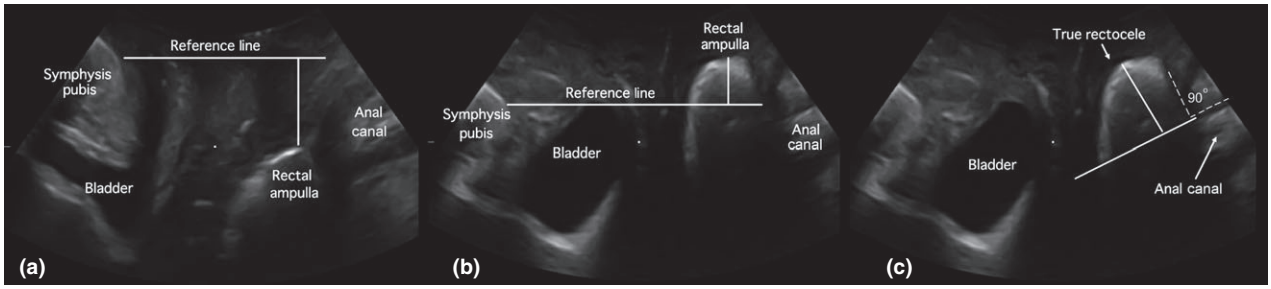

Figure 1 The midsagittal plane on translabial imaging. Panel 'a' at rest and panel 'b'–'c' at Valsalva. (a) illustrates the position of the rectal ampulla and (c) illustrates the depth of the rectocele. The stippled line shows a 90-degree disruption on the anterior contour of the anorectal muscularis.

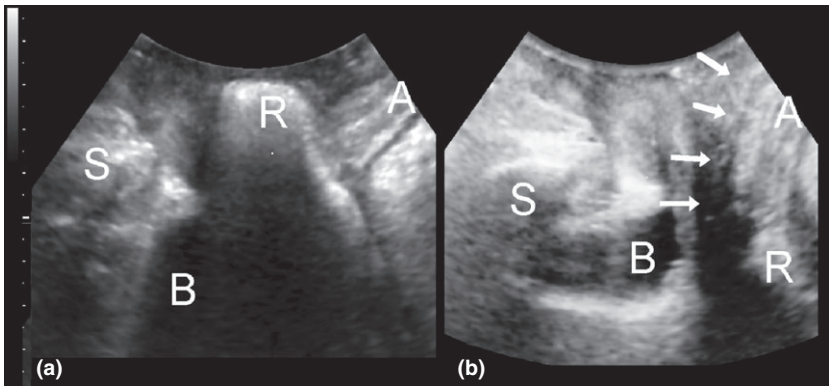

Figure 2 Typical appearances after defect-specific rectocele repair. Panel (a) shows pre-operative findings of a true rectocele of 2.5 cm depth; panel (b) demonstrates a completely normal posterior compartment contour (arrows) on Valsalva at the follow-up. S, symphysis pubis; B, bladder; R, rectocele; A, anus.

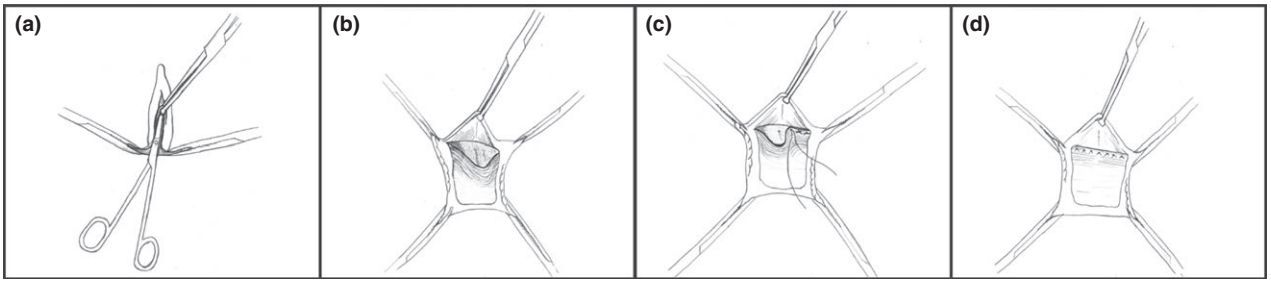

Figure 3 Defect-specific rectocele repair: (a) posterior colpotomy; (b) identification of the superior margin of the detached RVS; (c) attachment of the RVS to vault/pericervical ring; (d) completed RVS repair.

was 30.5 kg/m^2 (SD ±5.8). All except one were vaginally parous. One hundred and twelve (82%) women suffered from symptoms of prolapse (vaginal lump, bulge or dragging sensation), 106/137 (77%) from stress incontinence, 98/137 (72%) from urge incontinence, 56/137 (41%) from symptoms of voiding dysfunction and 21/119 (18%) from dyspareunia (119/137 were sexually active). Forty-nine women (36%) complained of constipation and 96/137 (70%) of obstructed defecation symptoms, that is vaginal or perineal digitation (n = 34/137, 25%), straining at stool (n = 75/137, 55%), and/or incomplete bowel emptying (n = 69/137, 50%). Pre-operatively, ICS POP-Q stage ≥2 of the anterior compartment was found in 98, central compartment in 21 and posterior compartments in 134 women. On ultrasound imaging, defects of the RVS were seen in 124/137 patients. In the remaining 13 cases, a defect of the RVS was diagnosed intra-operatively (9.4%) within dissection. The mean depth of pre-operatively diagnosed rectoceles was 20.1 mm (SD ±8.1). Mean hiatal area on Valsalva was 34.2 cm^2 (SD ±10.3). Fifty-one (37.2%) women were diagnosed with levator avulsion, which was bilateral in 23/137 (17%).

All women underwent a defect-specific rectocele repair as described above. Concomitantly, 25/137 (18%) had a vaginal hysterectomy, 58/137 (42%) an anterior repair, including 38/137 women (28%) with a Perigee™ mesh repair (American Medical System, Minnetonka, MN, USA), 59/137 (43%) a sacrospinous colpopexy, 3/137 (2%) a hysteropexy and 95/137 (69%) a suburethral sling. There were no intra-operative complications related to the rectocele repair, in particular no bowel perforation.

At follow-up, 117/137 (85%) women considered themselves cured or improved. Thirty-four women (25%) complained of recurrent symptoms of prolapse (vaginal lump, bulge or dragging sensation) and 47/137 (34%) of symptoms of obstructed defecation. The latter implies a significant reduction in such symptoms (70% versus 34%, $P < 0.0001$). From those who reported prolapse symptoms at follow-up (n = 34), 23 women had stage 2 or more descent of the anterior compartment but no objective recurrence in the posterior compartment on POP-Q assessment. Objective evidence of posterior compartment recurrence (Bp ≥ −1) was seen in 19/137 women (14%). However, only 7 of those women reported prolapse symptoms at follow-up. On imaging, recurrence of a true rectocele (i.e a diverticulum of the rectal ampulla) was seen in 27/137 women (20%). One was among those in whom there was no evidence of a true

rectocele on ultrasound pre-operatively. The mean depth of recurrent rectocele was 16.6 mm (10.3–25.1). Of those who did not have a defect shown post-operatively, 58.2% were cured of their symptoms of obstructed defecation. There was a highly significant association between rectocele cure on ultrasound and symptomatic cure (kappa 0.31, $P < 0.001$). Seventeen (15%) women reported dyspareunia at follow-up compared with 21 (18%) before the operation (15 were cured, 12 reported *de novo* dyspareunia, five remained the same, and one was no longer sexually active). When this analysis was repeated after exclusion of all women in whom a defect of the RVS was NOT diagnosed pre-operatively, we found similar results. Seventeen of 124 (14%) women had a clinical recurrence (Bp ≥ -1), 26/124 (21%) had a recurrence on ultrasound, and symptoms of obstructed defecation were relieved in 48/86 (56%).

We tested multiple potential predictors of recurrence such as age, BMI, vaginal parity, previous hysterectomy, previous prolapse surgery, follow-up interval, pre-operative clinical and ultrasound findings, against recurrent symptoms as well as clinical and sonographic recurrence (Table 1). Only hiatal area on Valsalva (for sonographic recurrence; $P = 0.01$; OR 0.95; 95% CI 0.91–0.99) and enterocele (for clinical and sonographic recurrence, $P = 0.006$; OR 4.04; 95% CI 1.48–10.97; and $P = 0.02$; OR 2.72; 95% CI 1.14–6.48, respectively) reached significance.

Discussion

In this single-surgeon series of 137 women, defect-specific rectocele repairs with transverse defect closure were demonstrated to be associated with high objective cure rates both clinically and on imaging, and a highly significant reduction in symptoms of obstructed defecation and prolapse. Restitution of normal posterior compartment anatomy was noted in 80% and resolution of obstructed defecation in 50% of cases at a mean follow-up of 1.4 years. Furthermore, the procedure is safe with no serious complications found in this series. It does not seem to increase dyspareunia rates, which concurs with the findings by Kenton *et al.*[20] and is in contrast to other techniques.[21,22]

Obstructed defecation is prevalent among women with pelvic floor dysfunction[23] and can be due to a number of causes.[24,25] Rectocele is commonly found in those women on imaging. While constipation and repeated straining at stool have been implicated in the pathogenesis of rectocele,[2] the finding of an association between resolution of abnormal defecatory symptoms and anatomical cure suggests that in some women, rectocele is the cause rather than the effect of defecatory abnormalities. Contrary to our findings, Van Laarhoven *et al.* have found no correlation between symptomatic relief and anatomical parameters on defecation proctography. However, this was a small study on only 26 subjects with either transperineal or transanal rectocele repair.[11]

In 13 cases, a true rectocele was not seen on transperineal ultrasound pre-operatively but was diagnosed in the theatre. The discrepancy may be explained by the effect of stool quality on visualisation of RVS defect on ultrasound. Hard stool may reduce rectocele depth by distending the diverticulum to such degree that its neck becomes indistinct. A false-negative finding on ultrasound can also be explained by the presence of prolapse in the anterior or apical compartment, which can cover the fascial defect, removing the pressure differential between intra-abdominal and atmospheric pressures, which would otherwise result in a protrusion of the anterior rectal wall into the vagina. In this scenario, if that portion of the vagina is covered by the bladder (at intraperitoneal pressure) or the uterus (a nondistensible, solid body), there will be no pressure differential between the rectal ampulla and the vagina. This may explain the discrepancy between findings in the operating room and on ultrasound.

Table 1 Association between potential patient predictors and subjective, clinical and sonographic recurrence

	Recurrent OD symptoms		Clinical Recurrence		Sonographic Recurrence	
Variable	Odds ratio (95% CI)	*P*-value	Odds ratio (95% CI)	*P*-value	Odds ratio (95% CI)	*P*-value
Age (years)†	1.00 (0.97–1.03)	NS	0.97 (0.92–1.01)	NS	0.99 (0.95–1.03)	NS
Body Max Index (kg/m^2)†	1.03 (0.97–1.10)	NS	0.99 (0.91–1.07)	NS	0.94 (0.88–1.01)	NS
Vaginal parity†	1.30 (0.98–1.73)	NS	0.98 (0.70–1.37)	NS	1.14 (0.82–1.57)	NS
Previous prolapse surgery*	0.77 (0.31–1.91)	NS	2.13 (0.73–6.25)	NS	1.21 (0.43–3.37)	NS
Previous hysterectomy*	1.25 (0.62–2.54)	NS	1.81 (0.68–4.82)	NS	2.02 (0.86–4.76)	NS
Follow up interval†	0.99 (0.97–1.02)	NS	0.98 (0.95–1.00)	NS	1.00 (0.97–1.03)	NS
Bp (POPQ)†	1.25 (0.95–1.65)	NS	0.77 (0.56–1.06)	NS	0.94 (0.70–1.27)	NS
Any avulsion*	0.93 (0.45–1.94)	NS	1.27 (0.47–3.40)	NS	0.99 (0.41–2.37)	NS
Area on Valsalva†	1.01 (0.98–1.05)	NS	0.98 (0.94–1.03)	NS	**0.95 (0.91–0.99)**	**0.012**
Rectocele depth†	1.00 (0.96–1.03)	NS	0.98 (0.93–1.03)	NS	0.97 (0.93–1.02	NS
Presence of enterocele*	0.99 (0.46–2.14)	NS	**4.03 (1.48–10.97)**	**0.006**	**2.72 (1.14–6.48)**	**0.02**

*Chi-square; †*t*-test; NS, non significant. Bold figures indicate significant data.

We were unable to identify clinically useful predictors of recurrence, with the possible exception of enterocele. It is plausible that the presence of an enterocele may signify a larger RVS defect, reducing the likelihood of achieving complete restitution of normal RVS anatomy. Levator avulsion has been shown to be a risk factor for prolapse recurrence.[26,27] However, in this study, we found no association between the state of the levator ani muscle and rectocele recurrence, which could be a power issue. On the other hand, this could also be due to varying mechanisms responsible for prolapse development and recurrence in individual compartment. The finding of a negative association between hiatal area on Valsalva and rectocele recurrence on ultrasound seems counterintuitive and may be spurious.

Some limitations of our study should be acknowledged. Firstly, this is a surgical audit of a single surgeon's technique, which limits the generalisability of the results. However, on the other hand, one may consider it as a strength of the study because of its homogeneity. Secondly, we did not compare the outcomes of defect-specific repair with other surgical procedures and could not, therefore, claim superiority of the technique for rectocele repair. However, as far as we are aware, this is the first study incorporating imaging data before and after defect-specific rectocele repair. The finding of a strong association between relief of bowel symptoms and anatomical cure provides validation of both imaging methodology and surgical technique. In the case of (true, radiological) rectocele, a visible anatomical abnormality (a diverticulum of the rectal ampulla) is clearly associated with a given symptom (obstructed defecation) and correction of this anatomical abnormality (obliteration of the diverticulum) results in symptom relief. This argues both for the imaging methodology used to describe the anatomical abnormality and for the surgical technique used to correct this abnormality, that is defect- specific rectocele repair as originally described by Richardson,[9] with the difference that most defects identified by us were high and transverse, rather than low or lateral. One explanation for this discrepancy may be that dissection of the RVS can be quite difficult, with the potential for iatrogenic defects in all those locations originally described by Richardson.

In conclusion, defect-specific rectocele repair seems highly effective for the relief of prolapse and obstructed defecation symptoms and for the restitution of normal anatomy of the posterior compartment at a mean follow-up of 1.4 years.

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