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Long-term subjective, clinical and sonographic outcomes after native-tissue and mesh-augmented posterior colporrhaphy

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Abstract

Introduction and hypothesis Our primary objective was to describe long-term outcomes after posterior colporrhaphy with and without mesh augmentation.

Methods This was a retrospective study including 93 patients after posterior colporrhaphy (native tissue in 39 and synthetic mesh augmented in 54). The indication was symptoms of prolapse with clinical posterior vaginal wall prolapse. Mesh augmentation and concomitant prolapse operations were performed at the surgeon's discretion. Patients underwent interview, clinical examination and 4D pelvic floor ultrasound. Imaging analysis was done with the reviewer blinded against all other data. Generalized linear modeling was used to compare groups with logistic regression for binary and linear regression for continuous outcomes.

Results Patients were seen on average 5.3 years after surgery and described persistent symptoms of prolapse in 32% and of obstructed defecation in 33%. Clinical recurrence (Bp ≥ -1) was seen in 20%, while sonographic recurrence (rectal ampulla descent to ≥ 15 mm below the symphysis pubis) was noted in 12%. A true rectocele was diagnosed in 33% of patients. No major differences in outcomes were found between those who underwent native tissue and those who had a mesh-augmented repair.

Conclusions Mesh augmentation was not superior to native tissue posterior colporrhaphy, and both were only moderately effective in eliminating a true rectocele and symptoms of obstructed defecation 5 years after reconstructive surgery.

Keywords Obstructed defecation · Posterior colporrhaphy · Pelvic floor ultrasound · Prolapse · Rectocele · Transperineal ultrasound

Introduction

Posterior vaginal wall abnormalities are highly prevalent in urogynecologic patients [1, 2]. Traditional transvaginal posterior colporrhaphy is considered highly successful in treating posterior vaginal wall prolapse [3]. Consequently, this is the procedure of choice of most gynecologists when they encounter prolapse of the posterior compartment [4]. The basic concept of the procedure is transverse shortening or plication of the rectovaginal septum (RVS). This technique is effective in treating a posterior compartment prolapse and alleviating prolapse symptoms, in particular compared with native tissue repairs of other pelvic compartments [5]. Nevertheless, the technique may be less effective for alleviating symptoms of obstructed defecation [6]. Furthermore, scant evidence exists on how well this technique performs in correcting a true rectocele, i.e., a defect of the RVS or Denonvilliers' fascia that results in herniation of the anterior rectal wall into the posterior vagina [7]. In clinical practice, the terms rectocele and posterior vaginal prolapse are often used interchangeably. However, the latter often results from other entities such as perineal hypermobility, deficient perineum, an isolated enterocele or even rectal intussusception, while a true rectocele is the cause in only about half of cases [8].

The diagnosis of a true rectocele can be made by rectal examination, defecation proctography, dynamic magnetic resonance imaging (MRI) or pelvic floor ultrasound (PFUS) [9–11]. To date, imaging methods have rarely been used in the follow-up of rectocele surgery because of logistic constraints. PFUS offers obvious advantages in clinical audit and surgical research as the required equipment is commonly

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available and as it is preferred by patients [12]. In contrast to surgical treatment for other pelvic floor compartments, which is mainly aimed at restoring normal vaginal anatomy, repair of the posterior compartment might also serve to restore normal bowel function.

Posterior compartment mesh augmentation has not been shown to be superior to native tissue repair, and thus its use is currently not recommended [3, 13–16]. However, most studies comparing native tissue with synthetic mesh-augmented repair have focused on prolapse symptoms and objective prolapse as outcome measure, disregarding postoperative residual rectocele and defecatory symptoms. As obstructed defecation is significantly associated with the presence of a true rectocele [1, 2], we were interested not just in clinical prolapse cure, but also in evaluating persistence of the rectovaginal septal defects and in symptoms of obstructed defecation.

Materials and methods

Between May 2005 and November 2012, a total of 322 women underwent posterior colporrhaphy in one tertiary center and its associated private facility by seven participating gynecologists. Some had the procedure as a native tissue repair ($n = 163$) and some with synthetic mesh augmentation ($n = 154$). In this audit project, we were able to see 39 patients (23%) after native tissue and 54 (35%) after mesh augmented posterior colporrhaphy. The procedure was performed by transverse plication of the rectovaginal septum, with or without subsequent mesh implantation using a posterior compartment mesh (mostly Apogee ™, two Pinnacle ™). The decision to use native tissue or synthetic mesh was made by the surgeons according to personal preferences. No imaging was performed preoperatively. The indication for surgery was based solely on the clinical diagnosis of posterior compartment prolapse. On the postoperative follow-up, patients were assessed by a standardized interview, clinical examination (POP-Q) [17] and 4D pelvic floor ultrasound (PFUS) examination using Voluson 730 expert or Voluson E8 systems with RAB 8–4 Mhz transducers (GE Kretz Ultrasound, Zipf, Austria) [18].

Prolapse symptoms were defined as a vaginal lump or a dragging sensation [19]. Straining at stool, vaginal/perineal/rectal digitation on defecation or the sensation of incomplete bowel emptying were considered symptoms of obstructed defecation [1, 2]. On clinical examination, POP-Q ≥ stage 2 was considered significant clinical prolapse. Offline analysis of archived ultrasound volume data sets was undertaken at a later date by the first author (MG) on a PC using proprietary software (GE Kretz 4D View 10.5 BT12, Kretz Medizintechnik, Zipf, Austria), blinded against all demographic and clinical data. Prior to this analysis, MG had undertaken a test-retest

series for sonographic outcome measures, achieving an intraclass correlation coefficient (single measures, absolute agreement definition) or a Cohen's kappa of ≥ 0.7, suggesting good agreement without significant bias. Sonographic organ descent on Valsalva maneuver was determined relative to the infero-posterior symphyseal margin, as previously described [18]. A rectocele was diagnosed if on PFUS a discontinuity was noted in the anterior anorectal muscularis that resulted in a diverticulum of the rectal ampulla extending into the vagina [11] (Fig. 1). A true rectocele was defined as a diverticulum of ≥ 10 mm in depth [20].

The primary outcome measure was the presence of a true rectocele on postoperative imaging assessment. Secondary outcome measures were patient satisfaction with the procedure, subjective overall cure or improvement, symptoms of prolapse, symptoms of obstructed defecation, point Bp on POP-Q and maximal sonographic descent of the rectal ampulla on Valsalva. Statistical analysis was performed using SAS V9.4 (SAS Institute Inc., Cary, NC, USA) for PC. Generalized linear modeling was used to compare groups with logistic regression for binary outcomes and linear regression for continuous outcomes. Multivariable models were adjusted for previous hysterectomy and previous prolapse procedures, which significantly differed between the groups on univariate analysis. $P < 0.05$ was considered statistically significant. The study was approved by the local ethics committee (reference SWAHS HREC 09/3).

Results

A total of 93 patients (29%) accepted the invitation to participate in this retrospective audit, and they formed our study group. Patients were seen at a minimum postoperative follow-up of 1 year (range 1.04–12.21 years, mean 5.31 years). Their mean age was 66 years [standard deviation (SD) 9, range 41–83], mean BMI 28.6 kg/m^2 (SD 5.9, range 17–47), mean weight 74 kg (SD 14, range 45–120) and median vaginal parity 3 deliveries (range 0–6). Thirty-two patients (35%) had had a previous prolapse repair and 39 (43%) a previous hysterectomy. A concomitant hysterectomy was performed in 14% ($n = 13$), and concurrent prolapse repair in another compartment was carried out in 58% ($n = 53$). On follow-up, 61 patients (67%) were satisfied with the outcome of the procedure, 76 (82%) considered themselves overall cured or improved, 30 (32%) had recurrent symptoms of prolapse, 31 (33%) described symptoms of obstructed defecation, and 7 (7%) suffered from both. Clinical recurrent posterior vaginal wall prolapse (point Bp ≥ −1) was seen in 18 patients (20%), whereas POP-Q stage 2 prolapse in any compartment was noted in 39 patients (45%). On ultrasound, significant prolapse of the rectal ampulla (≥ 15 mm below the symphysis pubis) was noted in 11 patients (12%), while another 5 (6%)
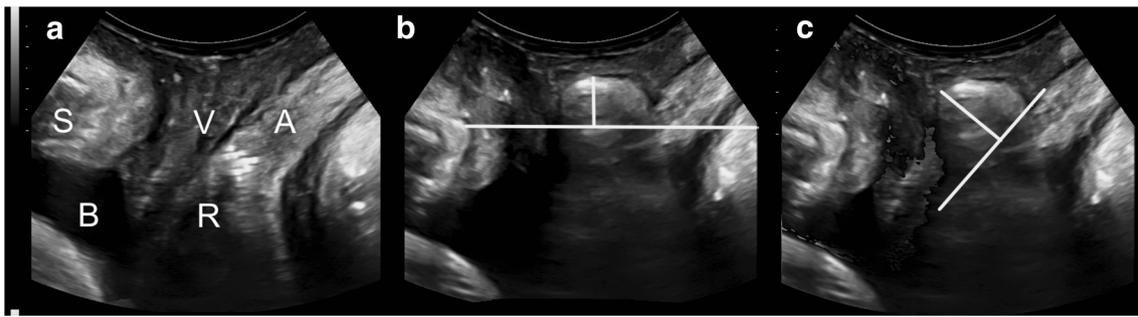
Fig. 1 Midsagittal view in a patient with a true rectocele obtained by pelvic floor ultrasound. Images were captured at rest (**a**) and on maximal Valsalva (**b**, **c**). Measurements of rectal ampulla descent (**b**) and rectocele depth (**c**) are shown by white lines perpendicular to a reference white line at the level of the symphysis pubis or the ventral part of the internal anal sphincter, respectively. A = anal canal, B = bladder, R = rectal ampulla, S = symphysis pubis, V = vagina

had an isolated enterocele (diagnosed if an enterocele sac was seen at or below the level of the symphysis pubis on imaging). A true rectocele (that is, an anterior diverticulum of the rectal ampulla) was diagnosed in 33% ($n = 29$). Thirty-four percent of patients (10/29) with a true rectocele suffered from symptoms of obstructed defecation compared with 30% (18/59) in those without a true rectocele. This small difference did not reach statistical significance ($P = 0.7$).

Comparing patients' characteristics (age, BMI, vaginal parity, follow-up interval, sonographic levator avulsion and concurrent prolapse operation in another compartment) (data not shown) between those who underwent native tissue repair and those who had mesh augmented repair showed no significant differences apart from history of previous hysterectomy (31% versus 52%, respectively, $p = 0.04$) or previous prolapse repair (20.5% versus 45.3%, respectively, $p = 0.01$).

No statistically significant differences in any of our subjective or objective outcomes were found between patients after native tissue and those after mesh augmented repair (Table 1). This remained unchanged after adjusting for the above-mentioned potential confounders as well. In those without significant posterior compartment descent on clinical examination, a substantial minority still showed a 'true rectocele',

i.e., a defect of the RVS. This was the case after both mesh (12/41, 29%) and native tissue repair (5/27, 18.5%; statistically non-significant).

Overall, six patients (6.5%) underwent repeat prolapse procedures in the interval between the index surgery and follow-up. Dyspareunia was documented in 19 patients (21%), 9 of which were after native tissue repair (23%). Eleven patients (12%) suffered from chronic pelvic pain, five of which were after native tissue repair (13%). Of those who had mesh augmented repair, 13% (7 patients) had vaginal mesh erosion, which had been treated surgically in 4 patients.

Discussion

In this long-term retrospective audit of patients following posterior colporrhaphy with and without mesh augmentation, we found those procedures to be moderately effective. Postoperative symptoms of prolapse and obstructed defecation, prevalence of clinical and sonographic posterior compartment prolapse as well as rates of true rectoceles were all fairly low. On follow-up, two thirds of patients were satisfied, two thirds had no symptoms of prolapse, and a similar fraction

Table 1 Comparison of subjective, clinical and sonographic outcomes of patients after posterior colporrhaphy (native tissue or mesh augmented) with those after defect-specific rectocele repair

	Satisfied	Cured or improved	Symptoms of prolapse	Symptoms of obstructed defecation	Mean Bp (cm)	Rectal ampulla descent on PFUS (mm)	True rectocele (defect ≥ 10 mm) on PFUS
Posterior colporrhaphy ($n = 93$)	61/91 (67%)	76 (82%)	30 (32%)	31 (33%)	−1.86 (SD 0.94)	0.7 above sp. (SD 15.8)	29/88 (33%)
Native tissue ($n = 39$)	22/38 (58%)	30 (77%)	13 (33%)	9 (23%)	−1.63 (SD 0.8)	1.2 below sp. (SD 17.6)	11/37 (30%)
Mesh augmented ($n = 54$)	39/53 (74%)	46 (85%)	17 (31%)	22 (41%)	−2 (SD 0.99)	2.1 above sp. (SD 14.4)	18/51 (35%)
P value	0.12	0.31	0.85	0.08	0.06	0.34	0.58
Adjusted P value*	0.13	0.35	0.87	0.11	0.07	0.48	0.99

*Adjusting for previous hysterectomy and previous prolapse repair

PFUS = pelvic floor ultrasound. SD= standard deviation. sp. = symphysis pubis

had no symptoms of obstructed defecation. Recurrent clinical prolapse of the posterior vaginal wall (≥ stage 2) was seen in about one fifth of patients, and significant descent of the rectal ampulla was noted in one tenth, while a true rectocele was more common and was diagnosed in about one third of patients. The latter finding implies that a true rectocele (i.e., a defect of the rectovaginal septum) may still be present underneath an apparently normal posterior vaginal wall. This seems particularly true after mesh augmentation (Fig. 2).

We previously were able to show that prolapse recurrence largely occurs within the first 2 years following surgery [21]. This study's long-term follow-up interval, with an average of > 5 years, to our knowledge is the longest described after posterior colporrhaphy, which is one of the major strengths of the study.

Comparing native tissue and mesh augmented repairs did not reveal any significant differences in patient characteristics or in any of our outcome measures between those groups (Table 1). As posterior mesh kits might provide apical support as well, we compared mesh patients with those after native tissue repair with concurrent apical prolapse. This comparison did not show any advantage of mesh augmentation (data not shown). This agrees with the medical literature and current guidelines which argue against the use of mesh in the posterior compartment [3, 13–16]. Previous comparisons between native tissue and synthetic mesh augmented repair of the posterior compartment have largely neglected residual rectocele as an outcome measure. We have shown that mesh augmented repair does not offer any advantage in that regard either.

To date, most published studies evaluating posterior colporrhaphy have focused on correcting posterior vaginal wall prolapse rather than correcting the actual anatomical defect, that is, the 'true' rectocele. Studies have mostly used clinical rather than imaging end points [3, 13–15]. In the only other study with imaging follow-up we were able to identify, Maher et al. showed excellent results for posterior colporrhaphy in terms of resolution of both symptoms of obstructed defecation and reduction of rectocele depth in a small study ($n = 38$) using defecation proctography [7]. In our study, we witnessed poorer results for posterior

colporrhaphy in that regard. The discrepancy might be explained by several major differences: Maher et al. used a narrow definition for obstructed defecation that relates only to digitation (our definition also included frequent straining at stool and the sensation of incomplete emptying), there was a substantially shorter mean follow-up interval (1 versus 5 years), and the study group was much smaller.

The transvaginal route has repeatedly been shown to have superior results compared with the transanal route [3, 22]. For transvaginal techniques, most studies have shown either similar or slightly better results for posterior colporrhaphy compared with the site-specific defect repair [23–25]. The defect-specific rectocele repair technique was first introduced in 1993 [26] and has recently showed promising results regarding subjective and objective outcomes and in eliminating a rectocele [27]. The major conceptual difference between this procedure and posterior colporrhaphy is that in the former the RVS is pulled cranially, instead of plicated transversely, to cover the defect through which the anterior rectal wall herniates into the vagina. A prospective randomized controlled trial comparing the different techniques may be needed to clarify whether one procedure offers any advantage over the others.

There are several limitations to our study. Due to its retrospective nature, we did not have preoperative imaging data. Surgeons relied solely on clinical examination. This might imply systematic error regarding anatomical correction of a true rectocele since some posterior colporrhaphy patients may not have had a defect of the RVS to start with, leading to overestimation of cure rates. Another limitation of the study is that we were able to follow-up only about one third of patients, implying potential selection bias. In fact, patients were more likely to agree to a follow-up appointment (39/163 vs. 54/154, $P = 0.036$) after mesh augmentation, which strongly suggests selection bias, probably due to recent negative publicity about mesh complications.

It is possible that our failure to show significant differences between the groups may be a power issue. However, while trends seem to favor mesh regarding prolapse cure, the opposite is the case for symptoms of obstructed defecation. It appears unlikely that a larger study would show a clear

Fig. 2 True rectocele in a patient after mesh augmented posterior colporrhaphy. Pelvic floor ultrasound images of the midsagittal plane were captured at rest (left), half-way Valsalva (middle) and maximal Valsalva (right). Three small white arrows point to an Apogee™ mesh placed in the posterior vaginal wall. A true rectocele is demarcated by dots, and its formation underneath the mesh is marked by a large white arrow

advantage of posterior compartment mesh, in particular considering the prevalence of complications such as erosion.

In contrast to previous studies in preoperative patients, the association between symptoms of obstructed defecation and the diagnosis of a true rectocele in our postoperative cohort was not statistically significant [1, 2]. This may indicate a power issue as the mechanism of defecation is complex and not solely based on normal functional anatomy. Another potential confounder lies in the fact that women who still have symptoms of obstructed defecation after surgical correction may constitute a selection of those whose symptoms were due to other factors rather than RVS defects.

In conclusion, this study has shown fair outcomes on average 5 years after posterior colporrhaphy with and without mesh augmentation. This was true for symptoms of prolapse and obstructed defecation, for posterior vaginal wall prolapse and for true rectocele on imaging. Synthetic mesh augmentation does not seem to be of any advantage for subjective or objective outcomes. In particular, mesh use was not associated with a reduced likelihood of defects of the rectovaginal septum.

Compliance with ethical standards

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