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Effects of Pelvic Organ Prolapse Repair on Urinary Symptoms: A Comparative Study Between the Laparoscopic and Vaginal Approach

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Objective: To compare changes in urinary symptoms before and after pelvic organ prolapse (POP) surgery, using either laparoscopic sacrocolpopexy (LSC) or transvaginal porcine dermis hammock placement with sacrospinous ligament suspension (VS). **Materials and Methods:** Data were prospectively collected from all women undergoing POP surgery between May 2001 and October 2009. Pre- and postoperative urinary symptoms, Urinary Distress Inventory (UDI), and Urinary Impact Questionnaires (UIQ) scores were compared within and between groups. A generalized linear model was used for multivariate analysis. **Results:** Out of the 151 patients included, 87 patients underwent LSC, and 64 VS. Overall, after a median follow-up of 32.4 months, POP surgery improved urinary frequency ($P = 0.006$), voiding difficulty ($P = 0.001$), stress urinary incontinence (SUI) ($P = 0.001$), but not urgency ($P = 0.29$). VS was more effective in treating SUI ($P < 0.001$ vs. 0.52) while LSC more effective on voiding difficulty ($P = 0.01$ vs. 0.08). Postoperative de novo symptoms were observed in 35.8% of patients with no difference between the groups ($P = 0.06$). UDI ($P = 0.04$) and UIQ ($P = 0.01$) scores were significantly lower after surgery. However, LSC significantly improved UDI ($P = 0.03$) with no effect on UIQ ($P = 0.29$) scores while VS significantly improved both scores ($P = 0.02$ and 0.001, respectively). Upon multivariate analysis, only the improvement in the impact of urinary symptoms on daily living was independently associated to VS (OR = 5.45 [95% confidence interval 2.20–13.44], $P = 0.01$). **Conclusion:** Most preoperative urinary symptoms decreased after POP surgery with equivalent proportion of de novo symptoms after vaginal and laparoscopic approaches. *Neurourol. Urodynam.* © 2011 Wiley-Liss, Inc.

Key words: laparoscopic sacrocolpopexy; pelvic organ prolapse; porcine dermis hammock; quality of life questionnaires; sacrospinous ligament suspension; urinary symptoms

INTRODUCTION

Pelvic organ prolapse (POP) is a major public health issue in an aging Western population where it is observed in as many as 38–76% of women consulting for routine gynecological care.[1] The lifetime risk of these women undergoing POP surgery is estimated at 11.8%.[2] Patients referred for surgery complain not only about bulging symptoms since there are often associated urinary, bowel, or sexual complaints. Urinary symptoms include incontinence, frequency, urgency, difficulty to void, or a feeling of incomplete emptying. These symptoms associated with POP are responsible for a significant decrease in health-related quality of life as compared to bulging symptoms alone.[3]

Preoperative concomitant stress urinary incontinence (SUI) is reported in about 40% of patients with POP.[4] Patients not complaining of SUI before surgery stand an estimated 11–20% risk of developing de novo SUI symptoms after the surgical correction of prolapse.[5] Occult SUI occurs as SUI can be masked by urethral kinking or compression due to cystocele. This explains why the risk of de novo SUI can be as high as 80% in patients not complaining of any urine leakage before surgery.[6,7]

Overactive bladder symptoms characterized by urgency, frequency, and urge incontinence occur in 55–86% of patients with POP.[3,8–10]

The aim of POP surgery is not only anatomical correction but also to improve functional symptoms and quality of life. However, a recent Cochrane review of the surgical management of POP[11] noted that the impact of surgery on associated pelvic floor symptoms and quality of life were poorly reported. No data are currently available on urinary symptoms following different surgical routes for POP repair. Therefore, the objectives of the present study were to evaluate the pre- and postoperative incidence of urinary symptoms as well as the impact of laparoscopic and vaginal surgical approaches to POP repair on these specific symptoms using validated questionnaires.

MATERIALS AND METHODS

Patients

From May 2001 to October 2009, a comparative study was conducted on prospective data of patients undergoing POP repair. Women either underwent laparoscopic sacrocolpopexy (LSC) or transvaginal total hammock with sacrospinous ligament suspension (VS). The latter approach was recommended in patients with co-morbidities contraindicating the laparoscopic approach such as severe heart failure, severe respiratory failure, morbid obesity, and abdomen with multiple adhesions.

Conflict of interest: none.
Linda Brubaker led the review process.
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Preoperative and follow-up pelvic examinations to evaluate POP stage used the International Continence Society terminology for female POP quantification (POPQ).[12] The maximal extent of prolapse was clinically measured during a Valsalva maneuver or coughing and was confirmed by the patient as being the most severe protrusion. Anatomical recurrence was defined as a POPQ $\geq$ stage II (≥ -1 cm). The study was approved by the Ethics Committee of the French National College of Obstetrics and Gynecology and all patients gave prior written informed consent.

Surgical Techniques

Total transvaginal hammock (VS) used a porcine dermis implant (Pelvicol® implant from Bard Limited, Crawley, UK). Surgery was performed with the patient in the dorsal lithotomy position under general or spinal anesthesia. POP repair was preceded by vaginal hysterectomy. If the latter had already been performed, a longitudinal incision was made at the vaginal apex. The implant was trimmed from an 8 cm $\times$ 12 cm Pelvicol® mesh so as to create an anterior palette and two posterior legs, the length of which was adapted according to anatomic measurements of each patient.

The anterior vaginal wall was incised along the midline from the vaginal vault to 2 cm below the urethral meatus. The vaginal mucosa was separated from the bladder by dissection. No additional colporrhaphy or pubocervical fascia plication was performed. After incising the perineal skin facing the obturator membrane, the endopelvic fascia was perforated with an Emmet needle (Collin®, Cachan, France) from the skin to the incised anterior vaginal wall. Nonabsorbable sutures were placed on the anterior edge of the implant. One end of the stitch was then brought back to the skin by the trans-obturator route. A second perforation was made through the obturator membrane, and the second end of the stitch was then brought back. The same procedure was performed on the contralateral side. The stitches on each side were then tied, allowing approximation of the implant under the urethra and bladder. The posterior vaginal wall was incised along the midline from the vaginal vault to the vaginal introitus. A bilateral pararectal dissection was performed to identify the sacrospinous ligament. Two nonabsorbable sutures were placed on each sacrospinous ligament, one near the midline for the posterior fixation of the implant leg and the second suture 1 cm outside for the sacrospinous fixation. Posterior fixation of the implant to the sacrospinous ligament was first performed on each side. The second suture was then tied, approximating the vaginal apex to the ipsilateral sacrospinous ligament. Finally, the colpotomy and skin incisions were closed with absorbable sutures. For large distal rectoceles, apart from a very distal rectovaginal dissection and mesh placement, an additional perineorrhaphy was often performed.

For laparoscopy, polyethylene meshes were used: Mersilene® (Ethicon, Sommerville, NJ) until 2005, then lightweight macroporous Parietex® (Covidien, Mansfield, MA) from 2005 to 2009. All patients were operated under general anesthesia. After CO_2 intra-peritoneal insufflation at 12 mmHg with a Veress needle, a 12 mm trocar was inserted at the umbilicus for the scope, two 5 mm trocars at the right and left iliac fossae, and a suprapubic incision for a 15 mm trocar. The first step of the procedure consisted of a subtotal hysterectomy with bilateral oophorectomy for postmenopausal patients, if the uterus was still in place. Vesicovaginal cleavage was extended to the lower third of the vagina. No colporrhaphy or bladder muscularis plication was performed. The uterus and adnexes were extracted using an electric morcellator. The second step of the procedure began by continuing the rectovaginal dissection to the lower third of the posterior vaginal wall and then extending it laterally to visualize the levator ani muscle fascia. Large distal rectoceles could thus be treated by extending the rectovaginal dissection distally. Next, the peritoneum facing the sacral promontory was opened to visualize the anterior vertebral ligament. The peritoneal opening was extended downwards so as to join the rectovaginal dissection. The posterior mesh was secured to the levator ani muscle fascia using nonabsorbable sutures or staples. The anterior mesh was then secured to the anterior vaginal wall using three nonabsorbable sutures. Finally, the anterior and posterior meshes were secured to the anterior vertebral ligament at the sacral promontory using a nonabsorbable suture or staples before closing the peritoneum with absorbable sutures. After exsufflation, the skin incisions were closed with absorbable sutures as well. A Foley catheter was left in place for 24 hr.

All patients underwent urodynamic investigations preoperatively but not after surgery. A urine analysis was performed to exclude any urinary tract infection. A vaginal retractor was used to reduce the prolapse so as to screen for occult SUI. Once identified, no anti-incontinence procedure was performed with the POP surgery. Any patient who had previously been treated for SUI or undergoing concomitant surgery for SUI was excluded from the study.

Follow-up pelvic examinations were carried out by the surgeons 4–6 weeks after surgery, then once every year. Patients were asked to answer validated quality of life questionnaires at the preoperative visit and then at each follow-up visit or through telephone interviews by investigators that were blinded to the type of surgery. The short version of the Pelvic Floor Distress Inventory (PFDI-20) and the Pelvic Floor Impact Questionnaire (PFIQ-7)[13] were used.

The PFDI-20 assesses the presence and amount of distress caused by 20 symptoms related to pelvic floor disorders. One of its three scales is the Urinary Distress Inventory (UDI) which includes six items. Patients were asked if they experienced each symptom, and if so, how much the symptom bothered them on a scale of 1 (not at all) to 4 (severe). Scores on the UDI range from 0 to 100 with higher scores indicating greater symptom distress. The PFIQ-7 assesses the impact of symptoms on activities of daily living. One of its three scales is the Urinary Impact Questionnaire (UIQ), which assesses the extent to which urinary symptoms affect seven aspects of daily living. The range of scores for the UIQ is also between 0 and 100, with higher scores indicating worse functional impact.

Statistical Analysis

Statistical analyses were carried out using the R 2.11® software. Qualitative variables were compared using the Fisher's exact test or χ^2 test, and quantitative variables by the Wilcoxon rank-sum test. UDI and UIQ scores were compared using the Wilcoxon signed-rank paired test. Multivariate analysis was performed using the generalized linear logistic model. A value of $P \leq 0.05$ was considered as a significant difference.

RESULTS

Two hundred patients were initially recruited for the study. Twenty of them were lost to follow-up and 39 were excluded because they underwent a concomitant trans-obturator tape procedure for SUI. Among the 151 patients that had POP

TABLE I. Patients' Demographic and Clinical Characteristics for the Whole Population (LSC + VS), and Comparison Between LSC and VS Groups

	LSC + VS, n = 151	LSC, n = 87	VS, N = 64	*P*-value
Age/years (mean ± SD)	59.58 ± 11.77	53.29 ± 9.49	68.05 ± 8.80	**<0.0001**
BMI/kg/m^2 (mean ± SD)	24.48 ± 3.26	23.75 ± 2.59	25.48 ± 3.79	**0.002**
Median parity	2 [0–12]	2 [1–7]	2 [0–12]	0.51
Menopausal status	109 (72.2%)	46 (52.8%)	63 (98.4%)	**<0.0001**
Preoperative prolapse stage by point Ba				0.08
Stage 0	5 (3.33%)	3 (3.44%)	2 (3.12%)	
Stage I	10 (6.62%)	8 (9.19%)	2 (3.12%)	
Stage II	38 (25.16%)	27 (31.03%)	11 (17.19%)	
Stage III	94 (62.25%)	46 (52.87%)	48 (75%)	
Stage IV	4 (2.65%)	3 (3.44%)	1 (1.56%)	
Preoperative prolapse stage by point C				0.06
Stage 0	9 (5.96%)	4 (4.59%)	5 (7.81%)	
Stage I	18 (11.92%)	15 (17.24%)	3 (4.68%)	
Stage II	55 (36.42%)	26 (29.88%)	29 (45.31%)	
Stage III	64 (42.38%)	38 (43.68%)	26 (40.62%)	
Stage IV	5 (3.31%)	4 (4.59%)	1 (1.56%)	
Preoperative prolapse stage by point Bp				0.40
Stage 0	30 (19.86%)	21 (24.14%)	9 (14.06%)	
Stage I	50 (33.11%)	30 (34.48%)	20 (31.25%)	
Stage II	44 (29.14%)	23 (26.44%)	21 (32.81%)	
Stage III	24 (15.89%)	11 (12.64%)	13 (20.31%)	
Stage IV	3 (1.98%)	2 (2.29%)	1 (1.56%)	
History of hysterectomy	20 (13.24%)	10 (11.49%)	10 (15.62%)	0.62
History of prolapse repair	14 (9.27%)	10 (11.49%)	4 (6.25%)	0.42
Median follow up/months	32.4 [7–101]	30.7 [7–101]	34 [12–74]	0.80
Anatomical recurrence	17 (11.25%)	2 (2.29%)	15 (23.43%)	**0.004**

LSC, laparoscopic sacrocolpopexy; VS, vaginal surgery with porcine dermis graft hammock and sacrospinous ligament suspension; BMI, body mass index.
Data presented as mean ± SD, as median with range within brackets or as number with percentage within parentheses.
Significant *P* values ($P < 0.05$) are in bold.

surgery only, 87 had LSC, and 64 had a total hammock using a porcine dermis implant with bilateral sacrospinous ligament suspension (VS). The main characteristics of both groups and the comparison between the groups are summarized in Table I.

Patients in the laparoscopy group were younger ($P < 0.0001$), had a lower body mass index (BMI) ($P = 0.002$), and were less often menopausal ($P < 0.0001$). However, on comparing preoperative POPQ measurements, no significant difference was found between the two groups for point Ba ($P = 0.08$), for point C ($P = 0.06$), or for point Bp ($P = 0.4$). There was a similar rate of previous hysterectomy ($P = 0.62$) and previous POP repair ($P = 0.42$).

The median follow-up period for both groups combined was 32.4 months (range: 7–101) with no statistically significant difference between the groups (30.7 months (range: 7–101) for the laparoscopy group vs. 34 months (range: 12–74) for the vaginal group, $P = 0.80$).

Most urinary symptoms were significantly improved after POP surgery (72.2% vs. 27.8%, $P < 0.001$) (Table II). Frequency decreased from 11.2% to 2.6% ($P = 0.006$), voiding difficulty from 14.6% to 3.3% ($P = 0.001$), and SUI from 25.8% to 11.2% ($P = 0.001$). Of the 21(13.9%) patients with occult incontinence, 11(7.3%) of them went on to present SUI symptoms postoperatively ($P = 0.09$). Urge symptoms decreased from 6.6% to 3.3% after surgery, but change was not significant ($P = 0.29$). On studying each surgical route separately, laparoscopy significantly improved voiding difficulty ($P = 0.01$) only. On the other hand, vaginal surgery significantly improved frequency ($P = 0.04$), and SUI ($P < 0.001$) but not voiding difficulty ($P = 0.08$) or urgency ($P = 0.20$) (Table II).

Postoperative de novo symptoms were observed in 35.8% of the patients overall (Table III) with no significant difference in incidence between the laparoscopic and vaginal approaches ($P = 0.06$). Urinary retention resolved spontaneously by leaving the Foley catheter in place for more than 24 hr after

TABLE II. Effects of Type of Surgery on Major Preoperative Most Bothersome Urinary Symptoms

	LSC + VS, n = 151			LSC, n = 87			VS, n = 64		
Symptoms	Before surgery	After surgery	*P*-value	Before surgery	After surgery	*P*-value	Before surgery	After surgery	*P*-value
Frequency	17 (11.2%)	4 (2.6%)	**0.006**	6 (6.9%)	1 (1.1%)	0.12	11 (17.2%)	3 (4.7%)	**0.04**
Voiding difficulty	22 (14.6%)	5 (3.3%)	**0.001**	12 (13.8%)	2 (1.3%)	**0.01**	10 (15.6%)	3 (4.7%)	0.08
Urgency and urge incontinence	10 (6.6%)	5 (3.3%)	0.29	2 (1.1%)	2 (1.1%)	0.61	8 (12.5%)	3 (4.7%)	0.20
SUI	39 (25.8%)	17 (11.2%)	**0.001**	16 (18.4%)	12 (13.8%)	0.52	23 (36%)	5 (8%)	**<0.001**
Total	109 (72.2%)	42 (27.8%)	**<0.001**	49 (56.3%)	25 (28.7%)	**0.005**	60 (93.7%)	17 (26.6%)	**<0.0001**

SUI, stress urinary incontinence.
Significant *P* values ($P < 0.05$) are in bold.

TABLE III. Effects of Type of Surgery on Major De Novo Most Bothersome Urinary Symptoms

De novo symptoms	LSC + VS, N = 151	LSC, n = 87	VS, n = 64	*P*-value
Frequency	4 (2.6%)	0 (0%)	4 (6.2%)	0.10
Voiding difficulty	6 (3.9%)	3 (3.4%)	3 (4.7%)	0.78
Urgency and urge incontinence	4 (2.6%)	1 (1.1%)	3 (4.7%)	0.53
SUI	26 (17.2%)	11 (12.6%)	15 (23.4%)	0.27
Urinary retention	14 (9.3%)	10 (11.5%)	4 (6.2%)	0.41
Total	54 (35.8%)	25 (28.7%)	29 (45.3%)	0.06

SUI, stress urinary incontinence.

surgery. Patients had the Foley catheter for a mean ± SD of 1.32 ± 1.79 days and 1.55 ± 1.3 days, respectively, after VS and LSC ($P = 0.36$). On combining all postoperative urinary (preexisting and de novo) symptoms, the decrease in urinary symptoms was statistically nonsignificant (72.2% vs. 63.5%, $P = 0.32$).

Pre- and postoperative urinary distress (UDI) scores were significantly higher for VS as compared to LSC ($P < 0.0001$), as were the pre- and postoperative impact on daily living (UIQ) scores ($P < 0.0001$) (Table IV). Both UDI ($P = 0.04$) and UIQ ($P = 0.01$) scores significantly decreased after surgery. However, LSC significantly improved UDI ($P = 0.03$) with no effect on UIQ ($P = 0.29$) scores. VS significantly improved both scores ($P = 0.02$ and 0.001, respectively). On comparing the change in scores between the two surgical approaches, no significant difference was noted in the change in UDI scores ($P = 0.79$), but UIQ scores were significantly better with the vaginal route ($P < 0.0001$).

Using the generalized linear model, we found a significant positive impact of VS on the UIQ score (OR = 5.45 [95% confidence interval 2.20–13.44], $P = 0.01$) (Table V). All other characteristics significant on univariate analysis (age, parity, BMI, and menopausal status) were nondeterminant factors on multivariate analysis. No independent factor proved to be predictive for specific urinary symptoms and for UDI scores.

Postoperative anatomical recurrence rates defined by a POPQ ≥ stage II were 23% (15 patients) for VS and 2.3% (2 patients) for LSC ($P = 0.004$). Recurrences for both groups involved point Ba (anterior compartment). Two patients in the vaginal group required reoperation by LSC because of bulging symptoms. Fifty-four patients complaining of SUI postoperatively had pelvic floor rehabilitation exercises as first line treatment. Twenty-seven of them responded to therapy. The remaining patients, 12 (13.8%) in the laparoscopy group and 15 (23.4%) in the vaginal group, required a trans-obturator tape procedure for SUI after POP surgery ($P = 0.32$).

DISCUSSION

POP surgery has a positive impact on most urinary symptoms with improvement in both UDI and UIQ scores after surgery. While laparoscopy had a significant efficacy on the difficulty in emptying the bladder, vaginal surgery had a better outcome on SUI symptoms. Nevertheless, both procedures resulted in a high proportion of de novo urinary symptoms making the overall decrease in postoperative urinary symptoms nonsignificant. Despite this, vaginal surgery improved the impact of these symptoms on daily living after multivariate analysis.

The prevalence of urinary symptoms in our population is lower than that reported by other investigators.[3,4,8,9] This can be explained by the way patients were selected. First, our patients are extracted from a surgical population whereas previous prevalence studies have mostly been based on women with POP not necessarily requiring surgery. Second, patients with severe SUI systematically underwent concomitant trans-obturator tape procedure thus excluding them from the present study. Furthermore, only the most severe complaints (score 4) of overactive bladder symptoms, that is, frequency, urgency, and urge incontinence, were taken into account. Data on slight or moderate symptoms were not collected. Although all patients were offered urodynamic testing, we only recorded the patients' subjective complaints, except for occult SUI which was screened for in each patient. Other urodynamic findings, like detrusor overactivity, were not evaluated since these are poorly correlated to symptoms presented by women with POP.[14]

TABLE IV. Urinary Distress (UDI) and Impact on Daily Living (UIQ) Scores Before and After Surgery for the Whole Population (LSC + VS), for LSC, and VS Groups Separately

	UDI (0–100)				UIQ (0–100)			
	Before surgery	After surgery	Change	*P*-value[a]	Before surgery	After surgery	Change	*P*-value[a]
LSC + VS (n = 151)	25 [0–87]	25 [0–75]	−4 [−50–54]	**0.04**	33 [0–100]	33 [0–100]	0 [−90–100]	**0.01**
LSC (n = 87)	8 [0–75]	6 [0–58]	−4 [−45–54]	**0.03**	0 [0–100]	0 [0–90]	0 [−90–100]	0.29
VS (n = 64)	39 [25–87]	33 [25–75]	−4 [−50–45]	**0.02**	62 [33–100]	33 [33–100]	−17 [−62–100]	**0.001**
P-value[b]	**<0.0001**	**<0.0001**	0.79		**<0.0001**	**<0.0001**	**<0.0001**	

LSC, laparoscopic sacrocolpopexy; VS, vaginal surgery with porcine dermis graft hammock and sacrospinous ligament suspension.
Data presented as median with range within brackets.
Comparison between scores performed using Wilcoxon signed-rank paired test.
[a]Comparison of scores within group before and after surgery.
[b]Comparison of scores between LSC and VS groups.
Significant *P* values ($P < 0.05$) are in bold.

TABLE V. Multivariable Analysis of Possible Factors Influencing the Impact of Urinary Symptoms on Daily Living (UIQ) Scores

	OR	95% confidence interval	*P*-value
Vaginal surgery	5.45	2.20–13.44	**0.01**
Age	1.00	0.96–1.05	0.55
BMI	0.96	0.86–1.06	0.40
Menopausal status	1.31	0.40–4.22	0.79
Ba prolapse stage	0.96	0.63–1.47	0.58
C prolapse stage	0.94	0.66–1.34	0.66
Bp prolapse stage	1.18	0.86–1.61	0.38

OR, odds ratio; BMI, body mass index.
Significant *P* values ($P < 0.05$) are in bold.

Despite the low prevalence of symptoms, this study found a high-resolution rate of urinary symptoms after POP surgery. More than three-quarters of the patients complaining of difficulty emptying the bladder before surgery were improved: 83% and 70%, respectively, with LSC and VS (Table II), but with around 4% of de novo symptoms. Our resolution rate is similar to that reported by Fletcher et al.[15] who obtained a success rate of 77% after anterior vaginal wall repair with polypropylene mesh. LSC seems to be more effective in decreasing bladder outlet obstruction because the latter is related to the POP which is better corrected by LSC than by VS as shown by our anatomic recurrence rate. On the contrary, the vaginal approach was more effective in treating SUI. A possible explanation could be in the surgical technique. The transvaginal procedure consists of a bladder–vaginal dissection up to the suburethral region where the porcine dermis graft is placed. Thus, the graft can provide some support to the bladder neck similarly to the possible effect of a suburethral tape used to treat SUI. Neither dissection to the suburethral region for the mesh placement nor concomitant Burch colposuspension was performed by laparoscopy, explaining the absence of any potential positive effect on SUI.

In contrast, overactive bladder symptoms were only slightly improved by POP repair. Although urinary frequency and urge symptoms decreased by 76% and 50%, respectively, only change in frequency rate was statistically significant. Similarly to SUI, better results were observed after vaginal surgery. This study confirms numerous previous reports about the beneficial effects of POP repair on overactive bladder symptoms.[10,15–17] Nevertheless, postoperative resolution rates published in the literature vary enormously, ranging from 31% to 59% for frequency, and from 49% to 82% for urge incontinence.[15–17] While most of the studies used validated questionnaires, discrepancies can exist because of cultural differences and the threshold used to define bothersome symptoms. Postoperative improvement in urgency appears to be lower than for obstructive and incontinence urinary symptoms, suggesting that urge symptoms may be due to detrusor smooth muscle neurogenic alterations. These detrusor lesions may be due to obstruction from progressive POP development and/or simply be the result of age-related ischemic damage. Sometimes, overactive bladder symptoms cannot be completely reverted by restoring normal anatomy because of persistent neurogenic or myogenic detrusor damage, proven by an increased detrusor wall thickness measured on ultrasound in women with detrusor overactivity.[18] Likewise, several studies showed poor relationships between overactive bladder symptoms and the stage of POP.[3,9,15,19] One particular study by Schimpf et al.[20] did not find any statistically significant association between anterior wall prolapse and urinary symptoms.

Nevertheless, UDI and UIQ scores were significantly lower after a median follow-up of more than 30 months after surgery. In this sense, our findings on laparoscopic and transvaginal POP repair concur with those of the Colpopexy and Urinary Reduction Efforts (CARE) prospective randomized trial whereby abdominal sacrocolpopexy had a beneficial role in reducing bothersome urinary symptoms after surgery, regardless of any concomitant colposuspension.[21] After controlling for confounding factors with multivariate analysis, we no longer found any relationship between reduction in UDI scores and POP surgery. Only vaginal surgery was independently associated with an improvement on the impact of urinary symptoms on daily living. Among other factors, de novo symptoms represent a possible explanation. After vaginal surgery, we observed between 4.7% to 6.2% of de novo overactive bladder symptoms, in line with figures reported by de Boer et al.[22] Conversely, our rate of 23.4% of de novo SUI are higher than that obtained by Miedel et al.[23] but the latter performed concomitant TransVaginal Tape procedures during POP surgery. In terms of these de novo symptoms, laparoscopic and vaginal surgery proved to be equivalent.

The strengths of this study include the large sample size, the use of validated urinary symptom questionnaires, and the long follow-up. However, a limitation resides in the absence of randomization between the laparoscopy and vaginal approaches. Finally, we used the short versions of quality of life questionnaires and hence have limited data to analyze. Nevertheless, to our knowledge, this is the first study specifically comparing urinary symptoms after LSC and vaginal surgery.

In conclusion we found that while urinary symptoms are improved after POP repair, the vaginal route is more effective than laparoscopic route on preoperative SUI symptoms and on the impact of symptoms on daily living. In contrast, the laparoscopic approach is more effective on the difficulty emptying the bladder. Patients would probably obtain better functional satisfaction from concomitant treatment for SUI during LSC than during vaginal surgery. Overactive bladder symptoms are less affected by POP repair than obstructive and incontinence symptoms. Randomized prospective trials are warranted to conclude on the best surgical strategy to optimize bladder function after POP surgery because of the complex interactions between mechanical, neurogenic, and myogenic causes involved.

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