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ORIGINAL CONTRIBUTION

Long-term Anatomical and Functional Results of Robot-Assisted Pelvic Floor Surgery for the Management of Multicompartment Prolapse: A Prospective Study

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BACKGROUND: Long-term data on robot-assisted sacrocolporectopexy for the treatment of multicompartment pelvic organ prolapse are scarce. With the rising prevalence of prolapse and increasing surgical repair, it is essential to evaluate long-term results.

OBJECTIVE: This study aimed to evaluate long-term functional and anatomic outcomes after sacrocolporectopexy.

DESIGN: This is a prospective, observational cohort study.

SETTINGS: This study was conducted at a teaching hospital with tertiary referral function for patients with gynecological/rectal prolapse.

PATIENTS: All patients undergoing robot-assisted sacrocolporectopexy from 2011 to 2012 were included.

INTERVENTION: Robot-assisted sacrocolporectopexy was performed.

MAIN OUTCOME MEASURES: The primary outcome was the anatomic cure rate after 1 and 4 years, defined as simplified pelvic organ prolapse quantification stage 1 vaginal apical prolapse and no external rectal prolapse or internal rectal prolapse present. Kaplan-Meier curves were used for determination of recurrence-free intervals. Secondary outcomes were functional pelvic floor symptoms (symptoms of bulge, obstructed defecation, fecal incontinence, urogenital distress inventory) and quality of life (Pelvic Floor Impact Questionnaire).

RESULTS: Fifty-three patients were included. After 12 and 48 months, the recurrence-free intervals based on Kaplan-Meier estimates were 100% and 90%. In total, there were 10 recurrences: 2 apical and 8 internal rectal prolapses. Symptoms of bulge (94%–12%; $p < 0.0005$), fecal incontinence (62%–32%; $p < 0.0005$), obstructed defecation (59%–24%; $p = 0.008$), and median Pelvic Floor Impact Questionnaire scores (124–5; $p = 0.022$) improved significantly at final follow-up. Median urogenital distress inventory scores showed improvement after 1 year (30–13; $p = 0.021$).

LIMITATIONS: This was an observational, single-center study with selective postoperative imaging.

CONCLUSIONS: Ninety percent of patients were recurrence free 48 months after robot-assisted sacrocolporectopexy. Symptoms of vaginal bulge, quality of life, constipation, and fecal incontinence improved significantly. However, a subgroup of patients showed persistent bowel complaints that underlie the complexity of multicompartment prolapse. See **Video Abstract** at http://links.lww.com/DCR/B265.

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RESULTADOS ANATÓMICOS Y FUNCIONALES A LARGO PLAZO DE LA CIRUGÍA DE PISO PÉLVICO ASISTIDA POR ROBOT EN EL TRATAMIENTO DEL PROLAPSO MULTICOMPARTIMENTAL: UN ESTUDIO PROSPECTIVO

ANTECEDENTES: Los datos a largo plazo sobre la sacrocolporectopexia asistida por robot para el tratamiento del prolapso multicompartimental de órganos pélvicos son escasos. Con el aumento de la prevalencia del prolapso y el aumento de la reparación quirúrgica, es esencial evaluar los resultados a largo plazo.

OBJETIVO: Evaluar los resultados funcionales y anatómicos a largo plazo después de la sacrocolporectopexia.

DISEÑO: Estudio prospectivo observacional de cohorte.

ESCENARIO: Hospital de enseñanza con función de referencia terciaria para pacientes con prolapso ginecológico/rectal.

PACIENTES: Todos los pacientes sometidos a sacrocolporectopexia asistida por robot en 2011-2012.

INTERVENCIÓN: Sacrocolporectopexia asistida por robot.

PRINCIPALES MEDIDAS DE RESULTADO: El resultado primario fue la tasa de curación anatómica a uno y cuatro años, definida como etapa 1 de prolapso apical vaginal en la cuantificación del prolapso de órganos pélvicos simplificado, y sin prolapso rectal externo o prolapso rectal interno presentes. Se utilizaron curvas de Kaplan Meier para determinar los intervalos libres de recurrencia. Los resultados secundarios fueron síntomas funcionales del piso pélvico (síntomas de abultamiento, obstrucción defecatoria, incontinencia fecal, inventario de molestias urogenitales) y calidad de vida (cuestionario de impacto del piso pélvico).

RESULTADOS: Se incluyeron 53 pacientes. Después de 12 y 48 meses, el intervalo libre de recurrencia basado en las estimaciones con método Kaplan Meier fue del 100% y 90%, respectivamente. En total hubo diez recurrencias: dos apicales y ocho prolapsos rectales internos. Los síntomas de abultamiento (94% a 12%; $p < 0.0005$), incontinencia fecal (62% a 32%; $p < 0.0005$), obstrucción defecatoria (59% a 24%; $p = 0.008$) y puntajes promedio del cuestionario de impacto del piso pélvico (124 a 5; $p = 0.022$) mejoraron significativamente en el seguimiento final. Las puntuaciones medias del inventario de molestias urogenitales mostraron una mejoría después de un año (30 a 13; $p = 0.021$).

LIMITACIONES: Estudio observacional de centro único con imagenología postoperatoria selectiva.

CONCLUSIONES: Noventa por ciento de los pacientes estaban libres de recurrencia 48 meses después de la sacrocolporectopexia asistida por robot. Los síntomas de abultamiento vaginal, la calidad de vida, el estreñimiento y la incontinencia fecal mejoraron significativamente. Sin embargo, un subgrupo de pacientes mostró molestias intestinales persistentes que subrayan a la complejidad del prolapso multicompartimental. Consulte **Video Resumen** en http://links.lww.com/DCR/B265.
(Traducción—Dr. Jorge Silva Velazco)

KEY WORDS: Multicompartment prolapse; Pelvic organ prolapse; Rectal prolapse; Robotic surgery; Sacrocolporectopexy.

Pelvic organ prolapse (POP), including rectal prolapse (RP), is a condition mostly affecting middle-aged women. Depending on the type of prolapse, symptoms can include urinary or fecal incontinence, obstructed defecation, pelvic pain, symptoms of bulge, and sexual dysfunction. These symptoms greatly impair quality of life (QoL) and are a growing worldwide serious socioeconomic burden because of the increasing prevalence of POP with an aging population.[1,2]

Pelvic floor disorders can be found in the anterior, middle, or posterior compartment. They are traditionally treated by the associated specialty, ie, urology, gynecology, or colorectal surgery. Multicompartment prolapses are commonly found as well with rates of 47% and higher reported.[3,4] These numbers are probably still underestimated because limited research has been performed. Therefore, single-compartment prolapse should alert the possibility of prolapse in another part of the pelvis. After hysterectomy, the prevalence of multicompartment prolapse is high, because a hysterectomy leads to loss of pelvic support.[5] Rectoceles often occur simultaneously with an internal rectal prolapse (IRP).[6] Therefore, evaluation of patients with POP by a multidisciplinary team is crucial.

At present, laparoscopic sacrocolpopexy is one of the preferred treatments for vaginal apical prolapse.[7] In surgery for RP, ie, external rectal prolapse (ERP), IRP with or without rectocele and enterocele, laparoscopic ventral mesh rectopexy is widely accepted, although other types of surgical repair are being performed as well (eg, resection or suture rectopexy and perineal approaches).[8] Complex, multicompartment prolapses have been treated by combining sacrocolpopexy with ventral mesh rectopexy, which has been shown to be safe without raised morbidity.[6,9,10] This integrative treatment, performed laparoscopically or with robotic assistance, has improved functional outcomes on the short and mid term.[11–13] Long-term results are scarce, however.[14] Robotic assistance is rapidly increasing in pelvic floor surgery because of its advantages in complex maneuvers such as intracorporeal suturing deep in the narrow pelvis.[15] The objective of this study was to assess short- and long-term outcome after robot-assisted laparoscopic sacrocolporectopexy (RSCR).

MATERIALS AND METHODS

Study Design

All consecutive patients undergoing RSCR in 2011 and 2012 for the treatment of female multicompartment pelvic organ prolapse were included. Patients were treated in our tertiary referral center for pelvic floor dysfunction. This prospective study was performed in accordance with the ethical standards of the Central Committee on Research Involving Human Subjects and with the Declaration of Helsinki. Informed consent was obtained for all patients.

Patient Evaluation

All patients were evaluated preoperatively by an urogynecologist and a colorectal surgeon. Proctoscopy and speculum examination were performed routinely. Genital prolapse was scored using the simplified Pelvic Organ Quantification (S-POP). S-POP scores prolapse by using the following landmarks: Ba) anterior vaginal wall; Bp) posterior vaginal wall; C) cervix/vaginal vault in patients after hysterectomy; and D) posterior fornix.[16] Stage 1 represents either no or minimal prolapse. Stage 2 represents descending of the most distal point of the prolapsed tissue 1 cm proximal until 1 cm distal to the hymnal remnants. Stages 3 and 4 are prolapse of landmarks beyond 1 cm distal to the hymnal remnants. Where the patient had a hysterectomy (eg, no cervix), landmark "D" of the S-POP is by definition no longer described. Rectal prolapse was diagnosed based on a combination of physical examination and imaging.

All women underwent dynamic MRI (dMRI) in supine position and/or a conventional defecogram preoperatively (Table 1). All patients were discussed in a multidisciplinary team (Fig. 1) and patients were counseled. Robot-assisted laparoscopic sacrocolporectopexy was considered if a combination of the following was present:

- An ERP *or* a high-grade IRP (a rectoanal intussusception)[17] ± rectocele or enterocele;
- Gynecological middle compartment prolapse: vaginal vault prolapse/uterine descensus (S-POP C ≥ stage 2);
- Disabling multicompartment symptoms not responding to conservative therapy (ie, fecal incontinence, obstructed defecation, sensation of a vaginal bulge, micturition symptoms).

Functional symptoms were assessed pre- and postoperatively with the help of (validated) questionnaires:

- Questions on bowel complaints of:
  - Obstructed defecation following the Rome III criteria[18]
  - Frequency and consistency of fecal incontinence. Fecal incontinence was then indexed according to the Browning & Parks scale (B&P).[19] This scale includes 4 categories: grade 1, continent; grade 2, incontinent for gas; grade 3, incontinent for gas and liquid defecation; grade 4, incontinent for gas, liquid, and solid defecation. Fecal incontinence was defined as B&P grade 3 to 4 with complaints at least once a month;

TABLE 1. Baseline demographics n = 53

Demographics	*n (%)*
Age, y	62.0 ± 12.1
BMI	25.8 ± 3.4
Previous pelvic floor surgery	23 (43.4)
Hysterectomy for POP	19 (35.8)
Hysterectomy for other indications	6 (11.3)
Ant. colporrhaphy	16 (30.2)
Post. colporrhaphy	14 (26.4)
Minimally invasive VMR	1 (1.9)
TVT	4 (7.5)
Other	6 (11.3)
Intra-abdominal surgery[a]	31 (58.5)
Postmenopausal	42 (79.2)
Parity	3 (1-6)
Sphincter rupture labor	1 (1.9)
Episiotomy labor	22 (41.5)
ASA score	
1	17 (32.1)
2	33 (62.3)
3	3 (5.7)
Sexually active	27 (50.9)
Smoking (active)	12 (22.6)
Preoperative imaging	
dMRI	49 (92.5)
Conventional defecogram	1 (1.9)[c]
Both	3 (5.7)
Concomitant surgery	
Subtotal hysterectomy	28 (52.8)[d]
TVT	3 (5.7)
Oophorectomy[e]	1 (1.9)
Ant. colporrhaphy	2 (3.8)
Post. colporrhaphy	0 (0.0)
Other	1 (1.9)
Mean total surgery time, min	183 ± 35
Mean blood loss, mL	53 ± 62
Intraoperative complications	3 (5.7)
Conversion	1 (1.8)
Mean length of hospital stay (days)	3.2 ± 1.1

ant = anterior; dMRI = dynamic MRI; ERP = external rectal prolapse; IRP = internal rectal prolapse; POP = pelvic organ prolapse; post: posterior; S-POP = simplified pelvic organ prolapse quantification; TVT = tension-free vaginal tape.
[a]Includes no POP/incontinence surgery.
[b]Only in patients with cervix in situ.
[c]Patient with ERP, no additional dMRI was necessary.
[d]One hysteropexy due to small uterus.
[e]Single or bilateral.

- Questions on symptoms of vaginal prolapse (sensation of and/or seeing vaginal bulge);
- Urogenital distress inventory (UDI-6) for micturition symptoms. The UDI-6 consists of 3 subscales: irritative, stress incontinence, and obstructive symptoms (range, 0–100)[20];
- Pelvic Floor Impact Questionnaire (PFIQ-7) for pelvic floor-related QoL. A higher score indicates a higher impact of complaints on daily life (range, 0–300).[21]

Outcome Measurements and Follow-up

Primary outcome was anatomic cure rate, defined as S-POP C stage 1 (middle compartment), with no ERP or high-grade

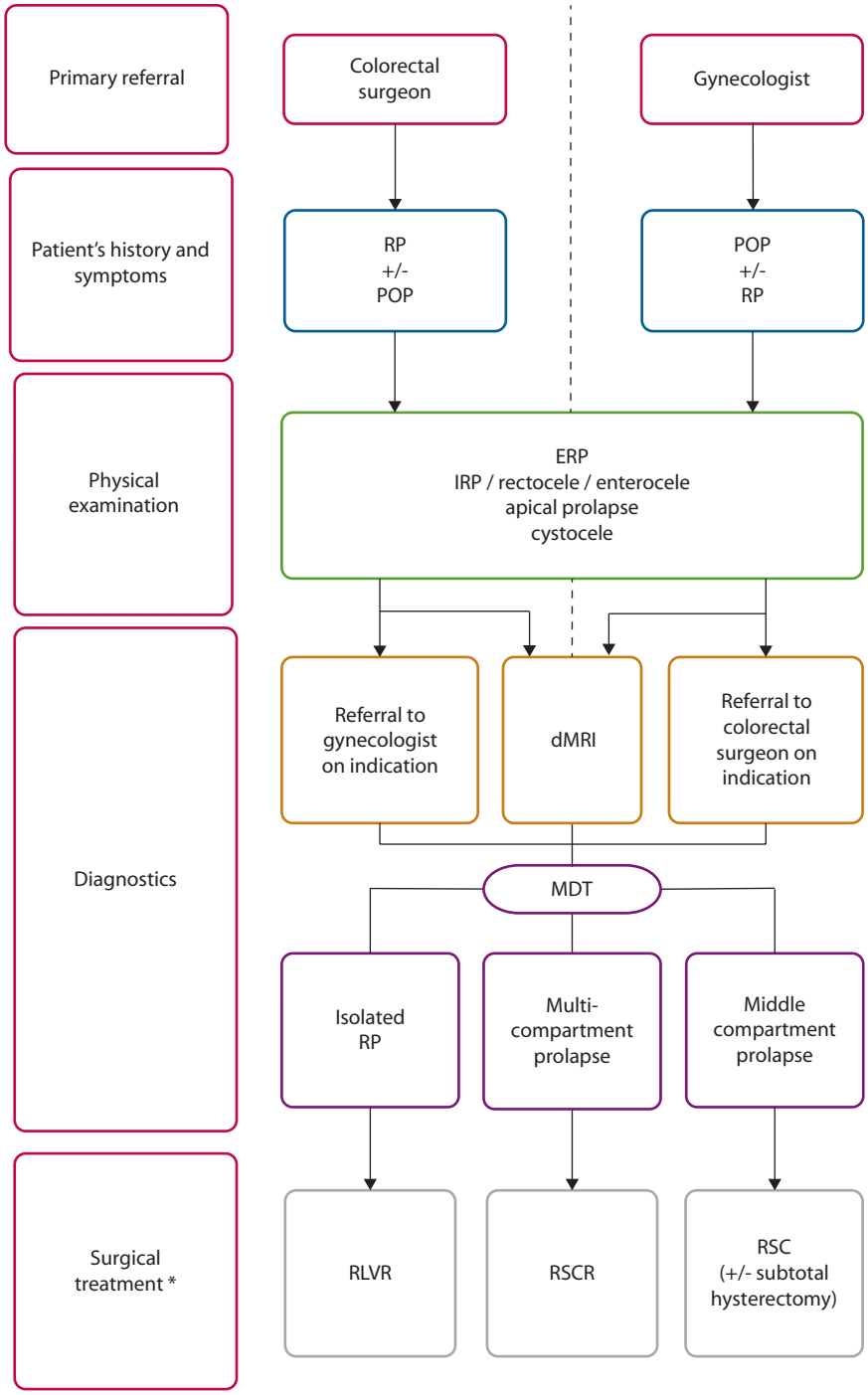


FIGURE 1. Flow chart of diagnostic workup. dMRI = dynamic magnetic resonance imaging; ERP = external rectal prolapse; IRP = internal rectal prolapse; MDT = multidisciplinary team; POP = pelvic organ prolapse; RLVR = robot-assisted laparoscopic ventral rectopexy; RP = rectal prolapse; RSC = robot-assisted laparoscopic sacrocolpopexy; RSCR = robot-assisted laparoscopic sacrocolporectopexy. *Surgical treatment is offered after unsuccessful conservative treatment when no contraindication for (minimal invasive) abdominal surgery exists.

IRP present (posterior compartment). In patients with POP-related symptoms, postoperative imaging was performed additionally. Recurrence was scored in case patients did not meet the criteria of anatomic cure. Kaplan-Meier estimates were used to describe the recurrence free interval. Secondary outcomes were functional symptoms and pelvic floor-related QoL assessed by the questionnaire. Postoperative reinterventions, including pessary use, were scored.

Routine postsurgery consultations were set at 6 weeks, 1 year, and 4 years. Patients were considered lost to follow-up if there was no postoperative consultation available *and* no questionnaire.

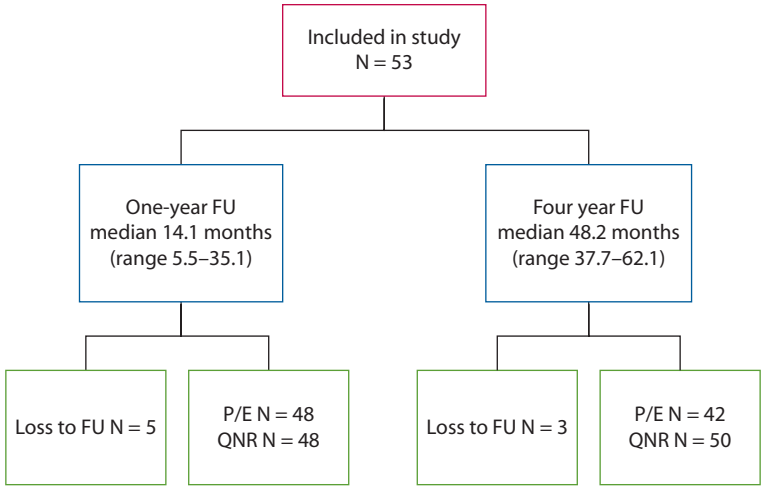


FIGURE 2. Flow chart of included patients. FU = follow-up; N=number; P/E = physical examination; QNR = questionnaire.

Surgical Technique

The technique and materials used have been described in detail previously.[11] In summary, after docking the Da Vinci Si (Intuitive Surgical, Inc, Sunnyvale, CA), the repair was started by performing a ventral mesh rectopexy according to D'Hoore and Penninckx.[22] A polypropylene mesh (sized 3×20 cm) was used (Prolene, Ethicon Inc, Johnsen & Johnson, Hamburg, Germany, weight 80–85 g/m^2). This was followed by a sacrocolpopexy and, if the uterus was in situ, a supracervical hysterectomy was performed, followed by a cervicosacrocolpopexy. Then dissection of the bladder from the anterior vaginal wall took place and a second piece of polypropylene mesh was sutured to the anterior vaginal wall and cervix/vaginal apex with nonabsorbable sutures. The posterior vaginal wall was sutured to the rectopexy mesh. Both meshes were then connected to the cervix/vaginal apex into a Y-shape. Finally, the peritoneum was closed to cover the mesh.

The rectopexy was performed by a colorectal surgeon; the sacrocolpopexy/supracervical hysterectomy with cervicopexy was performed by an urogynecologist. Our multidisciplinary team includes 3 colorectal and 2 urogynecologists.

Statistical Analysis

Statistical analysis was performed using SPSS v. 22.0 (IBM Corp, Armonk, NY). A p value of <0.05 was considered significant. Data were presented as mean ± SD and as median and range for parametric and nonparametric distributed continuous values. Number and percentages were used for nominal and categorical values. Independent-sample T test, Mann-Whitney U test, and χ^2 test were used to compare data for mean, median, and nominal values. Kaplan-Meier curves were made to describe time until recurrence.

RESULTS

Patients

Fifty-three patients were included. Baseline characteristics of the patients are depicted in Table 1. Mean age was 62.0 ± 12.1. Forty-three percent of patients had a history of previous POP or anti-incontinence surgery. Median time to follow-up was 14.1 months (range, 5.5–35.1) for the 1-year postoperative consultation and 48.2 months (range, 37.7–62.1) for the final consultation.

Forty-eight patients (91%) were examined after 1 year and 42 (79%) were examined after 4 years (Fig. 2). At final follow-up, 2 patients declined prolapse-related consultations because they received a stoma (one due to therapy-resistant fecal incontinence as a result of severe sphincter dysfunction, and one in the setting of treatment for colorectal malignancy). One patient was lost to follow-up for unknown reasons. One patient declined physical examination because she experienced no symptoms. Seven patients responded solely by questionnaire.

Anatomic Results and Postinterventions

The mean values of S-POP A, B, and C improved significantly ($p < 0.0005$; Table 2). Two patients developed an asymptomatic stage 2 recurrence of the apical compartment. There were no patients with a recurrent full-thickness RP (Table 2). In 13 patients with suspected POP symptoms, an additional dMRI was performed: recurrent high-grade IRP and/or rectocele was diagnosed in 8 patients (Table 2). One redo rectopexy and one Delormes procedure was performed. No imaging was performed in other symptomatic patients because of minimal complaints or other pathologies causing the symptoms (eg, dysfunctional sphincter, stress urinary incontinence).

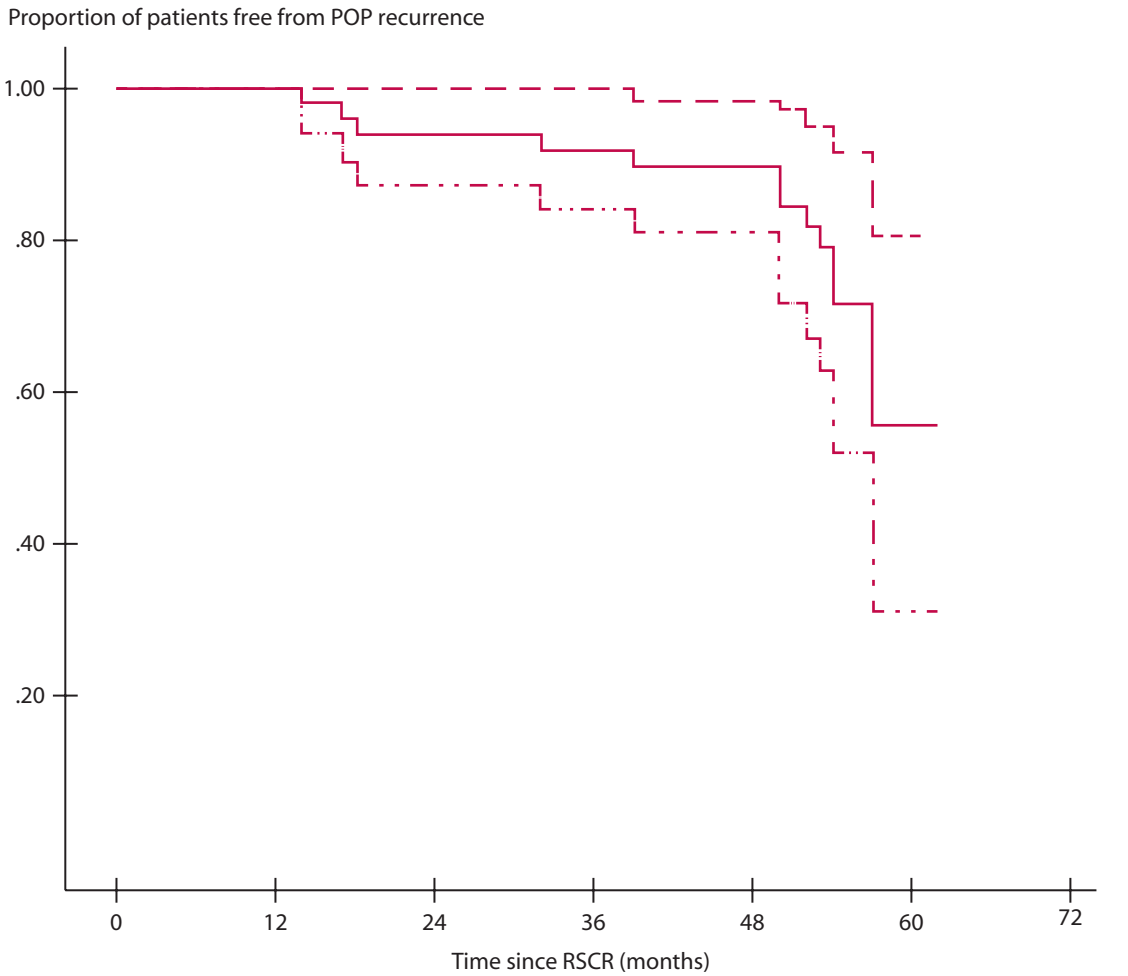
With the aid of Kaplan-Meier analyses, estimated recurrence-free percentages were calculated: 100% after 12 months, 94% after 24 months, 92% after 36 months, and 90% after 48 months (Fig. 3). After 60 months, this percentage lowered to 56%, but showed a broad 95% CI.

Seven patients were treated for hemorrhoids and 2 were treated for sphincter dysfunction. Because of micturition problems, 7 patients received further treatment

TABLE 2. Pre- and postoperative pelvic organ prolapse

Anatomical outcome	*Preoperative mean ± SD*	*One year mean ± SD*	*p value*[a]	*Four year mean ± SD*	*p value*[b]
S-POP Ba	2.4 ± 1.0	1.4 ± 0.7	<0.0005	1.3 ± 0.6	<0.0005
S-POP Bp	2.2 ± 1.0	1.3 ± 0.6	<0.0005	1.4 ± 0.7	<0.0005
S-POP C	2.2 ± 1.0	1.0 ± 0.0	<0.0005	1.1 ± 0.2	<0.0005
S-POP D[c]	1.4 ± 0.9	1.0 ± 0.0	0.137	1.1 ± 0.2	0.14
ERP, n (%)	4 (7.5)	0	–[d]	0	–[d]
High-grade IRP/rectocele, n (%)	36 (67.9)	2 (3.8)	–[d]	7 (13.2)	–[d]
With enterocele, n (%)	13 (24.5)	1 (1.9)	–[d]	1 (1.9)	–[d]

ERP = external rectal prolapse; IRP = internal rectal prolapse; S-POP = simplified Pelvic Organ Prolapse Quantification. For explanation of S-POP see Patient Evaluation section.
[a]Comparing 1-year with preoperative results.
[b]Comparing 4-year with preoperative results.
[c]Only when cervix is present.
[d]No statistical tests were performed because not all patients underwent postoperative imaging.



No. at risk	53	49	45	44	23	1
Mean RFS		1.0	0.94	0.92	0.90	0.56
95% CI		1.0-1.0	0.87-1.0	0.84-1.0	0.81-0.99	0.30-0.81

FIGURE 3. Kaplan-Meier curve for recurrence after RSCR (straight line). The dotted lines represent the upper and lower 95% CI limits. POP = pelvic organ prolapse; RFS = recurrence-free survival; RSCR = robot-assisted laparoscopic sacrocolporectopexy.

TABLE 3. Functional results

Patients reported outcomes	*Preoperative n = 53*	*FU 14 months n = 48*	*p value*	*FU 48 months n = 50*	*p-value*
Symptoms of bulge	50 (94.3)	7 (14.6)	<0.0005	6 (12.0)	<0.0005
UDI-6 total (0–100)	30.0 (0–80)	13.3 (0–60)	0.02	33.3 (0–83)	0.18
Irritative symptoms (0–100)	33.3 (0–100)	16.7 (0–83)	0.11	33.3 (0–100)	0.01
Stress symptoms (0–100)	33.3 (0–100)	33.3 (0–100)	0.25	33.3 (0–83)	0.31
Obstructive/discomfort (0–100)	33.3 (0–100)	16.7 (0–67)	0.003	16.7 (0–100)	0.18
Rome III ODS present	31 (58.5)	13 (27.1)	0.001	12 (24.0)	0.008
Fecal incontinence	33 (62.3)	19 (39.6)	0.02	16 (32.0)	<0.0005
B&P grade 3	17 (32.1)	8 (16.7)		4 (8.0)	
B&P grade 4	16 (30.2)	11 (22.9)		12 (24.0)	
PFIQ-7 (0–300)	123.8 (0–266.7)	23.8 (0–200.0)	0.04	5.0 (0–226.1)	0.02
Urinary impact (0–100)	35.8 (0–90.5)	0 (0–81.0)	0.24	1.0 (0–76.2)	0.04
Colorectal-anal impact (0–100)	33.3 (0–100)	5.2 (0–76.2)	0.03	4.0 (0–77.7)	0.07
POP impact (0–100)	28.6 (0–85.7)	0 (0–66.6)	0.08	0 (0–72.2)	0.008

Data presented as median (range) or n (%). B&P = Browning and Parks; FU = follow-up; NA = not applicable; ODS = obstructed defecation syndrome; PFIQ = pelvic floor impact questionnaire; POP = pelvic organ prolapse; UDI-6 = urogenital distress inventory.

(tension-free vaginal tape n = 5, other n = 2). At final follow-up, 1 patient was diagnosed with an asymptomatic vaginal mesh exposure (1.9%). This was treated with vaginal estrogen cream.

Functional Results

Functional results are presented in Table 3. Symptoms of vaginal bulge diminished significantly from 94% before surgery to 12% at final follow-up. After 1 year, UDI-6 total scores improved significantly ($p = 0.021$), especially with respect to obstructive symptoms (Table 3). Before surgery, 31 patients (59%) and 33 patients (62%) had symptoms of obstructed defecation and fecal incontinence. At last follow-up, symptoms significantly improved in 63% of patients with obstructed defecation and 45% of patients with fecal incontinence before surgery. Five patients experienced new-onset obstructed defecation: 2 patients after 1 year (4.2%) and 3 patients after 4 years (6.0%). There were no cases of de novo fecal incontinence.

The PFIQ-7 questionnaire on QoL showed a low preoperative response rate of only 25%. However, postoperatively, the response rate was 79%. Significant improvement of median PFIQ-7 scores was seen. Mean improvement of scores was 54.7 and 71.0 points after 1 and 4 years.

DISCUSSION

Pelvic organ support and its relation to pelvic floor function and dysfunction is complex and still incompletely understood. It is thought that prolapse of each compartment of the pelvic floor shares a common pathophysiologic pathway, which is supported by the high prevalence of multicompartment prolapse.[3,4] Acknowledgement of the existence of more than one prolapsed organ is essential and has changed surgical treatment to a multidisciplinary setting over recent years, with improved patient outcome on the short- and mid-term view.[11–13] This current study is the first to report on longer follow-up after RSCR.

After 12 and 48 months, the recurrence-free interval based on Kaplan-Meier estimates was 100% and 90%. In total, 10 recurrent prolapses were seen, mainly of the posterior compartment. Two of these patients needed a reintervention to treat recurrent posterior prolapse. In literature, the majority of studies quote recurrence rates between 0 and 6.9% for sacrocolporectopexy with a median follow-up between 12 and 54 months.[11,13,14,23] These studies had either a shorter follow-up period,[11,13] high loss to follow-up,[23] or only postoperative evaluation with questionnaires.[23] Furthermore, heterogeneity in definitions and outcome measurements was high. Because symptoms of bulge are associated with prolapsing of vaginal tissue beyond the hymnal remnants, we used the cutoff value of S-POP stage 2 or more as clinically relevant.[24] Jallad et al[12] who retrospectively scored recurrence of both vaginal prolapse and ERP (but no IRP), and used a definition of recurrence more similar to ours, found recurrence rates of 20.3% (8.5% vaginal prolapse, 13.5% RP (median follow-up: 17 months)) after sacrocolporectopexy. We found similar rates with considerably longer follow-up. Our RP rates were higher, but did include IRP. A large study of 919 patients undergoing laparoscopic ventral mesh rectopexy for isolated RP showed a 10-year recurrence rate of 8.2% (n = 242) in patients with ERP and 14.2% (n = 677) for patients initially diagnosed with IRP.[8] The slightly higher RP recurrence found in our cohort underlines the complexity and severity of multicompartment POP. Also, our results of the Kaplan-Meier curve after 48 months are less reliable because of broad 95% CIs. We did find more cases of recurrent POP after 48 months, implying the need for research with longer follow-up.

Relief of functional symptoms and improved QoL are the most important outcomes for the patient. We have previously reported our 1-year results on safety and func-

tional outcome after RSCR of another comparable series of patients.[11] With the current study, we focused specifically on the sustainability of this surgery. To our knowledge, this is the second study reporting on long-term minimally invasive results and the first on long-term results after robotic surgery for multicompartment prolapse.

At final follow-up, symptoms of obstructed defecation and fecal incontinence were resolved in 63% and 45% of our patients. Although this is a significant improvement, there still remains a fair amount of patients with persisting defecation problems. In the existing literature on POP a wide range of definitions for (improved) obstructed defecation and (improved) fecal incontinence is used that makes comparison complicated. Slawik et al,[14] the only study reporting on long-term outcome after sacrocolporectopexy (median follow-up 54 months), found a higher improvement of bowel symptoms: 80% of patients with resolved obstructed defecation (definition unclear) and 91% with improved fecal incontinence (Wexner incontinence score). These higher success rates could possibly be explained by the different definitions used. Also, their series of patients had a higher percentage of ERP at baseline (55% versus 7.5%), and only 31% (versus 59%) had preoperative obstructed defecation. No results of complaints of the other compartments were reported. Silvis et al[25] also used B&P scale for fecal incontinence. When using the same definition of cured symptoms, a similar curation rate of 43% was found in their series of 25 patients 12 months after open sacrocolporectopexy.

More long-term results are reported in the literature on single-compartment prolapse. After minimally invasive ventral mesh rectopexy for prolapse of the posterior compartment, wide ranges of improved fecal incontinence and obstructive defecation of 20% to 92% and 45% to 93% were reported.[6] Here, a wide range of definitions was used as well. Results from our own pelvic floor clinic after ventral mesh rectopexy in large series of patients showed cure rates of obstructed defecation and fecal incontinence between 76% to 79% and 64% to 77% after mid- to long-term follow-up.[8,26] The lower cure rates found in this study again underline the more complex POP in multicompartment patients. Also, the etiology of functional bowel symptoms can be multifactorial, and the relation between anatomic abnormalities and symptoms is complex and not linear. This is supported by the difference found in restored anatomy and cured symptoms. Patients should be counseled for this.

Robot-assisted laparoscopic sacrocolporectopexy positively influenced total UDI-6 scores on micturition after 1 year, mainly based on better obstructive scores. However, no difference was seen after 4 years. Increase of age could have been an influence on urge and stress incontinence symptoms. This emphasizes the complexity of treating multicompartment pelvic floor disorders once more. Although providing apical support with sacrocolpopexy, support of the anterior compartment may prove more challenging.[27]

Quality of life improved significantly. Mean PFIQ-7 scores improved with 71 points at long-term evaluation. Utomo et al[21] suggested that a change in PFIQ-7 of at least 31.8 points was clinically relevant. Missing data on preoperative PFIQ-7 values were high but are thought to be randomly missing. However, the conclusions drawn from these data should be drawn with cautiousness.

A limitation of this study is that there was no control group. Furthermore, the single-center nature of this study limited generalizability. Another limitation is that postoperative dMRI was performed only in patients with suspected recurrent POP. However, asymptomatic anatomic recurrences are, in our opinion, not clinically relevant.

We believe that patients' history could have had an influence on the results. Patients who underwent a previous hysterectomy for prolapse are more prone to have weak connective tissue and are more at risk for recurrence. However, this study was underpowered to look for risk factors for recurrence.

The strong points of this study are the long follow-up period with minimal loss to follow-up and the prospective design. Severity of functional symptoms and findings on dMRI are poorly correlated.[28] Focus on functional outcome was therefore another strength. Dichotomized cutoff points for obstructed defecation and fecal incontinence were used. We suggest that future studies use (patient-reported) outcome measures for bowel symptoms with more than 2 gradations, such as the Obstructed Defecation Score according to Altomare for obstructed defecation and the Fecal Incontinence Severity Index for fecal incontinence.

Multidisciplinary assessment is essential, and careful preoperative evaluation with a tailored approach for individual patients should be made. This leads to more efficient treatment with single recuperation periods for the patient, and possibly reduces health care costs.[29] This study emphasizes the need of multidisciplinary treatment for pelvic floor disorders. The results we presented are promising and could aid surgeons in treating complex multicompartment prolapse.

CONCLUSION

In conclusion, 90% of patients were recurrence free 48 months after RSCR based on physical examination and postoperative imaging. Symptoms of vaginal bulge, QoL, obstructed defecation, and fecal incontinence improved significantly. However, a substantial portion of patients experienced persistent complaints of obstructed defecation and/or fecal incontinence. This underlies the complexity of treating multicompartment POP.

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