

Vaginal assisted laparoscopic sacrocervicopexy with anterior colpotomy (VALSAC): technique and mean 20 months outcomes

O. Sevket¹, T. Takmaz^{1,*}, A.C. Sevket², A. Toprak³, P. Ozcan¹

¹Department of Obstetrics and Gynecology, Bezmialem University Faculty of Medicine, Istanbul (Turkey)

²Department of Obstetrics and Gynecology, Private Okmeydanı Hospital, Istanbul (Turkey)

³Department of Statistics, Bezmialem University Faculty of Medicine, Istanbul (Turkey)

Summary

The main purpose of our study is to evaluate the efficacy and safety of vaginal assisted laparoscopic sacrocervicopexy with anterior colpotomy (VALSAC) for apical pelvic organ prolapse. We retrospectively reviewed the results of twenty-three women with stage III and IV prolapse treated with VALSAC between April 2017 and June 2019. With a mean follow-up of 20 months, apical pelvic organ prolapse was cured in 95.7 % of patients. There was no complication in terms of mesh exposure, persistent pain, hematoma, infection. The mean pre- and post-operative POP-Q scores were, for the Aa point, 1.61 ± 1.82 cm and -1.96 ± 0.87 cm ($p < 0.01$), for the C point, 2.87 ± 1.6 cm and -5.26 ± 1.86 cm ($p < 0.01$) for the Ap point, -1.43 ± 0.89 cm and -2.09 ± 0.59 cm ($p < 0.01$). VALSAC is a promising minimally invasive technique for pelvic floor reconstruction that appears to provide good outcomes. *Content:* The main purpose of our study is to evaluate the efficacy and safety of vaginal assisted laparoscopic sacrocervicopexy with anterior colpotomy (VALSAC) for apical pelvic organ prolapse.

Key words: Anterior colpotomy; Pelvic organ prolapse; Sacrocervicopexy; Supracervical hysterectomy; Y-mesh.

Introduction

Pelvic organ prolapse (POP) is a common benign disease in elderly women; the lifetime risk of a woman requiring surgical intervention to treat prolapse is 11% [1, 2]. The total number of women undergoing prolapse surgery is expected to significantly increase in future years as the size of the elderly population increases [3].

Several surgical techniques are available for the treatment of POP, including transvaginal and abdominal restorative approaches, as well as obliterative (vaginal closure) procedures. Pelvic floor reconstruction with mesh (PROLENE® polypropylene mesh, Ethicon Inc., Somerville, New Jersey, USA) is a widely accepted procedure for POP treatment due to its efficacy and safety. For healthy patients who prefer a restorative procedure, sacrocolpopexy (SC) is the standard recommendation [4]. However, mesh exposure after SC has been reported to occur in 2%-5% of cases [5]. Recent studies that have evaluated the surgical outcomes of pelvic floor reconstruction have focused on the risks of mesh erosion and exposure; these reports have suggested the use of sacrocervicopexy and sacrohysteropexy to reduce these complications [6].

The main purpose of our study was to evaluate the efficacy and safety of vaginal-assisted laparoscopic sacrocervicopexy with anterior colpotomy (VALSAC) for apical POP to reduce mesh erosion and exposure. We also aimed to

describe and standardize our surgical technique.

Materials and Methods

Study design and study population

This study retrospectively reviewed all women who had been treated with VALSAC for apical POP between April 2017 and June 2019 at the Department of Obstetrics and Gynecology of the Bezmialem University Hospital. The study was based on the retrospective analysis of 23 women who presented at our department with symptomatic stage III-IV prolapse and who desired surgical management of their condition.

The following inclusion criteria were applied: patients with stage III-IV prolapse based on the Pelvic Organ Prolapse Quantification System (POP-Q), a negative Papanicolaou test, no previous history of prolapse surgery, no current pregnancy, no contraindications for laparoscopic surgery, no history of genital or abdominal cancer, and no active pelvic or abdominal infections. All the patients were preoperatively assessed using the POP-Q, and patients with stage III-IV prolapse, based on the POP-Q, underwent surgery. Additionally, the Pelvic Floor Impact Questionnaire (PFIQ-7) [7, 8] was used to evaluate each patient's quality of life preoperatively. The PFIQ-7 includes three scales (bladder/urine, bowel/rectum, and vagina/pelvis), with higher total scores indicating that the POP has a more severe impact

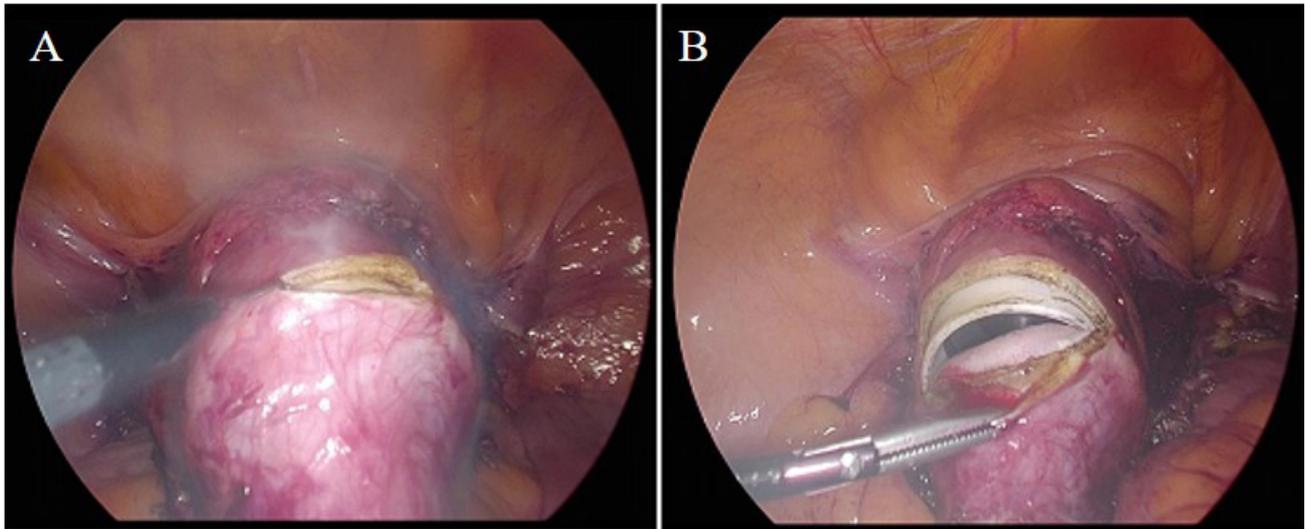


Figure 1. — (A, B) Performing the anterior colpotomy through an incision on the anterior surface of the upper vagina using monopolar cautery.

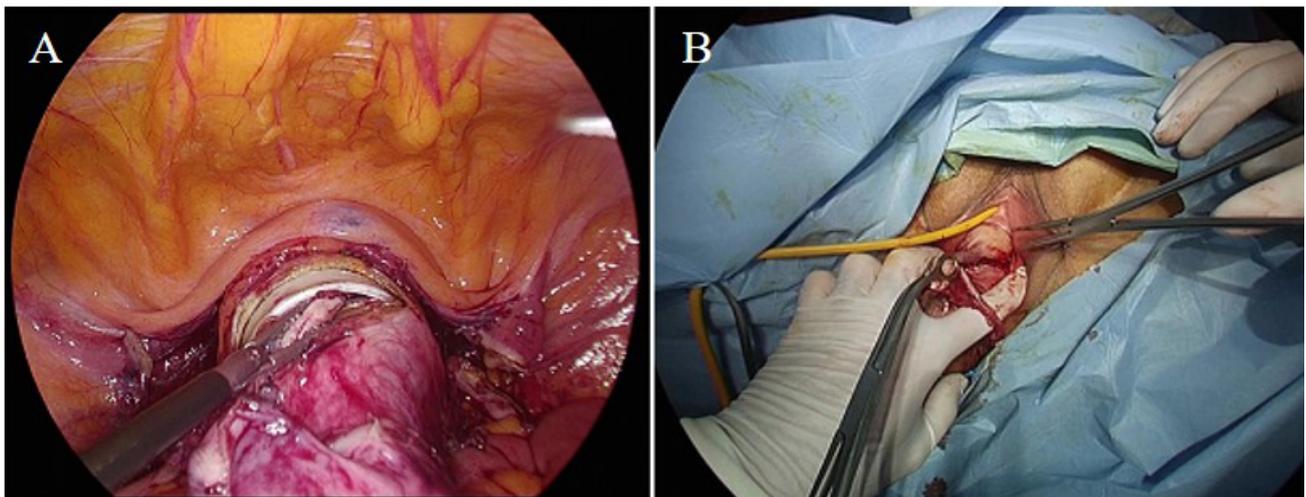


Figure 2. — (A) Placing of the left adnexa into the vagina by anterior colpotomy. (B) Removal of the uterus from the abdominal cavity by traction on the left adnexa inserted into the vagina with forceps.

on the patient's quality of life. All operative procedures were performed by one experienced gynecologist (OS). The collected data included age, parity, body mass index (BMI), estimated blood loss, operation time, hospitalization time, concomitant surgeries, complications, and follow-up time.

Postoperative follow-up

The Foley catheter was removed 8 hours after surgery, and the patients were discharged according to a postoperative clinical assessment 48 to 72 hours after surgery. During each visit, the patients provided their relevant history, and a physical examination was performed. The following complications were assessed: persistent pain, hematoma, infection, mesh exposure, mesh erosion, constipation, new urinary incontinence, and recurrent prolapse (recurrence of preoperative complaints). The preoperative

POP-Q and PFIQ-7 scores were compared with the values that were obtained at the last postoperative follow-up using the Wilcoxon signed-rank test, where a p value < 0.05 was considered statistically significant.

Surgical technique

The laparoscopic surgeries were performed under general anesthesia in the semi-lithotomy position, which allowed both vaginal and laparoscopic access. At the beginning of the surgery, a Foley catheter was inserted into the bladder, and a uterine manipulator was placed in the uterus. A pneumoperitoneum was created using a Veress needle, and four laparoscopic ports were prepared: a 10-mm umbilical port and three 5-mm lateral ports.

The round ligament was occluded and cut using an ultrasonic scalpel (Johnson & Johnson, New Brunswick, New

Jersey, USA). The leaves of the broad ligament were separated by cutting the round ligament, and the anterior leaf of the broad ligament was dissected toward the uterovesical fold. The uterovesical fold of the peritoneum was dissected with an ultrasonic scalpel. The vesicocervical space was identified, and the peritoneum of the bladder was mobilized approximately 1.5 cm from the anterior cervix. The mobilization of the bladder allowed the upper vagina to emerge. After the occlusion of both the infundibulopelvic ligaments, using a bipolar LigaSure system (Covidien Company, Boulder, Colorado, USA) for the bilateral salpingo-oophorectomy, both the uterine arteries were visualized by dissecting the anterior and posterior leaves of the broad ligament. The operation continued with the occlusion of both the uterine arteries using the bipolar LigaSure system. An anterior colpotomy was performed through an incision on the anterior surface of the upper vagina using monopolar cautery (Figure 1).

The left adnexa was inserted into the vagina through the anterior colpotomy (Figure 2). The operation then continued vaginally. The left adnexa that had been placed in the vagina was removed with forceps so that the uterus could be removed from the abdominal cavity. After the uterus was removed, a circular incision was created around the cervix using monopolar cautery to complete the supracervical hysterectomy (Figure 3). A polypropylene Y-mesh (3 × 12 cm) was prepared (Figure 4). The Y-mesh was attached to the front of the cervix and the midline of the posterior cervix using a nonabsorbable monofilament polypropylene 0 suture (Prolene, Model W 8630, Ethicon, Somerville, New Jersey, USA). The anterior part of the Y-mesh, which was shorter than the posterior part, was attached near the vagina's apex. The cervix and the Y-mesh were returned to the abdominal cavity before sacral attachment (Figure 5). The anterior and posterior vaginal repairs were performed using conventional vaginal techniques, and, if necessary, the anterior colpotomy was repaired. The procedure then returned to laparoscopic surgery, using the peritoneal incision from the cervix. The incision was carried cranially into the pelvis, lateral to the rectosigmoid, and medial to the right uterosacral ligament. After the visualization of the right ureter and the right common iliac vessel, the sacral promontory was visualized. The other piece of the Y-mesh was attached to the anterior longitudinal ligament of the sacral promontory with a nonabsorbable monofilament polypropylene 0 suture. After the suspension, any excess mesh was shortened. Finally, the peritoneum was closed over the mesh to completely retroperitonealize the graft.

Results

The study enrolled 23 women with a mean age of 59.35 ± 9 years. All the surgeries were performed by the same surgeon (OS). The baseline characteristics of the patients are presented in Table 1, and the perioperative and short-term outcomes (operation time, estimated blood loss, hospitalization time, mean follow-up time, concomitant surg-

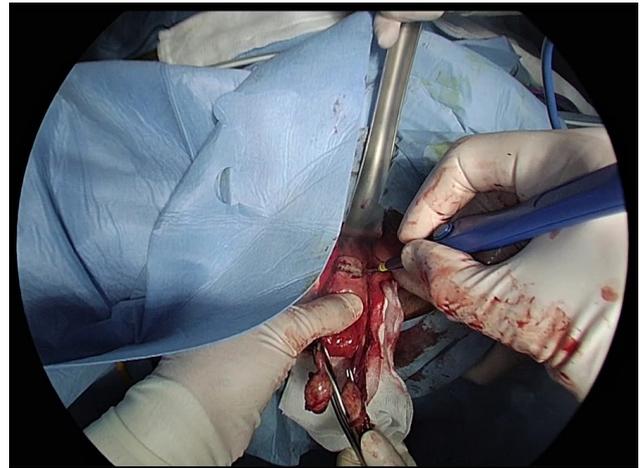


Figure 3. — Circular incision was created around the cervix using monopolar cautery to complete the supracervical hysterectomy by vaginally.



Figure 4. — Self-prepared polypropylene Y-mesh.

eries, complications, and postoperative examination findings at the last follow-up) are presented in Table 2. The mean BMI was 28.78 ± 3.17 kg/m², and the mean parity was 3.17 ± 1.74. The mean operative duration was 155.61 ± 49.13 minutes; the mean intraoperative estimated blood loss was 38.96 ± 25.24 mL. The mean postoperative hospital stay was 2.22 ± 0.42 days. No patients in the study were lost during postoperative follow-up. There were no conversions to laparotomy, and no intraoperative complications were detected. There were no complications related to mesh exposure, persistent pain, hematoma, or infection. However, there were two new incidences of urinary incontinence. There was only one postoperative complication of a recurrent prolapse. In that case, the patient's preoperative complaints recurred. This patient underwent a second laparoscopic surgery. During that surgery, we noticed that part of the Y-mesh that had been attached to the anterior longitudinal ligament of the sacral promontory had sepa-

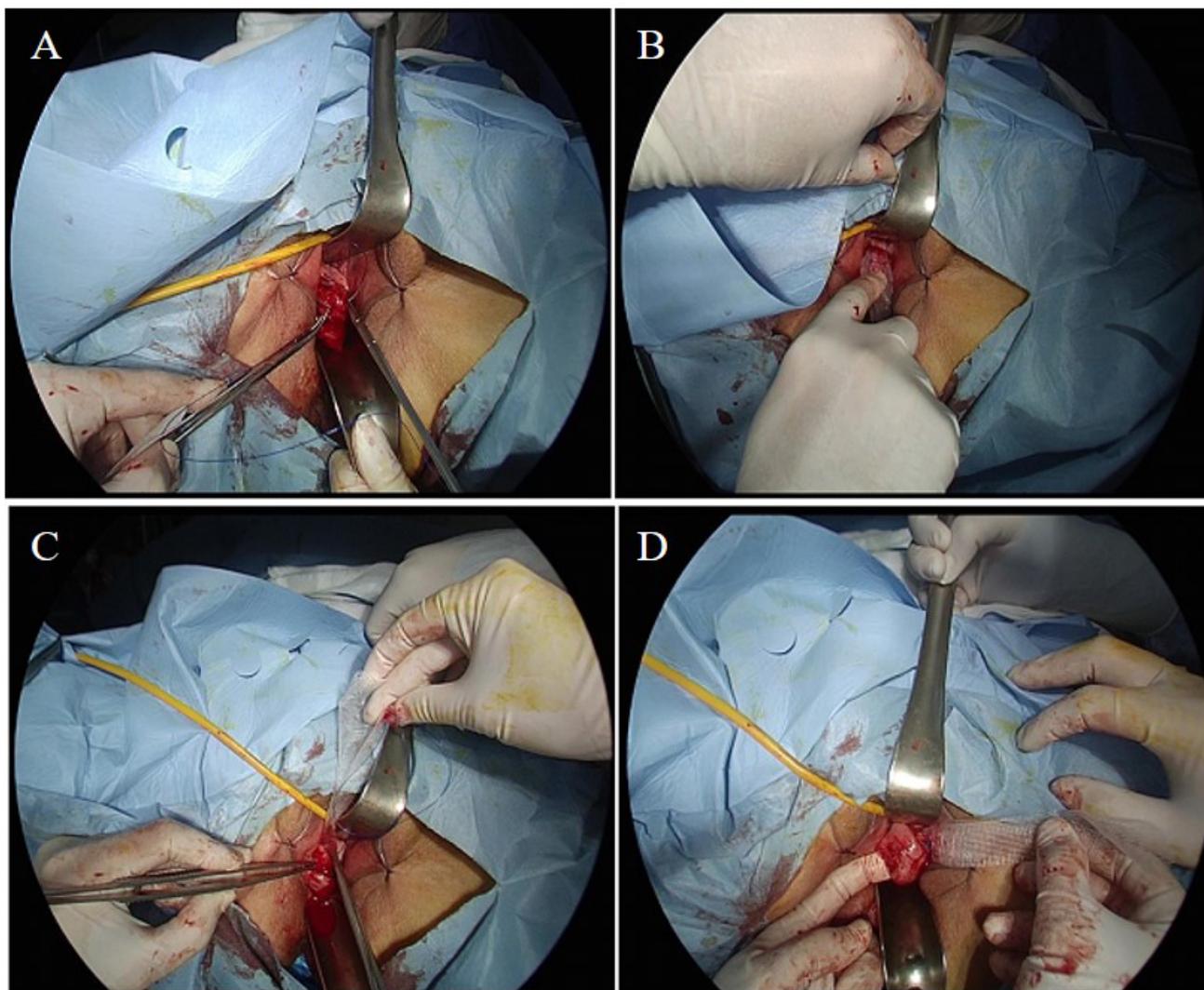


Figure 5. — (A, B) Attaching the Y-mesh to the midline of the posterior cervix using a nonabsorbable monofilament polypropylene 0 suture. (C) Attaching the Y-mesh to the anterior cervix using a nonabsorbable monofilament polypropylene 0 suture. (D) The anterior and posterior parts of Y-mesh fixed to the cervix.

rated. The Y-mesh was reattached to the anterior longitudinal ligament of the sacral promontory. The second surgery was successful, and the patient has had no complaints for 13 months (case no. 7).

The preoperative and postoperative examination findings and the last follow-up POP-Q point measurements are shown in Table 3. The POP-Q point measurements at the last postoperative follow-up showed statistically significant improvements when compared to the preoperative POP-Q point measurements. The mean preoperative and postoperative POP-Q scores were, for the Aa point, 1.61 ± 1.82 cm (range -2 to 4) and -1.96 ± 0.87 cm (range 0 to -3) ($p < 0.01$), for the C point, 2.87 ± 1.6 cm (range -1 to 5) and -5.26 ± 1.86 cm (range 1 to -11) ($p < 0.01$), and for the Ap point, -1.43 ± 0.89 cm (range -3 to 1) and -2.09 ± 0.59 cm (range -1 to -3) ($p < 0.01$). The preoperative and postoperative examination findings and the last follow-up PFIQ-7

Table 1. — Patient characteristics ($n = 23$).

Characteristics	Value
Age (year)	59.35 ± 9 (43 - 74)
Body mass index (kg/m^2)	28.78 ± 3.17 (24.6 - 34.4)
Parity	3.17 ± 1.74
1	3 (13, 04)
2	5 (21, 73)
3	8 (34, 78)
4	3 (13, 04)
≥ 5	4 (17, 39)

Values are mean \pm standard deviation (range) or n (%).

scores are shown in Table 4. The mean total of the PFIQ-7 scores were 131.25 ± 42.66 (preoperative) and 16.35 ± 26.42 (postoperative) ($p < 0.01$).

Table 2. — Perioperative and short-term outcomes (n = 23).

Variable	Value
Operative time (min)	155.61 ± 49.13
Estimated blood loss (mL)	38.96 ± 25.24
Length of stay (days)	2.22 ± 0.42
Follow-up time (months)	19.52 ± 7.21
Concomitant surgery	
Ant. colporrhaphy	7 (30.43%)
Post. colporrhaphy	1 (4.34%)
Ant. + Post. colporrhaphy	3 (13.04%)
Complications	
Persistent pain	0 (0)
Hematoma	0 (0)
Mesh exposure	0 (0)
Infection	0 (0)
Constipation	0 (0)
New urinary incontinence	2 (8.69%)
Recurrence	1 (4.34%)

Values are mean ± standard deviation or n (%).

Discussion

This article presents the outcomes of 23 patients who underwent VALSAC. Our results show that VALSAC is a safe and feasible technique that provides significant improvement of POP-related symptoms. In addition, this minimally invasive technique provides a high rate of success and good cosmetic results.

Pelvic organ prolapse is a very common condition in female population with a severe impact on quality of life and a significant impairment of sexual function; for this reason, a multidisciplinary approach is recommended for an accurate management [9,10]. Many recent studies that have evaluated the surgical outcomes of pelvic floor reconstruction have suggested the use of sacrocervicopexy and sacrohysteropexy to reduce mesh erosion and exposure and to support the cervix [6]. Previous studies have also indicated that the risk of mesh exposure in SC is lowered to one-fifth that of a hysterectomy with the use of uterine or cervical preservation. The use of mesh with a hysterectomy is a critical confounding factor for mesh exposure. Importantly, mesh-exposure complications may require subsequent operations [11-15]. There were no mesh exposures in the 23 study patients who underwent VALSAC. Only one patient underwent a second laparoscopic surgery due to a recurrent prolapse that resulted from the separation of the Y-mesh from the anterior longitudinal ligament of the sacral promontory. In the second laparoscopic surgery, that part of the Y-mesh was reattached to the anterior longitudinal ligament of the sacral promontory.

Whether to preserve the uterus during POP surgery depends on the patient's preference, the presence of any uterine pathology, and the surgeon's experience. Meriwether *et al.* reported that there is a lack of information about

the necessity and prevalence of hysterectomy after hysteropexy. They also indicated that there is insufficient data on the risk of malignancy, the use of screening tools, and the rate of prolapse recurrence after hysteropexy [14]. A review of the efficacy and safety of uterine preservation during the surgical management of uterine prolapse reported that hysteropexy was not an appropriate procedure for women who were contraindicated for uterine preservation and who could not continue routine gynecological surveillance [12]. On the other hand, the bilateral salpingo-oophorectomy could be an option to reduce the baseline risk of ovarian cancer especially for women with completion of child-bearing when clinically feasible. SGO and ACOG recommend salpingectomy or bilateral salpingo-oophorectomy as an appropriate option during hysterectomy or other pelvic surgeries [16, 17]. In addition, for the vaginal attachment of mesh to the cervix, supracervical hysterectomy with or without salpingo-oophorectomy is a part of our procedure. However, the vaginal attachment of mesh to the cervix could provide a safer surgical option than hysteropexy, especially in obese women. The vaginal approach for mesh attachment should also be considered to minimize infection-related complications. Linke *et al.* evaluated the microbiological contamination of the peritoneal cavity in women with symptomatic cholecystolithiasis who underwent transvaginal rigid-hybrid cholecystectomy using natural orifice transluminal endoscopic surgery (NOTES). They demonstrated that there was a low risk of microbiological contamination of the peritoneal cavity for surgeries that were conducted using the transvaginal approach [11]. However, a recent study compared the perioperative complications of minimally invasive SC and mesh-augmented vaginal repair to manage POP. The results of this study indicated that the vaginal approach offered no significant improvement in infection-related complications [15]. In accordance with these results, there were no infection-related complications with the vaginal approach used in our study. Accordingly, our VALSAC technique may be preferable to hysteropexy, but further investigations and comparative studies are needed prior to the technique's widespread adoption.

O'Sullivan *et al.* reported that only 33% of surveyed surgeons would chose to perform SC as the primary surgery for the treatment of vault prolapse, even though SC is the gold standard approach for this treatment [13]. According to their results, the main reason for this preference was the difficulty in dissecting the anterior and posterior vaginal walls. Jacquetin *et al.* and Popovic *et al.* highlighted the necessity of surgical experience to prevent bladder and bowel injuries that might occur at the dissection of the anterior and posterior vaginal walls during SC [18, 19]. In our technique, there is no need to dissect the anterior and posterior vaginal walls during sacrocervicopexy, decreasing the risk of bladder and bowel injuries. Our technique also requires relatively less surgical experience.

Table 3. — Change in POP-Q values ($n = 23$).

Case no	Aa		Ap		C	
	Pceop.	Postop.	Pceop.	Postop.	Pceop.	Postop.
1	1	-3	-1	-2	5	-7
2	1	-2	-1	-2	3	-4
3	-1	-2	-2	-2	2	-4
4	3	-2	-1	-2	3	-7
5	1	-1	-2	-2	1	-5
6	3	-3	-2	-3	1	-5
7	0	0	-3	-3	3	1
8	0	-1	-3	-3	3	-4
9	3	-1	-1	-1	5	-4
10	-1	-2	-2	-1	4	-7
11	1	-2	-1	-2	3	-6
12	-1	0	-2	-2	5	-6
13	3	-2	0	-1	4	-6
14	3	-2	-1	-2	2	-4
15	3	-2	1	-2	5	-3
16	4	-2	-1	-2	3	-7
17	-2	-3	-1	-2	1	-5
18	3	-3	-2	-3	1	-6
19	1	-2	-2	-2	5	-5
20	3	-3	-2	-3	2	-7
21	1	-2	-2	-2	-1	-7
22	4	-3	-1	-2	3	-7
23	4	-2	-1	-2	3	-6
Mean \pm sd	1.61 \pm 1.82	-1.96 \pm 0.87	-1.43 \pm 0.89	-2.09 \pm 0.59	2.87 \pm 1.6	-5.26 \pm 1.86

Following the April 2014 FDA safety communication regarding power morcellation, the FDA recommended the use of an endobag during hysterectomy and myomectomy morcellation due to the risk of intraabdominal dissemination of malignant cells [20]. In our technique, the uterus is removed from the abdominal cavity through the anterior colpotomy. This technique is safer and more cost-effective than the endobag and morcellation combination. In addition, the anatomical structure of the uterus is preserved by removing the uterus from the abdomen through the anterior colpotomy. This procedure also allows a pathologist to easily and accurately perform a histological examination of the uterus.

Previous studies have showed that prolapse recurrences after pelvic floor reconstruction primarily occurred in the anterior vaginal wall. Therefore, treatment of anterior wall prolapse remains a serious problem [6, 21, 22]. It is still unknown how the factors of mesh placement location, vaginal dissection level, suture location, and the number of sutures affect this problem [13]. Serati *et al.* presented total laparoscopic hysterectomy followed by uterosacral ligament duplication as a simple alternative procedure with low morbidity and optimal surgical outcomes for the management of apical POP with stage III-IV according to their preliminary results of 25 consecutive women [23]. However, a study evaluated the efficacy of transvaginal bilateral sacrospinous

fixation in women affected by second recurrences of vaginal vault prolapse at 12-month follow-up. The results of this study demonstrated that transvaginal bilateral sacrospinous fixation seems to be safe and effective in women affected by second recurrence of vaginal vault prolapse after previous monolateral sacrospinous fixation [24]. In a prospective cohort study, Van Zanten *et al.* reported that the need for additional operations due to prolapse recurrence was higher in women who underwent a robot-assisted SC than in those women who underwent a robot-assisted supracervical hysterectomy with a sacrocervicopexy [6]. Similarly, we also reported no recurrence of anterior vaginal wall prolapse in our study. Several theories have been proposed to explain these results. We suggest that the anterior part of the Y-mesh should be kept shorter than the posterior part of the Y-mesh and that the anterior part should be distally positioned. Additional randomized, controlled trials are required to test these theories.

Some limitations of our technique need to be highlighted. The first limitation of our study is not the randomized, controlled and comparative study. It is just based on the retrospective analysis of our record. The second limitation was small sample size.

Table 4. — PFI-Q 7 scores: preoperative and postoperative (n = 23).

Case no	Bladder / Urine		Bowel / Rectum		Vagina / Pelvis		Total	
	Preop.	Postop.	Preop.	Postop.	Preop.	Postop.	Preop.	Postop.
1	8	2	3	0	17	0	133, 33	9, 52
2	12	6	3	2	12	4	128, 57	57, 14
3	8	3	0	0	13	0	100, 00	14, 28
4	12	2	5	0	18	0	166, 66	9, 52
5	0	4	2	2	19	0	100, 00	28, 57
6	19	4	4	0	19	0	200, 00	19, 04
7	12	9	0	0	16	16	133, 33	119, 04
8	9	2	0	0	16	0	119, 04	9, 52
9	6	0	2	0	14	0	104, 76	0, 00
10	10	3	4	0	18	0	152, 38	14, 28
11	10	0	3	3	13	0	123, 80	14, 28
12	0	0	3	0	6	0	42, 85	0, 00
13	12	0	8	0	5	0	119, 04	0, 00
14	10	0	0	0	3	0	61, 90	0, 00
15	12	0	8	0	2	0	104, 76	0, 00
16	15	0	0	0	5	0	95, 23	0, 00
17	14	4	8	0	17	0	185, 71	19, 04
18	7	0	0	0	16	0	109, 52	0, 00
19	5	0	3	0	14	0	104, 76	0, 00
20	17	1	7	0	17	0	195, 23	4, 76
21	17	2	3	0	21	0	195, 23	9, 52
22	12	2	5	0	16	0	157, 14	9, 52
23	14	8	5	0	20	0	185, 71	38, 09
Mean ± sd	10.48 ± 4.83	2.26 ± 2.61	3.30 ± 2.68	0.3 ± 0.82	13.78 ± 5.66	0.87 ± 3.4	131.25 ± 42.66	16.35 ± 26.42

Conclusions

We propose that VALSAC is a promising, minimally invasive technique for pelvic floor reconstruction that appears to provide good outcomes. This small series demonstrated low exposure rates and blood loss, as well as short operative times and an overall low rate of symptomatic POP recurrence. The well-designed, randomized, controlled, comparative studies are required to further investigate and standardize this new technique before implementing its routine use in clinical practice.

Ethics Approval and Consent to Participate

The study protocol was approved by the local institutional ethics committee and the institutional education and planning committee (BEAH 2019 1/16). Written informed consent was obtained from all the participating patients. All patients were informed about our new experimental technique before surgery.

Acknowledgments

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Conflict of Interest

The authors declare no conflict of interest.

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Corresponding Author:

TAHA TAKMAZ, M.D.

Bezmailem Vakıf University Hospital,

İskender Paşa Mh Adnan Menderes Bulvarı,

Vatan Cad, 34093 Fatih , Istanbul, 34093 (Turkey)

e-mail: thtkmz@hotmail.com