



# The effect of surgical plication of uterosacral ligament to rectovaginal fascia on lower urinary tract symptoms in patients with posteroapical compartment defect

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## ABSTRACT

**Objectives:** A competent rectovaginal fascia (RVF) and uterosacral ligaments (USL) are required to provide active and passive structural support to rectum and vagina. We aimed to reveal the effect of the anatomical improvement provided by plication surgery of RVF to USLs on the lower urinary tract symptoms (LUTS) in the posteroapical compartment defect.

**Materials and Methods:** This prospective study was carried out with patients who applied to the Urogynecology Polyclinic of Muğla Sıtkı Koçman University, Department of Obstetrics and Gynecology between August 2018 and March 2020. Patients with POP stage >1 and posteroapical compartment defects were included in the study. In the preoperative and postoperative periods (3<sup>rd</sup>, 6<sup>th</sup>, and 12<sup>th</sup> months), the lower urinary system symptoms of the patients were questioned and the Pelvic Organ Prolapse Quantification (POP-Q) scoring system was evaluated and were compared.

**Results:** Of the patients included in the study, 42 (82.35%) were multiparous, 7 (13.72%) were primiparous, and 2 (3.92%) were nulliparous. Statistically significant improvements were observed in lower urinary symptoms in the postoperative 3<sup>rd</sup>, 6<sup>th</sup>, and 12<sup>th</sup> month controls ( $p<0.05$ ), while there were significant improvements in Aa, Ba, C, D, Ap, Bp, Pb, and TVL scores in the postoperative period ( $p<0.05$ ).

**Conclusion:** Based on the results of this native tissue surgery; the suturing of RVF to USLs for posteroapical compartment defect seems an effective surgical intervention with satisfactory anatomical and symptomatic outcomes.

**Keywords:** Native tissue repair; posteroapical prolapse; rectovaginal fascia; uterosacral ligament; vaginal surgery

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## INTRODUCTION

The etiology of pelvic organ prolapsus (POP) is multifactorial. Known risk factors for the disease include pregnancy, childbirth, congenital or acquired connective tissue abnormalities, pelvic floor denervation or weakness, aging, hysterectomy, menopause, and factors associated with chronically increased intra-abdominal pressure.<sup>1-4</sup>

Women with prolapsus often have a variety of pelvic floor symptoms, and only some of these symptoms are directly related to the prolapsus. Generalized prolapse symptoms include a feeling of drooping from the vagina, a lump or protrusion and a dragging discomfort or pain inside the vagina. Symptoms of bladder, bowel or sexual dysfunction are often present. Women may need to use their fingers to assist defecation or micturition.<sup>5</sup>

Treatment of women with pelvic organ prolapse directly depends on the severity of the symptoms, the woman's general health, and the surgeon's preferences and technical capacity. Available options for treatment include conservative, mechanical and surgical interventions.

A competent perineal body and uterosacral ligaments (USLs) are required to provide active and passive anatomical support to rectum and vagina.<sup>6</sup> The rectovaginal fascia (RVF) attaches to the USLs and cervical ring above, to the Arcus Tendineus Fascia Pelvis below, and the perineal body most distally, ensuring the anatomical integrity of the posterior compartment. Traditionally, it has been believed that posterior vaginal compartment prolapsus was largely due to defects in the RVF.<sup>7</sup> However, this condition, which can also be defined as an isolated rectocele, is very rare. In the vast majority of cases, herniation of both the rectum and the small intestine from the apex of the vagina to the vagina is seen as a result of the detachment of the RVF from the USL/cervical ring (rectoenterocele).<sup>8</sup> Rarely, the RVF breaks off from the perineal body, in which case the RVF must be surgically reattached to the perineal body.<sup>9</sup>

The intensity of symptoms caused by this anatomical physiopathology, which is also defined as a posteroapical compartment defect, is the tip of the iceberg. The current study aims to reveal the effect of anatomical improvement on the lower urinary tract symptoms (LUTS) provided by plication surgery of RVF to USL in posteroapical compartment defect.

## MATERIALS AND METHODS

This prospective case-control study was approved by the local ethics committee for clinical research of Muğla Sıtkı Koçman University, Faculty of Medicine, Muğla, Turkey (approval no and date: 13/VII, August 8, 2018). Between August 2018 and March

2020, data from patients who underwent surgical plication of USL to RVF for posteroapical pelvic organ prolapsus (POP-Q stage >1) in our urogynecology clinic were analyzed. The necessary information was obtained from the hospital database and patient files.

The inclusion criteria are as follows: negative stress test and isolated posteroapical compartment defect. The exclusion criteria are as follows: positive stress test, presence of anterior compartment defect, history of previous pelvic floor surgery and pregnancy.

During this period, we performed 51 surgical plications of USL to RVF operation for posteroapical prolapsus by one surgeon with advanced urogynecology experience (AAS). The records of the preoperative and 3<sup>rd</sup>, 6<sup>th</sup>, and 12<sup>th</sup> month postoperative POP-Q stages were also recorded from patient files. The preoperative and 6<sup>th</sup>, and 12<sup>th</sup> month postoperative POP-Q stages were compared and analyzed.

Urogynecological patient evaluation forms were used in the diagnosis, treatment, and follow-up processes of the patients. In the anamnesis, the LUTS of the patients before and after surgery were questioned. Pre- and post-surgical LUTS were evaluated for recovery, the persistence of complaints, and de-novo occurrence. All patients had urogynecologic examination and POP-Q scoring. The follow-ups of the patients were carried out by the same physicians. The LUTS which were questioned are as follows: vaginal winding, urgency, frequency, abnormal emptying, nocturia, pelvic pain, fecal incontinence.

### Description of the RVF-USL plication technique

The patients were prepared for the operation in the lithotomy position under sterile conditions under general or spinal anesthesia. In cases with a posteroapical compartment defect, the decision about where to make the incision was made according to one of the following:

In cases with posteroapical compartment defects, the index and middle fingers in sterile gloves were advanced from the posterior fornix to the distal vagina. The line where the vaginal rugae started was determined, and the vaginal mucosa was cut superficially with a scalpel no. 11, approximately 3 cm in the transverse plane.

In the patient with a posteroapical compartment defect, the index and middle fingers in sterile gloves were advanced from the posterior fornix to the distal vagina. In cases, whose vaginal rugae were lost, the posterior wall of the vagina was compressed between the index and thumb and palpated while the fingers were advanced. The tissue condensation line in the vaginal mucosa, formed by the shrinkage of the RVF detached from the

USL, was cut superficially with the scalpel no: 11 approximately 3 cm in the transverse plane.

The porous tissue under the part of the incision line facing the apex of the vagina was dissected with Metzenbaum scissors from the mucosa of the posterior wall of the vagina, and the extraperitoneal parts where the right and left USLs meet with the cervix were reached. The vaginal mucosa on the side of the incision line facing the vaginal entrance was resected by sharp dissection from the RVF. The approximately 0.5 cm wide RVF was exposed along the incision line. Using a non-absorbable polyester (Ethibond®) 2/0 suture, the suture needle was first inserted into the right USL and then exited from the ipsilateral part of the RVF. The same process was repeated on the left side. The sutures were tied and the RVF was suspended to the right and left USL. Bleeding was controlled. Then, the vaginal mucosa was closed by continuous suturing with synthetic absorbable polyglactin 910 (Vicryl rapid®) suture 2/0 on the repaired RVF. One roll of tampon was placed in the vagina. The cases were mobilized at the 8<sup>th</sup> postoperative hour. On the first postoperative day, the bladder catheter and the rolled tampon placed in the vagina were removed.

### Postoperative patient follow-up

In the first postoperative week, the patients were evaluated in terms of general health status, wound healing, and possible early surgical complications. In the postoperative 3<sup>rd</sup>, 6<sup>th</sup>, and 12<sup>th</sup> month controls of the patients, both lower urinary tract symptoms (constipation, vaginal winding, urgency, frequency, abnormal urination, dysuria, pelvic pain, fecal incontinence, and defecation difficulty) were observed and the POP-Q scoring was also done. The symptoms and POP-Q scores of the patients were noted.

### Statistical analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences software Version 25 (SPSS, Inc., Chicago, IL). The data were expressed as the mean  $\pm$  standart deviation. Changes in preoperative and postoperative LUTS and POP-Q scores were made using the dependent variable analysis method and the Wilcoxon Signed-Rank test. A statistically significant P value was set at  $\leq 0.05$ .

## RESULTS

The demographic characteristics of the patients included in the study are summarized in Table 1. Of the patients, 42 (82.35%) were multiparous, 7 (13.72%) were primiparous, and 2 (3.92%) were nulliparous. All of the patients who gave birth had a history of normal delivery, while 21 (41.18%) had a history of difficult

delivery. The mean age of the patients was  $51.86 \pm 13.69$  years. The number of smokers was 14 (27.45%). The mean body mass index of the patients was  $26.4 \pm 2.7$  kg/m<sup>2</sup> and 28 (54.9%) cases were in the postmenopausal period.

The evaluation of the preoperative and postoperative POP-Q measurements of the patients is summarized in Table 2. According to these data, the postoperative recovery rate in Aa, Ba, C, D, Ap, Bp, Pb values in the postoperative controls of the patients was statistically significant ( $p < 0.05$ ). In addition, there was no statistically significant difference in genital hiatus (GH) and total vaginal length (TVL) compared to preoperative measurements.

The comparison of the preoperative and postoperative LUTS of the patients is given in Table 3. According to these data, the postoperative recovery rate was statistically significant in the patients' complaints of vaginal winding, urgency, frequency, abnormal emptying, nocturia, pelvic pain, and fecal incontinence in postoperative symptom inquiries ( $p < 0.05$ ). It was determined that these symptoms of the patients, which were detected in the preoperative period, were significantly regressed in the postoperative 12<sup>th</sup> month follow ups (Figure 1). Indeed, in the 3<sup>rd</sup> month follow up of the patients, significant improvements in LUTS are remarkable. The highest level of improvement in vaginal winding, urgency, frequency and nocturia complaints was detected at the sixth month controls of the patients. However, the highest level of improvement in fecal incontinence, abnormal emptying and pelvic pain complaints was detected at the third month review of the patients. After remarkable improvement

**Table 1. Demographic and clinic characteristics of the patients**

Characteristics	Total patients (n=51)
Age (years)	51.86 $\pm$ 13.69
BMI (kg/m <sup>2</sup> )	26.4 $\pm$ 2.7
<b>Gravity</b>	
Multiparous	42 (82.35%)
Primiparous	7 (13.72%)
Nulliparous	2 (3.92%)
<b>Menopausal status</b>	
Postmenopausal	28 (54.9%)
Premenopausal	23 (55.1%)
<b>History of vaginal delivery</b>	51 (100%)
<b>Traumatic vaginal delivery</b>	21 (41.18%)
<b>Smoking</b>	
Yes	14 (27.45%)
No	37 (72.55%)
BMI: Body Mass Index; n: number	

**Table 2. Preoperative and postoperative POP-Q measurements in RVF-USL patients (n=51)**

		Aa	Ba	C	D	Ap	Bp	Gh	Pb	TVL
Pre	Mean (SD)	-0.93 (1.36)	-1.10 (1.75)	-4.17 (2.07)	-6.03 (2.38)	1.10 (0.88)	1.47 (1.01)	4.60 (1.19)	2.43 (0.86)	9.03 (1.22)
	Median	-0.50	-1.00	-5.00	-7.00	1.00	1.00	4.50	2.00	9.00
	Range	5	8	9	9	4	5	4	4	6
	Mean rank	3.17	3.05	2.88	2.82	3.93	3.95	2.32	2.92	2.55
Postop 3	Mean (SD)	-2.00 (1.53)	-2.03 (1.69)	-4.90 (1.69)	-6.70 (1.98)	-2.47 (1.04)	-2.47 (1.04)	4.87 (0.86)	2.13 (0.68)	9.13 (1.19)
	Median	-2.50	-3.00	-5.00	-7.00	-3.00	-3.00	5.00	2.00	9.00
	Range	7	8	10	9	4	4	4	4	7
	Mean rank	2.35	2.38	2.17	2.13	1.97	1.95	2.58	2.38	2.75
Postop 6	Mean (SD)	-2.27 (1.70)	-2.30 (1.70)	-4.63 (1.75)	-6.43 (2.01)	-2.63 (0.96)	-2.60 (1.04)	4.83 (0.91)	2.07 (0.52)	8.93 (1.11)
	Median	-3.00	-3.00	-5.00	-7.00	-3.00	-3.00	5.00	2.00	9.00
	Range	8	8	9	9	4	4	4	2	6
	Mean rank	1.95	1.98	2.48	2.60	1.73	1.77	2.52	2.38	2.35
Postop 12	Mean (SD)	-1.47 (1.96)	-1.50 (1.98)	-4.67 (1.89)	-6.43 (2.21)	-1.80 (1.58)	-1.90 (1.54)	4.87 (0.89)	2.03 (0.49)	8.93 (1.20)
	Median	-2.00	-2.00	-5.00	-7.00	-2.50	-3.00	5.00	2.00	9.00
	Range	8	8	10	10	5	5	4	2	6
	Mean rank	2.53	2.58	2.47	2.45	2.37	2.33	2.58	2.32	2.35
Pre - Postop 3 - Postop 6 - Postop 12	Chi-square	20.39	17.7	16.68	16.48	70.98	73.25	4.16	18.09	5.82
	<i>p</i> -value	<0.001	0.001	0.001	0.001	<0.001	<0.001	0.245	<0.001	0.121

\*Statistically significant difference. Friedman's test ( $\chi^2=17.43$ ;  $p<0.05$ ); ¥value that makes a difference between Pre, POP-Q3, POP-Q6 and POP-Q12 values.  
POP-Q: Pelvic Organ Prolapse Quantification, SD: standard deviation, TVL: total vaginal length, Gh: genital hiatus, Pb: perineal body, Postop: postoperative (month); Pre: preoperative (month); RVF: rectovaginal fascia; USL: uterosacral ligaments; n: number

in all symptoms, a non-statistical increase in the symptoms of frequency, abnormal emptying, nocturia and pelvic pain was observed at the patients' 12<sup>th</sup> month follow-up. However, the improvements in the symptoms of vaginal winding, urgency and fecal incontinence were stable at 12<sup>th</sup> month follow-up.

## DISCUSSION

RVF was first described in 1969.<sup>10</sup> Richardson drew attention to the importance of this structure, which was not considered in surgical treatment for many years, in 1993.<sup>11</sup> Subsequent studies focused on repairing only the defected area of this fascia and on transverse repair.<sup>12</sup>

Colporrhaphy posterior (CP) is the most commonly used surgical method in the posterior compartment defects. In the study by Karram and Maher<sup>13</sup>, the anatomic success rate was 83% and the dyspareunia rate was 18% after the CP operation. As a result of

Abendstein et al.'s<sup>6</sup> study, it was concluded that vaginal mucosal repair did not contribute to the support mechanism of PB and USL. For levatorplasty, which is a method frequently added to this operation, the anatomical success was 76%–96%, while dyspareunia was found up to 50% according to the results of various studies.<sup>13,14</sup>

In the current study, the native tissue of women has been used for the surgical treatment of the posteroapical compartment defect. Patients with posteroapical compartment defects have several symptoms that affect their quality of life, especially the urgency and nocturia. These symptoms are the main reasons why these patients apply to the hospital. Therefore, it is very important to recover these symptoms, as well as anatomical improvement after surgery. In the study by Kilic et al.<sup>15</sup>, it was stated that women with posterior POP should be carefully examined not only for anorectal or bulging symptoms but also for LUTS.

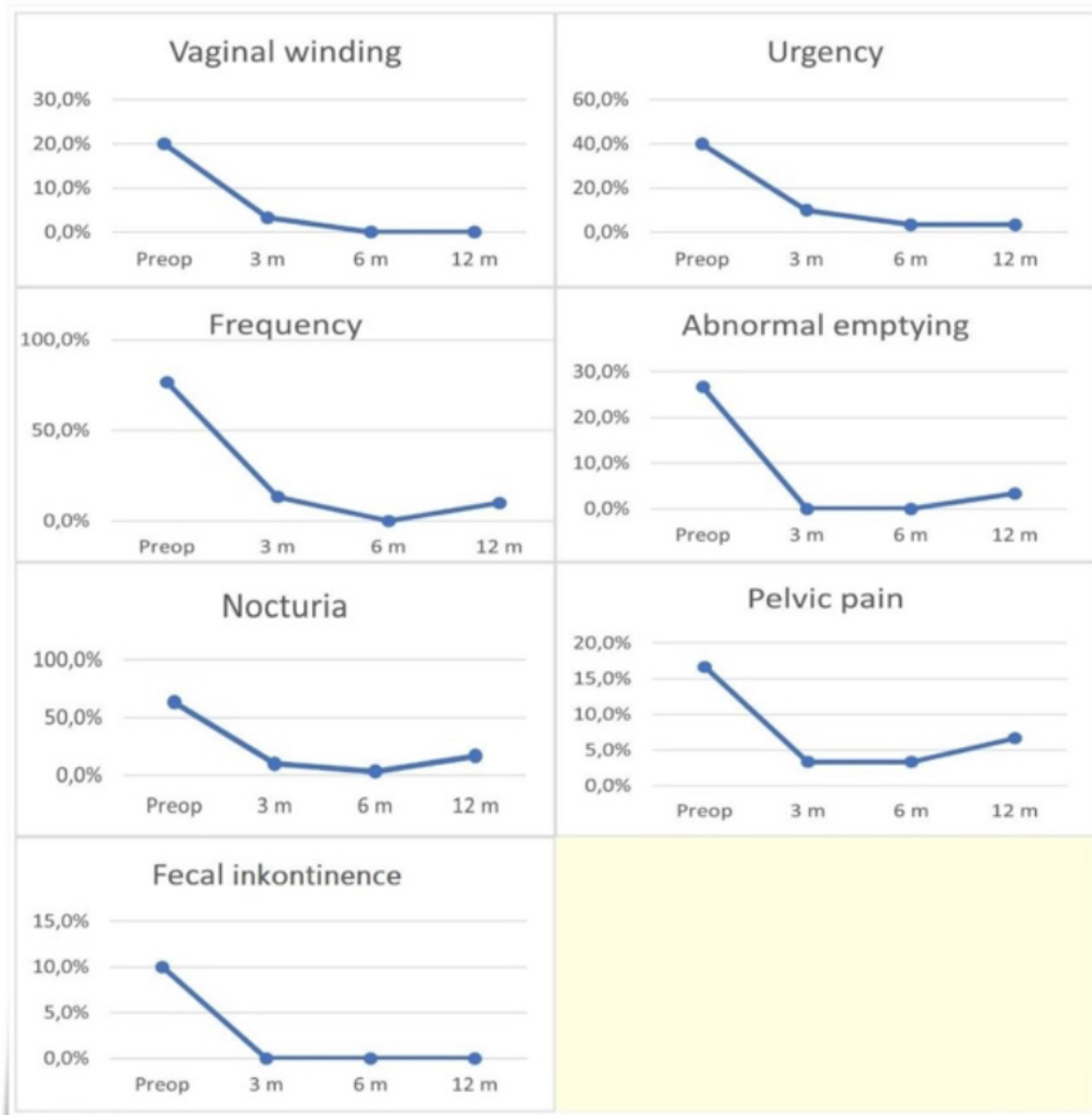
LUTS assessment was also performed for patients in the current study, as recommended in the relevant study. In this study, besides the anatomical improvement, symptomatological improvement was also obtained with the surgery applied to the patients. It was seen that these symptoms, which were detected in the preoperative period of the patients, were significantly regressed in the postoperative 12<sup>th</sup> month controls. Moreover, the abrupt onset of the cessation of the LUTS is noteworthy. This is compatible with the idea mentioning that the repair of distorted pelvic anatomy would lead to a symptom free state.

According to the Integral Theory; LUTS such as urgency, nocturia, abnormal emptying, frequency, low abdominal pain and deep dyspareunia arise due to laxity in the USL and clinically

this symptom complex has been defined as Posterior Fornix syndrome by Petros and Ulmsten<sup>16</sup>.

It should also be mentioned that the patterns of graphics show that none of the symptoms would be worsened in the longer term. This study shows that the native tissue surgery performed in the posteroapical compartment has very good results regarding anatomical healing as well as LUTS.

A limitation of this study is the number of patients. There are very few studies on this subject in the literature. In order to generalize the data of this study, there is a need for large-scale studies with a larger number of patients in different centers and by different surgeons.



**Figure 1.** Bayesian Network output nodes (top row) predicting the likelihood of defects in the anterior (a), middle (m), or posterior (p) zones, or a diagnosis of tethered vagina syndrome (t). Intermediate diagnosis and test, and patient questions and clinical test nodes are as shown.

Table 3. Preoperative and postoperative lower urinary tract symptoms in RVF-USL patients (n=51)											
		Constipation	Vaginal winding	Urgency	Frequency	Abnormal emptying	Nocturia	Dysuria	Pelvic pain	Fecal incontinence	Difficult defecation
Preoperative	Mean (SD)	1.93 (0.25)	1.80 (0.41)	1.60 (0.49)	1.23 (0.43)	1.73 (0.45)	1.37 (0.49)	1.83 (0.38)	1.83 (0.38)	1.90 (0.31)	1.93 (0.25)
	Median	2.00	2.00	2.00	1.00	2.00	1.00	2.00	2.00	2.00	2.00
	Range	1	1	1	1	1	1	1	1	1	1
Postoperative 3 <sup>rd</sup> month	Mean rank	2.42	2.22	1.98	1.47	2.12	1.70	2.32	2.32	2.35	2.40
	Mean (SD)	1.97 (0.18)	1.97 (0.18)	1.90 (0.31)	1.87 (0.35)	2.00 (0.0)	1.90 (0.31)	1.97 (0.18)	1.97 (0.18)	2.00 (0.0)	2.00 (0.0)
	Median	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Postoperative 6 <sup>th</sup> month	Range	1	1	1	1	0	1	1	1	0	0
	Mean rank	2.42	2.55	2.58	2.73	2.65	2.77	2.58	2.58	2.55	2.53
	Mean (SD)	2.00 (0.0)	2.00 (0.0)	1.97 (0.18)	2.00 (0.0)	2.00 (0.0)	1.97 (0.18)	1.97 (0.18)	1.97 (0.18)	2.00 (0.0)	2.00 (0.0)
Postoperative 12 <sup>th</sup> month	Median	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	Range	0	0	1	0	0	1	1	1	0	0
	Mean rank	2.55	2.62	2.72	3.00	2.65	2.90	2.58	2.58	2.55	2.53
Postoperative 6 <sup>th</sup> month	Mean (SD)	2.00 (0.0)	2.00 (0.0)	1.97 (0.18)	1.90 (0.31)	1.97 (0.18)	1.83 (0.38)	1.93 (0.25)	1.93 (0.25)	2.00 (0.0)	2.00 (0.0)
	Median	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	Range	0	0	1	1	1	1	1	1	0	0
Preoperative	Mean rank	2.55	2.62	2.72	2.80	2.58	2.63	2.52	2.52	2.55	2.53
	Chi-square	4.71	15.63	23.09	50.62	21.48	36.36	9.92	9.92	9.00	16.68
Postoperative 3 <sup>rd</sup> month											
Postoperative 6 <sup>th</sup> month	<i>p</i> -value	0.194	<b>0.001</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>0.019</b>	<b>0.019</b>	<b>0.029</b>	0.112
Postoperative 12 <sup>th</sup> month											

Significant *p*-values are shown in bold.  
 \*Statistically significant difference. Friedman's test ( $\chi^2=17.43$ ;  $p<0.05$ ).  
 POP-Q: Pelvic Organ Prolapse Quantification, SD: standard deviation, RVF: rectovaginal fascia, USL: uterosacral ligaments; n: number

## CONCLUSION

Based on the results of this native tissue surgery; the suturing of RVF to USLs for posteroapical compartment defect seems an effective surgical intervention with satisfactory anatomical and symptomatic outcomes.

## ACKNOWLEDGEMENTS

This study was originally conducted as a graduation thesis in obstetrics and gynecology.

## ETHICS

**Ethics Committee Approval:** This prospective case-control study was approved by the local ethics committee for clinical research of Muğla Sıtkı Koçman University, Faculty of Medicine, Muğla, Turkey (approval no and date:13/VII, August 8, 2018).

**Informed Consent:** It was obtained.

**Peer-review:** Internally peer-reviewed.

## Contributions

Concept: İ.G., D.A.G., B.S., A.A.S.; Design: İ.G., D.A.G., B.S., A.A.S.; Data Collection and/or Processing: İ.G., D.A.G., M.F.K; Analysis and/or Interpretation: İ.G., D.A.G., B.S., A.A.S.; Writing: İ.G., D.A.G., M.F.K., B.S., A.A.S.

## DISCLOSURES

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study received no financial support.

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