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## Questions surrounding the optimal time for surgical treatment of pelvic organ prolapse

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### ABSTRACT

**Objective:** The purpose of study is to evaluate the recurrence rate of pelvic organ prolapse after surgical treatment and pre- to postoperative changes in sexual function of patients with different stages of pelvic organ prolapse.

**Methods:** The presented study was a single-centre observational nonrandomized analysis of an ongoing prospective cohort study evaluating anatomical and clinical outcomes in reproductive aged women scheduled for native tissue repair of POP staged I–III. Two hundred and ten women were recruited, of whom 120 (57.1%) had the advanced prolapse form (POP-Q III). Women at preoperative POP stage I–II were compared with women at stage III without apical prolapse.

**Results:** The best effectively rate with low recurrence depends on preoperative prolapse stage. The overall objective success rate was about 80% in five years in patients with preoperative stage I–II. Study shows a significant improvement in sexual function in all patients with pelvic organ prolapse in five years after surgery.

**Conclusion:** This study showed that women with advanced POP have a higher risk of recurrence after POP native tissue repair compared with early stages and proved the improvement of sexual function especially in women with advanced prolapse forms. Women with early stage of POP should be advised to postpone surgery until progression of complaints because of the high recurrence risk.

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### Introduction

The timely diagnosis, classification and staging of pelvic organ prolapse, the definition of "significant" prolapse, the time to start treatment and the method of treatment remain uncertain. Some authors have claimed that the prevalence of POP was doubled after vaginal delivery compared with caesarean section, two decades after one birth [1]. The treatment of prolapse may be conservative or surgical. Most clinicians consider the surgical method of prolapse treatment to be the most acceptable, and the main principle of prolapse surgical treatment is the correction of all the structures for the preservation of a normal anatomic-topographical arrangement of the pelvic organs and the restoration of pelvic organ structures [2,24].

Conservative prolapse treatment is either an alternative to surgical treatment or can be used to delay surgery; however, it can be used at the different stages of the disease or in patients with

multiple comorbidities and contraindications for surgery. A variety of pessaries are described which aim to alleviate the symptoms of prolapse and avert or delay the need for surgery but there is no consensus on the use of different types of device, the indications nor the pattern of replacement and follow-up care [3].

Surgical treatment is typically required for advanced prolapse in POP-Q stages 3–4, often with the use of mesh implants [4]. The use of mesh implants is an effective method for providing good anatomic results and reducing recurrence. However, mesh-related complications following transvaginal management of pelvic organ prolapse (POP) and/or stress urinary incontinence (SUI) have received significant attention in the last decade [5]. Transvaginal mesh has a higher re-operation rate than native tissue vaginal repairs (grade A) [6].

Considering the frequency and severity of complications associated with mesh implants, the US Food and Drug Administration published a warning in 2011 about the use of vaginal mesh implants, and in 2016 suggested that meshes used for reconstructive and plastic surgeries of the pelvic floor are high risk and should mainly be used for the treatment of recurrent prolapse [7]. Thus,

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the use of native tissues for prolapse treatment became a priority, and some authors consider the use of native tissues with fascial plication to be the first-line choice for the treatment of anterior and posterior prolapse. The indications for mesh use still require caution and discernment [8].

The purpose of study is to evaluate the recurrence rate of the POP after the surgical treatment and pre- to postoperative changes in sexual function of patients with different POP stages (classified as POP-Q stage I–III).

## Materials and methods

### General description of conducted research and applied methods

The present study was a single-centre observational nonrandomized analysis of an ongoing prospective cohort study evaluating anatomical and clinical outcomes in reproductive aged women scheduled for native tissue repair of POP staged I–III in the 2nd Gynaecology Department of Moscow City Clinical Hospital (CCH), named after S.S. Yudin (CCP T3). Two hundred and ten of reproductive age (28–42 years) patients were included for surgical treatment when they presented with prolapse-related symptoms such as a sensation of a bulge or a lump in the vagina or recurrent bacterial vaginosis or desired "improving a woman's well-being".

From 2009–2013, they were examined and underwent native tissue repair. The criteria for inclusion in the study were as follows: primary POP staged I, II (without apical compartment) or III (without apical compartment); reproductive age; previous deliveries. All patients had pelvic floor discomfort symptoms and desired to be examined and treated for prolapse. They did not plan to be pregnant again. The exclusion criteria for the study were previous prolapse surgery and unwillingness to undergo examination and treatment for prolapse. Signed, informed consent was obtained. Patients with POP I–II and the absence of pelvic floor discomfort symptoms were excluded.

All patients were divided into two groups. The first group included 90 patients of reproductive age with early-stage POP (POP-Q stage I–II), of these five patients were with POP staged I. The second group consisted of 120 patients of reproductive age with stage III POP without apical prolapse according to the POP-Q classification.

All women had a standardized interview, including clinical and obstetrics antecedents. For POP severity evaluation, the POP-Q classification system was used to quantitatively evaluate POP for each of the prolapsed vaginal segments [9]. The clinical diagnosis was made according to the ICD-10 statistical classification. Patients underwent transvaginal, translabial and transperineal ultrasonography to determine the state of the pelvic floor structure using a Voluson E8 Expert ultrasound system with a high-frequency intracavitary sensor at scanning frequencies of 4.5–11.9 MHz and in 4D using existing techniques. To determine urination disturbance, functional tests were performed, urination diaries were filled in, and PISQ-12 (Pelvic Organ Prolapse and Incontinence Sexual Function Questionnaire) questionnaires were used [10].

Surgical treatment included colpoperineorrhaphy with levatorplasty following standard techniques in 20 (9.5%) patients with SUI in combination with tension-free vaginal tape-obturator (TVT-O). An additional 33 (15.7%) patients with uterine cervix deformation underwent uterine plastic surgery according to V.I. Eltsov-Strelkov. During the Eltsov-Strelkov operation, the cervix is dissected into external and internal flaps, excision of scar-modified tissues in the place of old lateral tears. The excised edges of the inner flap are connected with single catgut sutures; the nodes are immersed in the lumen of the channel. Radial seams connect the inner and outer flaps. Then separate catgut sutures are placed on the lateral edges of the wound of the musculoskeletal outer flap of

the vaginal part of the cervix. All surgical interventions were performed in the first phase of the menstrual cycle by one surgeon.

For anterior and posterior colporrhaphy, the methods described by M.S. Baggish and M.M. Karram [11] were used: strengthening of the vesicocervical fascia using separate stitches and plication along the middle line of the ureterovesical junction and then in the base of the bladder to provide support to the bladder. In the case of paravaginal defects, end-to-end correction of paravaginal defects was used; the lateral edge of the torn-off fascia was fixed by separate stitches to the upper part of the anterior vaginal wall. Levatorplasty was used in individual cases depending on the degree of muscle separation.

The main outcome measures were subjective and objective cure and patients' satisfaction at a certain point in time at 1 month, 6 months, 1 year, 3 years and 5 years after surgery. Anatomic results (absence of recurrence) was regarded as effective if POP-Q Ba and Bp measurements were less than or equal to 0. Subjective results were considered when patient did not report any prolapse related symptoms. Patient satisfaction was assessed using ten-point patient satisfaction score. The highest possible satisfaction would be rated as 10. The PISQ-12 was used to assess the effect of surgery on sexual function.

Data were analyzed with SPSS ver. 16.0 (SPSS Inc., Chicago, IL, USA). Demographics were assessed with descriptive statistics. Analysis employed the Mann-Whitney *U*-test, Pearson chi-square test, and Wilcoxon signed-rank test.

### Clinical characteristics of the examined patients

The final study population consisted of 210 women (Fig. 1). The were no statistically significant differences between the groups in age, body mass index (BMI), parity, forceps delivery, sexual activity, family history of POP, frequency of benign cervical pathology and recurrent bacterial vaginitis (Table 1).

## Results and discussion

### Results of surgical treatment for prolapse

The clinical types of the various stages of pelvic organ prolapse were investigated at the early stages of prolapse: isolated POP-Q stage I–II forms (cystocele/rectocele or uretorecele) were revealed in 46 women (51.1%); combined forms were revealed in 44 women (48.9%). Among the isolated forms, cystocele was twice as frequent as rectocele (32 (35.5%) vs 14 (15.5%), respectively) ( $p < 0.05$ ) ( $n = 90$ ). Among patients with combined POP (POP-Q stage III) cystocele combined with rectocele was revealed in 100% of cases; cystocele was the prevailing prolapsing segment two times more often (79 patients (65.9%)) than rectocele (41 patients (34.2%)) ( $p < 0.05$ ). Table 2 shows ultrasonographic signs of pelvic floor status.

Diastasis of levator ani (more than 1.5 cm) was found in the majority of patients (92.2% in group 1 and 97.5% in group 2). Hypermobility of the uretero-vesical segment was observed in all examined patients who showed signs of a vesicocervical fascia defect. Dislocation of the urethrovesical segment and deformation of the bladder wall (US - a sign of cystocele) were noted in addition to hypermobility in 53.3% of women with early-stage POP and 68.3% of women with POP-Q stage III prolapse.

In 73.3% of patients from group 1 and 90.9% from group 2, defects of the levators in the form of asymmetry and disturbance of muscle bundle contours (irregularity/blurring of contours), as well as the presence of hyperechogenic (connective tissue) inclusions in a projection of bulbous and cavernous muscle tissues were regarded as manifestations of trauma (rupture) to the muscles of the pelvic floor during labour. Defects of the rectal contour were

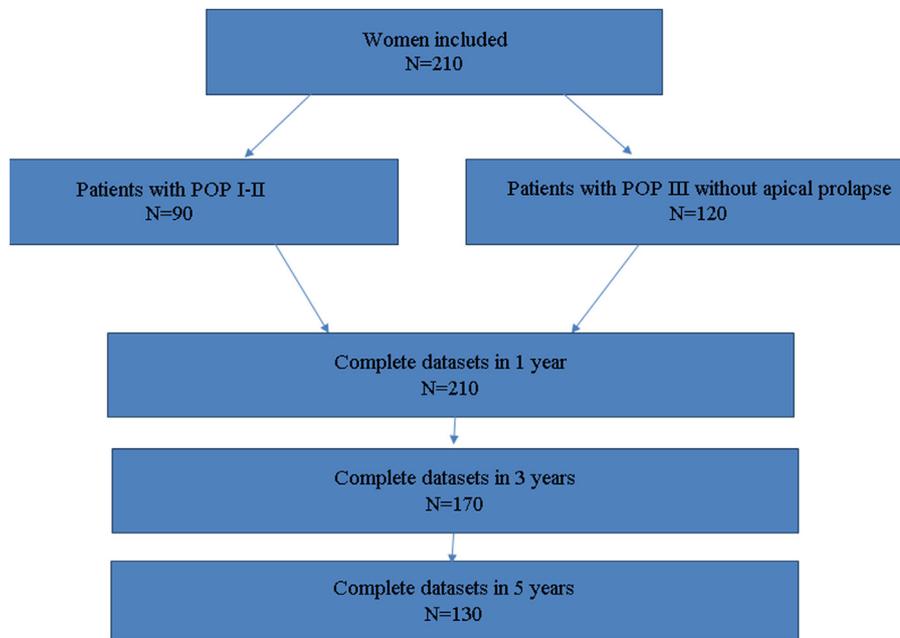


Fig. 1. Women scheduled for surgery for POP, inclusion and study population.

Table 1

Clinical characteristics of the patients according to study group.

Category	Patients with POP I–II, N = 90	Patients with POP III without apical prolapse, N = 120	P-values
Age (years), median <sup>a</sup> (Q <sub>1</sub> –Q <sub>3</sub> )	380 (29–42)	380 (28–42)	NS
BMI (kg/m <sup>2</sup> ), median <sup>a</sup> (Q <sub>1</sub> –Q <sub>3</sub> )	252 (20.7–33.2)	254 (20.3–32.0)	NS
Parity, median (range) <sup>b</sup>	1.5 (1–3)	1.8 (1–3)	NS
Forceps delivery, percentage <sup>p</sup>	7.8 (7/90)	9.2 (11/120)	NS
Family history of POP, percentage <sup>p</sup>	467 (42/90)	492 (59/120)	NS
Benign cervical pathology, percentage <sup>p</sup>	633 (57/90)	625 (75/120)	NS
Recurrent bacterial vaginitis <sup>p</sup>	58.9 (53/90)	62.5 (75/120)	NS

Notes: NS – not statistically significant; a – Independent Student's test; b – Mann-Whitney U test; P – Pearson Chi-squared.

Table 2

Ultrasonographic signs of pelvic floor status in the examined patients, n (%).

US sign	Groups	
	Group 1 (POP stage I–II), n = 90	Group 2 (POP stage III), n = 120
Hypermobility of the utero-vesical segment	90 (100%)	120 (100%)
Diastasis of levator ani muscle (more than 1.5 cm)	83 (92.2%)	117 (97.5%)
Levator avulsion	66 (73.3%)	109 (90.9%)
Dislocation of the utero-vesical segment	48 (53.3%)	82 (68.3%)
Rectal contour defects	19 (21.1%)	16 (13.3%)
Decrease in puborectal muscle thickness	14 (15.5%)	25 (20.8%)

observed in 21.1% of women with POP I–II and 13.3% of women with POP III, confirming the rectocele and defects of the rectovaginal fascia. All patients were satisfied with the surgical treatment. Overall satisfaction with the outcome (ten-point PS scale) were  $8.1 \pm 2.2$  in group with POP I–II and  $7.2 \pm 1.6$  in group with POP III.

Analysis of scores of the PISQ-12 questionnaire showed that the score of avoidance of sexual activity due to vaginal bulging, climax, sexual satisfaction and comparison of orgasmic level were significantly improved one and five years after surgery in both groups. Patients with POP III showed significantly improved score of pain during intercourse ( $3.1 \pm 0.5$  vs.  $1.9 \pm 0.8$ ,  $P = 0.04$ ) (Table 3).

The analysis of anatomic outcomes by type of initial stage of POP during the follow-up period is shown in Table 4. One month after the operation, all patients with POP-Q stage I–II prolapse and almost all patients with POP-Q stage III prolapse (95%) had a prolapse of stage 0 or 1; this result had changed slightly by the 6-month follow-up, although these changes were not significant ( $p > 0.05$ ). These results indicate the success of surgical treatment during this observation period. At 1 year after the operation, 4 patients (4.4%) with early-stage POP and 28 patients (27.5%) with POP-Q stage III prolapse had prolapse recurrence to stage II. Stage III prolapse was not found in any of the patients one year after the operation.

At 3 years, 10 patients (14.3%) with POP staged I–II showed prolapse recurrence; among those with prolapse recurrence, cystocele up to stage II occurred in 8 patients (10%), and rectocele up to stage II occurred in 2 (4.4%) of patients. No recurrence of prolapse to stage III was registered. In patients with POP-Q stage III prolapse recurrence was observed in 31.2% of patients 3 years after the operation; of those, recurrence to stage II prolapse occurred in 28.1% of patients and recurrence to stage III occurred in 3.1% of patients (the recurrence involved cystocele in 1 woman (25%) and rectocele in 2 women (75%). No progression to stage IV prolapse was noted.

At 5 years, the frequency of recurrence changed not too much in women with early-stage prolapse classified as POP-Q I–II, while recurrence was observed in 47.8% of patients in the POP-Q stage III

**Table 3**

Comparison of sexual function in one and five years after surgery.

PISQ-12	Group 1				Group 2			
	Preop. (n=90)	Postop. in 1 year (n=80)	Postop. in 5 year (n=64)	P-value<0.05 <sup>a</sup>	Preop. (n=210)	Postop. in 1 year (n=102)	Postop. in 5 year (n=90)	P-value<0.05 <sup>a</sup>
Total PISQ-12 score	25.6 ± 3.6	25.6 ± 4.2	25.8 ± 4.8	NS	27.7 ± 5.3	26.9 ± 3.9	27.6 ± 5.2	NS
Sexual desire	1.4 ± 1.0	1.2 ± 1.1	1.6 ± 0.9	NS	2.3 ± 0.9	1.4 ± 0.7	1.8 ± 0.9	NS
Climax	2.9 ± 1.2	1.3 ± 0.6	1.5 ± 0.8	P=0.018 (1–2) P=0.029 (1–3)	3.2 ± 0.4	2.1 ± 0.3	2.2 ± 0.6	P=0.032 (4–5) P=0.029 (4–6)
Sexual excitement	2.1 ± 1.1	1.0 ± 0.9	1.9 ± 1.2	NS	3.0 ± 1.2	3.2 ± 1.2	2.9 ± 0.9	NS
Sexual satisfaction	3.1 ± 0.5	1.9 ± 1.0	2.0 ± 0.9	P=0.041 (1–2) P=0.032 (1–3)	3.0 ± 1.2	2.1 ± 0.8	1.9 ± 1.2	P=0.038 (4–5) P=0.042 (4–6)
Pain during intercourse	2.5 ± 1.4	2.1 ± 0.8	2.7 ± 1.2	NS	3.1 ± 0.5	1.7 ± 1.2	1.9 ± 0.8	P=0.026 (4–5) P=0.031 (4–6)
Fear of incontinence restricts sexual activity	3.4 ± 0.9	3.2 ± 0.8	3.0 ± 1.2	NS	2.4 ± 1.2	3.0 ± 0.5	2.8 ± 0.8	NS
Avoids sexual activity because of bulging in vagina	2.4 ± 1.0	2.8 ± 1.3	2.9 ± 1.2	P=0.038 (1–2) P=0.041 (1–3)	1.0 ± 1.0	3.5 ± 0.5	3.2 ± 0.8	P=0.017 (4–5) P=0.012 (4–6)
Negative emotional reactions	1.9 ± 1.3	2.6 ± 0.5	2.3 ± 0.9	NS	2.5 ± 1.3	1.6 ± 0.8	2.0 ± 1.0	NS
Erection problems of partner	2.5 ± 1.3	3.0 ± 0.8	2.6 ± 1.2	NS	3.2 ± 1.5	2.8 ± 0.5	2.9 ± 1.0	NS
Premature ejaculation of partner	2.4 ± 1.2	3.0 ± 0.9	2.6 ± 1.0	NS	3.2 ± 1.0	2.8 ± 1.2	3.4 ± 0.8	NS
Comparison of orgasmic level between past and present	1.3 ± 0.5	3.3 ± 0.6	2.7 ± 1.0	P=0.018 (1–2) P=0.025 (1–3)	0.7 ± 0.8	2.6 ± 0.5	2.2 ± 0.8	P=0.015 (4–5) P=0.018 (4–6)

Notes: a – Wilcoxon signed rank test, data are presented as mean ± standard deviation.

PISQ-12, Pelvic Organ Prolapse/Urinary Incontinence Sexual Function Questionnaire-Short Form 12.

**Table 4**

Anatomic evaluation of prolapse during the follow-up period of up to 5 years, n (%).

POP-Q	Follow-up period									
	1 month (n=210)		6 months (n=196)		1 year (n=182)		3 years (n=166)		5 years (n=154)	
	POP-Q I–II (n=90)	POP-Q III (n=120)	POP-Q I–II (n=84)	POP-Q III (n=112)	POP-Q I–II (n=80)	POP-Q III (n=102)	POP-Q I–II (n=70)	POP-Q III (n=96)	POP-Q I–II (n=64)	POP-Q III (n=90)
0	88 (97.7%)	110 (91.6%)	79 (94.0%)	97 (86.6%)	70 (87.5%)	56 (54.9%)	47 (67.1%)	37 (38.6%)	41 (64.1%)	11 (12.2%)
I	2 (2.3%)	10 (8.4%)	5 (5.9%)	15 (13.4%)*	6 (7.5%)	18 (17.6%)*	13 (18.6%)	29 (30.2%)*	13 (20.3%)	36 (40%)*
II	0	0	0	0	4 (5.0%)	28 (27.5%)*	10 (14.3%)	27 (28.1%)*	10 (15.6%)	29 (32.2%)*
III	0	0	0	0	0	0	0	3 (3.1%)	0	14* (15.6%)

Notes: \* – significant differences compared with the POP-Q stage I–II group (p&lt;0.05).

group. Recurrence to stage II prolapse occurred in 29 patients (32.2%), and recurrence to stage III prolapse occurred in 14 patients (15.6%). Among the patients with recurrence to stage II prolapse, cystocele was found in 5 (17.2%) patients and rectocele was found in 24 patients (82.8%). Among those with recurrence to stage III prolapse, cystocele was observed in 3 patients (21.4%) and rectocele was observed in 11 patients (78.6%). No group showed worsening of prolapse to POP-Q IV.

Thus, analysis of the long-term results showed that satisfactory anatomic outcomes remained after 6 months in both groups. Satisfactory anatomic outcomes remained after one year in patients with POP-Q stage I–II prolapse; however, among patients with POP-Q stage III prolapse, recurrence was noted in 27.5% of patients, generally to stage II prolapse; recurrence to rectocele was twice as common as recurrence to cystocele.

#### Effectiveness of surgical treatment depending on stage of pelvic organ prolapse

The question about optimal time for nature tissue repair of pelvic organ prolapse is very important especially in "mesh discussing era". Different types of surgical interventions for the correction of pelvic structures have been discussed but there is no obvious evidence indicating the optimal time, equipment and

materials. There are a significant number of corrective surgical techniques for POP described in the literature, which shows that there is still a lack of consensus on this issue [12]. However, the concept of restoring the pelvic floor organs to the anatomic position prevails and has to relieve associated symptoms of POP [13].

In our study, we applied traditional surgical treatment techniques using nature tissue for anterior and posterior colpoperineorrhaphy and levatorplasty to restore the cervical, visceral and rectovaginal fascia, following techniques presented by several authors [14]. In this study, characteristics of women seeking surgical treatment were compared regardless of stage of POP. The only women of reproductive age were included. It helped us to exclude low estrogen levels influence on tissue characteristics. Our results indicate that the best effectively rate with low recurrence depends on preoperative prolapse stage. The overall objective success rate was about 80% in 5 years in patients with preoperative stage I–II. There was no recurrence within 12 months, and at 3 years, prolapse recurrence occurred only in a small percentage of cases (14.3%). In patients with preoperative stage III recurrence rate was about 60%.

POP recurrence after surgery is a major problem, with anatomical recurrence rates reported in the literature from 31% up to 64% [12,15,16]. Advanced preoperative stage seems to be an

important risk factor for recurrence [17]. The knowledge that more advanced POP has a higher risk of recurrence after surgery raises the question as to whether it would be favorable to perform POP surgery at an earlier stage, i.e., at a younger age, rather than to wait until POP has progressed to a more advanced stage. Furthermore, Vergeldt et al. showed that women with advanced cystocele were usually older than women with early stages of POP [18]. So, it is more difficult to choose intraoperative strategy and to evaluate surgical risk especially in case of advanced prolapse forms for the older patient.

One could argue that there is no need to correct early stage of POP. But we believe that a kind of predictive medicine should take place in patients with POP in reproductive age. We suggest that women with early stage of POP should be advised to postpone surgery until progression of complaints because of the high recurrence risk.

According to anatomic atlases and the opinions of researchers at the beginning of the last century, the mm. levator ani are the main muscular component of the pelvic floor [19]. The puborectal component of the levators plays an important role in supporting the urethra and the distal portion of the vagina. Sonographically determined levator-urethral gap is strongly associated with symptoms, symptom bother, and pelvic organ prolapse on clinical examination and imaging [20]. The separation of these muscles from the pubic bone increases the risk of POP development, especially the development of anterior and central prolapse.

Our data showed that there was no direct association between the prolapse stage and the extent of traumatic damage to the pelvic floor structures. In the case of clinically manifested prolapse stages, ultrasonography revealed significant structural disorders regardless of POP stage. So, in all the cases we diagnosed anatomical disorders of pelvic floor structures. This study confirms the opinion of many authors that the obstetric injuries play the main role in prolapse formation [21]. Traumatic damage to the pelvic floor fascia and muscles was revealed in our study in all patients with early-stage prolapse (POP-Q stage I–II) and with POP-Q stage III prolapse. Our data are similar to others who concluded that many healthy women selected from the general population have symptoms and signs of POP 20 years after their first delivery, and PFMT is associated with POP-Q  $\geq 2$  [22].

We believe that the decreased POP recurrence either in case of stage I–II or stage III is a result of fascia strengthening caused by their attachment to the uterine cervix around the isthmus and the use of point-to-point correction of paravaginal defects. Such a surgical technique promotes the strengthening of the general pelvic floor, which decreases the risk of prolapse recurrence. The obtained data show that the levators play an important role in prolapse development. Diastasis of levator ani muscle was revealed in almost every patient (92.2 and 97.5%), independent of prolapse stage. In other studies, the leading role of the levators as the main supporting pelvic floor structures was also confirmed [21,23].

## Conclusion

This study showed that women with advanced POP have a higher risk of recurrence after POP native tissue repair compared with early stages and proved the improvement of sexual function especially in women with advanced prolapse forms. We suggest that women with early stage of POP should be advised to postpone surgery until progression of complaints because of the high recurrence risk. Vaginal route in these cases is the most effective and safe. The findings are important for proper counselling of patients prior to operative POP treatment.

This prospective study shows a significant improvement in sexual function in patients with POP in five years after surgery. Significantly fewer women avoided sex postoperatively compared

with preoperatively due to vaginal bulging in patients with advanced prolapse form. Orgasmic level after surgery was significantly improved in both groups. Postoperatively, fewer patients reported having dyspareunia in case of POP stage III. No differences were seen in the total number of sexual excitement and negative emotional reactions. De novo dyspareunia occurred in 1.9% of patients.

The use of modern suture material, layer-by-layer restoration of tissues, lack of an excessive tension of tissues, adequate haemostasis, and effective rehabilitation measures in the postoperative period promote the formation of a qualitative scar without deformation or considerable colpostenosis.

## Conflict of interest

The authors declare that they have no conflicts of interest.

## Compliance with ethical standards

This study was approved by Ethics Committee of RUDN University (Reference No: 21).

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