Combined Abdominal Sacrocolporectopexy as Re-Operation for Repeated Multi-Compartment Pelvic Prolapse

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ABSTRACT

Aim: was to improve unsatisfactory results of primary surgery for middle pelvic compartment prolapse with its gradual development in the total pelvic organ prolapse.

Material of study: Study group consisted of 17 patients who underwent various corrective operations using their own tissues from the vaginal access for pelvic prolapse in the area of the middle segment of the pelvis: uterine prolapse or vaginal prolapse after hysterectomy. Of these, the previous hysterectomy for uterine prolapse was performed in 7 patients. In terms of 6.5±0.8 years after the primary surgical treatment, they had a repeated combined pelvic prolapse, including prolapse of the uterus or vaginal apex after hysterectomy, i.e. a relapse of the "middle prolapse", as well as a newly developed pelvic prolapse in the area of the posterior segment of the pelvis: rectal prolapse, rectocele of the III degree, perineum descenfence and prolapse in the anterior segment of the pelvis: urethro-vesical segment or bladder. Re-surgery consisted of combined anterior and posterior abdominal sacrocolporectopexy using synthetic grafts and was combined with the Burch urethral suspension technique for the prevention and correction of stress urinary incontinence.

Results: 12 months after the operation, a clinical study, ultrasound and MRI showed correction of anterior and middle prolapse, while no patients reported stress urinary incontinence. The position of the leading points of the prolapse in the POP-Q system showed that all patients achieved its 0-I degree. Data on the posterior pelvic compartment were confirmed by a digital examination of the rectum, which did not reveal a rectocele of more than I degree in any patient. According to MRI data, there was a correction of the position of the uterus and the vaginal apex in patients with previous hysterectomy, and their displacement during straining did not exceed 1 cm. All patients noted a decrease in the severity of obstructive defecation. According to defecography the level of the perineal position rose from -6.2±0.4 cm to -2.6±0.3 cm (P=0.000) at rest and from -8.9±0.6 cm to -5.7±0.5 cm (P=0.000) when straining. The values of the posterior anorectal angle decreased from 136.7 ° ±5.4 ° to 105.2 ° ±3.5 ° (P=0.000) at rest and from 171.1 ° ±5.3 ° to 142.7 ° ±4.8 ° (P=0.000) when straining. The barium evacuation rate increased from 2.9±0.4 g / sec to 5.1±0.5 g / sec (P=0.001). The percentage of barium suspension remaining after evacuation decreased from 40.3±5.7% to 19.9±3.8% (P=0.005). According to anorectal manometry there was a decrease in the sensitivity threshold from 32.9±1.7 ml to 26.2±1.3 ml (P=0.004); a decrease in the threshold of maximum tolerable distention from 85.3±2.2 ml to 76.2±1.8 ml (P=0.003); a decrease in the amplitude of the recto-anal inhibitory reflex from 49.6±5.8 mm Hg. up to 35.2±4.9 mmHg (P=0.067) and its duration from 29.9±6.1 seconds to 16.8±2.7 seconds (P=0.055). There was also an improvement in the function of fecal continence. The resting pressure in the area of the internal anal sphincter increased from 42.5±4.5 mm Hg up to 57.3±5.1 mm Hg (P=0.092); in the area of the external anal sphincter from 34.6±4.1 mm Hg up to 46.4±4.2 mmHg (P=0.053).

Conclusions: Satisfactory anatomical and functional results were achieved in patients with repeated total pelvic prolapse by performing combined abdominal sacrocolporectopexy using synthetic grafts.

Keywords: Repeated pelvic prolapse, re-surgery, sacrocolporectopexy, MRI, defecography, anorectal manometry

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INTRODUCTION

Pelvic organ prolapse is the protrusion or prolapse of one or more pelvic organs. According to epidemiological studies, it is observed in 20% of women of childbearing age and in 50% of women over 50 years of age (1, 2). By now, 20% of this category of patients undergo surgical treatment and their number increases as the population ages (3,4,5,6). However, unsatisfactory treatment results are 25-30% and do not tend to decrease. Unsatisfactory results may be due to a relapse of the disease, or the development of another type of prolapse. The reasons for repeated pelvic organ prolapse are not fully determined. Most often, this is a young or older age, obesity, genetic predisposition to pelvic floor weakness, chronic obstructive pulmonary disease, diabetes, performing inadequate primary surgical treatment (2,3). Up to 18% -25% of this category of patients undergo repeated operations, and this percentage increases after each subsequent intervention (3,7). Although the causes of relapses and poor treatment results of pelvic prolapse are often discussed in the literature, very few studies report surgical outcomes in patients with repeated prolapse.

The aim of our research was to improve unsatisfactory results of primary surgery for middle pelvic compartment prolapse with its gradual development in the total pelvic organ prolapse.

MATERIAL AND METHODS

Study group consisted of 17 patients who underwent various corrective surgeries using their own tissues by vaginal access in 2009-2019 for pelvic organ prolapse in the middle segment of the pelvis: uterine prolapse or vaginal prolapse after hysterectomy. Among them, hysterectomy for uterine prolapse was performed in 7 patients. They were assigned to a separate group due to the fact that they had repeated combined pelvic prolapse, including, in addition to prolapse in the posterior region, rectal prolapse, rectocele III degree,

perineum prolapse, recurrent prolapse in the middle segment of the pelvis, prolapse of the uterus, or of the vagina after hysterectomy, and prolapse in the anterior segment of the pelvis (urethro-vesical segment or bladder), so called total pelvic prolapse. Surgical treatment of this group of patients consisted of combined anterior and posterior abdominal sacrocolporectopexy using synthetic grafts and was combined with the Burch urethral suspension technique for the prevention and correction of stress urinary incontinence. In addition to complaints of pelvic organ prolapse, which causes discomfort and reduced quality of life, all patients had complaints about the need for strong and prolonged straining during defecation, a feeling of incomplete emptying of the rectum after defecation, i.e. obstructive defecation syndrome. Similar complaints were present before the initial surgical treatment and persisted in the postoperative period. All patients associated the development of combined pelvic prolapse after primary surgical treatment with persistent constipation. Before repeated surgery, all patients had grade I-II fecal incontinence. The average time interval from initial surgical treatment to re-surgery was 6.5±0.8 years. The patients included in the study group had the following demographic indicators: all were of Caucasian race, the average age was 68.8±6.5 years, the body mass index was 31.4±2.9 kg / m2, the number of births was 2.6±0.8, all 17 patients were in menopause, none of them took hormone replacement drugs, and 3 patients smoked (17.6%). All of these patients had co morbidities: 8 (47.1%) patients had chronic obstructive pulmonary disease; 13 (76.5%) had coronary heart disease; 5 (29.4%) had diabetes mellitus; and 10 (58.8%) had a combination of co morbidities. Although all patients had co morbidities in the compensation stage, and did not have an increased risk for surgical treatment.

Treatment results were evaluated 12 months after surgery. The results of treatment of anterior and middle pelvic segment prolapse were evaluated using ultrasound scanning and magnetic resonance imaging. The results of pelvic posterior segment correction were assessed additionally according to defecography and anorectal manometry.

The results were processed on a personal computer using the Biostatistics program. The distribution of the studied features was indicated as "mean value ± standard deviation" $(x \pm \sigma)$, n - sample size. For comparison of mean values was used one factory dispersion analysis according to Newman-Kales criterion. Differences were considered significant at $p<0.05$.

RESULTS AND DISCUSSION

For combined abdominal sacrocolporectopexy in this group of patients, we did not note any serious complications in the postoperative period and during its performing, such as bleeding from the presacral venous plexus, damage to the rectum and ureters. The average duration of surgery was 112±5.8 minutes. The average blood loss was 268±21.3 ml. There were no pyo-inflammatory complications caused by the use of polypropylene grafts. Vaginal erosion, 1 cm in diameter, in the area of the posterior vaginal wall was present in 1 (5.8%) patient. However, it did not cause discomfort to the patient, and the graft did not need to be excised. We did not note other complications that are typical for the use of mesh implants described in the literature, such as granulomas, shrinking of the mesh, and narrowing of the vagina.

12 months after the operation, a clinical study, ultrasound and MRI showed correction of the anterior and middle prolapse. We noted that stress urinary incontinence of degree I persisted in 2 out of 8 patients who had degree III incontinence prior to repeated surgery. In the postoperative period, stress urinary incontinence de novo of degree I was observed in 3 patients, despite preventive colposuspension by Burch. After 1.5 years, two of them were performed suspension of the middle third of the urethra using the TVT-O method with a positive effect. The position of the leading points of the prolapse according to the POP-Q system showed that all patients achieved its 0-I degree (table 1).

Table 1: Positions of leading points of the POP-Q system before and after repeated surgical treatment in patients of the study group (n=17)

Defined points according to POP-Q(cm)	Before operation	After operation	p-value
Aa	+2.8±0.5	- 2.7±0.6	P=0.000
Ba	+3.6±0.7	- 3.2±0.5	P=0.000
Ap	+4.1±0.5	- 3.5±0.4	P=0.000
Bp	+ 4.7±0.9	-3.7±0.6	P=0.000
C	+3.1±0.6	-7.2±0.9	P=0.000
TVL	5.5±0.9	8.5±1.1	P=0.042

Data on the pelvic posterior segment were confirmed by a digital rectal examination, which also did not reveal a rectocele greater than 1 cm in any patient.

Correction of apical prolapse, according to MRI data, is presented in table 2, from which it follows that the uterus or vagina apex in patients who previously had a hysterectomy took its physiological position, and their displacement during straining did not exceed 1 cm, which indicated the replacement of the lost function of the uteri-sacral ligaments with a mesh graft.

Table 2: Results of apical prolapse correction in patients of the study group according to MRI data (n=17)

Main estimated parameters (mm) (n=25)	Healthy volunteer	Before operation	After operation	p-value
Location of the UCZ*/ the VA** relative to the PCL***				
In the rest	28.7±1.6	-1.5±0.93	0.4±3.4	0.000
When straining	16.8±1.7	-3.9±1.3	21.1±2.5	0.000
Mobility of the UCZ*/ the VA**	9.2±0.8	25.5±4.8	10.4±0.8	0.002

UCZ* - utero-cervical zone
VA** – vaginal apex
PCL*** - pubic-coccygeal line

In the long-term postoperative period after 12 months, all patients noted a decrease in the severity of symptoms of obstructive defecation. The patients ' subjective sensations were confirmed by objective research results.

The following data were obtained using ultrasound. Despite the fact that when visualizing the muscles levators ani, 5 patients had their severe atrophy on both sides, in which their thickness did not exceed 1 cm and 12 patients had muscle rupture on one or both sides, after repeated surgery when visualizing at rest and straining the rectocele, the rectal mucosa, recto-rectal invagination were not visualized. All patients had correctly positioned grafts in the upper third of the anterior vaginal wall, rectovaginal septum, and posterior semicircle of the rectum. Defecography also demonstrated improved anatomic and functional results in patients after re-operation. As a result of re-operation, the level of the perineum location relative to the pubo-coccygeal line corresponded to normal, amounting to -2.6±0.3 cm at rest, compared to this indicator before surgery, corresponding to -6.2±0.4 cm (P=0.000).When straining, these data were -8.9±0.6 cm before re-surgery and -5.7±0.5 cm 12 months after it (P=0.000). The values of the posterior ano-rectal angle at rest before re-surgery were much higher than normal, amounting to 136.7 ° ±5.4°.After re-surgery, they corresponded to 105.2 °±3.5 ° (P=0.000). When straining, the value of the anorectal angle before re-surgery corresponded to 171.1 ° ±5.3°, and 142.7 ° ±4.8 ° after it (P=0.000). Before re-surgery, all patients had a violation of barium evacuation from the rectum while defecating; the rate of barium evacuation was 2.9±0.4 g / sec. After 12 months of re-surgery, this parameter improved to 5.1±0.5 g / sec(P=0.001). Before re-surgery, the percentage of barium suspension remaining in the rectum after defecation significantly exceeded the normal values, amounting to 40.3%±5.7%.After re-surgery, the percentage of barium suspension remaining after emptying was almost equal to the norm, amounting to 19.9%±3.8% (P=0.005) (table 3).

Table 3: Results of defecography in patients of the study group before re-surgery and 12 months after it (n=17)

Main estimated parameters (mm) (n=25)	Healthy volunteer	Before operation	After operation	p-value
The level of the anorectal zone relative to PCL*				
In the rest	-2.9±0.9	-6.2±0.4	2.6±0.3	0.000
When straining	-5.6±1.0	-8.9±0.6	-5.7±0.5	0.000
Posterior ano-rectal angle				
In the rest	92°±1.5°	136.7°±5.4°	105.2°±3.5°	0.000
When straining	137°±1.5	171.1°±5,3°	142.7°±4,8°	0.000
Barium evacuation rate (g / sec)	5.6±0,9	2.9±0,4	5.1±0.5	0.001
Amount of barium remaining after evacuation (%)	16.5±5.3	40.3±5.7	19.9±3.8	0.005

PCL* – pubo-coccygealline

Physiological studies have also shown improvement in emptying function. When determining reflex function before re-surgery, the rectal volume sensory threshold, specifically the threshold of first sensation, in the study group patients was 32.9±1.7 ml. 12 months after the operation, it decreased to 26.2±1.3 ml (P=0.004).The threshold of maximum tolerable distention before re-surgery also exceeded the normal values, amounting to 85.3±2.2 ml. After re-surgery, it decreased to 76.2±1.8 ml (P=0.003).After re-surgery the amplitude of the recto-anal inhibitory reflex (RAIR) decreased from 49.6±5.8 mmHg up to 35.2±4.9 mmHg (P=0.067) and its duration from 29.9±6.1 sec to 16.8±2.7 sec (P=0.055) (table 4).

All patients in this group had I-II degree of fecal incontinence at the time of re-surgery, which was confirmed by the results of anorectal manometry. When anorectal manometry was performed before re-surgery, a decrease in the resting pressure in the internal anal sphincter area was observed to 42.5±4.5 mm Hg, and external anal sphincter up to 34.6±4.1 mmHg in comparison with these parameters in

healthy volunteers. After re-surgery there was an increase in resting pressure in the area of the internal anal sphincter and external anal sphincter to 57.3±5.1 mm Hg. and 46.4±4.2 mmHg, respectively. With a voluntary contraction of the pelvic floor muscles, the maximum squeeze pressure in the area of the anal canal increased from 119.8±10.5 mm Hg up to 156.7±9.4 mm Hg (P=0.000), approaching the norm, 162.3±13.2 mm Hg.

Table 4: Results of anorectal manometry in patients of the study group before re-surgery and 12 months after it (n=17)

Main estimated parameters (n=50)	Healthy volunteer	Before operation	After operation	p-value
The threshold of first sensation (ml)	18.7±5.1	32.9±1.7	26.2±1.3	0.004
The threshold of maximum tolerable distention (ml)	72.3±3.1	85.3±2.2	76.2±1.8	0.003
RAIR amplitude (mmHg)	32.8±2.6	49.6±5.8	35.2±4.9	0.067
RAIR duration (sec)	15.1±1.9	29.9±6.1	16.8±2.7	0.055
Resting pressure in the internal Anal sphincter area (mmHg)	59.8±6.2	42.5±4.5	57.3±5.1	0.092
Resting pressure in the external Anal sphincter area (mmHg)	48.8±3.2	34.6±4.1	46.4±4.2	0.053
Maximum squeeze pressure in The area of the anal canal	162.3±13.2	119.8±10.5	156.7±9.4	0.000

The balloon expulsion test also confirmed an improvement in rectal evacuation function. Before repeated surgery, only 4 (23.5%) of 17 patients showed the ability to expel a 50 ml-balloon out of the rectum within 1 minute without difficulty. 12 months after the operation, all patients performed this test with ease.

There was also a decrease in pudendal nerve terminal motor latency from 2.71±0.5 msec to 2.29±0.4 msec, which is due to the discontinuation of its overextension.

Subjective evaluation of the results of re-surgery, compared with the results of primary surgery, was conducted on the basis of filling out the King's Health Questionnaire and Cleveland Clinic Constipation Scale validated for Russian-speaking patients (8, 9). In both questionnaires, the higher number of points scored by the patients corresponded to greater severity of symptoms and lower quality of life.

All patients noted an improvement in the quality of life in the long term after surgical treatment. The average score for the severity of prolapsed symptoms before re-surgery, according to the King's Health Questionnaire, was 109.5±9.6.12 months after the second operation, the average score was 26.5±5.3 (P=0.000). Before the operation, constipation was noted by all patients, the average number of points according to Cleveland Clinic Constipation Scale was 20.3±2.3 points. After 12 months of re-surgery, all patients reported improved emptying. The average number of points was 12.6±2.6 points.

From the anatomical and functional positions, the female pelvis can be divided into three segments: the anterior, including the bladder and urethra; the middle, the uterus and vagina; the posterior, the anal canal, rectum, rectovaginal septum, and perineum. Pelvic prolapse can occur both within one segment of the pelvis and in all its departments (10, 11). With the increasing age of the female population, pelvic prolapse becomes an increasingly common disease that negatively affects the quality of life of patients(12, 13). The frequency of this pathology reaches 50% in women older than 50 years and 70% in women older than 60 years (14). Taking into account the high prevalence of pelvic prolapse and the fact that the surgical method of treatment is the most effective, the risk of women undergoing surgery during their life is 20%, including repeated 18%-25% (13, 15, 16). In order to clarify research on repeated surgical interventions for pelvic prolapse, An International Urogynecological Association (IUGA) /International Continent Society (ICS) have proposed the following standardized terminology. It is advisable to divide operations for pelvic prolapsed into primary and repeated operations, performed on a similar segment of the pelvis, and in a de novo occur in the other segment, as well as operations for complications associated with primary surgery (17). According to different authors, the frequency of repeated operations is very different. So according to Olsen et al. (1997) in the United States, the frequency of repeated operations was 29.2% (18). In the future, due to the development of pelvic surgery, there was a decrease in this percent to 10% -18% (19, 20). The reasons for the unsatisfactory results of surgical treatment of pelvic prolapse are not precisely established. P. Dällenbach and other authors believe that they are associated with progressive connective tissue weakness, genetic predisposition, and mechanical factors, such as ruptures of

levator muscles (21). Most authors believe that repeated operations are the result of a failed primary operation (13, 14). It is also believed that the correction of one type of pelvic prolapse may predispose women to develop another type of pelvic prolapse (or de novo prolapse) in another segment of the pelvis due to changes in the dynamic forces within it (22).

The group of patients we studied had the most severe form of repeated prolapse, which had a combined character, i.e., total prolapse. From our point of view, if there are defects in the supporting structures in various segments of the pelvis, their complex surgical correction is necessary, as defects in the middle segment of the pelvis destabilize the anterior and posterior segments. Currently, there is no generally accepted method of surgical treatment of combined pelvic prolapse, especially repeated. From our point of view, if there are defects in supporting structures in various segments of the pelvis, a complex surgical correction is necessary, since defects in the middle segment of the pelvis destabilize the anterior and posterior segments (23). Most surgeons now believe that abdominal sacrocolpopexy with the use of synthetic grafts is the most reliable method of surgical treatment of pelvic prolapse. When using this surgical technique, the pelvic organs are fixed in the most approximate version to the normal anatomical position and all defects in the structures supporting them can be eliminated simultaneously (24). When re-correcting pelvic prolapse in this group of patients, we used a modification of sacrocolporectopexy, that combines the advantages of posterior loop rectopexy according to Wells, and anterior rectopexy according to D'Hoore. Posterior loop rectopexy is more preferable for patients with fecal incontinence, since the posterior anorectal angle is reduced and the post-anal zone is lifted, which is important for the continence function (25). Anterior sacrocolpopexy simultaneously with the lifting of the rectum allowed to eliminate the rectocele, contributed to the rise of the perineum and does not aggravate constipation. The above mentioned advantages of each of the methods are also confirmed by the conclusions of other authors, but are not studied enough (26, 27). Fixing the mesh to the vagina posterior wall, to the cervix, or the apex of the vagina after hysterectomy allowed us to correct pelvic prolapse in the middle segment of the pelvis. Sacrocolporectopexy, as recommended by other authors, was supplemented with Burch colposuspension for correction or prevention of stress urinary incontinence (28, 29). For fixation of the pelvic organs to the sacrum at sacrocolpopexy we used grafts of synthetic mesh. As well as most authors, we believe that the use of synthetic grafts increases the reliability of this method (30). However, the percentage of erosion and shrinking of the mesh is high and, according to the literature, ranges from 2% to 10% (31). Like many other researchers, we can't compare our results with the use of previous generation mesh, since we used modern, lighter, and more porous materials. As recommended by other authors, we used a mesh of type 1 (32). The risk of erosion in the mesh area also depends on the type of suture material that it is fixed with. Traditionally, for abdominal sacrocolporectopexy, the mesh was fixed with non-absorbable sutures. However, recently, many surgeons prefer long-term resorption suture material. In a retrospective study comparing non-absorbable and long-term absorbable monofilament suture material, it was shown that the use of the last one can reduce the percentage of erosions to 3.7%-0% (33). We also used a long-term absorbable monofilament suture material, and erosion in the mesh area was observed in one patient. We cannot predict the percentage of possible erosions in such cases due to the small number of patients.

12 months after the operation, a clinical study, ultrasound and MRI showed anatomical correction of anterior, middle and posterior prolapse. The functions of emptying and continence and its parameters in patients of this group were close to normal. However, more distant results remain unknown and require further evaluation.

CONCLUSION

After correction of prolapse in the middle segment of the pelvis, using the patient's own tissues, in some patients, prolapse can progress and affect all parts of the pelvis. For these patients re-surgery is indicated. We obtained satisfactory anatomical and functional results when performed combined abdominal sacrocolporectopexy with additional reinforcement of all pelvic compartments with synthetic grafts.

CONFLICT OF INTEREST
None

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