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Risk factors for relapse of pelvic organ prolapse after reconstructive surgery without the use of synthetic materials

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Abstract

Objective: To determine the factors contributing to the relapses of pelvic organ prolapse after surgical corrections based on the use of autogenous tissues.

Material and Methods: A retrospective multivariate analysis of the dependence of the frequency of relapses of pelvic organ prolapse on the risk factors for its occurrence. It included 286 patients aged between 2 and 4 years after surgical correction without the use of synthetic materials. The study was conducted on the basis of a detailed database obtained before surgical treatment and taking into account the age of women, their life history, the presence of concomitant somatic pathology, degree of genital prolapses, family and obstetric-gynecological history, manifestations of connective tissue dysplasia, and anthropometric data.

Results: It was found that risk factors for the relapses are the age of patients over 55 years, advance of prolapse, disease duration over 10 years, overweight and abdominal obesity, prolapse in first-degree relatives, more than four external or visceral markers of connective tissue dysplasia.

Conclusion: These factors should be taken into account when choosing methods of surgical correction of the disease. If any the preference should be given to the use of synthetic materials.

Keywords: Pelvic organ prolapse, relapse risk factors

Introduction

The cause of genital prolapse is the excess of intra-abdominal pressure over the ability of the muscle complex and ligamentous-fascial structures, responsible for holding the pelvic organs, to counteract it. This could be caused by a significant increase in intra-abdominal pressure due to lifestyle or any pathological conditions (ascites, chronic obstructive pulmonary diseases, etc.) [1], which is relatively rare. Much more often, the development of the disease is determined by the dehiscence of ligamentous-fascial structures associated with their traumatic damage, dystrophic disorders or manifestations of systemic connective tissue dysplasia [2].

The surgical method is the main one in the treatment of pelvic organ prolapse. There are many options for correcting vaginal anatomy, most of which are of historical interest. Conventionally, they can be divided into three groups: occlusive methods, technologies based on the restoration of the anatomical relationships of the pelvic organs using autogenous tissues, and using synthetic materials. Occlusive methods, being non-physiological, but of the lowest operational risks, are used mainly in old age or in case of severe somatic pathology. The most commonly used methods are those based on the use of autogenous tissues. The main problem of these methods is the large number of relapses, reaching 45% of cases [3, 4]. This is due to the fact that restoring normal vaginal anatomy does not eliminate the disease causes. Technologies based on duplicating autogenous incompetent connective tissue structures with synthetic materials mainly solve this problem. At the same time, they significantly increase the risks of intra- and postoperative complications [5] and lead to a significant increase in the cost of treatment, and therefore their use must be strictly justified. Considering this circumstance, knowledge of the markers of dehiscence of autogenous connective tissue structures is extremely important for an adequate choice of method of surgical treatment.

The purpose of the study was to determine factors contributing to the relapses of pelvic organ prolapse after the use of surgical correction methods based on the use of autogenous tissue.

Materials and Methods

Surgical treatment of pelvic organ prolapse was performed in 773 patients in the gynecological department of the Central Municipal Clinical Hospital No. 6 of Donetsk for the period from 2006 to 2016. The evaluation of its results was carried out on the basis of a follow-up examination of 451 (58.3% of the total) women in the period from 2 to 4 years after the surgery. At the same time, a detailed database concerning clinical and anamnestic characteristics, the course of the disease and the causes of its occurrence in these patients was accumulated as a part of other research work carried out in the clinic. Its presence made it possible to conduct a retrospective multivariate analysis of the dependence of the relapse frequency on the presence of risk factors for these patients.

Various types of technology using synthetic materials were used in 165 (36.6%) women of the total number of re-examined ones. Surgical correction was carried out using autologous tissues in 286 (63.4%) cases. These patients made up the study group. Surgical treatment was performed. Various methods of apical fixation were used in all patients, namely: vaginal hysterectomy - 182 (63.6%), sacrospinal colpopexiation - 32 (11.2%), ventrofixation - 10 (3.5%), amputation of the cervix with transposition of the vaginal vault and cardinal ligaments - 62 (21.7%). In addition, all women underwent posterior colporrhaphy with levator plication to enhance active support of the pelvic organs. 232 (81.1%) women had defects in the pubocervical fascia, and, therefore, they underwent anterior colporrhaphy with fascial reconstruction.

The results of surgical treatment were assessed based on a vaginal profile examination conducted in accordance with the POP-Q quantitative classification. The concept of "disease relapse" included cases of diagnosis of disorders of vaginal anatomy corresponding to genital prolapse of stage II or higher. Age of women, life history, presence of concomitant somatic pathology, degree of genital prolapse, family and obstetric-gynecological history, manifestations of connective tissue dysplasia, and anthropometric data were analyzed to determine the dependence of the frequency of relapses on the risk factors using the database accumulated before surgical treatment.

Working and living conditions, the presence of somatic diseases, such as chronic diseases of the respiratory system, irritable bowel syndrome, and various nosological forms of organ-specific manifestations of hereditary collagenopathy were taken into account in the analyzed database based on the life history. A history of hernias of various locations, non-traumatic habitual dislocations and hip dysplasia, splanchnoptosis, connective tissue dysplasia of the heart, myopia, bile duct dyskinesia, and hemorrhoids was taken into account among this group of diseases. The presence of pelvic organ prolapse in first-degree relatives was taken into account in family history. The number of pregnancies, births, ages at

which the first and last births occurred, the interval between births, fetal weight, history of obstetric surgeries, birth injuries, gynecological diseases, surgical interventions on the pelvic organs, and age of menopause onset and the time passed since its onset were taken into account based on obstetric and gynecological history data.

Duration and age of onset of the first signs of genital prolapse were determined from the disease history data.

External manifestations of hereditary collagenopathy were taken into account based on the data of a general system examination [6]. The presence of skin hyperelasticity was assessed (the size of the skin fold above the outer ends of the collarbones was at least 3 cm). Muscle tone, the presence of diastasis of paired muscles, hernias of various localizations, chest deformities, flat feet (Friendland podometric method), severity of physiological curves of the thoracic and lumbar spine, joint hyperlability using the Beighton method, and varicose veins were determined.

The concept of "systemic connective tissue dysplasia" was used when patients had four or more external or visceral markers [7].

In addition, a number of anthropometric indicators were measured in these patients: height, weight, waist circumference, hip circumference. Body mass index (BMI) was calculated as the ratio of weight to the height square value in meters. BMI value of less than 22 is assessed as insufficient, value above 26 is overweight. The ratio of waist to hip volume (W/H) was also calculated. A WC/HC value of more than 0.85 is regarded as a manifestation of abdominal obesity [8].

Classical methods of variation statistics were used to process statistical data [9]. The sampling error ($\pm m$) was calculated to compare proportions expressed as percentages (P). The statistical significance of differences in proportions was assessed using Student's t-test. The null hypothesis of equality was discarded and differences between the compared proportions were considered significant at $p < 0.05$.

Results

The presence of relapses was established in 108 women (37.8%) after the study of the vaginal profile. Relapsing prolapse of II degree occurred in 39 (36.1%) cases, III degree - 69 (63.9%) cases. Isolated defects of vaginal anatomy were noted in 48 (44.4%) patients, with violations of the anterior segment occurring in 27 cases, posterior segments in 21. 60 (55.6%) women had combined defects of vaginal anatomy: a combination of apical, anterior and posterior - 27, apical and posterior - 3, apical and anterior - 9, anterior and posterior - 21. Thus, the most common relapses were associated with dehiscence of the pubocervical fascia, namely in 84 cases (77.8%).

Analysis of the study data showed that none of the women indicated difficult working or living conditions after surgical treatment. The differences in the incidence of chronic lung diseases and irritable bowel syndrome in patients with and without relapses were not statistically significant.

Data on the frequency of relapse of genital prolapse depending on obstetric risk factors for the disease are presented in Table 1.

Table 1: Rate of genital prolapse relapse versus obstetric risk factors

Risk factor	Number of women with risk factors	Relapse rate	Number of women without risk factors	Relapse rate	P
More than 2 childbirths	44	16 (36.4±7.3%)	242	92 (38.0±3.1%)	>0.05
First childbirth after the age 30	36	12 (33.3±7.9%)	250	96 (38.4±3.1%)	>0.05
The interval between childbirths is more than 10 years	48	18 (37.7±7.0%)	238	90 (37.8±3.1%)	>0.05
Fetal weight over 4000	33	13 (39.4±8.5%)	253	95 (37.5±3.0%)	>0.05
Childbirth injury	56	24 (42.9±6.6%)	230	84 (36.5±3.2%)	>0.05

Note: There was no significantly significant difference between the groups at $p>0.05$

As can be seen from the table, obstetric risk factors for the development of genital prolapse did not affect the frequency of relapses after surgical treatment.

Analysis of relapses rate depending on the type of surgical treatment also showed no statistically significant differences. Thus, 66 (36.3±3.6) relapses were noted in 182 women after radical surgical treatment, 42 (40.4±4.8) relapses were observed in 104 patients after the use of organ-preserving methods ($p>0.05$).

Determining the frequency of relapses depending on the degree of genital prolapsed that 40 patients had II degree prolapse, the number of relapses was 5 cases (12.5±5.2%). Relapses occurred in 54 (32.9±2.7%) women with grade III genital prolapse out of 164 women, in 25 (46.3±6.8%) women with grade IV genital prolapse out of 54 women. In all cases, the differences in frequency were statistically significant ($p<0.05$). Similar data were obtained for posthysterectomy prolapse. Thus, relapses were noted in 26 (92.9±4.9%) out of 28 patients with posthysterectomy prolapse. Relapse occurred in 82 cases (31.8±2.9%) in the remaining 258 patients ($p<0.05$). The obtained result indicates the difficulties of restoring the integral relationship of the fascial-ligamentous structures that make up the pericervical ring due to their partial loss during a previous hysterectomy.

Analysis of the relapse frequency depending on risk factors (indicating the causes to some extent determining the dehiscence of the connective tissue) established that the average age of the patients was 53.94±9.7 years. Relapses of the disease were noted in 31 (22.3±3.5%) cases of 139 women under the age of 55 years. In 147 patients over 55 years, relapses occurred in 77 cases (52.4±4.1%) ($p<0.05$). Similar data were obtained for postmenopausal women.

There were significant differences in the incidence of relapse of genital prolapse depending on the disease duration. Thus, late relapses were noted in 54 (28.7±3.3%) of 188 women with a disease duration of up to 10 years. At the same time, relapses also occurred in 54 (55.1±5.0%) of 98 patients with a disease duration of more than 10 years ($p<0.05$).

The incidence of relapse of genital prolapses also depended on anthropometric parameters such as excess body weight and abdominal obesity. Thus, relapses occurred in 57 cases (60.0±5.0%) out of 95 patients with a body mass index exceeding 26, and 51 (26.7±3.2%) - in 191 women who were not overweight ($p<0.05$). Relapses occurred in 52 (66.7±5.3%) of the 78 patients with abdominal obesity ($WC/HC > 0.85$), and in 56 (26.9±3.1%) of the remaining 208 patients ($p<0.05$).

There were significant differences in the incidence of relapses of genital prolapses after surgical treatment depending on the hereditary predisposition to the occurrence of the disease itself and manifestations of systemic connective tissue dysplasia. Thus, relapses occurred in 23 (67.6±8.0%) among 34 patients who had first-degree relatives with the presence

of genital prolapse, while relapses occurred in 85 (33.7±3.0%) of 252 women without hereditary predisposition ($p<0.05$). Relapses were detected in 62 (66.7±4.9%) of 93 patients with the presence of four or more markers of systemic connective tissue dysplasia. At the same time, it occurred in 46 (23.8±3.1%) of 193 women with the absence of these manifestations.

Discussion

Our data on the frequency of relapses after surgical treatment of pelvic organ prolapse correspond to the results obtained by other authors and indicate their high frequency for correction methods using autogenous tissues^[3, 4].

We performed retrospective analysis aimed at determining the significance of risk factors considering the occurrence of relapses from the point of view of the disease continuation. The significance of generally accepted factors indicating an increase in intra-abdominal pressure in the development of relapses among the examined patients was not established. Also, the significance of obstetric risk factors for the disease occurrence which indirectly indicate the traumatic nature of damage to the fascial-ligamentary pelvic structures was not established. This is most likely due to the fact that these defects were eliminated during surgical procedures.

The data on the influence of factors that to some extent indicate the presence of connective tissue dystrophic disorders, such as the age of patients and postmenopausal period of life, the degree of prolapse and its duration, overweight and abdominal obesity, hereditary predisposition to genital prolapse and hereditarily determined systemic connective tissue dysplasia were connective tissue were statistically significant.

Age-related atrophic processes associated with estrogen deficiency in the postmenopausal period occur in the muscular and connective tissue structures of the vagina and pelvic floor and are accompanied by a decrease in collagen content. In addition, circulatory disorders are progressing with a lack of estrogen, due to the lack of stimulation of the release of vasoactive substances such as nitric oxide by endothelial cells leading to hyalinization of collagen and fragmentation of elastic fibers^[10, 11]. A number of authors point out risk factors for relapses, such as severe degrees of prolapse and disease duration over 10 years^[12, 13]. Most likely this is due to increasing dystrophic changes in the pelvic structures caused by long-term hypoxia due to impaired vascular architectonics. The significance of such factors as overweight and abdominal obesity that we identified contradicts the data of Bodner-Adler B., *et al.* (2022)^[1], who did not establish the influence of these factors on the incidence of prolapse relapses. At the same time, a number of studies have proven the presence of a pathogenetic relationship between the accumulation of excess adipose tissue and the development of a smoldering systemic inflammatory response and the progression of metabolic

disorders, including those in connective tissue [14, 15]. In addition, the role of abdominal obesity in the occurrence of high intra-abdominal pressure is undeniable. All this could serve as an explanation for our data.

The role of hereditary predisposition in the occurrence of genital prolapses and the presence of hereditarily determined systemic connective tissue dysplasia was proven long time ago [16-18]. Naturally, an attempt to correct anatomical disorders by using autogenous incompetent connective tissue structures also leads to an increased risk of prolapse relapse.

Conclusion

1. The number of relapses after the use of surgical treatment of pelvic organ prolapse, based on their fixation or elimination of fascial defects using autogenous connective tissue structures, reaches 38% within following period of 2 to 4 years.
2. Risk factors for the relapses are: the patient's age over 55 years, pronounced degrees of prolapse, disease duration over 10 years, overweight and abdominal obesity, prolapse in first-degree relatives, more than four external or visceral markers of connective tissue dysplasia, previous hysterectomy.
3. These factors indicate the presence of connective tissue insufficiency caused by dystrophic changes or the presence of systemic connective tissue dysplasia.
4. The data obtained should be taken into account when choosing methods of surgical correction, giving preference to the use of synthetic materials in patients with risk factors.

Conflict of Interest

Not available Financial.

Support

Not available.

Reference

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