

## 1. Introduction

Hysterectomy increases the risk of genitourinary syndrome. The definition of “genitourinary syndrome” includes a range of manifestations associated with the highest probability of the development of atrophic and dystrophic processes in estrogen-dependent tissues and structures of the lower third of the urogenital tract (lower third of the ureters, bladder, urethra, vagina) as well as in the ligament of the pelvis and pelvic floor muscles [1, 2]. Hysterectomy for uterine fibroids is characterized by hypoestrogenic status, as the uterus with fibroids is a site of local hypoestrodiolemlia, and the simultaneous removal of this depot, even with the preservation of ovarian tissue inevitably leads to disruption of steroid homeostasis [3, 4]. Estrogens are neurotransmitters of the neuromuscular system of the vagina due to the high sensitivity of noradrenergic neurons, which are mainly localized in the vaginal arches and are involved in maintaining the tone of the smooth muscles of the uterus, vagina, and urethra. Estrogen deficiency can be a factor in the atony of the vaginal walls and lead to their omission [5–8]. The search for diagnostic predictors of urogenital disorders at the preoperative stage, timely diagnosis, development and use of surgical methods for prevention and correction of urogenital disorders in the postoperative period remains relevant.

**The aim of the research** – method of determining the structure of long-term results of hysterectomy for uterine fibroids in women of reproductive age using different approaches for the possibility of optimizing the diagnostic algorithm in the preoperative period in the future.

## 2. Materials and methods of the research

On the basis of the gynecological department of Kyiv Perinatal Center in the period from 2015 to 2020, 160 women aged 40 to 50 years with symptomatic uterine fibroids, who under-

## LONG-TERM EFFECTS OF HYSTERECTOMY DUE TO UTERINE FIBROIDS IN WOMEN OF REPRODUCTIVE AGE

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**Abstract:** The article presents an analytical assessment of long-term postoperative consequences in women of reproductive age after hysterectomy for uterine fibroids.

**The aim** of the study to determine the structure of long-term results of hysterectomy for uterine fibroids in women of reproductive age using different approaches to the possibility of optimizing the diagnostic algorithm in the preoperative period in the future.

**Materials and methods** – 160 women aged 40 to 50 years with symptomatic uterine fibroids, who underwent hysterectomy performed by vaginal, laparoscopically assisted vaginal, abdominal, were examined. Research methods are the following: physical examination of patients, assessment of pelvic floor (cough test, Valsalva maneuver, “Stop Test” with Kegel cones), diagnosis of urogenital dysfunction using a standardized POP-Q system; instrumental examination; complete urodynamic testing, cystometry, (for assessment of the severity of urinary incontinence the classification of the International Continence Society (ICS) was used); assessment of the patient’s quality of life on the 10th day after surgery, 3, 6, 12 months and three years after surgery using the international standard questionnaire MOS SF-36; study of the local infectious status of the female body (bacteriological and bacterioscopic examination of discharge from vagina and urethra, determination of vaginal pH

**Results and their discussion.** The structure of distant postoperative manifestations was determined (after 36 months of postoperative monitoring): clinical manifestations of intestinal function discomfort in the same degree in patients of three subgroups, 2.4 and 2.9 times less often in group I patients indicated chronic pelvic pain, in 1.7 times less often – for genitourinary disorders, vaginal prolapse in a third of cases, especially in women with abdominal HE and classic vaginal HE (30.0±5.0 % and 37.8±5.0 %, respectively, against 17.8±4.0 % – in the group with laparotomically assisted HE). **Conclusions.** Given the data on genitourinary disorders and vaginal prolapse in almost a third of observations after hysterectomy for uterine fibroids, it is advisable to consider additional examination of latent signs of genitourinary syndrome at the preoperative stage to optimize the choice of access, the volume of surgical treatment.

**Keywords:** uterine fibroids, hysterectomy, urogenital disorders.

went hysterectomy, were examined. Patients were divided three groups. The main group included 90 patients aged 45.9±1.3 years who underwent vaginal hysterectomy without appendages and laparoscopically assisted vaginal hysterectomy, the comparison group consisted of 70 patients with hysterectomy performed by abdominal access with an average age of 47.2±1.6 years. The mean age of patients in both the main and comparison groups had no statistically significant differences compared with controls  $p<0.05$ . Exclusion criteria were history of ovariectomy, malignancies of any location, severe somatic pathology, refusal of patients to participate in the study. The control group consisted of 50 women with asymptomatic fibroids of reproductive age 44.7±1.3 years. Examinations were performed both at the preoperative stage and 3 years after the surgery.

All questions regarding the possibility of conducting these studies were agreed with the Commission on Bioethical Expertise and Ethics of Scientific Research of the Bogomolets National Medical University protocol No. 140 dated 21.12.2020, the study was performed with the analysis of medical records before surgical recovery retrospectively, all patients gave their voluntary consent to examination, questionnaires. The research is based on ethical standards in accordance with the Helsinki Declaration of the World Medical Association (THE 52ND WMA GENERAL ASSEMBLY, EDINBURGH, SCOTLAND, OCTOBER 2000)

Research methods are the following: physical examination of patients, assessment of pelvic floor (cough test, Valsalva maneuver, “Stop Test” with Kegel cones), diagnosis of urogenital dysfunction using a standardized POP-Q system; instrumental examination; complete urodynamic testing, cystometry, (for assessment of the severity of urinary incontinence the classification of the International Continence Society (ICS) was used); assessment of the patient’s quality of life on the 10<sup>th</sup> day after

surgery, 3, 6, 12 months and three years after surgery using the international standard questionnaire MOS SF-36; study of the local infectious status of the female body (bacteriological and bacterioscopic examination of discharge from vagina and urethra, determination of vaginal pH, the index of vagina was evaluated; standard methods of variation statistics, method of calculating the odds ratio (OR) and its 95 % confidential interval (95 % Confidential Interval, 95 % CI).

Statistical processing of the results was performed using statistical packages IBM SPSS Statistics (ver. 22) and statistical environment R (ver. 3.1). Estimation of frequency distributions and variability of indicators was performed by parametric methods of statistics. For comparative analysis, the Chi-square ( $\chi^2$ ) and Fisher's exact tests were used.

### 3. Results

Monitoring of complaints for 36 months revealed clinical manifestations of intestinal function discomfort after surgery in almost the same degree in patients of three subgroups, 2.4 and 2.9 times less often patients in group I indicated chronic pelvic pain, 1.7 times less often – in genitourinary disorders, dyspareunia, and sexual dysfunction in the case of laparoscopically assisted hysterectomy. Also, in the dynamics of postoperative monitoring there was a high proportion of disorders of the biocenosis of the genital mucosa (2.4 times more often), vaginal dysbiosis hypoestrogenism. Of note is the increase in the proportion of pelvic floor descent and prolapse in one third of cases, especially in women with abdominal HE and classic vaginal HE (30.0±5.0 % and 37.8±5.0 %, respectively, against 17.8±4.0 % – in group with laparotomically assisted HE,  $p<0.05$ ). The structure of distant postoperative manifestations is presented in **Table 1**.

Barlow-scale vulvovaginal atrophy was higher in patients with vaginal hysterectomy, with vulvovaginal atrophy being most severe in women >45 years of age, confirming the role of hypoestrogenism in the mechanisms of trophic mucosal changes. Loss of this protective mechanism makes the vaginal

epithelium vulnerable to infection, which in turn reduces a woman's sexual confidence and contributes to the development of dyspareunia [9]. Most patients rated their condition on the D. Barlow scale at 2–3 points, i.e. they noted discomfort that worsens daily life and other disorders of moderate severity. Against the background of estrogen deficiency there are not only atrophic changes of the vaginal mucosa, vulva, and urethra, but also changes the metabolism and quality of collagen types I and III, elastin, their restructuring occurs, resulting in the vagina loses its folds, decreases the depth and lumen of the vaginal canal walls of the vagina. Suppression of tissue resistance makes them vulnerable to secondary infection, which forms the basis for the infectious-inflammatory process of the vagina and urinary tract. The results of the examination in the remote postoperative period showed a shift in the pH level of the vaginal mucosa 5.0–6.5 – in the same 39 (86.7 %) patients after vaginal hysterectomy, and 36 (51.4 %), which confirmed hypoestrogenism.

One of the important criteria for diagnosing pelvic floor failure and prognosis of genitourinary syndrome is the determination of markers of undifferentiated connective tissue dystrophy, the analysis of the prevalence of which in this study allowed to identify in 69 patients (43.12±8.0 %) stage of 160 observations dysplastic phenotype. Statistical calculations suggested a correlation between the probability of urogenital disorders and the symptom complex associated with connective tissue weakness (OR-19.26; 95 % CI; 2.21-49.16,  $p<0.05$ ). The obtained results allowed to identify the most significant markers of NDST, including cardiovascular microanomalies (mitral trap prolapse, additional ventricular chord and urinary system) (nephroptosis) – in equal proportions of 22.5±43.0 %, intestinal motility disorders (gastroptosis, predisposition to constipation) – 20.0±5.0 %, musculoskeletal system (scoliosis, weakness of the ligaments in the form of dislocations of the joints, frequent fractures) – 18.8±4.0 %, varicose veins of the pelvis and lower extremities – 38.1 %, hernias of different localization – 17.5±4.0 %.

**Table 1**

Structure of distant postoperative manifestations (36 months of postoperative monitoring), M±m, abs. number, %

Indicators	Group of patients with HE, n=160		
	Group I, n=90		Group II (AH), n=70
	Subgroup IA (VH), n=45	Subgroup IB (LAVH), n=45	
Genitourinary disorders, including:	39 (86.7±4.0)*	24 (53.3±6.0)**	63 (90.0±4.0)
cysturethritis;	11 (24.4±4.0)	9 (20.0±8.0)	16 (22.9±7.0)
dysuria;	22 (48.9±6.0)*	11 (24.4±7.0)**	33 (47.1±8.0)
urinary incontinence (imperative)	12 (26.7±7.0)	9 (20.0±5.0)**	19 (27.1±7.0)
Dyspareunia	16 (35.6±5.0)*.**	8 (17.8±7.0)**	16 (22.9±7.0)
Sexual dysfunction, including decreased libido	14 (31.1±7.0)*	8 (17.8±8.0)**	19 (27.1±8.0)
Chronic pelvic pain	12 (26.7±8.0)*.**	10 (22.2±8.0)**	45 (64.3±8.0)
Dysbiosis	39 (86.7±2.0)*.**	24 (53.3±4.0)	36 (51.4±4.0)
Low score of vulvovaginal atrophy on the Barlow scale	23 (51.1±6.0)*	12 (26.7±7.0)**	33 (47.1±6.0)
Intestinal dysfunction	21 (46.7±8.0)*	15 (33.3±8.0)**	32 (45.7±8.0)
Omission of the walls of the vagina I–II degree			
Including:			
Cystocele	17 (37.8±5.0)*.**	8 (17.8±2.0)**	21 (30.0±4.0)
apical prolapse	6 (13.3±4.0)*.**	0**	5 (7.12.0±)
feeling of a foreign body	17 (37.8±4.0)*.**	3 (6.7±2.0)**	19 (27.1±3.0)

Note: \* – the difference is statistically significant relative to the indicators of the IB subgroup,  $p<0.05$ ; \*\* – the difference is statistically significant relative to the indicators of group II,  $p<0.05$

A quality-of-life survey in 52 (57.7±4.0 %) patients after vaginal hysterectomy and 33 (47.1±4.0 %) after abdominal hysterectomy showed full effectiveness of surgical recovery and improvement of quality of life one year after surgery. In 35 (38.8±4.0 %) patients of group I and 21 – 30.0±7.0 % of the comparison group, improvement was noted, but at the same time dissatisfaction with the quality of life. Manifestation of genitourinary manifestations established in the dynamics of the postoperative period, in our opinion, could play an important role in the development of psycho-emotional and depressive disorders that had a negative impact on quality of life.

#### 4. Discussion

The obtained results agree with the results of studies of other scientists on the multifactorial etiology of genitourinary syndrome after hysterectomy [3, 10]. This statement allows to determine the algorithm for the diagnosis of latent clinical manifestations of genitourinary syndrome at the preoperative stage to optimize the choice of access, the volume of surgical treatment. We have proposed a sequence of tests recommended for use in the preoperative phase. First, screening for the initial symptoms of urinary incontinence and pelvic floor failure is an analytical evaluation of questionnaires (CII-SF) and urination diaries. The next stage should include assessment of somatic status and careful collection of medical history – age, body mass index, determination of concomitant extragenital diseases with increased intra-abdominal pressure, markers of connective tissue dysplasia, as well as several samples (cough test, Valsalva test, gasket test). Optimal diagnostic methods include assessment of psychological and neurogenic status.

**Study limitations.** The results of the analysis reflect the data only of the gynecological department of the Perinatal Center of Kyiv. As not all patients joined the study after hysterectomy, there may be shifts in the results of the study due to underrepresentation. However, the study has representative and comparable groups.

**Prospects for further research.** Given that the manifestation of genitourinary syndrome after surgery for uterine fibroids and, consequently, the negative impact on women's quality of life remains underestimated, it is advisable to conduct further research to modify surgical techniques, development of

preventive and rehabilitative postoperative measures based on identified stage of predictors of urogenital disorders.

#### 5. Conclusions

Dissatisfaction with the quality of life after hysterectomy was noted in 35 (38.8±4.0 %) patients of group I and 21 – 30.0±7.0 % of group II, although there was an improvement, with the most significant negative impact on its parameters have symptoms urinary incontinence, intestinal function, dyspareunia, and the severity and timing of their occurrence depend on the degree of minimization of surgical trauma and the choice of surgical access. Given the data on genitourinary disorders in the vast majority (78.7±8.0 %) and vaginal prolapse in almost a third of cases (in women with abdominal HE 30.0±5.0 %, classic vaginal HE 37.8±5.0 % laparoscopically assisted HE 17.8±4.0 %,  $p<0.05$ ) after hysterectomy for uterine fibroids, it is advisable to consider additional examination of the latent signs of genitourinary syndrome at the preoperative stage to optimize the choice of access, the volume of surgical treatment. The analysis of the prevalence of markers of undifferentiated connective tissue dystrophy allowed in this study to identify 69 patients (43.12±8.0 %). The relationship between the probability of genitourinary disorders and the symptom complex associated with connective tissue weakness has been suggested (OR-19.26; 95 % CI; 2.21-49.16,  $p<0.05$ ).

Urogynecological aspects of long-term hysterectomy results using different approaches require careful comprehensive examination and comparison with clinical symptoms of existing urogenital disorders in the preoperative stage.

#### Conflict of interests

The authors declare that they have no conflicts of interest.

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