Correction of urodynamic disorders in women with genitourinary syndrome using a fractional CO₂-laser

V.O. Beniuk, V.M. Goncharenko, M.S. Puchko, A.A. Momot, T.V. Kovaliuk, V.O. Polovynka
Bogomolets National Medical University, Kyiv

This article is devoted to the treatment of urodynamic disorders in women with the genitourinary syndrome by using a fractional CO₂-laser. Nowadays, the development of genitourinary syndrome is an urgent problem among women of different ages. Genitourinary disorders are a complex of symptoms associated with the development of atrophic and dystrophic processes in the estrogenic tissues (the urethra, lower third of the uterus, pelvic floor ligaments and muscles).

The objective: to determine the pathogenetic effectiveness of CO₂ laser in the treatment of urodynamic disorders in premenopausal women with genitourinary syndrome.

Materials and methods. The study covered 130 female patients with symptoms of the genitourinary syndrome. The patients were divided into two groups depending on their treatment. The main group consisted of 56 women using CO₂ laser therapy. The comparison group consisted of 74 women who were treated with local application of hormone. To assess the efficacy of treatment and the functional status of the lower urinary tract, a comprehensive pre-treatment and post-treatment urodynamic examination were performed.

Results. The average age of the patients in the examined groups was 47.2±2.5 years. After the treatment, the urodynamic examination showed an increase of the maximal intraurethral pressure from 16.8±17.9 to 26.7±21.2 mm Hg in the main group (p<0.01). The urethral closure pressure increased from 15.3±13.2 to 26.8±18.5 mm Hg (p<0.01). These changes were found upon examination of the functional length of the urethra, which increased from 2.0±0.3 to 3.0±0.4 cm, and thus reached normative values for healthy women. At the same time, the pre-treatment and post-treatment indicators did not statistically differ in comparison group.

Conclusions. The results of the study show that the MonaLisaTouch method of laser fractional ablation of vaginal and vulva epithelium is highly effective compared with local hormonal therapy and can be recommended as a monotherapy for urogenital disorders and pelvic floor dysfunction.

Key words: genitourinary syndrome, CO₂-laser, estriol, urodynamic examination.
Genitourinary disorders – this complex of symptoms, connected with atrophic and dystrophic processes in the urogenital tract and the effect of pharmacological agents in GS treatment.

**Objective of research:** to determine and substantiate the effectiveness of using CO2-laser in the treatment of women with moderate GS symptoms.

**Methods of research:** of 130 women with genitourinary syndrome, 56 women were divided into two groups. The main group included 56 women who received laser ablative treatment, and the control group consisted of 74 women who received traditional treatment with local estriol. The study was conducted by comparing the results of urodynamic examination before and after treatment.

**Results:** The average age of the women included in the study was 47.2 ± 2.5 years. After the treatment, there were significant changes in the urogenital tract, including a decrease in the number of bacterial cells and a decrease in the pH of the vaginal fluid. The functional capacity of the pelvic floor muscles improved, and the pressure at the urethral neck increased. The pressure at the bladder neck decreased, and the flow rate increased. The control group showed no significant changes.

**Conclusion:** Laser ablative treatment is effective in treating women with moderate GS symptoms. The results of the study confirm the effectiveness of laser treatment compared to traditional treatment with local estriol.

**Keywords:** genitourinary syndrome, CO2-laser, estriol, urodynamic examination.
incompatibilities with a number of other drugs limit the possibility of their use [4, 15].

Currently, for the correction and treatment of GS, drugs containing estriol – a natural estrogen synthesized in the human body, and has a selective effect on the state of the urogenital diaphragm are widely used [12, 14, 22, 25–27]. However, given the increased risk of developing cancer, including breast cancer in this age group of women, the North American Menopausal Society and the International Society for the Study of Women’s Sexual Health advises to limit the systemic use of estrogen medications that can act as an etiopathicogenic treatment. At the same time, the society emphasizes the relative safety of local estrogen forms application in order to reduce and prevent GS symptoms. The use of estriol drugs helps to restore the physiology of the urogenital tract: vaginal epithelium, connective tissue elements of collagen and elastin [21].

The positive effect of estriol medications is realized by selectively acting on the urogenital tract, restoring normal microflora and physiological pH value of the vaginal contents, improving the proliferation of the mucous membrane of the external genitals, reducing the possibility of urogenital infections and preventing the urinary incontinence [2, 32].

Physical therapy improves the contractile function of the pelvic floor muscles, eliminates a “gapping” effect of the perineum and restores an obturation function. However, physical therapy has almost no effect on the vaginal walls prolapse, whereas only the pelvic floor and lower third of the vagina are trained [5].

At the same time, none of these methods contributes to the complete disappearance of UI stress symptoms, and the frequency of relapses after the disease is high, which forces a woman to long-term monitoring and treatment, significantly impairing their life quality [4, 15]. The search for alternative treatment methods led to the development and implementation of the new technology for GS correction which is based on the use of laser energy [19, 20, 21, 29, 34].

It should be noted that currently more and more information about the prospects of using minimally invasive laser technologies in urogynecology is being accumulated. But the information about its clinical effectiveness and safety in the treatment of UI stress in women are provided only in a few sources [4, 15, 19–21, 23]. Structural mechanisms of the therapeutic effect of laser radiation on the morpho-functional state of the vaginal walls after treatment with laser technologies remain insufficiently studied. Information about these mechanisms is provided only in selected publications [4, 33, 35]. This determines the prospect of further research in this area and the purpose of our research.

The objective: to determine and justify pathogenetically the effectiveness of CO2-laser application in the complex treatment of genitourinary syndrome in perimenopausal period patients.

**MATERIALS AND METHODS**

In order to achieve the purpose, a prospective examination of 130 women at the age of 45–55 years who were treated in the Gynecological Department No. 2 of the Kyiv City Maternity Hospital No. 3 and in the Medical center «Academy of Your Health» with manifestations of genitourinary syndrome, was conducted. All women were divided into two groups depending on the prescribed therapy. The main group consisted of 56 premenopausal age women with genitourinary syndrome, who were offered the therapy with the CO2-laser application. Proposed laser therapy involved 4 sessions performing at an interval of 30–45 days with a laser power of 40 W, exposure time of 1000 MS and the distance between points-1000 microns.

The comparison group was formed by 74 women with genitourinary syndrome manifestations, who were intended only for therapy with local estriol application at the rate of one application of cream per day for a month, followed by further dosage reduction to one application twice a week for 7 months. The total duration of treatment for women in both groups was 8 months.

The criteria for inclusion in the research were the age of the women (between 45 and 55 years), GS clinical manifestations and the absence of acute extragenital pathology.

The criteria for exclusion from the research were epilepsy and mental disorders, acute pelvic inflammatory processes, sex transmitted diseases, vaginal wall prolapse of the 3rd grade and uterine prolapse, pregnancy and postpartum period, menstruation and cancer.

All patients before treatment had a set of examinations, including gynecological examination, cytological smear examination, ultrasound examination of the pelvic organs, pH-metry and Femoflor Screen testing. In the presence of GP, the severity of anterior and posterior vaginal walls prolapse was determined in the gynecological chair, and a cough test was performed.

To assess the functional status of the lower urinary tract, a comprehensive urodynamic examination (maximal intraurethral pressure, urethral closure pressure, functional length of the urethra) was performed. The efficacy of treatment was assessed before and after treatment based on the urodynamic data.

**RESULTS**

Both patients of the main and the comparison groups were comprehensive according to the place of residence, family and social status. That allowed to judge only the differences due to the method of stressful urinary incontinence treatment.

The average age of patients in the examined groups was 47.2±2.5 years, but their structure was significantly dominated by women over 52 years old.

After the treatment according to the urodynamic examination, the maximum intraurethral pressure increased from 16.8±17.9 to 26.7±21.2 mmHg in the main group (p<0.01). The urethral closure pressure increased from 15.3±13.2 to 26.8±18.5 mmHg (p<0.01). These changes were found upon examination of the functional length of the urethra, which increased from 2.0±0.3 to 3.0±0.4 cm, and thus reached normative values for healthy women. At the same time, the indicators in the pre-treatment and post-treatment comparison groups did not statistically differ. The results of the intra-urethral pressure profile are presented in table.
The inclusion of CO2-laser therapy to the complex treatment of genitourinary syndrome can significantly reduce the manifestations of genitourinary disorders, which is confirmed by urodynamic examinations before and after treatment.

The positive therapeutic result of the CO2-laser, from our point of view, occurs due to the effect on the ethiopathogenetic mechanisms of the syndrome complex.

Thus, the results of our study show that the MonaLisaTouch laser fractionated ablation of the vaginal epithelium and vulva is highly effective compared to local hormonal therapy and can be recommended as a monotherapy for pelvic floor dysfunction.

### Results of urethral profilometry before and after treatment, M±s

| Indicators                     | Before treatment | After treatment | p-value | Significance |
|-------------------------------|------------------|-----------------|---------|--------------|
|                               | Main group       | Comparison group | Main group | Comparison group |
| Maximum intra-urethral pressure, mm Hg | 16.8±17.9        | 16.6±18.1       | 26.7±21.2** | 17.6±18.2'   |
| Urethral occlusion pressure, mmHg | 15.3±13.2        | 15.8±14.1       | 26.8±18.5** | 18.8±15.2'   |
| Functional urethral length, cm | 2.0±0.3          | 2.0±0.3         | 3.0±0.4*   | 2.5±0.4*     |

Note: – * Statistically significant differences in outcomes before treatment, p<0.05 (t-Student’s test); – ** statistically highly significant difference from the pre-treatment results, p<0.01 (t-test); – º statistically insignificant differences in comparison to the pre-treatment results, p>0.05 (t-test).

### CONCLUSIONS

The inclusion of CO2-laser therapy to the complex treatment of genitourinary syndrome can significantly reduce the manifestations of genitourinary disorders, which is confirmed by urodynamic examinations before and after treatment.

The positive therapeutic result of the CO2-laser, from our point of view, occurs due to the effect on the ethiopathogenetic mechanisms of the syndrome complex.

Thus, the results of our study show that the MonaLisaTouch laser fractionated ablation of the vaginal epithelium and vulva is highly effective compared to local hormonal therapy and can be recommended as a monotherapy for pelvic floor dysfunction.

### Information about the authors

Beniuk Vasyl O. – Department of Obstetrics and Gynaecology № 3 Bogomolets National Medical University, 03148, Kyiv, Kuchera str., 7. E-mail: benyuk@i.ua
ORCID ID 0000-0002-5984-3307

Goncharenko Vadym M. – Department of Obstetrics and Gynaecology № 3 Bogomolets National Medical University, 03148, Kyiv, Kuchera str., 7.
ORCID ID 0000-0002-8317-3737

Puchko Maryna S. – Department of Obstetrics and Gynaecology № 3 Bogomolets National Medical University, 03148, Kyiv, Kuchera str., 7. E-mail: puchkomari@gmail.com
ORCID ID 0000-0002-2936-7741

Momot Alona A. – Department of Obstetrics and Gynaecology № 3 Bogomolets National Medical University, 03148, Kyiv, Kuchera str., 7. E-mail: alionamomot@ukr.net
ORCID ID 0000-0001-9339-881X

Polovynka Vadym O. – Department of Clinical Pharmacology and Clinical Pharmacy, Bogomolets National Medical University, 01601, Kyiv, 13 T. Shevchenko Blvd.
ORCID ID 0000-0002-5893-5402

Kovaliuk Tetiana V. – Department of Obstetrics and Gynaecology № 3 Bogomolets National Medical University, 03148, Kyiv, Kuchera str., 7. E-mail: tatyanah7@meta.ua
ORCID: 0000-0001-9339-881X

**Відомості про авторів**

Бєнюк Василь Олексійович – Кафедра акушерства і гінекології № 3 Національного медичного університету імені О.О. Богомольця, 03148, м. Київ, вул. В. Кучера, 7. E-mail: benyuk@i.ua
ORCID ID 0000-0002-5984-3307

Гончаренко Вадим Миколайович – Кафедра акушерства і гінекології № 3 Національного медичного університету імені О.О. Богомольця, 03148, м. Київ, вул. В. Кучера, 7
ORCID ID 0000-0002-8317-3737

Пучко Марина Сергіївна – Кафедра акушерства і гінекології № 3 Національного медичного університету імені О.О. Богомольця, 03148, м. Київ, вул. В. Кучера, 7
ORCID ID 0000-0002-2936-7741

Момот Альона Анатоліївна – Кафедра акушерства і гінекології № 3 Національного медичного університету імені О.О. Богомольця, 03148, м. Київ, вул. В. Кучера, 7. E-mail: alionamomot@ukr.net
ORCID ID 0000-0001-9339-881X

Половинка Владислав Олександрович – Кафедра клінічної фармаціології та клінічної фармації Національного медичного університету імені О. О. Богомольця, 01601, м. Київ, бул. Т. Шевченка, 13
ORCID ID 0000-0001-8406-7816

Ковалюк Tetiana Wolodymivna – Кафедра акушерства і гінекології № 3 Національного медичного університету імені О. О. Богомольця, 03148, м. Київ, вул. В. Кучера, 7
ORCID: 0000-0001-9339-881X
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