

<https://doi.org/10.47183/mes.2025-269>



LAPAROSCOPIC ACCESS IN TREATMENT OF REPRODUCTIVE SYSTEM DISEASES IN WOMEN WITH MULTIPLE ADHESIONS

Elena A. Soloveva^{1,2}, Oleg S. Filippov^{2,3}, Anna P. Uryupina¹, Nina A. Chugunova¹, Daria A. Ivanova¹, Anna M. Utkina¹

¹ Novorossiysk Clinical Center, Novorossiysk, Russia

² Federal Scientific and Clinical Center for Children and Adolescents, Moscow, Russia

³ Burnasyan Federal Medical Biophysical Center, Moscow, Russia

Introduction. Recent progress in abdominal surgery and operative gynecology has led to a significant increase in the number of patients with postoperative abdominal adhesions. The incidence of adhesions after abdominal surgery reaches 67–95%, a serious health problem. In their presence, any following operations may be associated with an increased risk of intra- and postoperative complications.

Objective. To study the possibility of laparoscopic access and its outcome in the surgical treatment of women with reproductive system diseases concomitant with pronounced abdominal and pelvic adhesions.

Materials and methods. A retrospective analysis of 265 patient medical records was performed. The general group included 91 women who had undergone surgery for diseases of the reproductive system in the setting of pronounced abdominal and pelvic adhesions. The second group (control) comprised 174 patients who had undergone surgery for diseases of the reproductive system and had no adhesions. The average age of the patients in the general and control groups was 47.1 ± 12.8 and 46.5 ± 8.1 years, respectively. The preoperative examination included ultrasonography and dynamic magnetic resonance imaging (MRI) of the abdominal cavity and lesser pelvis. For laparoscopic surgery, a STORZ high-resolution video system (Germany) and a BOWA power plant (Germany), including high-frequency (HF) electric, laser, and argon plasma energy, were used. Statistical data processing was carried out using the Statistica 13 and MS Office Excel software. The result was considered statistically significant at $p < 0.05$.

Results. The conducted comparative analysis demonstrated the possibility of using laparoscopic access for the treatment of women with reproductive system pathologies in combination with pronounced abdominal and pelvic adhesions. The duration of surgery, the volume of blood loss, the severity of pain, the duration of hospitalization, and convalescence had no statistically significant differences between the general ($n = 91$) and control groups ($n = 174$). The absence of differences in the frequency of intra- and postoperative complications proves laparoscopic access to be safe in the setting of severe adhesions. The safety is ensured by preoperative patient preparation and examination, use of necessary modern equipment and tools, surgical skills and experience.

Conclusions. The use of laparoscopic access for performing surgical treatment of patients with reproductive system diseases in combination with pronounced adhesions can be considered as the preferred and safe treatment method.

Keywords: adhesive process; laparoscopy; adhesiolysis; hysterectomy; myomectomy; anti-adhesive barrier

For citation: Soloveva E.A., Filippov O.S., Uryupina A.P., Chugunova N.A., Ivanova D.A., Utkina A.M. Laparoscopic access in treatment of reproductive system diseases in women with multiple adhesions. *Extreme Medicine*. 2025;27(1):131–137. <https://doi.org/10.47183/mes.2025-269>

Funding: the study was carried out without sponsorship.

Compliance with the ethical standards: the study was carried out retrospectively, therefore requiring no ethical approval. All patients signed informed consent for surgery and other types of treatment. Taking into account the retrospective nature of the study, no special consent was required to analyze the results.

Potential conflict of interest: the authors declare no conflict of interest.

✉ Elena A. Soloveva solovevaln@inbox.ru

Received: 11 Jul. 2024 **Revised:** 26 Dec. 2024 **Accepted:** 6 Feb. 2025 **Online first:** 25 Feb. 2025

УДК 618.1-089

ЛАПАРОСКОПИЧЕСКИЙ ДОСТУП ДЛЯ ЛЕЧЕНИЯ ЗАБОЛЕВАНИЙ РЕПРОДУКТИВНОЙ СИСТЕМЫ ЖЕНЩИН ПРИ ВЫРАЖЕННОМ СПАЕЧНОМ ПРОЦЕССЕ

Е.А. Соловьева^{1,2}, О.С. Филиппов^{2,3}, А.П. Урюпина¹, Н.А. Чугунова¹, Д.А. Иванова¹, А.М. Уткина¹

¹ Новороссийский клинический центр Федерального медико-биологического агентства, Новороссийск, Россия

² Федеральный научно-клинический центр детей и подростков Федерального медико-биологического агентства, Москва, Россия

³ Федеральный медицинский биофизический центр им. А.И. Бурназяна Федерального медико-биологического агентства, Москва, Россия

Введение. Развитие абдоминальной хирургии и оперативной гинекологии определило значительное увеличение числа больных с послеоперационными спайками брюшной полости. Частота встречаемости спаечного процесса после абдоминальных операций достигает 67–95%. Абдоминальные спайки представляют собой серьезную проблему для здоровья. При необходимости повторных операций при наличии спаечного процесса значительно возрастает риск интра- и послеоперационных осложнений.

Цель. Изучить возможность и результаты применения лапароскопического доступа при хирургическом лечении женщин с заболеваниями репродуктивной системы в сочетании с выраженным спаечным процессом брюшной полости и малого таза.

Материалы и методы. Проведен ретроспективный анализ 265 историй болезни пациенток. В основную группу была включена 91 женщина, прооперированная по поводу заболеваний репродуктивной системы на фоне спаечного процесса брюшной полости и малого таза. Вторую группу (контрольная) составили 174 пациентки, прооперированные по поводу заболеваний репродуктивной системы и не имеющие спаечного процесса. Средний возраст пациенток основной группы составил $47,1 \pm 12,8$ года, контрольной группы — $46,5 \pm 8,1$ года. Предоперационное обследование включало в себя ультразвуковое исследование и динамическое магнитно-резонансное исследование (МРТ) брюшной полости и малого таза. Для выполнения лапароскопических операций использовали видеосистему высокого разрешения компании STORZ (Германия), энергетическую установку компании BOWA (Германия), включающую электрохирургию высокой частоты (ЭХВЧ), лазерную и аргонно-плазменную энергию. Статистическая обработка данных проводилась с использованием программы Statistica 13 и MS Office Excel. Результат считался статистически значимым при $p < 0,05$.

© E.A. Soloveva, O.S. Filippov, A.P. Uryupina, N.A. Chugunova, D.A. Ivanova, A.M. Utkina, 2025

Результаты. Проведенный сравнительный анализ продемонстрировал возможность применения лапароскопического доступа для лечения женщин с патологией органов репродуктивной системы в сочетании с выраженным спаечным процессом брюшной полости и малого таза. Длительность оперативного вмешательства, объем кровопотери, выраженность болевого синдрома, длительность госпитализации и реconvalesценции не имели статистически значимых различий между основной ($n = 91$) и контрольной группами ($n = 174$). Отсутствие различий частоты интра- и послеоперационных осложнений доказывает, что лапароскопический доступ в условиях выраженного спаечного процесса является безопасным, что обеспечивается предоперационными подготовкой и обследованием пациента, применением необходимого современного оборудования и инструментария, оперативными навыками и опытом хирурга.

Выводы. Применение лапароскопического доступа для выполнения оперативного лечения пациенток с заболеваниями органов репродуктивной системы в сочетании с выраженным спаечным процессом может рассматриваться как предпочтительный и безопасный метод лечения.

Ключевые слова: спаечный процесс; лапароскопия; адгезиолизис; гистерэктомия; миомэктомия; противоспаечный барьер

Для цитирования: Соловьева Е.А., Филиппов О.С., Урюпина А.П., Чугунова Н.А., Иванова Д.А., Уткина А.М. Лапароскопический доступ для лечения заболеваний репродуктивной системы женщин при выраженном спаечном процессе. *Медицина экстремальных ситуаций*. 2025;27(1):131–137. <https://doi.org/10.47183/mes.2025-269>

Финансирование: исследование выполнено без спонсорской поддержки.

Соответствие принципам этики: исследование выполнено ретроспективно, поэтому не нуждается в этическом одобрении. Все пациенты дали информированное согласие на операцию и другие виды лечения. С учетом ретроспективного характера исследования для анализа результатов не требовалось специального согласия.

Потенциальный конфликт интересов: авторы заявляют об отсутствии конфликта интересов.

✉ Соловьева Елена Анатольевна solovevaln@inbox.ru

Статья поступила: 11.07.2024 **После доработки:** 26.12.2024 **Принята к публикации:** 06.02.2025 **Online first:** 25.02.2025

INTRODUCTION

Recent achievements in abdominal surgery and operative gynecology have led to a significant increase in the number of patients with postoperative abdominal adhesions [1]. The development of abdominal adhesions occurs in 67–95% of cases after general abdominal surgery and up to 97% after gynecological surgery with laparotomy access [2, 3]. According to research studies, 63% of the laparotomy access length is involved in the formation of anterior abdominal wall adhesion of the omentum and intestinal loops [4, 5].

According to the International Adhesion Society experts, postoperative adhesions in the abdominal cavity are the most common complication, posing a serious health problem for patients and significantly reducing their quality of life. The most significant consequences of adhesions involve intestinal obstruction (32–85%), female infertility (15–40%), dyspareunia and chronic abdominal pain syndrome (20–50%) [6]. The need for adhesiolysis during subsequent surgical procedures increases the operation duration by an average of 24–50 min. In addition, the risk of iatrogenic intestinal damage, bleeding, and subsequent fistula formation increases, thus lengthening the recovery time. Moreover, repeated laparotomy and adhesiolysis can only worsen the adhesion formation [2, 7–9, 10]. At the same time, according to some authors, laparoscopic adhesiolysis decreased the risk of adhesion recurrence and secondary surgical infections (infectious septic complications, wound infection) [11, 12].

Currently, the efforts aimed at preventing adhesions involve anti-adhesive barriers made of hyaluronic acid and carboxycellulose, thorough hemostasis during surgery, and delicate tissue handling [2, 13–15].

Most publications on the characteristics of adhesions in the abdominal cavity address the features of diagnosis, treatment methods, and analysis of complications of

intestinal adhesive obstruction that occur after surgical interventions on abdominal organs [16–18].

Despite the current progress in minimally invasive technologies that have made it possible to minimize the traumatic nature of surgical interventions, the use of modern multimodal postoperative rehabilitation programs and a variety of means and methods aimed at preventing the adhesive process, the results of therapeutic and preventive measures cannot be considered sufficient [6, 19]. The issue of pelvic and abdominal adhesions resulting from surgical interventions on the female reproductive system requires research attention due to its decisive importance for selecting treatment tactics and surgical access.

To date, standardized diagnostic criteria and recommendations for selecting surgical access when treating women with reproductive organ pathologies concomitant with a widespread adhesive process are lacking. This dictates the need to study the technological capabilities of minimally invasive surgery for its further improvement and implementation in gynecological practice.

In this study, we set out to investigate the possibility of using laparoscopic access and its outcome in the surgical treatment of women with reproductive system diseases in combination with pronounced abdominal and pelvic adhesions.

MATERIALS AND METHODS

We carried out a retrospective analysis of 265 records of patients operated at the Gynecological Department of the Novorossiysk Clinical Center for Reproductive System Diseases using laparoscopic access.

The general group included 91 women who had undergone surgery for reproductive system diseases in the setting of pronounced abdominal and pelvic adhesions (grade III–IV according to Blinnikov's scale). The second group

(control) consisted of 174 patients who had undergone surgery reproductive system diseases and had no adhesions or those with a slight degree of its severity (I–II degree according to Blinnikov's scale). The scale is presented in Table 1.

The criteria for selecting patients in the study group were the age of women over 18 years old, reproductive system diseases that required surgical treatment, and abdominal adhesions of varying severity.

In the general group, the average age of the patients was 47.1 ± 12.8 years. In the general group, 55 (60.4%) women were overweight or obese of varying severity with an average BMI of 27.5 ± 5.9 kg/m² (maximum 42.4 kg/m²); 5 (5.4%) patients with morbid obesity with a BMI of more than 40 kg/m² underwent surgery. Body weight deficiency was found in only 1 (1.1%) case. Out of the entire sample, only 30 (32.3%) women were of normal weight.

In the control group of 174 patients, the average age was 46.5 ± 8.1 years. Overweight and obese women prevailed: 113 (64.9%) patients with an average BMI of 30.1 ± 6.7 kg/m² (maximum 52.6 kg/m²), of whom 30 (17.2%) were morbidly obese. Most of the operated patients had a combined gynecological pathology.

The preoperative examination of the patients and operation planning included ultrasonography and dynamic magnetic resonance imaging (MRI) of the abdominal cavity and lesser pelvis. One of the objectives of this study was to determine the presence, localization, and prevalence of the adhesive process, the involvement of the anterior abdominal wall and intestinal loops with the purpose of selecting the safest access to the abdominal cavity (places of insertion of trocar for optics and trocar for instruments).

Abdominal ultrasonography (US) was performed in all patients. Isolated preoperative ultrasonography in obese patients was associated with technical difficulties, which resulted in an objective diagnostic error. In such cases, 16 (17.6%) patients additionally underwent dynamic MRI of the abdominal cavity and lesser pelvis. This group included women with 3–4 obesity grade.

Laparoscopic surgery was performed using a STORZ high-resolution video system (Germany), a BOWA power plant from (Germany), including high-frequency (HF) electric, laser, and argon plasma energy.

A laparoscopic access using 30° anterolateral vision optics provided more reliable information about the condition of the abdominal organs, as well as the presence, localization, and prevalence of adhesions. The volume of dissected splices was determined individually in each case.

In order to prevent damage to internal organs during the introduction of an optical trocar, taking into account ultrasonography and MRI mapping data, in 18 (19.9%) cases

the trocar was installed in an open way along the midline 3–5 cm above the navel; in 9 (9.8%) cases, the optical trocar was not inserted along the classical point of the umbilical region. The Veres needle was not used to create a carboxyperitoneum. To minimize the pathological effect of carboxyperitoneum, abdominal pressure was maintained at a level of 6–8 mmHg.

A combination of various methods and tools was used to dissect the splices: an ultrasonic scalpel (BOWA, Germany), scissors, and mechanical traction. After performing adhesiolysis and gaining access to the pelvic organs, the necessary amount of surgery was performed to solve the set clinical task. To prevent the formation of adhesions in the postoperative period, great importance was given to hemostasis and sanitation of the abdominal cavity. To create an anti-adhesive barrier, an anti-adhesive preparation based on polyethylene oxide and carboxymethylcellulose was injected into the abdominal cavity. Upon the completion of the surgery, the site of the first trocar insertion was examined to ensure the absence of intestinal damage.

A comparative assessment of the results of surgical treatment was carried out by analyzing the duration of surgical treatment, the volume of blood loss, the severity of pain syndrome on the VAS scale, and the duration of hospitalization. In the postoperative period, the classical visual analog pain scale (VAS) was used to assess the pain syndrome [21, 22].

Statistical data processing was carried out using the Statistica 13 and MS Office Excel software. The result was considered statistically significant at $p < 0.05$.

RESULTS AND DISCUSSION

According to the results obtained, The study found that benign uterine tumor processes prevailed in the general group in 34 (37.4%) cases and in the control group in 86 (49.4%) cases. Benign ovarian neoplasms were registered in 23 (25.3%) patients of the general group and 29 (16.7%) women from the control group. The relevant data is presented in Table 2.

In the general group, 81 (89%) of the patients had previously undergone various surgical procedures on the abdominal and pelvic organs. Only 10 (10.9%) women in this group had no history of any prior surgical procedures. Table 3 shows the types of surgical interventions previously performed in patients of the general group with a pronounced adhesive process. The total number of operations performed was 180, of which 123 (68.3%) were performed for gynecological pathology and 57 (31.7%) operations on

Table 1. Grades of abdominal adhesions by O.I. Blinnikov

Grade I	Local adhesions limited to the postoperative scar area or part of the abdominal cavity, occupying no more than 1/3 of one compartment in the absence of adhesions in other areas
Grade II	Local adhesions in combination with single rare adhesions in other areas
Grade III	Adhesions occupying more than 1/3 of the abdominal cavity
Grade IV	Diffuse adhesions occupying 2/3 of the abdominal cavity

Table prepared by the authors using data from [20]

Table 2. Indication for surgical treatment ($p > 0.05$)

	General group $n = 91$		Control group $n = 174$	
	n	%	n	%
Uterine fibroids	34	37.4	86	49.4
Ovarian neoplasms	23	25.3	29	16.7
External genital endometriosis	11	12.1	18	10.3
Chronic inflammatory diseases of the pelvic organs with hydrosalpinxes	8	8.8	7	4.0
Infertility	6	6.6	17	9.7
Pelvic organ prolapse	4	4.4	12	6.9
Atypical endometrial hyperplasia, adenomatosis	2	2.2	5	2.9
Chronic pelvic pain syndrome	3	3	0	0

Table prepared by the authors using their own data

abdominal organs. Previous surgical interventions in the vast majority of 149 (82.8%) cases were performed by laparotomy access. Laparoscopic access was performed only in 29 (16.1%) operations, vaginal access — in 2 (1.4%) operations.

To achieve the clinical task, the patients of the general and control groups underwent various amounts of surgery. Table 4 shows the main types of surgical treatment performed. A large proportion were radical operations, such as radical hysterectomy with appendages or fallopian tubes.

The analysis of the medical records of the patients in both groups found that no damage to the internal organs occurred during the introduction of the trocar for optics and instruments. When comparing the features of the course of surgery and the course of the postoperative period in

cases of surgical treatment in patients of the general and control groups, no statistically significant differences were found (Table 5).

Thus, the average duration of surgical intervention increased by 25–40 min in the general group due to the time spent on adhesiolysis. The average volume of blood loss and the hospitalization duration did not differ significantly among the groups. In all cases of surgical intervention, the amount of surgical treatment required by the clinical situation was performed, which additionally confirms the possibility of performing the required amount of surgical intervention in the presence of pronounced adhesions in the abdominal cavity. There were no laparotomy conversions in both groups of patients.

Health promotion in both groups was carried out starting from the first day of the postoperative period; sparing nutrition was organized from the second day. In all patients, intestinal motility was restored on days 1–2.

On the first day after surgery, only 6 (6.6%) patients from the general group rated pain on a scale of 7–8 points. Moderate pain at a level of 5–6 points according to VAS was noted in 38 (41.8%), while a mild pain level of 3–4 points was noted by 42 (46.2%) women. There were no complaints of pain at all in 5 (5.4%) patients from the general observation group. By the third day, all patients had reported a pain level of 2–3 points, which made it possible to cancel the use of painkillers. Similar data were obtained in the control group.

The average duration of hospitalization stay in both groups did not differ statistically, the corresponding data are presented in Table 5. The need to perform adhesiolysis during surgery did not lead to an increase in the postoperative bed day. Significant intraoperative and postoperative complications, such as injury to adjacent organs, bleeding from damaged vessels, and purulent-septic complications in the early and late postoperative periods, were not recorded in both groups. In the general group, in one case, sigmoid colon deserosing occurred without opening the lumen. The defect was sutured laparoscopically and did not affect the course of the postoperative period. During the follow-up year, there were no cases of intestinal adhesive obstruction in both groups of patients.

Table 3. Total number and types of previous surgical interventions in patients of the general group based on anamnesis data

Surgical interventions	Number of interventions
On the reproductive system organs, in particular:	123
operations on the uterine appendages	43
Caesarean section	38
tubal pregnancy	13
hysterectomy	12
endometriosis	10
myomectomy	5
inflammatory diseases	2
On the abdominal organs, in particular:	57
appendectomy	30
cholecystectomy	9
bowel surgery	6
injuries and traumas of abdominal organs	5
operations for diffuse peritonitis	4
liver surgery	3

Table prepared by the authors using their own data

Table 4. Types of surgical procedures

Types of surgical interventions	General group <i>n</i> = 91		Control group <i>n</i> = 174	
	<i>n</i>	%	<i>n</i>	%
Radical hysterectomy with bilateral oophorectomy	38	41.8	99	55.2
Ovarian neoplasm excision	13	14.3	20	11.5
Adnexectomy	11	12.1	13	7.5
Endometriosis surgery	8	8.7	8	4.6
Myomectomy	7	7.8	20	11.5
Tubectomy	5	5.5	0	0
Dissection of the adhesions (infertility)	5	5.5	4	2.3
Promontofixation using a mesh implant	4	4.4	12	6.9
Scar metroplasty after cesarean section	0	0	1	0.6

Table prepared by the authors using their own data

Table 5. Main indicators of surgical intervention

Parameter	General group	Control group
Average surgery duration, min	107.9 ± 34.38	81.9 ± 25.6
Average volume of blood loss, mL	65 ± 32.5	61.9 ± 29.2
Average hospital length of stay, bed days	5.6 ± 1.8	6.1 ± 1.3
Stay in the intensive care unit 1 day after surgery, number of patients, %	28 (30.8%)	59 (33.9%)
Conversion to laparotomy, %	0	0

Table prepared by the authors using their own data

To date, pronounced adhesions remain a contraindication for selecting laparoscopic access during surgical treatment. It is believed that adhesions impair visualization, increase the risk of damage to the internal organs of the abdominal cavity (intestines, large vessels, etc.), and worsen the outcome of surgical treatment in patients with diseases of the female reproductive system. In addition, the range of noninvasive preoperative diagnostic tools of adhesions is limited, not finding application in routine practice [23, 24].

The development and implementation of standardized diagnostic criteria and surgical tactics for a safer surgical treatment in patients with reproductive system diseases in combination with pronounced abdominal and pelvic adhesions will make it possible to use laparoscopic technologies in larger groups of patients with reproductive system diseases [24–26].

Preoperative mapping of adhesions using ultrasonography and MRI of the abdominal cavity and lesser pelvis with a high degree of probability facilitates the selection of the safest points of trocar insertion into the abdominal cavity. The refusal to use a Veres needle and the direct introduction of the trocar into the abdominal cavity followed by the creation of a carboxyperitoneum does not increase the risk of abdominal organ damage. The use of 30° anterior-lateral vision optics significantly improves visualization in the presence of adhesions. A combination of modern instruments with various types of energy improves the quality of

adhesiolysis, reduces the risk of damage to the abdominal and pelvic organs, injury to surrounding tissues, and bleeding. All of the above increases the safety of surgical intervention performed in the setting of adhesions using the laparoscopic method. The presented conclusions are consistent with the literature data [12, 25–27].

The conducted comparative analysis demonstrates the possibility of using laparoscopic access for the treatment of women with reproductive system pathologies concomitant with pronounced abdominal and pelvic adhesions. Laparoscopic access in the setting of pronounced adhesions is a safe choice, which is ensured by preoperative preparation and examination of the patient, the use of necessary modern equipment and tools, the surgical skills and experience of the surgeon.

CONCLUSION

The use of laparoscopic access for performing surgical treatment in patients with reproductive system diseases in combination with pronounced adhesions can be considered as the preferred and safe method of treatment. The use of modern methods of preoperative mapping of adhesions (ultrasonography, MRI) and modern equipment contributes to improving the safety of laparoscopic methods and reducing the risk of intraoperative and postoperative complications.

References

1. Lavreshin PM, Botasheva VS, Gobedzhishvili VV, Kelasov IG. Dynamics of morphologic changes in the peritoneum at its mechanical damage. *Medical Bulletin of the North Caucasus*. 2010;4:59–62 (In Russ.).
EDN: [NBXMFP](#)
2. Catena F, Di Saverio S, Kelly MD. et al. Bologna Guidelines for Diagnosis and Management of Adhesive Small Bowel Obstruction (ASBO): 2010 Evidence-Based Guidelines of the World Society of Emergency Surgery. *World J. Emerg Surg*. 2011;5:1–24.
<https://doi.org/10.1186/1749-7922-6-5>
3. Bezhenar VF, Tsyurdeeva AA, Baylyuk EN. Adhesive disease pelvic organs in gynecological patients: from pathogenesis to prevention. *Oncogynecology*. 2014;4:68–74 (In Russ.).
EDN: [TDXGYJ](#)
4. Behman R, Nathens AB, Byrne JP, Mason S, Look HN, Karanicolas PJ. Laparoscopic Surgery for Adhesive Small Bowel Obstruction Is Associated With a Higher Risk of Bowel Injury: A Population-based Analysis of 8584. *Patients Annals of Surgery*. 2017;266(3):489–98.
<https://doi.org/10.1097/SLA.0000000000002369>
5. Szomstein S, Menzo E, Simpfendorfer C, Zundel N, Rosenthal RJ., Laparoscopic Lysis of Adhesions. *World J Surg*. 2006;30:1–7.
<https://doi.org/10.1007/s00268-005-7778-0>
6. Nazarenko AA, Akimov VP, Malyshev PO. Epidemiology, pathogenesis and prevention of postoperative adhesions in the abdominal cavity. *Bulletin of Surgery named after I.I.Grekov*. 2016; 175(5):114–8 (In Russ.).
EDN: [XBVPAJ](#)
7. Bezhenar VF, Ailamazian ÉK, Baïlyuk EN, Tsyurdeeva AA, Polenov NI. Etiology, pathogenesis and prevention of adhesions in surgery of the pelvic. *Russian Obstetrician-Gynecologist Gazette*. 2011;11(2):90–101 (In Russ.).
EDN: [PZAVRV](#)
8. Adamyan LV, Kozachenko AV., Kondratovich LM. Peritoneal adhesions: the history of research, classification and pathogenesis (a review). *Russian Journal of Human Reproduction*. 2013;6:7–13 (In Russ.).
EDN: [RZQNGR](#)
9. Lutsevich OE, Akimov VP, Shirinsky VG, Bichev AA. Issues of pathogenesis of adhesive peritoneal disease and modern approaches to its prevention. Literature review. *Moscow Surgical Journal*. 2017; 3:11–26 (In Russ.).
EDN: [YSTFQI](#)
10. Yusubov IA. The role of minimally invasive technologies in the diagnosis and treatment of intestinal obstruction of postoperative adhesive origin. *Siberian Scientific Medical Journal*. 2023;43(4):132–8 (In Russ.).
<https://doi.org/10.18699/SSMJ20230414>
11. Sikirica V, Bapat B, Candrilli SD, Davis KL, Wilson M, Johns A. The inpatient burden of abdominal and gynecological adhesiolysis in the US. *Sikirica et al. BMC Surgery*. 2011;11:2–9.
<https://doi.org/10.1186/1471-2482-11-13>
12. Zvyagintsev VV, Gorpinyuk VP, Fomov GV et al. Features of laparoscopic operations in patients after abdominal cavity interventions. *Modern problems of science and education*. 2019; (4):128 (In Russ.).
<https://doi.org/10.17513/spno.29013>
13. Ahmad G, Kim K, Thompson M et al. Barrier agents for adhesion prevention after gynaecological surgery. *Cochrane Database of Systematic Reviews*. 2020;3(4):CD000475.
<https://doi.org/10.1002/14651858.CD000475.pub4>
14. Ahmad G, Thompson M, Kim K et al. Fluid and pharmacological agents for adhesion prevention after gynaecological surgery. *Cochrane Database of Systematic Reviews*. 2020;7:CD001298.
<https://doi.org/10.1002/14651858.CD001298.pub5>
15. Bondarevsky IYa, Shalmagambetov MS, Bordunovskiy VN. The current state of the problem of forecasting and prevention of postoperative peritoneal adhesiogenesis (literature review). *Ural Medical Journal*. *Ural medical journal*. 2018;1(156):69–78 (In Russ.).
EDN: [YODEDL](#)
16. Shkerdina MI, Antonyan SZh, Zharikov Yu O. Aspects of laparoscopic treatment of patients with adhesive small bowel obstruction (literature review). *Bulletin of surgery named after I. I. Grekov*. 2020;179(2):79–84 (In Russ.).
<https://doi.org/10.24884/0042-4625-2020-179-2-79-84>
17. Tarasenko SV, Zaitsev OV, Sokolov PV, et al. Laparoscopic access in the treatment of adhesive small bowel obstruction. *Bulletin of Surgery named after I. I. Grekov*. 2018; 177(2):30–3 (In Russ.).
<https://doi.org/10.24884/0042-4625-2018-177-2-30-33>
18. Behman R, Nathens AB, Byrne JP, Mason S, Look Hong N, Karanicolas PJ. Laparoscopic Surgery for Adhesive Small Bowel Obstruction Is Associated With a Higher Risk of Bowel Injury : a Population-based Analysis of 8584 Patients. *Ann. Surg*. 2017;266(3):489–98.
<https://doi.org/10.1097/SLA.0000000000002369>
19. Schaefer SD, Alkatout I, Dornhoefer N, Herrmann J, Klapdor R, Meinhold-Heerlein I, Meszaros J, Mustea A, Oppelt P, Wallwiener M, Kraemer B. Prevention of peritoneal adhesions after gynecological surgery: a systematic review. *Arch Gynecol Obstet*. 2024;310(2):655–72.
<https://doi.org/10.1007/s00404-024-07584-1>
20. Ayushinova NI, Shurygina IA, Shurygin MG, Glinskaya EV. Assessment of the severity of the adhesive process in the abdominal cavity. *Siberian Medical Journal (Irkutsk)*. 2014;7:10–14 (In Russ.).
EDN: [TQPYQJ](#)
21. Mokhov EM, Kadykov VA, Sergeev AN, et al. Pain assessment scales and features of their application in medicine (literature review). *Verkhnevolzhsky Medical Journal*. 2019;18(2):34–7 (In Russ.).
EDN: [DEYKPY](#)
22. Hawker GA, Mian S, Kendzerska T, French M. Measures of adult pain: Visual Analog Scale for Pain (VAS Pain), Numeric Rating Scale for Pain (NRS Pain), McGill Pain Questionnaire (MPQ), Short-Form McGill Pain Questionnaire (SF-MPQ), Chronic Pain Grade Scale (CPGS), Short Form-36 Bodily Pain Scale (SF-36 BPS), and Measure of Intermittent and Constant Osteoarthritis Pain (ICOAP). *Arthritis Care Res (Hoboken)*. 2011;63(11):S240–52.
<https://doi.org/10.1002/acr.20543>
23. Ghonge NP, Ghonge SD. Computed tomography and magnetic resonance imaging in the evaluation of pelvic peritoneal adhesions: What radiologists need to know? *Indian J Radiol Imaging*. 2014;24(2):149–55.
<https://doi.org/10.4103/0971-3026.134400>
24. Armashov VP, Belousov AM, Vavshko MV, Madrakhimov ShN, Armashov GV, Matveev NL. Is ultrasound diagnosis of peritoneal adhesions possible before abdominal surgery? *Innovative medicine of Kuban*. 2022;4:75–8 (In Russ.).
<https://doi.org/10.35401/2541-9897-2022-25-4-75-81>
25. Lutsevich OE, Gallyamov EA, Popov SV, et al. Features of laparoscopic operations in conditions of adhesive peritoneal disease and the possibility of its laparoscopic treatment and prevention. *Pacific Medical Journal*. 2017;1 (67): 69–73 (In Russ.).
<https://doi.org/10.17238/PmJ1609-1175.2017.1.69-73>
26. Di Saverio S, Birindelli A, Broek RT. et al. Laparoscopic adhesiolysis : not for all patients, not for all surgeons, not in all centres. *Updates Surg*. 2018;70(4):557–61.
<https://doi.org/10.1007/s13304-018-0534-4>
27. Byrne J, Saleh F, Ambrosini L, Quereshy F, Jackson T D, Okrainec A. Laparoscopic versus open surgical management of adhesive small bowel obstruction: a comparison of outcomes. *Surg Endosc*. 2015;29(9):2525–32.
<https://doi.org/10.1007/s00464-014-4015-7>

Authors' contributions. All the authors confirm that they meet the ICMJE criteria for authorship. The most significant contributions were as follows: Elena A. Soloveva — experimental design, literature review, collecting and preparation of samples, data analysis, writing the main part of the text; Oleg S. Filippov — experimental design, making final edits; Anna P. Uryupina — collecting and preparation of samples, data analysis, writing part of the text; Nina C. Chugunova — experimental design; Daria A. Ivanova — literature review, data analysis; Anna M. Utkina — literature review, data analysis.

AUTHORS

Elena A. Soloveva, Cand. Sci. (Med.)
<https://orcid.org/0009-0004-9442-8645>
solovevaln@inbox.ru

Anna P. Uryupina
<https://orcid.org/0009-0008-3348-3631>
anna.petra3@mail.ru

Daria A. Ivanova
<https://orcid.org/0009-0006-1942-7516>
daria.andreevna1995@mail.ru

Oleg S. Filippov, Dr. Sci. (Med.), Professor
<https://orcid.org/0000-0003-2654-1334>
ilippovolsen@yandex.ru

Nina A. Chugunova
<https://orcid.org/0009-0003-3345-579X>
nkc@nkc-fmba.ru

Anna M. Utkina
<https://orcid.org/0009-0000-1757-0307>
annautkina83@gmail.com