

Effectiveness of laparoendoscopic surgical treatment with single-site / single-incision laparoscopic surgery method in gynecological practice

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Laparoendoscopic single-site surgery (LESS) / single-incision laparoscopic surgery (SILS) is considered the effective minimally invasive laparoendoscopic method for solving gynecological problems.

The aim of the study was to clinically analyze and evaluate the main advantages and disadvantages of transumbilical LESS / SILS surgeries used in the surgical treatment of patients with tubo-ovarian pathologies.

Materials and methods. Depending on the tasks and the methods of examination and surgical treatment, patients were divided into 3 large groups: group I (comparison group I) patients underwent laparotomic surgical interventions on the pelvic organs; group II (comparison group II) patients were subjected to classical laparoscopic surgical treatment tactics, and group III (main group) patients underwent minimally invasive LESS / SILS surgeries.

Results. Pain intensity was statistically significantly lower measuring to 1.8 ± 0.1 cm on the Visual Analogue Scale in the postoperative period when applying LESS compared to other methods. The final analysis of intraumbilical scar on the Vancouver Scar Scale has revealed the highest cosmetic effect with a statistically significant score of 0.14 ± 0.08 6 months after LESS. In the long-term postoperative period, the least statistically significant complications have been observed after LESS / SILS with a rate of ventral hernia of 2.1 % and adhesions – 6.3 %.

Conclusions. The main advantages of LESS / SILS compared to laparotomy and laparoscopic surgeries are as follow: reduced blood loss, fewer postoperative complication rates, and faster recovery of patients in the early postoperative period. Since only a single incision is made, the pain sensation is minimal, and patients quicker return to usual daily activities. The main disadvantages of LESS are certain technical difficulties encountered during the procedure, as well as complications (conversion) observed during the intraoperative period. Since complications after LESS are minimal, this method is considered a more optimal approach for patients compared to classical laparoscopy. There is a need to optimize the application and functions of this method in clinical practice.

Keywords:

laparoendoscopic single-site surgery, tubo-ovarian pathologies.

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Ефективність лапароендоскопічного хірургічного лікування з одного доступу / лапароскопічного хірургічного втручання з одним розрізом у гінекологічній практиці

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LESS (лапароендоскопічне хірургічне втручання з одного доступу) / SILS (лапароскопічне хірургічне втручання з одним розрізом) визначено як ефективний малоінвазивний лапароскопічний метод у гінекологічній практиці.

Мета роботи – клінічно проаналізувати й оцінити основні переваги та недоліки трансумбілікальних однопортових лапароендоскопічних / лапароскопічних хірургічних втручань з одним розрізом, що застосовують під час хірургічного лікування пацієнтів із тубооваріальною патологією.

Матеріали і методи. Залежно від використаних методів обстеження та хірургічного лікування хворих поділили на три групи: до I групи (I група порівняння) залучили пацієнтів, яким виконано лапаротомні оперативні втручання на органах малого таза; до II групи (II група порівняння) – жінок, у яких застосували класичну лапароендоскопічну тактику хірургічного лікування; до III групи (основна) – пацієнток, яким виконано малоінвазивні LESS / SILS хірургічні операції.

Результати. У післяопераційному періоді інтенсивність болю у жінок із групи, де застосовано метод LESS, статистично вірогідно нижча порівняно з іншими групами, становила $1,8 \pm 0,1$ см за візуальною аналоговою шкалою. Під час остаточного аналізу внутрішньопупкової рубцевої тканини за шкалою Ванкувера через 6 місяців після операцій LESS / SILS досягнуто найкращого косметичного ефекту зі статистично значущими відмінностями ($0,14 \pm 0,08$ бала) порівняно з іншими методами. У віддаленому післяопераційному періоді найменше статистично значущих ускладнень зафіксовано у пацієнток, оперованих за методом LESS: частота вентральної грижі – 2,1 %, спайкового процесу – 6,3 %.

Висновки. Головні переваги методу LESS / SILS порівняно з лапаротомією та лапароскопією полягають у тому, що пацієнти зазнають меншої крововтрати, у них виникає менше післяопераційних ускладнень, прооперованих швидше активізують у ранньому післяопераційному періоді. Оскільки роблять лише один розріз, відчуття болю мінімальне, і пацієнти швидше повертаються до трудової діяльності. Основний недолік хірургії LESS – виникнення певних технічних труднощів під час процедури, а також ускладнень (пов'язаних із переходом на іншу методику), що виникають під час операції. Оскільки ускладнення під час хірургії LESS мінімальні, цей метод визначено як оптимальний для пацієнтів порівняно з класичною лапароскопією. Разом із тим, для ширшого використання в клінічній практиці метод потребує оптимізації.

Ключові слова:

лапароендоскопічна одномоментна хірургія, тубооваріальні патології.

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In recent years, special attention has been paid to less-invasive surgeries in gynecology. Laparoscopic surgery is a minimally invasive surgical method used in various gynecological diseases, including tubo-ovarian pathologies. Single-port laparoscopic surgery (SPLS) is considered one of the innovations in minimally invasive gynecological surgery and it is expected that this technique will increase the quality of gynecological operations [1]. In contrast to traditional laparoscopic surgeries with 3–5 small incisions (5–20 mm each), SPLS involves using a single skin incision no larger than 2 cm at the umbilicus [2]. Various retrospective studies have shown the advantages of laparoscopic surgery over laparotomy. These advantages include fewer postoperative complications, less pain, shorter hospitalization periods, faster wound healing after surgery, improved quality of life, and better cosmetic outcomes [2].

However, due to the technical difficulties of the procedure, SPLS is not widely used. The insertion of multiple instruments through the same incision impedes the correct use of the devices [3]. Laparoendoscopic single-site surgery (LESS) is the most minimally invasive laparoscopic technique, requiring a single parietal incision for a trocar, contrary to conventional laparoscopy, which uses multiple parietal incisions to insert several trocars. In addition to its aesthetic effectiveness, LESS results in reduced pain associated with parietal trauma. Some authors believe that reducing the number of trocars lowers the risk of vascular, neurological, urinary, or gastrointestinal complications. There are conflicting opinions about the LESS surgical technique effectiveness. Andy Schmitt et al., comparing the results of six randomized trials, have not detected any significant difference in the postoperative outcomes between LESS and conventional laparoscopic augmentation ovarian surgery. Two of these studies have shown less pain after LESS, while the other has reported increased shoulder tip pain. At the same time, it has been noted that the LESS group had better aesthetic results than other surgeries [4].

In this regard, further studies are needed to determine the advantages of LESS over conventional laparoscopy. According to a meta-analysis of studies, only 9 % of surgeries performed with LESS were related to gynecological procedures. The first written description of the numerous and significant gynecological surgical operations performed using LESS technology in medicine was given by Pelosi in 1991. So, he gave a detailed analysis of laparoendoscopic bilateral salpingo-oophorectomy and hysterectomy operations performed using LESS technology [5]. Wheelless performed about 1000 LESS tubal sterilizations, and Pelosi performed LESS hysterectomy and bilateral salpingo-oophorectomy in 1991 [6]. Successful attempts have been made in modern gynecological practice to perform LESS treatment of adnexal masses in a certain number of patients and salpingectomy and salpingotomy in tubal pregnancies using SPLS. SILS (Single Incision Laparoscopic Surgery) is, in fact, another name for LESS procedures and, in some cases, refers to the same thing. However, SILS is a more widely used term and is often applied to emphasize the “single incision” approach. In SILS procedures, a single incision is made, but the SILS method often involves the use of various instruments and specialized multichannel ports. These tools allow surgeries to be more complex, providing the possibility of using more instruments or improving ac-

cess to difficult areas [7]. Better cosmetic effects of LESS procedures are clearly accepted by most experts.

Currently, there is very little information on the use, safety and benefits of LESS in gynecological procedures, and the functional advantages and safety aspects have not yet been thoroughly examined and validated [2]. According to this viewpoint, one of the most pressing problems facing gynecology is determining the effectiveness of this technique in contrast to other surgical techniques and enhancing its technical capabilities.

Aim

The aim of the study was to clinically analyze and evaluate the main advantages and disadvantages of transumbilical LESS / SILS surgeries used in the surgical treatment of patients with tubo-ovarian pathology.

Materials and methods

The clinical part of the study was conducted in 2013–2015 on the basis of Azerbaijan State Advanced Training Institute for Doctors named after A. Aliyev (Department of Obstetrics and Gynecology of the Republican Clinical Hospital named after Academician M. A. Mirgasymov), the Republic Diagnostic Center, and Baku Medical Plaza Clinic, where the results of complex examinations and surgical treatments of patients were analyzed.

Depending on the tasks and methods of examination and surgical treatment, patients were divided into 3 large groups: group I (comparison group I) – 23 (21.10 %) patients underwent laparotomic surgical interventions in the pelvic organs; group II (comparison group II) – 38 (34.86 %) patients were subjected to classical laparoscopic surgical treatment tactics, and group III (main group) – 48 (44.04 %) patients underwent minimally invasive LESS / SILS surgeries. The examined patients were in reproductive age between 18 and 42 years old, with a mean age of 27.5 ± 0.9 years in the main group, 26.3 ± 0.7 years in comparison group II and 28.9 ± 1.3 years in comparison group I.

Of the 23 patients who underwent open laparotomy, a standard median laparotomy incision was used in 11 patients and a transverse (Pfannenstiel) laparotomy incision was used in 12 patients. In this group, ovarian cysts were detected in 13 (56.5 %), ectopic tubal pregnancy – in 10 (43.5 %), while hydrosalpinx, polycystic ovary syndrome (PCOS), and tubal infertility were not observed.

In comparison group II, consisting of 38 women who underwent surgical treatment with classical laparoscopy, ovarian cysts were detected in 21 (55.3 %), ectopic tubal pregnancy – in 6 (15.8 %), hydrosalpinx – in 1 (2.6 %), secondary tubal infertility – in 1 (2.6 %), and PCOS – in 9 (23.7 %) patients. In 38 patients who underwent laparoscopic surgery, access was performed through standard 4 ports during the operation, and the pressure of insufflated CO₂ was 10–13 mm Hg. The surgical technique can be schematically summarized as follows: using a thin tubular trocar, depending on the extent of procedures and entry site, 3 or 4 anterior abdominal wall incisions (D = 5–10 mm) were done. A trocar designed for an optical device to assist the laparoscopic instrument insertion was placed at the umbilical region (through a 1 cm incision directly into the

peritoneal cavity). Two lateral trocars (McBurney's point and another symmetrical one on the contralateral side) and, if necessary, the 3rd trocar should be inserted in the suprainguinal region. Specific localization combinations of trocars may vary according to surgical practice (Figs. 1, 2).

In the main group of 48 patients who underwent LESS/SILS procedures, ovarian cysts were diagnosed in 23 (47.9 %), ectopic tubal pregnancy – in 13 (27.1 %), hydrosalpinx – in 1 (2.1 %), secondary tubal infertility – in 8 (16.7 %), and PCOS – in 5 (10.4 %) cases. Depending on clinical indications, patients underwent selective interventions using the LESS method – salpingo-oophorectomy, ovarian drilling, ovarian cystectomy, etc.

In 48 patients who underwent LESS, the standard single-port access was made during the procedure, and the pressure of insufflated CO₂ was 10–13 mm Hg. The main characteristic of transumbilical SPLS and its distinguishing feature from others was that the only umbilical access port was made via a 1.5–2.0 cm incision sagittally through the umbilicus. Then, the subcutaneous tissue and aponeurosis, peritoneum were opened to the same size to enter the abdominal cavity. A multi-channel single port of various brands designed for the relevant LESS procedures was thereupon placed in the navel. Following the placement of trocars in these channels with a diameter determined by a surgeon, the procedure started with the insertion of instruments and optics into the abdominal cavity.

After the surgery, all the patients underwent comprehensive examinations according to the following principle: in the early term (up to 2 weeks), in the near term (up to 6 months) and in the long term (up to 5 years). The intensity of postoperative pain perception in patients was measured by the Visual Analogue Scale (VAS), and cosmetic effects were determined by the Vancouver Scar Scale (VSS). Besides, in the long term, hernias, adhesions, pelvic dysfunctions, etc. were evaluated.

Non-parametric Mann–Whitney U (2 groups) and Kruskal–Wallis H (3 groups) criteria were used to analyze differences between the group indicators [8].

Results

The study has analyzed the effectiveness, safety and rehabilitation characteristics of 3 types of surgical methods (open, laparoscopic and LESS / SILS) used for tubo-ovarian pathology in the early, near and long term according to the criteria listed below (Table 1).

Out of 23 patients who underwent open laparotomy surgery, unilateral cystectomy via laparotomy was performed for 13 (56.5 ± 10.3 %) women, and unilateral tubectomy – for 10 (43.5 ± 10.3 %) women with residual ectopic tubal pregnancy. The operation time was 87.4 ± 6.6 min. The median intraoperative blood loss was 155.2 ± 8.5 ml and open laparotomy surgical instruments were used. No intraoperative complications were detected. In the early postoperative period, surgical wound-related complications were observed in 5 (21.7 %) patients. Hence, pain, redness, and signs of infiltration and solidification were noted at a location along the surgical wound in 2 (8.7 %) patients after laparotomic tubectomy on the 3rd postoperative day, while local signs of inflammation were seen at the middle and lower 1/3 of the laparotomic incision in the other 3 (13.0 %) patients (2

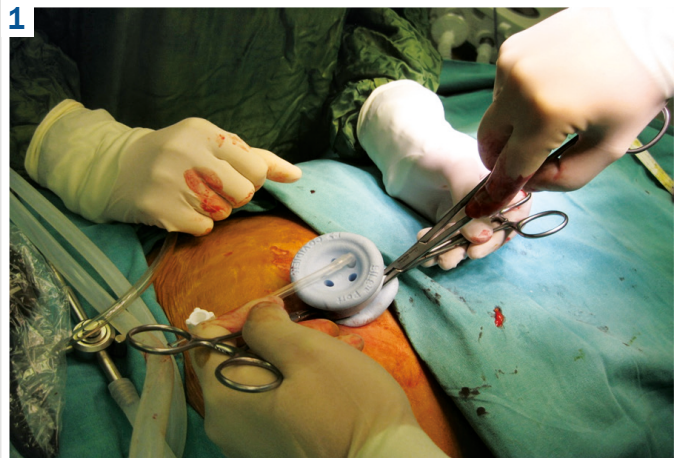


Fig. 1. Single port placement.



Fig. 2. Insertion of trocar(s).

(8.7 %) patients after laparotomic tubectomy + 1 (4.3 %) patient after cystectomy) on the 3rd–4th postoperative day. Signs of intestinal paresis (abdominal bloating, nausea, absence of defecation, difficulty in flatus passage) were found in 3 (13.0 %) patients, adhesions – in 8 (34.8 %) patients.

Postoperative pain syndrome and the intensity of pain perception were measured in comparison group I patients on the VAS in cm (0–10 cm), and the result was 7.52 ± 0.15 cm (6–9 cm).

The length of hospital stay (number of bed-days), as one of the clinical criteria for assessing the postoperative period, was 6.43 ± 0.63 days (2–14 days) in comparison group I depending on the activation index of the patients. The patients were activated within 2–3 days after the surgery. The overall appearance of postoperative scars was evaluated by simple examination of the anterior abdominal wall with clear visualization of roughly formed scar tissue. Subjective symptoms (itching, tightness, etc.) were also reported by the patients. These criteria were dynamically monitored on days 15, 30 and 6 after the surgery and evaluated using the VSS scoring system (0–13) according to parameters of pigmentation, vascularity, thickness and

Table 1. Characteristics of the used surgical methods

Parameter, units of measurement	Surgery types			p
	Open (laparotomy)	Laparoscopic	LESS / SILS	
Operation time, min	87.4 ± 6.6	41.7 ± 3.5	49.2 ± 2.2	<0.001
Blood loss, ml	155.2 ± 8.5	53.0 ± 4.4	46.1 ± 3.2	<0.001
Intraoperative complication (conversion)	–	2 (5.3 %) (open lap)	1 (2.1 %) (Lap), 1 (2.1 %) (LESS+)	–
Postoperative complications				
Wound complications (infection)	5 (21.7 %)	2 (5.3 %)	–	–
Abdominal complications				
paresis	3 (13.0 %)	–	1 (2.1 %)	–
adhesion	8 (34.8 %)	7 (18.4 %)	3 (6.3 %)	–
Activation, hours	35.00 ± 0.23	<24	<12	<0.001
Pain perception by the VAS, cm	7.52 ± 0.15	4.32 ± 0.20	1.81 ± 0.10	<0.001
Triangulation angle	–	>90°	0–15°	<0.001
Return to work, day	35	21	18	<0.001

p: statistical significance of differences between the group indicators.

Table 2. Postoperative status after LESS

Statistic parameters		Indicators, n = 48			
		Pain, cm	Activation, hour	Hospital stay, 1 / 2 / >2 days	Working capacity, day
M ± m (min–max)		1.81 ± 0.10 (1–4)	1.08 ± 0.04 (1–2)	1.04 ± 0.03 (1–2)	1.06 ± 0.04 (1–2)
p ₁		<0.001	<0.001	<0.001	<0.001
p ₂		<0.001	<0.001	>0.05	<0.001
Gradation	1	15 (31.3 %)	44 (91.7 %)	46 (95.8 %)	45 (93.8 %)
	2	29 (60.4 %)	4 (8.3 %)	2 (4.2 %)	3 (6.3 %)
	3	2 (4.2 %)	–	–	–
	4	2 (4.2 %)	–	–	–
	5	–	–	–	–
χ ² ; p ₁		χ ² = 71.0; p ₁ < 0.001	χ ² = 71.0; p ₁ < 0.001	χ ² = 65.5; p ₁ < 0.001	χ ² = 71.0; p ₁ < 0.001
χ ² ; p ₂		χ ² = 72.2; p ₂ < 0.001	χ ² = 71.5; p ₂ < 0.001	χ ² = 1.86; p ₂ > 0.05	χ ² = 74.8; p ₂ < 0.001

pliability of scars. In group I patients, these indicators amounted to 11.08 ± 0.47 on day 15; 8.08 ± 0.55 on day 30; 6.08 ± 0.42 after 6 months, which were considered sufficient (Fig. 3).

In group II, 21 (55.3 %) patients with ovarian cysts, 6 (15.8 %) with tubal pregnancy, 9 (23.7 %) with PCOS, 1 (2.6 %) with primary tubal infertility, and 1 (2.6 %) with hydrosalpinx underwent surgical treatment.

The duration of traditional laparoscopic interventions in comparison group II patients was 41.7 ± 3.5 min (p₁ < 0.001), which was considered statistically significant. The intensity of pain perception was measured by the VAS in cm (0–10 cm), similarly to comparison group I, and it was 4.32 ± 0.20 cm (p₁ < 0.001). The length of hospital stay corresponded to the activation rate of patients. Hence, comparison group II patients were activated within 6–12 hours after the surgery and discharged home from the hospital in satisfactory condition within 2–3 days.

Patients who had laparoscopic surgery had a significantly different overall postoperative scar condition compared to comparison group I, namely, 4.58 ± 0.08 on day 15; 3.42 ± 0.13 on day 30; and 1.92 ± 0.08 after 6 months.

2 (5.3 %) patients in this group needed for conversion to open surgery during laparoscopic procedure, that was considered as an intraoperative complication. So, in 2 (5.3 %) patients undergoing laparoscopic surgery for ectopic tubal pregnancy, multiple adhesions were found in the abdominal cavity after previous surgeries, resulting in the conversion to open laparotomy. In the early postoperative period, surgical wound-related complications were

observed in 2 (5.3 %) patients. In addition, pain, redness, infiltration and solidification were seen in 2 (5.3 %) patients at a location along the surgical wound of the access port in the umbilical region on postoperative day 3, and in the late period, signs of acute partial intestinal obstruction caused by adhesions were observed in 7 (18.4 %) patients 4–6 months after the surgery.

Thus, in the context of comprehensive examinations and specific analysis of the study, classical laparoscopic operations can be regarded as more universal in the operative treatment of various pelvic organ pathologies in gynecological practice compared to open laparotomy.

LESS / SILS operations were performed in group III (main) consisted of 48 (44.0 %) patients included in the study, 13 (27.1 %) of them were diagnosed with tubal pregnancy, 23 (47.9 %) – with ovarian cysts, 6 (12.5 %) – with primary tubal infertility, 5 (10.4 %) – with PCOS and 1 (2.1 %) – with hydrosalpinx. Various types of surgeries (cystectomy, salpingectomy, ovarian drilling) by the LESS method using Covidien laparoscopic and glove-ports (made from gloves), articulating and Karl Storz rigid instruments, trocars and optics were performed. All manipulations can be performed during LESS. However, several technical difficulties were observed during the operation. For example, we encountered difficulties such as unfavorable ergonomics of the operating movements, violation of the triangle principles, and crossing instruments in the operating area. While the duration of traditional laparoscopic interventions was 41.7 ± 3.5 min (p₁ < 0.001) in comparison group II patients, this value was on average 49.2 ± 2.2 min (p₁ < 0.001) during

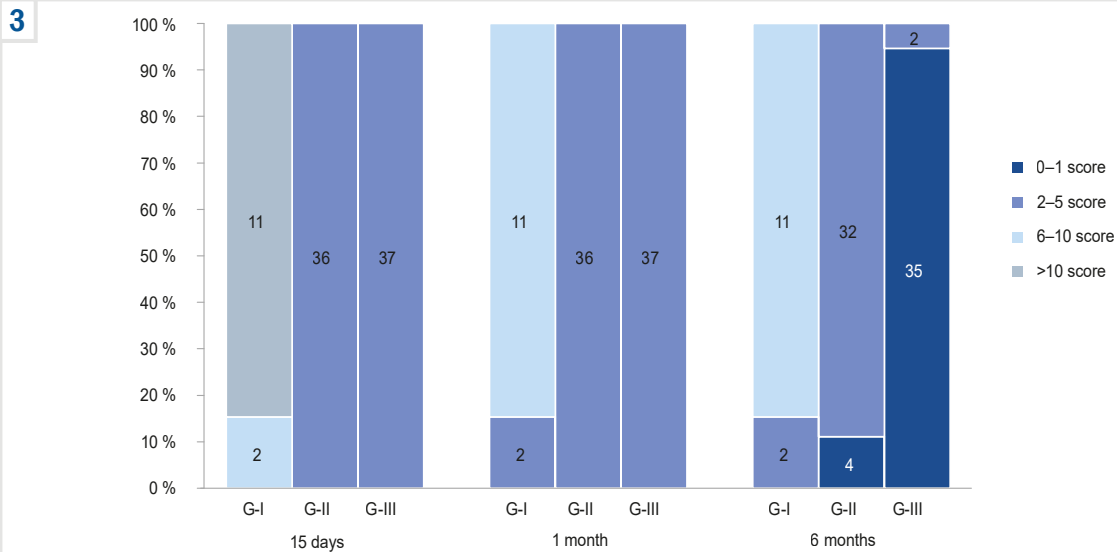


Fig. 3. Evaluation of scar tissue by the VSS in patients who underwent various surgeries.

transumbilical interventions, which was not considered a significant loss of time.

The intensity of pain perception in the main group of patients was measured by the VAS in comparison with other groups. So, contrary to other groups, the mean indicator was 1.81 ± 0.10 cm ($p_1 < 0.001$; $p_2 < 0.001$) in the main group (Table 2).

According to the results obtained, the pain intensity was relatively lower in the main patient group after LESS as compared to that in patients who underwent classical laparoscopy, and analgesic agents were neither needed or very low doses of anti-inflammatory analgesics were used.

The main group patients were activated within the first 6 hours after LESS and discharged from the hospital the next day in good condition. The psychoemotional state of the patients was stable and satisfactory.

In 2 (4.2 %) patients of this group, conversion from LESS / SILS to other operations occurred, which was considered an intraoperative complication. Multiple adhesions were further found in the abdominal cavity after the previous operation in 1 patient who underwent laparoscopic surgery for ectopic tubal pregnancy, and technical difficulties arose rendered the LESS / SILS performance impossible.

In another patient, due to a widespread inflammatory process, LESS / SILS was converted to a multiport laparoscopic surgery, thereby increasing the triangulation angle and ensuring successful completion of the surgery.

The final scar tissue score was 0.14 ± 0.08 6 months after LESS, while this score was 1.92 ± 0.08 after classical laparoscopy with statistically significant $p \leq 0.001$. Thus, opinions of many researchers regarding a significant superiority of postoperative cosmetic outcomes in LESS over other alternative surgical methods should be followed.

The analysis of the early and long-term postoperative period has revealed several complications in the main patient group. In 1 patient, infection of the trocar insertion area was observed on postoperative day 4, and the process resolved by secondary healing with the usage of appropriate antibacterial (local and systemic) therapy.

In the early postoperative period, signs of intestinal paresis were observed in 1 patient of this group. In particular, this patient developed signs of slow transit constipation (abdominal bloating, nausea, absence of defecation, difficulty in flatus passage) after LESS tubectomy within 2 postoperative days.

In the main patient group, these indicators were assessed as sufficient: 3.65 ± 0.13 on day 15; 3.14 ± 0.06 on day 30; and 0.14 ± 0.08 after 6 months. The indicators were significantly different from the results obtained in the comparison group II.

Discussion

The statistical result validity ($p < 0.001$) suggests the absence of significant differences despite longer duration of single-port laparoscopy compared to classical laparoscopy. For example, the operation time of single-port transumbilical laparoscopy was 49.2 ± 2.2 minutes, compared to 41.7 ± 3.5 minutes for classical laparoscopic procedures. We believe that the operation time prolongation is directly related to the surgeon's experience and high level of surgical skills in single-port procedures, as well as the surgeon-assistant-camera coordinated complementarity. Difficulties such as unfavorable ergonomics during surgery, violation of the triangle principles, and crossing or instable instruments in the surgical area are also important factors for prolonged operation time.

It was evident that postoperative activation of group I patients occurred on the 3rd day after open laparotomy without any complications, group II patients – the following day. Patients who underwent LESS / SILS were activated within the first 6 hours of the postoperative period.

The intensity of the pain perception was dynamically controlled in comparison group I patients. This is regarded as one of the postoperative criteria of acute pain syndrome. Patients who underwent surgery using the classic laparoscopic technique reported less intensity of pain compared to comparison group I.

The postoperative hospital stay ranged from 2 to 7 days in comparison group I, depending on the patient activation, and they were discharged home from the hospital in a satisfactory condition. Hospital discharge time was on the 2nd–3rd postoperative day in comparison group II. The patients in the main group were activated within the first 6 hours after LESS and discharged home from the hospital in a satisfactory condition the following day.

We should also mention that there were no intraoperative issues when performing SPLS. According to researchers, one of the indisputable advantages of LESS / SILS is a high cosmetic effectiveness [9]. Since the navel is a natural orifice in the anterior abdominal wall, a transumbilical incision and sutures make the postoperative scars invisible by hiding them in the umbilical cicatrix, providing high cosmetic results.

The occurrence of complications during classical laparoscopy in our patients supports the idea found in the literature that complications are more common during classical laparoscopy than in SPLS [3, 10, 11]. In the study conducted by D. Shigemi et al., laparoscopy had advantages in shorter surgery time (125 min versus 166 min) and hospital stay (5 days versus 7 days), less incidence of blood transfusions (4.7 % versus 10.0 %) compared to laparotomy [11].

Al-Badawi I. A. et al. also observed fewer complications in laparoscopic studies. Thus, the duration of laparoscopic operations was 66 minutes, blood loss – 10 ml, hospital stay – 1 day, pain perception according to the VAS – 2 points, and no serious complications were detected in the intraoperative or postoperative period. The wound scar length was 1.2 cm 6 months postoperatively [2].

In a study conducted by K. Nakayama et al., the mean duration of LESS was 67.2 minutes, the average blood loss was 10.1 ml, the incidence of pre- and postoperative complications and the cosmetic effectiveness were determined [3]. Kim J. S. et al. have also shown that after operations using S. W. Kim's technique, wound healing was faster, compared to laparotomy, and this method was useful for removing large ovarian tumors [12].

The high effectiveness of the applied LESS / SILS innovative surgical technique, its completion with satisfactory cosmetic outcomes, overall aesthetics, and normal postoperative psychological state of the women after the operation are confirmed by a generalized clinical analysis of the main patient group with intraumbilical scar tissue. In addition, it suggests that LESS, the most practical endovideosurgery, can be used in a variety of gynecological procedures. This method is more optimal for patients and physically strenuous for surgeons compared to classical laparoscopy.

Thus, as a result of a comprehensive study and specific analysis of the research work, LESS was again regarded as appropriate and the most convenient endovideosurgery technique in a wide profile of gynecological practice. There is no doubt that the instruments and access port will be further improved by the current quick advancements in science and technology, which will also eliminate any technical issues that may arise throughout the procedure.

Conclusions

1. The main advantages of LESS compared to laparotomy and laparoscopic surgeries are the following: reduced blood loss, fewer postoperative complication rates, quick

activation in the early postoperative period. Since only one incision is made, the pain sensation is minimal, and patients return to their work activities more quickly.

2. The main disadvantage of LESS surgery is the occurrence of certain technical difficulties during the procedure, as well as intraoperative complications (conversion).

3. Since LESS complications are minimal, this method is considered a more optimal approach for patients compared to classical laparoscopy. There is a need to optimize the application and functionality of this method in clinical practice.

Ethics approval

Permission to conduct the study was obtained from the Ethics Committee. The study plan was carried out in accordance with the Declaration of Helsinki, and the protocol was approved by the Institutional Committee of Ethics on Medical Sciences of the Azerbaijan State Medical Training Institute (No. 6, 28 March 2013). All patients provided written informed consent for the surgery and for the use of their data for scientific purposes.

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