

Assessment of the Results of Prevention of Wound and Systemic Complications in Allohernioplasty of Restrained Ventral Hernias

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Introduction. In modern herniology, despite advances in surgical techniques and prosthetic technologies, the problem of reducing the risk of wound infection is still relevant [1]. At the same time, a special category is made by patients for whom various variants of hernioplasty are performed for emergency indications, in particular, with the development of a restrained hernia, fistulas and other complications, during the elimination of which the surgical wound is always susceptible to the development of microbial contamination [2]. The frequency of wound infection in these cases can reach 37% and higher, which affects not only the outcome of the operation, but also causes a significant increase in costs due to the need for additional procedures and a longer hospital stay [3].

The scale of this problem for the health care system, as well as for the patient, is very wide, as demonstrated by the continued interest in identifying risk factors and planning prevention strategies [4]. In this aspect, the most pressing issues are not only the technical aspects of prosthetic repair, but also tactical approaches to optimizing the treatment and prophylactic program for managing patients with ventral hernia, including such preventive measures as local and systemic prevention of the development of complications specific to hernia repair.

Most operations for ventral hernias involve the use of various prosthetic materials [5, 6]. According to a prospective multicenter study, the main complications of allohernioplasty are: removal of the infected mesh - 1.3%, infection requiring additional intervention - 4.0%, 8.0% of relapses, 5.3% of repeated interventions and 6.7% of seroma drainage [7].

In turn, the highest risk of developing a wound infection, reaching 42%, is

observed during operations under conditions of initial bacterial contamination, which may be associated with infringement of the intestine and the need to resect its necrotic part, or with the presence of skin fistulas in recurrent hernias, as well as in parastomal hernias with intestinal fistulas [8]. There is an opinion that in these conditions the use of a synthetic mesh should be avoided, since there is a high incidence of severe wound infection and recurrent hernia [9]. However, most authors agree that a one-stage treatment of a hernia in a contaminated wound using various prosthetic materials is still effective and provides a low recurrence rate if certain therapeutic and prophylactic measures are followed during the perioperative period [10].

The purpose of this study is to determine the clinical effectiveness of the proposed measures for the prevention of the development of postoperative complications in the surgery of restrained ventral hernias by improving tactical and technical approaches.

Material and methods. The study was based on the results of treatment of 147 patients with strangulated ventral hernias, who were urgently operated at the surgery department of the clinic of the Andijan State Medical Institute for the period from 2015 to 2020. All patients were divided into two groups: the main group included 56 patients with the indicated diagnosis, the comparison group included 91 patients. The main direction of the study was the improvement of methods for preventing the development of postoperative wound and systemic complications in patients with strangulated ventral hernias who underwent allohernioplasty.

As an opportunity to improve the results of operations in the main group, the proposed complex of tactical and technical preventive measures was used, which included specific perioperative antibacterial therapy, treatment of the wound surface after the alloplasty stage and within 2-3 days after the operation through a special catheter, supplied to various sites in the wound, antiseptic agent "FarGALS", as well as drainage of the surgical wound by the type of vacuum aspiration with two or three-channel drains, in conjunction with rehabilitation measures aimed at preventing respiratory and cardiovascular complications, enhanced analgesic therapy.

The age of the patients was from 23 to 83 years, the average age in the comparison group was 53.5 ± 1.3 years and in the main group - 54.5 ± 1.4 years. In the comparison group, there were 68 women (74.7%), men - 23 (25.3%). In the main group there were 44 women (78.6%), men - 12 (21.4%).

When diagnosing and distributing patients with ventral hernias, the classification of J.P. Chevrel, A.M. Rath (SWR-classification). Where S denotes the localization of the hernia, W is the width of the hernial orifice, R is the presence of a relapse (Table 1). As you can see from the table. 1, analysis of the localization of the defect showed that the examined patients mainly had a median location of the defect (M1, M2, M3, M4), of which the most common were supra-umbilical hernias - 49 (33.3%) and peri-umbilical hernias - 57 (38.8 %). Lateral location was diagnosed in 11 cases: 7 (4.8%) patients with subcostal hernias and only 4 (2.7%) patients with iliac hernia. The combined location of the defect was found in 2 (1.4%) cases.

Table 1. Distribution of patients with strangulated hernias according to Shevrel-Rath classification

Signs			Comparison group (n=91)		Basics. Group (n=52)		Total (n=147)		
			<i>abc.</i>	%	<i>abc.</i>	%	<i>abc.</i>	%	
S	M	M ₁	supraumbilical	33	36,3%	16	28,6%	49	33,3%
		M ₂	umbilical	34	37,4%	23	41,1%	57	38,8%
		M ₃	sub-navel	17	18,7%	9	16,1%	26	17,7%
		M ₄	suprapubic	1	1,1%	1	1,8%	2	1,4%
	L	L ₁	subcostal	3	3,3%	4	7,1%	7	4,8%
		L ₂	transverse	0	0,0%	0	0,0%	0	0,0%
		L ₃	iliac	2	2,2%	2	3,6%	4	2,7%
		L ₄	lumbar	0	0,0%	0	0,0%	0	0,0%
	ML	combined	1	1,1%	1	1,8%	2	1,4%	
W	W ₁	less than 5 cm	0	0,0%	0	0,0%	0	0,0%	

W	W ₂	from 6 to 10 cm	59	64,8%	28	50,0%	87	59,2%
	W ₃	from 11 to 15 cm	21	23,1%	19	33,9%	40	27,2%
	W ₄	morethan 15 cm	11	12,1%	9	16,1%	20	13,6%
R	R ₀	postoperative	86	94,5%	52	92,9%	138	93,9%
	R ₁	firstrelapse	4	4,4%	3	5,4%	7	4,8%
	R ₂	secondrelapse	1	1,1%	1	1,8%	2	1,4%

The distribution of patients depending on the width of the defect showed that there were no patients with a defect width of up to 5 cm, in 87 (59.2%) - the width of the hernial defect ranged from 6 to 10 cm, in 40 (27.2%) - 11- 15 cm and 20 (13.6%) - over 15 cm, i.e. In general, defects with a width of 6-15 cm prevailed. It was characteristic that in the main group, wider defects were detected (from 11 to 15 and over 15 cm (50.0%)), while in the comparison group, patients with a defect width of more than 10 cm accounted for 35.2%.

The vast majority of patients (93.9%; n = 133) were treated with postoperative ventral abdominal hernias.

The average time of infringement in both groups did not exceed 8 hours. Most often, patients applied within the first 2-4 hours after the infringement. The frequency of patients seeking medical help later than 4 hours after infringement was practically the same in both groups and amounted to 23.2% and 20.9% in the main and comparison groups, respectively, which excluded the negative effect of the infringement time on the study results.

The severity of the general condition of patients was assessed as average in the vast majority - 91.1% (51) and 92.3% (84) in the main and comparison group, respectively, and only in 3.6% (2) cases of the main and 2, 2% (2) in the comparison group had a severe degree of the disease.

By the type of restrained postoperative ventral hernia, the patients were distributed as follows: infringement of the loop of the small intestine was detected in

41 patients in the comparison group and 27 in the main group, while resection was performed in 8 (8.8%) and 6 (10.7%) cases restrained area, in 33 (36.3%) and 21 (37.5%) cases, in the comparison group and the main group, respectively, without bowel resection.

When an infringement of a strand of the greater omentum was detected, resection was performed in 37 (40.7%) and 24 (42.9%) cases in the comparison group and the main group, respectively. Without omentum resection, 13 (14.3%) in the comparison group and 5 (8.9%) in the main group, respectively.

The comorbidities identified in patients with incisional ventral hernias and their distribution in the study groups are presented in Table. 2.6, while, as can be seen from the table, in 35 (23.8%) cases, 2 or more concomitant diseases were diagnosed. Among concomitant diseases, hypertensive disease prevailed, revealed in 52 (35.4%) patients. Next in frequency is chronic lung disease, noted in 26 (17.7%), and diabetes mellitus - in 11 (7.5%) patients. From severe cardiovascular pathology prevailed: 3 (2.0%) patients with acute myocardial infarction, 2 (1.4%) patients with acute cerebrovascular accident (Table 2).

Table 2

Distribution of patients by the frequency of comorbidities

Diseases	Comparisongroup(n=91)		Maingroup (n=56)		Total (n=147)	
	ābc.	%	ābc.	%	ābc.	%
Arterialhypertension	31	34,1%	21	37,5%	52	35,4%
Chroniclungdisease	15	16,5%	11	19,6%	26	17,7%
Diabetes	6	6,6%	5	8,9%	11	7,5%
History of acute myocardial infarction (PICS)	2	2,2%	1	1,8%	3	2,0%
History of acute cerebrovascular accident	1	1,1%	1	1,8%	2	1,4%
Chronicckidneydisease	2	2,2%	2	3,6%	4	2,7%
Combinations of 2 or more diseases	21	23,1%	14	25,0%	35	23,8%

By the nature of the operations performed, the patients were distributed as follows: onlay prosthetics with suturing of the aponeurosis defect was performed in 44 (48.4%) patients in the comparison group and in 26 (46.4%) patients in the main group; onlay prosthetics without suturing the aponeurosis defect was performed in 47 (51.6%) cases in the comparison group and in 30 (53.6%) cases in the main group. The distribution of patients by type of operation is presented in table. 3.

Table3.

Distribution of patients by type of operation

Operation type	Comparison group		Main group	
	abc.	%	abc.	%
Herniotomy, resection of the loop of the small intestine, "onlay" prosthetics with suturing of the aponeurosis defect	3	3,3%	3	5,4%
Herniotomy, resection of the loop of the small intestine, "onlay" prosthetics without suturing the defect of the aponeurosis	5	5,5%	3	5,4%
Herniotomy, resection of the strand of the greater omentum, onlay prosthetics with suturing of the aponeurosis defect	23	25,3%	15	26,8%
Herniotomy, resection of the greater omentum strand, "onlay" prosthetics without suturing the aponeurosis defect	14	15,4%	9	16,1%
Herniotomy, "onlay" prosthetics with suturing of the aponeurosis defect	18	19,8%	8	14,3%
Herniotomy, "onlay" prosthetics without suturing the aponeurosis defect	28	30,8%	18	32,1%
Total	91	100,0%	56	100,0%

In the postoperative period, daily examination and study of the general condition of patients were carried out, complaints were detected, indicators (pulse rate, blood pressure) were measured, thermometry was carried out, and the state of the organs and systems was assessed. The local status of the postoperative wound was assessed by examination, palpation, and auscultation of the abdomen. After the operation, dressings were performed to control the course of the wound process. The evaluation criteria were: the patient's subjective sensations (the nature and intensity of pain), visual and

palpation assessment of the condition of the wound (presence or absence of hyperemia, infiltration, edema of the edges, the amount and nature of the discharge from the wound).

During ultrasound of the postoperative wound, attention was paid to the thickness of the anterior abdominal wall in the area of operation, tried to differentiate the anatomical layers of the anterior abdominal wall, echostructure and echogenicity of the tissues of the anterior abdominal wall in the area of operation and surrounding tissues, the presence of additional formations and inclusions, and when they were detected, the sizes were determined. , shape, contours, echo structure and echogenicity.

To assess the intensity of pain in the postoperative period, a 10-point visual analogue scale was used. According to this scale: mild pain corresponds to 1-2 points, moderate to 3-4 points, medium pain to 5-6 points, severe pain to 7-8 points and severe intolerant to 9-10 points. The assessment was carried out once a day when coughing, moving, and taking a deep breath.

Results. According to the data obtained on a 10-point visual analogue scale, the intensity of pain on day 1 after surgery was assessed by patients both in the comparison group and in the main group as strong, the mean values were 7.8 and 7.2 points, respectively. Already on the second day, against the background of the adopted treatment tactics in the main group, the intensity of pain was lower than in the comparison group, and corresponded to 5-6 points, on average 6.5. In the future, this trend continued, and on the 6th day after the operation, patients in the main group noted moderate pain, while in the comparison group, patients noted pain of moderate intensity.

The dynamics of differences in the intensity of postoperative pain can be more clearly traced in Fig. 1. Thus, throughout the entire postoperative period, statistically better indicators of the pain syndrome point scale were observed in the main group of patients ($t = 2.43-3.18$; $p < 0.05$).

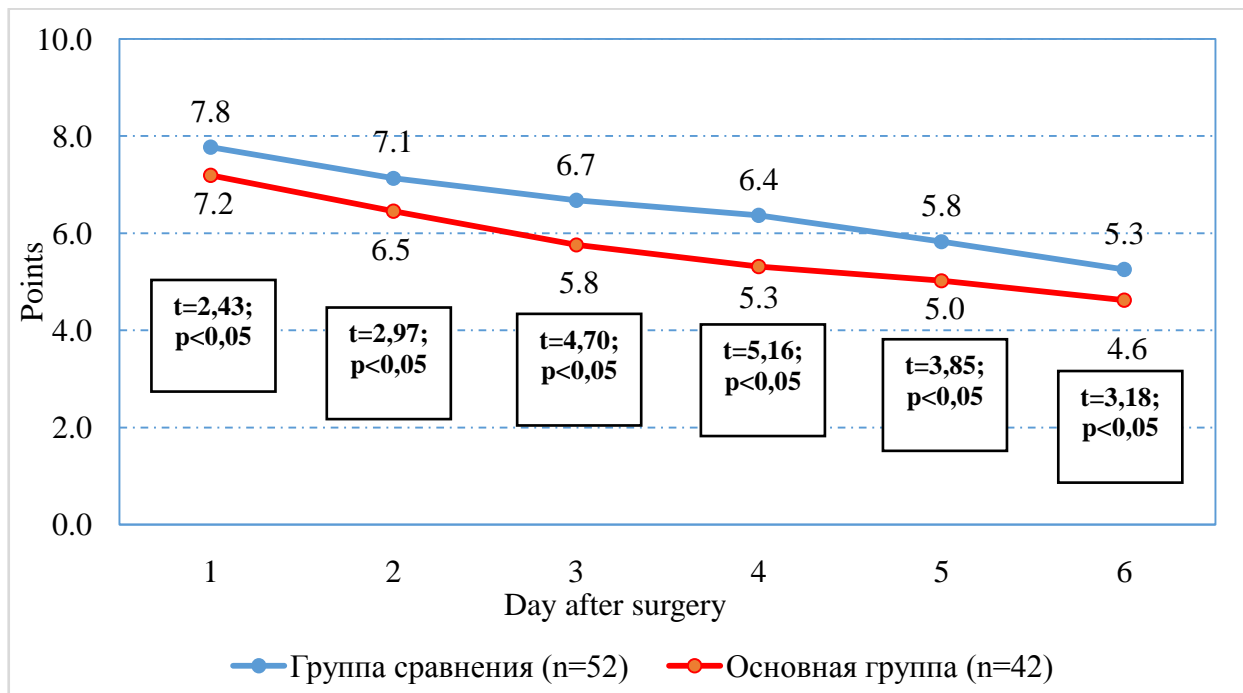


Figure 1. Dynamics of pain intensity according to an analogue scale

Evaluation of the amount of discharge through the drains in the study groups showed that on the first day after the operation in the main group of patients the volume of separated fluid averaged 71.3 ml, while in the comparison group it was 96.6 ml. On the 3rd day after surgery, these indicators were 30.3 ml and 48.5 ml in the main and comparison groups, respectively.

Drawing up a graph of the dynamics of changes in the amount of drainage discharge, and statistical processing of the data showed that already on the first day after the operation there was a significant difference in favor of the patients of the main group ($t = 5.49$; $p < 0.05$), which remained throughout the drainage period wound cavity (Fig. 2).

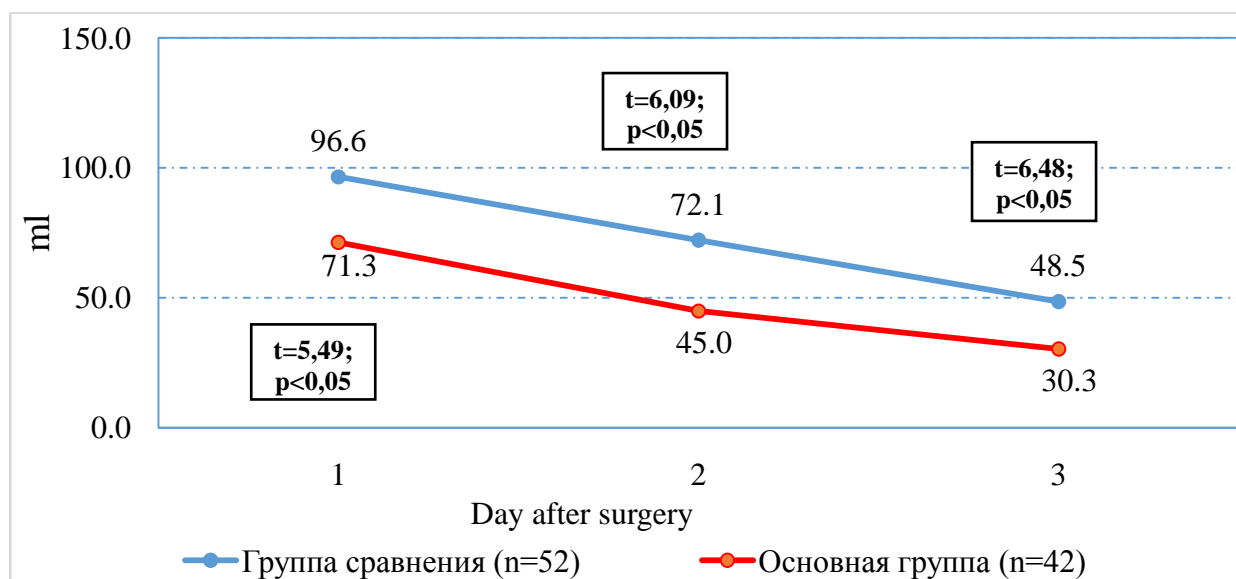


Figure 2. Dynamics of changes in the amount of drainage secretions (ml)

Bronchopulmonary complications, including pneumonia, pleurisy and respiratory failure with the development of acute respiratory distress syndrome (ARDS), occurred with the highest frequency in the comparison group (13.2%; n = 12), while in the main group of patients this indicator was 7.1% (n = 4) without ARDS development (Table 4).

Among cardiovascular complications in the comparison group, rhythm disturbances (3.3%) and venous thrombosis (3.3%) were most often noted, which, in combination with myocardial infarction (2.2%) and pulmonary embolism (1, 1%) accounted for 9.9%.

In the main group of patients, only 2 (3.6%) cases of cardiovascular complications were observed (1 patient had myocardial infarction and 1 rhythm disturbance).

In the comparison group, among other systemic complications (4.4%; 4 cases), one could distinguish acute renal failure, erosive gastrointestinal bleeding and intestinal paresis. In the main group, only 1 (1.8%) case had intestinal paresis.

We referred to postoperative local complications as prolonged intake of exudate, seroma, infiltration, hematoma, and marginal skin necrosis of postoperative wounds. At the same time, in the comparison group, seroma was most

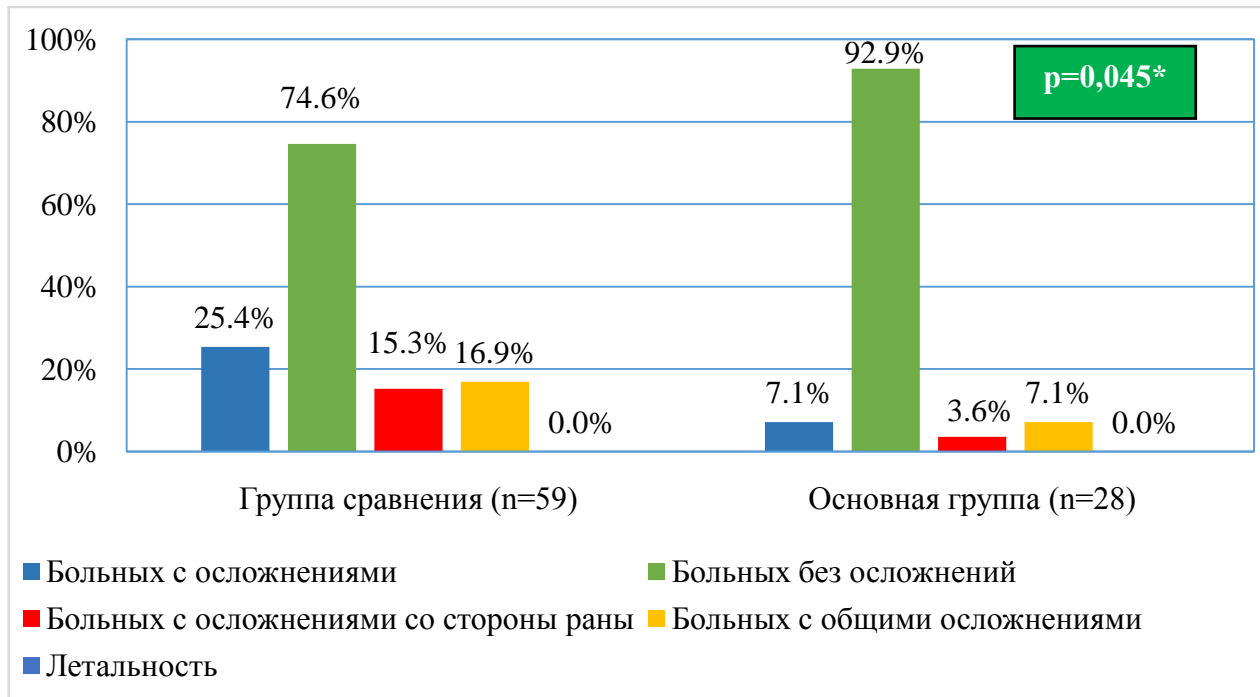
often observed, amounting to 9.9% (n = 9), while in the main group, this local complication was noted only in 1 (1.8%) case. Also, in the comparison group, 6 (6.6%) patients had a prolonged intake of postoperative exudate, 5 (5.5%) - wound infiltration and 3 (3.3%) - wound suppuration.

Table 4. The frequency of complications in the comparison groups

Complications	Comparison group (n=91)		Main group (n=56)	
	<i>abc.</i>	%	<i>abc.</i>	%
overall				
Bronchopulmonary	12	13,2%	4	7,1%
Pneumonia	3	3,3%	1	1,8%
Pleurisy	4	4,4%	2	3,6%
Respiratory failure	3	3,3%	1	1,8%
ARDS	2	2,2%	0	0,0%
Cardiovascular	9	9,9%	2	3,6%
Violation of the rhythm of the heart	3	3,3%	1	1,8%
Myocardial infarction	2	2,2%	1	1,8%
TELA	1	1,1%	0	0,0%
Venous thromboses	3	3,3%	0	0,0%
Others	4	4,4%	1	1,8%
Acute renal failure	1	1,1%	0	0,0%
Erosive housing complex	1	1,1%	0	0,0%
Intestinal paresis	2	2,2%	1	1,8%
Local				
Seroma	9	9,9%	1	1,8%
Infiltration of p / o wounds	5	5,5%	2	3,6%
Suppuration of the wound	3	3,3%	0	0,0%
Hematoma	2	2,2%	1	1,8%
Marginal skin necrosis	1	1,1%	0	0,0%
Long-term intake of p / o exudate	6	6,6%	1	1,8%

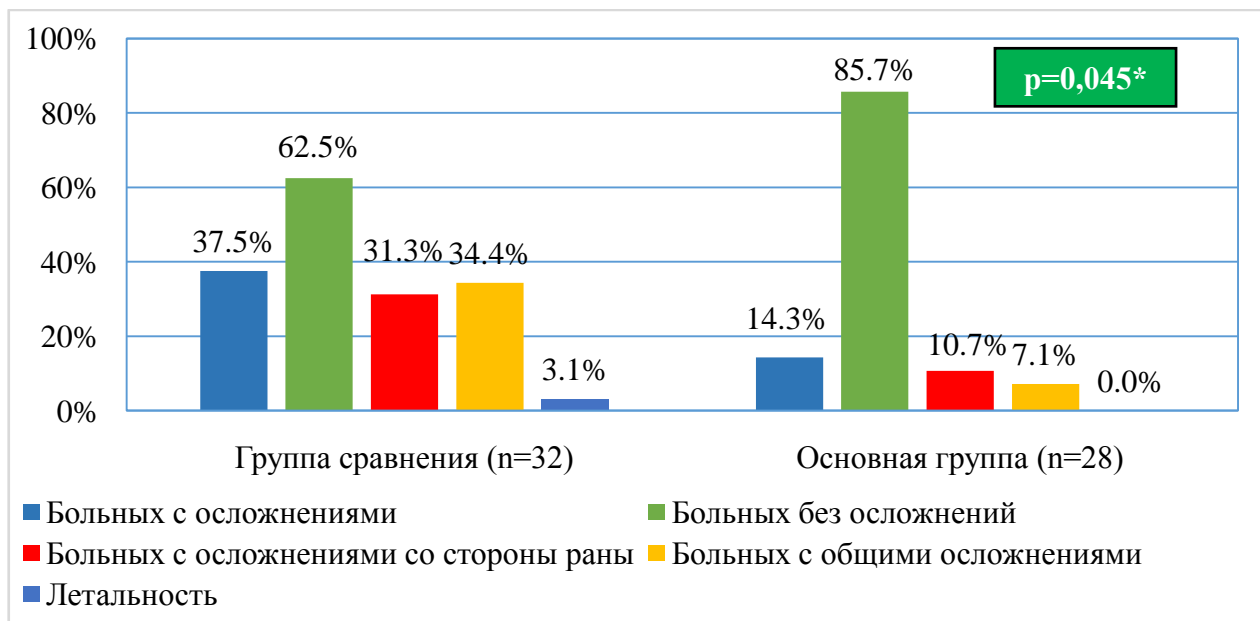
The summary results of treatment for the size of the hernial defect up to 10 cm (W1-W2) are shown in Fig. 3. As you can see, in the main group of 26 in 28 (92.9%) cases, complications were not observed. In the comparison group, this indicator was less (74.6%) and with a statistically significant difference (p = 0.045).

In the remaining 10 (16.9%) cases, general complications were noted and in 9 (15.3%) cases - local wound complications, which in the main group occurred only in 1 (3.6%) and 2 (7.1%) patients, respectively ($\chi^2 = 4.036$; Df = 1; p = 0.045).



*- Indicators on the proportion of patients with complications between the groups - $\chi^2 = 4.036$; Df = 1; p = 0.045

Figure 3. Summary of treatment results for W1-W2 sizes



*- Indicators for the proportion of patients with complications between the groups - $\chi^2 = 4.115$; Df = 1; p = 0.043

Figure 4. Summary of treatment outcomes for W3-W4 sizes

Analysis of the results of treatment of patients with ventral hernias larger than 11 cm (W3-W4) showed that complications developed in 37.5% (12 of 32 patients) of cases in the comparison group, while in the main group this indicator was only 14.3% (4 out of 28 patients) with a statistically significant difference ($\chi^2 = 4.115$; Df = 1; $p = 0.043$). Wound purulent-inflammatory complications accounted for the greater part in the study group (10.7%; 3 out of 28 patients), in comparison with general complications, which had a frequency of 7.1% (2 out of 28). In the comparison group, general systemic complications were most often noted, accounting for 34.4% (11 out of 59 patients), while local wound complications accounted for 31.3% (10 cases out of 59) (Fig. 4).

In turn, it should be noted that in the comparison group in 12 (13.2%) cases, complications were resolved within 5-7 days (standard terms of the postoperative period), 14 (15.4%) patients had complications that required additional treatment activities and (or) lengthening the hospital period. In the main group of patients, these indicators were lower and amounted to 8.9% and 1.8%, respectively. Severe complications with subsequent mortality were noted in 1 (1.1%) case in the comparison group. In the main group, mortality was not noted. Statistical indicators between groups - $\chi^2 = 9.048$; Df = 3; $p = 0.029$.

We also studied the indicators in groups for the stay of patients in the intensive care unit and for the postoperative hospital period (Fig. 4.7). Thus, patients from the comparison group were in the intensive care unit for an average of 1.5 days, while in the main group - 1.2 days ($t = 3.16$; $p < 0.001$).

The duration of postoperative treatment was 7.7 days in the comparison group and 6.7 days in the main group, which is also a statistically significant difference ($t = 5.34$; $p < 0.001$).

Output. Improvement of methods for preventing the development of complications during allohernioplasty in patients with restrained ventral hernias allowed reducing the incidence of wound complications from 20.9% (in 19 out of

91 patients in the comparison group) to 7.1% (in 4 out of 56 patients in the main group; $\chi^2 = 4.856$; $df = 1$; $p = 0.026$), general complications from 23.1% (in 21 patients) to 7.1% (in 4 patients; $\chi^2 = 6.236$; $df = 1$; $p = 0.013$), respectively, increase the proportion of discharged without complications in patients from 70.3% (64 patients) to 89.3% (50 patients; $\chi^2 = 7.155$; $df = 1$; $p = 0.008$). Intra- and postoperative preventive rehabilitation measures carried out made it possible to reduce the stay of patients in the intensive care unit from 1.5 ± 0.1 (in the comparison group) to 1.2 ± 0.1 days (in the main group; $t = 3.16$; $p < 0.01$), and in general, the hospital period from 7.7 ± 0.1 to 6.7 ± 0.1 days ($t = 5.34$; $p < 0.001$).

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Evaluation of the results of prevention of wound and systemic complications in allogenioplasty of infringed ventral hernias

The authors analyze the results of treatment of 147 patients with abnormal ventral hernias, which were operated on as a matter of urgency in the surgery department of the Andijan State Medical Institute for the period from 2015 to 2020.

As an opportunity to improve the results of operations in the main group, the proposed set of tactical and technical preventive measures is used: treatment of the

wound surface after the alloplasty stage and within 2-3 days, brought to various areas in the wound, antiseptic drug "FarGALS", drainage of the operating wound in the type of vacuum aspiration of two or three-channel drainage, combined with rehabilitation measures aimed at the prevention of respiratory and cardiovascular complications, enhanced analgesic therapy.

The authors conclude that the improvement of methods of prevention of complications in allogenioplasty in patients with infringed ventral hernias allowed to reduce the incidence of wound complications from 20.9% to 7.1%, general complications from 23.1% to 7.1%, respectively, to increase the proportion of patients discharged without complications from 70.3% to 89.3%.