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COMPARATIVE ANALYSIS OF IMMEDIATE RESULTS OF PROSTHETIC PLASTY IN EXTENSIVE AND GIANT INCISIONAL VENTRAL HERNIAS

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Abstract:

The article raises the pressing issue of operative therapy for extensive and giant incisional ventral hernias. The authors provided a comparative analysis of various methods of ventral hernia plasty, including the use of a modified method of giant hernia plasty. Incidence of wound complications development was thoroughly noted after each type of plasty. Collective results of the uncomplicated course of the post operative period in the comparison groups were analyzed.

Keywords: Ventral hernias

RELEVANCE. Incisional ventral hernia (IVH) is associated with significant complications such as pain, ileus, strangulation, and ischemia of the hernia contents. Despite the development of recovery methods, high morbidity and even mortality persist [2,6,8]. Surgical treatment is the only method of plasty[9,11]. Risk factors that increase the likelihood of developing incisional hernias are: wound infection, male gender, obesity, abdominal distension, the underlying disease process, and sometimes poorly stitched surgical suture [12,13].

The management of patients with IVH has changed significantly over the past 20 years due to technological advances and improvements in surgical approaches. Modification of before surgery risk factors, such as smoking cessation and weight loss, mesh selection appropriate to hernia type and planned mesh placement, and wide mesh coverage beyond the margins of the hernia defect are key success factors
[1,2,3,4, 5, 7, 10].

MATERIALS AND METHODS. The research is based on a study of the results of allohernioplasty in 448 patients with extensive (large) and giant IVH, who were operated on the basis of the surgical department of the 1st clinic of the Samarkand State Medical Institute in the period from 2012 to 2021. All patients were divided into two groups. The comparison group included 320 patients operated on from 2012 to 2019; whose surgical treatment strategy used standard approaches to prosthetic repair. The study group included 128 patients over the period 2020-2021 in whom the proposed tactical and technical aspects in allohernioplasty for large and giant IVH were applied. In particular, in the study group, a combined method of plasty of giant hernias of the anterior abdominal wall was used, including a laxative incision of the aponeuros is of the rectus abdominis muscles on both sides at a distance that allows closing the hernial orifice and suturing the hernial orifice without tension, characterized in that the incision of the rectus anterior layer aponeurosis is made in the form of an ellipse, and the hernial orifice is closed by suturing the medial walls of the aponeurosis, leaving at least 1 cm along the edge of the dissected inner aponeurosis layer. The Hemoben coating agentis applied to the area of rectus aponeurosis defects. The area sofdivergence of the aponeurosis layers are strengthened with a mesh implant with two sides by suturing the edges of the implant with the dissected edges of the rectus aponeuros is end-to-end with one row of sutures.

The study was conducted in two groups to evaluate the clinical results of the proposed tactical and technical aspects. The carried out analysis took into account various factors.

DISCUSSION. In the comparison group, IVH plastic surgery using the on lay method was performed in only 175 patients: 101 (57.7%) patients with extensive hernias and 74 (42.3%) patients with giant hernias. Almost the same ratio is noted in the study group; IVH plasty using the on lay method was performed in only 50 patients: 26(52%) patients with extensive hernias and 24(48%) patients with giant hernias (Table1).

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If we pay attention to the complications that developed in the early postoperative period, a clear prevalence of seroma and purulence in the comparison group catches the eye, both in the elimination of extensive hernias and giant hernias. In extensive hernias in the comparison group, seromas were noted in 11.9% of cases, while in the study group, only 3.8% of cases, which is three times less. With giant hernias in the comparison group, seromas were noted in 41.9% of cases, while in the study group, only 16.7% of cases, which is 2.5 times less.

Table 1 The incidence of wound complications in the reconstruction of the anterior abdominal wall with implantation of the onlay prosthesis

The nature of wound	Comparison group		c	
Complications	abs.	%	abs.	%
Extensive hernias				
Infiltrate	3	3,0%	1	3,8%
Seroma	12	11,9%	1	3,8%
Purulence	3	3,0%	0	0,0%
Total	18	17,8%	2	7,7%
Giant hernias				
Infiltrate	4	5,4%	1	4,2%
Seroma	31	41,9%	4	16,7%
Purulence	6	8,1%	1	4,2%
Total	41	55,4%	6	25,0%
All patients				
Infiltrate	7	4,0%	2	4,0%
Seroma	43	24,6%	5	10,0%
Purulence	9	5,1%	1	2,0%
Total	59	33,7%	8	16,0%

A similar pattern was observed when taking into account the purulence of postoperative wounds: it was observed in 3% of cases in extensive hernias in the comparison group, while in the study group, there was no suppuration; with giant hernias in the comparison group, it was observed in 8.1% of cases, while in the study group, there were only 4.2% of cases, which is two times less. The number of in filtrates, in general, did not differ between the groups: 7(4%) cases in the comparison group versus2 (4%) in the study group.

Fig. 1 shows the proportion of patients with wound complications after implantation of the onlay prosthesis. The graph clearly demonstrates a significant decrease in wound complications after surgery in the study group. Thus, with extensive hernias, the number of wound complications decreased from 17.8% to 7.7% of cases ($\chi2=1.599$; Df=1; p=0.207), and with giant hernias, the number of wound complications decreased from 55.4% to 25% of cases. ($\chi2=6.713$; Df=1; p=0.010). Accordingly, the introduction of an improved technique of tension-free prosthetic IVH plasty in conjunction with the use of the proposed option for preventing the development to wound complications using the antiseptic agent FarGALS and exposure to low-energy laser radiation made it possible to reduce the number of seromas and purulences in the study group by almost two times and increase the proportion of patients without local wound complications from 66.3% to 84% of cases ($\chi2=5.836$;Df=1;p=0.016)

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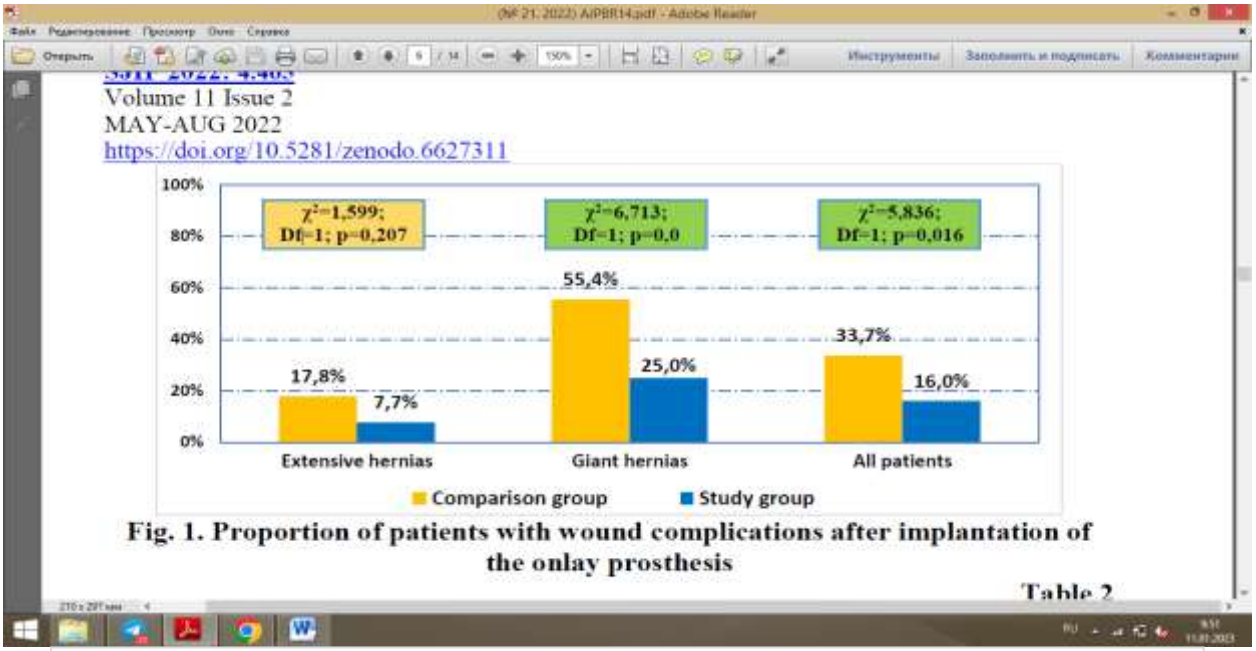

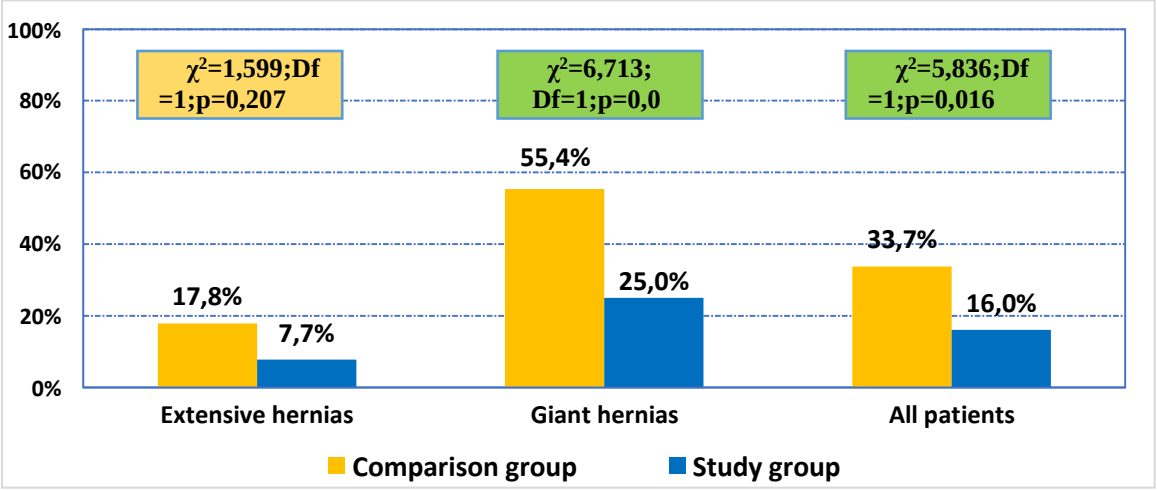

Fig. 1. Proportion of patients with wound complications after implantation of the onlay prosthesis

Table 2 The incidence of wound complications after the correction of the anterior abdominal wall with the implantation of the inlay prosthesis in the comparison group and the combined method in the study group

The nature of wound complications	Comparison group		Study group	
	abs.	%	abs.	%
Extensive hernias				
Infiltrate	2	13,3%	1	4,2%
Seroma	3	20,0%	2	8,3%
Purulence	1	6,7%	0	0,0%
Total	6	40,0%	3	12,5%
Giant hernias				
Infiltrate	9	6,9%	2	3,7%

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Seroma	48	36,9%	6	11,1%
Purulence	9	6,9%	1	1,9%
Total	66	50,8%	9	16,7%
All patients				
Infiltrate	11	7,6%	3	3,8%
Seroma	51	35,2%	8	10,3%
Purulence	10	6,9%	1	1,3%
Total	72	49,7%	12	15,4%

In the comparison group, IVH plastic surgery using the inlay method was performed in only 145 patients: 15 (10.4%) patients with extensive hernias and 130(89.6%) patients with giant hernias. Almost the same ratio is noted in the study group IVH plastic surgery using the inlay method was performed in only 78 patients: 24(30.7%) patients with extensive hernias and 54 (69.3%) patients with giant hernias (Table 2).

With extensive hernias in the comparison group after correction of the anterior abdominal wall with implantation of an inlay prosthesis, seromas were noted in 20% of cases, while in the study group, only in 8.3% of cases, which is 2.4 times less. With giant hernias in the comparison group, seromas were noted in 36.9% of cases, while in the study group, only in 11.1% of cases, which is 3.3timesless.

A similar pattern was observed when taking into account the purulence of postoperative wounds: in the comparison group, it was observed in 6.7% of cases in extensive hernias, while in the study group, there was no purulence; with giant hernias in the comparison group, it was observed in 6.9% of cases, while in the study group only 1.9% of cases, which is 3.6 times less. Even the whole number of infiltrates in the groups differed by two times: 11 (7.6%) cases in the comparison group versus 2(3.8%) in the study group.

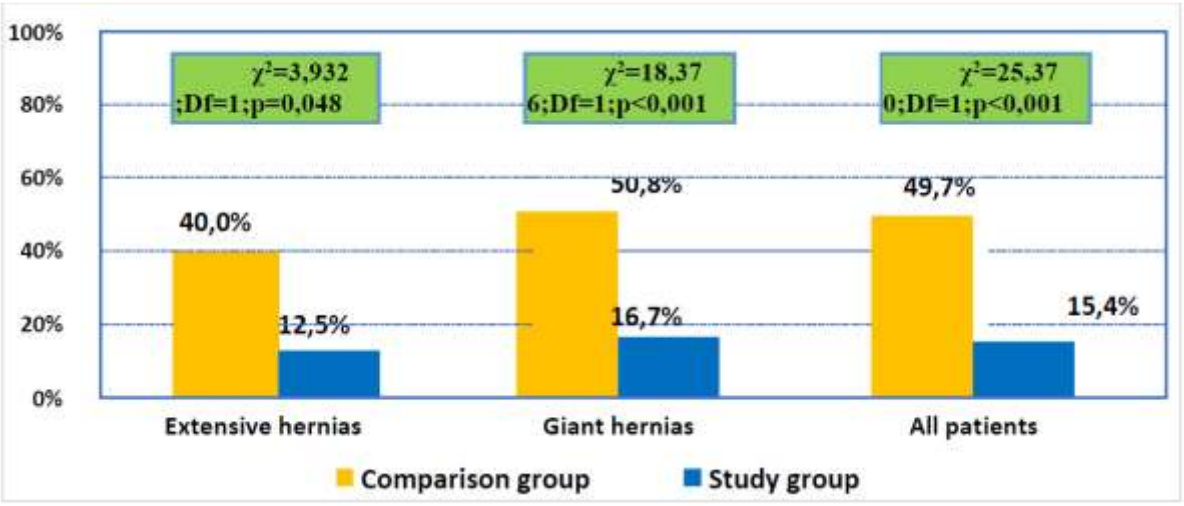

Fig. 2. The proportion of patients with wound complications after correction with implantation of the inlay prosthesis in the comparison group and the combined method in the study group

Figure 2 shows the proportion of patients with wound complications after implantation of the inlay prosthesis. There is a sharp decrease in postoperative wound complications in the study group. Thus, with extensive hernias, the number of wound complications decreased from 40.0% to 12.5% of cases ($\chi 2=3.932$; Df=1; p=0.048), and with giant hernias, the number of wound complications decreased from 50.8% to 16.7 % of cases, ($\chi 2=18.376$; Df=1; p<0.001). That is, a set of measures to prevent the development of wound complications in the study group made it possible to reduce the number of seromas and purulence by almost 3.23 times and increase the proportion of patients without local wound complications from 50.3% to 84.6% of cases

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($\chi 2=25.370$;Df=1;$p<0.001$). In this case, after correction with the implantation of the inlay prosthesis in the comparison group and the combined method in the study group, it was possible to obtain an even higher difference comparing with the onlay plasty.

In a pooled analysis in the comparison group, IVH plastic surgery using various methods was performed in only 320 patients: 116 (36.25%) patients with extensive hernias and 204(63.75%) patients with giant hernias. Almost the sameratio is noted in the study group. IVH plastic surgery was performed in only 128 patients: 50 (39%) patients with extensive hernias and 78 (61%) patients with giant hernias. In extensive hernias in the comparison group after correction of the anterior abdominal wall, seromas were noted only in 12.9% of cases, while in the study group, only in 6.0% of patients, which is 2.15 times less. With giant hernias in the comparison group, seromas were noted in 38.7% of cases, while in the study group, only in 12.8% of cases, which is three times less(Table3)

Table 3 Summary of incidence of wound complications in comparison groups

The nature of wound complications	Comparison group		Study group	
	abs.	%	abs.	%
Extensive hernias				
Infiltrate	5	4,3%	2	4,0%
Seroma	15	12,9%	3	6,0%
Purulence	4	3,4%	0	0,0%
Total	24	20,7%	5	10,0%
Giant hernias				
Infiltrate	13	6,4%	3	3,8%
Seroma	79	38,7%	10	12,8%
Purulence	15	7,4%	2	2,6%
Total	107	52,5%	15	19,2%
Total				
Infiltrate	18	5,6%	5	3,9%
Seroma	94	29,4%	13	10,2%
Purulence	19	5,9%	2	1,6%
Total	131	40,9%	20	15,6%

A similar pattern is fixed when taking into account purulence of postoperative wounds: with extensive hernias in the comparison group in 3.4% of cases, while in the study group, there was no purulence; with giant hernias in the comparison group, purulence was noted in 7.4% of patients, while in the study group only in 2.6%, which is 2.8 times less. Even the whole number of infiltrates in the groups differed by almost 1.5 times: 18 (5.6%) cases in the comparison group versus 5 (3.9%) in the study group.

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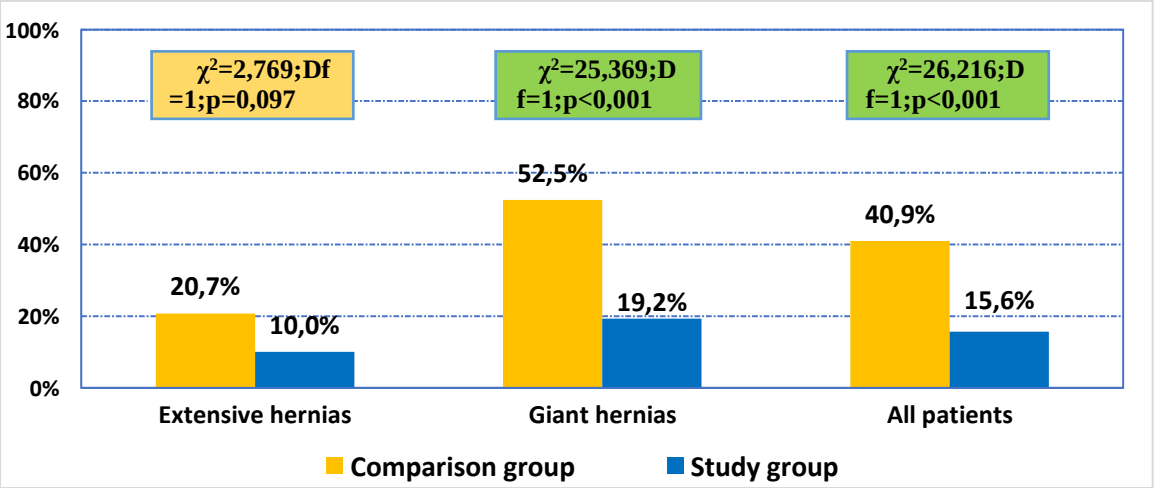

Fig. 3. The total proportion of patients with wound complications in the comparison groups

Figure 3 shows the total proportion of patients with wound complications in the comparison groups. Here, as well as in the previous graphs, there is a significant decrease in postoperative wound complications in the study group. Thus, with extensive hernias, the number of wound complications decreased from 20.7% to 10.0% of cases (χ2=2.769; Df=1; p=0.097), and with giant hernias, the number of wound complications decreased from 52.5% to 19.2 % of cases, (χ2=25.369; Df=1;p<0.001). That proposed technique of incisional large ventral hernia alloplasty in the study group made it possible to achieve adequate reconstruction of the anterior abdominal wall, use a smaller size of the prosthetic material and reduce the incidence of infection in the wound. As the result, the number of wound complications reduced from 40.9% to 15.6% and the proportion of patients without local wound complications increased from 59.1% to 84.4% of cases (χ2=26.216; Df=1;p<0.001).

Unfortunately, complications are not only local. Their number and incidence of development depends on the presence of concomitant cardiovascular, bronchopulmonary, hormonal diseases and on the degree of discrepancy between the volume of the hernial sac and the volume of the abdominal cavity, which is especially important for giant hernias.

Table 4 shows the summary incidence of systemic complications in the comparison groups, the most severe are myocardial infarction, PATE, ARDS, and compartment syndrome. It is noteworthy that for these indicators in the comparison group numbers are much worse than in the study group. For example, in the study group, a new surgical technique made it possible to avoid compartment syndrome completely, while in the comparison group, this complication was noted in 2 patients. Myocardial infarction developed in 1 case, only in the comparison group. ARDS in the comparison group also developed only in two cases. PATE in the study group was noted in 2 patients in the comparison group and in one case.

Table 4 Summary incidence of systemic complications in comparison groups

Compliction	Comparison group		Study group	
	abs.	%	abs.	%
Extensive hernias				
Compartment syndrome	1	0,9%	0	0,0%
Pleuritis	5	4,3%	1	2,0%
Pneumonia	3	2,6%	1	2,0%
Bronchitis	6	5,2%	2	4,0%
ARDS	1	0,9%	0	0,0%
Myocardial infarction	1	0,9%	0	0,0%
PATE	1	0,9%	0	0,0%
Heartbeat arrhythmia	2	1,7%	2	4,0%

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Giant hernias				
Compartment syndrome	1	0,5%	0	0,0%
Pleuritis	11	5,4%	2	2,6%
Pneumonia	8	3,9%	1	1,3%
Bronchitis	17	8,3%	4	5,1%
ARDS	1	0,5%	0	0,0%
Myocardial infarction	0	0,0%	0	0,0%
PATE	1	0,5%	1	1,3%
Heartbeat arrhythmia	5	2,5%	0	0,0%
Total				
Compartment syndrome	2	0,6%	0	0,0%
Pleuritis	16	5,0%	3	2,3%
Pneumonia	11	3,4%	2	1,6%
Bronchitis	23	7,2%	6	4,7%
ARDS	2	0,6%	0	0,0%
Myocardial infarction	1	0,3%	0	0,0%
PATE	2	0,6%	1	0,8%
Heartbeat arrhythmia	7	2,2%	2	1,6%

Perhaps at first glance, there is no big difference in the number of systemic complications in the groups, especially if we consider only the context of extensive hernias - 17.2% in the comparison group and 12.0% in the study group ($\chi2=0.727$;Df=1; p =0.394). But when analyzing giant hernias and all patients in total, there is a significant difference (Fig.4). Thus, in the giant hernias plasty, systemic complications in the comparison group were noted in 21.6% of cases, while in the study group, only in 10.3% ($\chi2=4.801$; Df=1; p=0.029). In the case of a pooled analysis by groups, regardless of the type of plasty and the size of the hernia, in the comparison group, systemic complications were noted in 20.0% of patients, and in the study group in 10.9% of patients. That increased the proportion of patients without systemic complications from 80.0% to 89. 1% ($\chi2=5.222$; Df=1; p=0.023). This once again proves the correctness of the chosen surgical approach and methods for preventing severe complications in the early postoperative period.

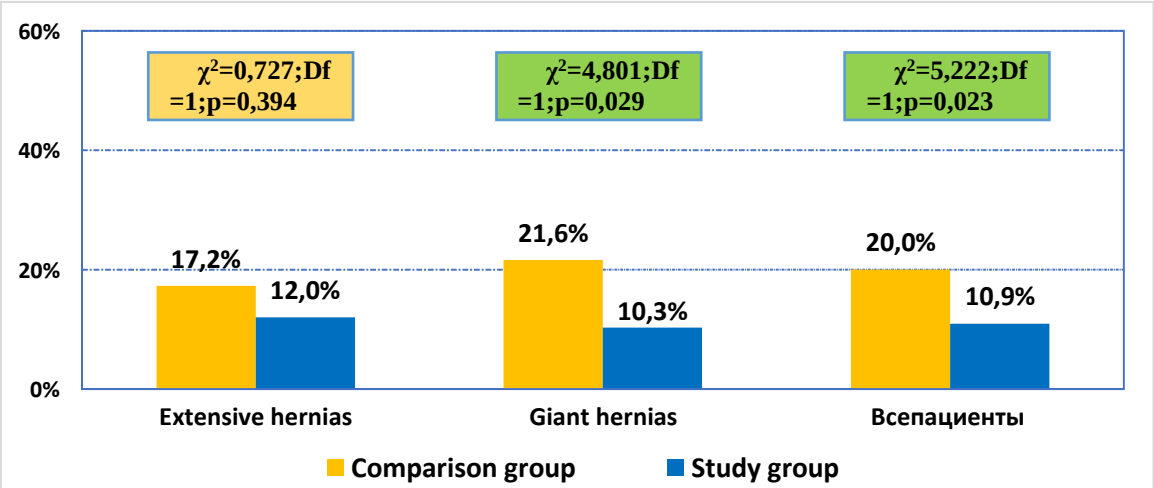

Fig. 4. The total proportion of patients with systemic complications in the comparison groups

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To compare the types of plasty, we analyzed the incidence of uncomplicated course (Fig. 5). It turned out that for all types of plastic surgery there is a significant difference between the comparison and the study groups.

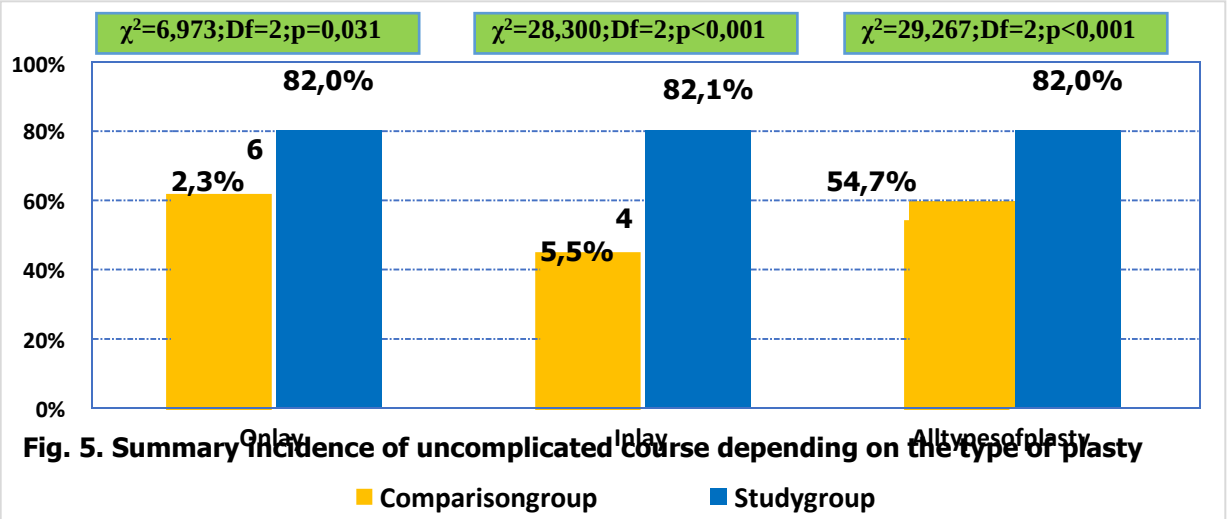

Fig. 5. Summary incidence of uncomplicated course depending on the type of plasty

When dividing patients according to the timing of drainage, it was found that in the comparison group, the average duration was 7.1±1.8 versus 5.3±1.9 days (t=9.44;p<0.001). If we take in to account that by the 7th day in the study group, only 24 (18.75%) of 128 patients with an averaged is charge of 39.0±16.5ml had drainage, while at these terms in the comparison group, 183 (57 .2%) out of 320 patients had a discharge of up to 55.4±30.4 ml, it becomes obvious why the drainage time in the study group was significantly less.

The number of postoperative complications, their severity, and the timing and nature of discharge from the drainage of course, influenced the timing of hospitalization (Fig.6).

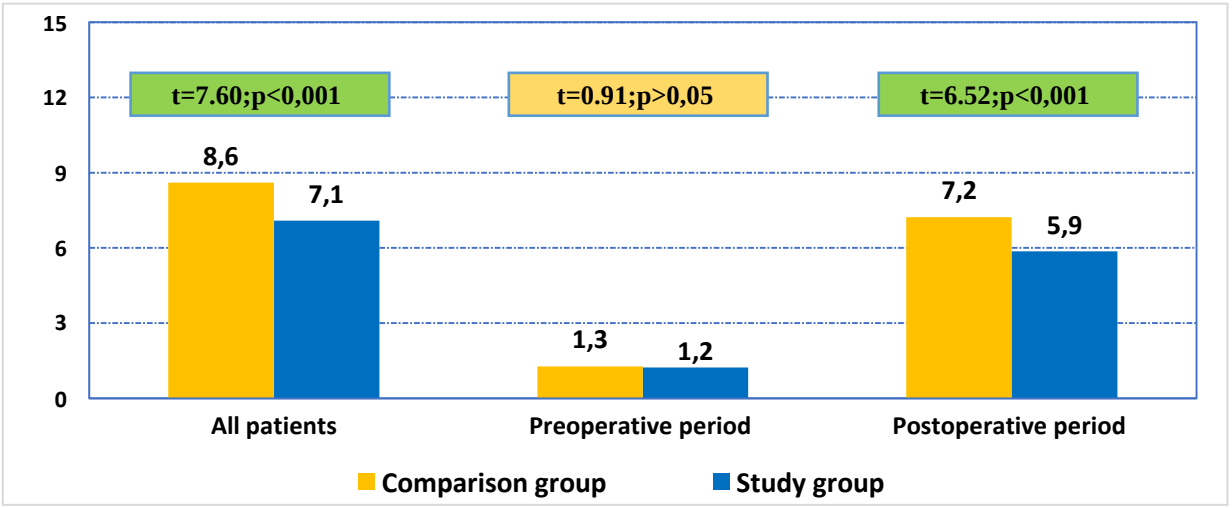

Fig. 6. Average terms of hospitalization in comparison groups (days)

If there was no significant difference in the duration of the preoperative period of 1.3±0.4 days/1.2±0.5 days (t=0.91; p>0.05), then the total time of hospitalization and the postoperative period were significantly shorter in the study group: 8.6±2.7days vs. 7.1±1.5 days (t=7.60; p<0.001) and 7.2±2.9 days vs. 5.9±1.5 days (t=6.52;p<0.001), respectively.

CONCLUSIONS. Conducted clinical studies have convincingly proved the advantages of using the proposed technical aspects of prosthetic plasty and

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tactical aids for preventing the development of wound complications in the immediate and long-term postoperative period in the most complicated situations (extensive and giant IVH).

A comparative analysis of clinical studies showed that the use of the proposed tactical and technical recommendations for prosthetic repair for extensive and giant IVH allowed to reduce the incidence of wound complications from 40.9% to 15.6%($\chi 2=26.216$; $Df=1$; $p<0.001$), including the formation of clinically significant seromas from 29.4% to 10.2% ($\chi 2=18.576$; $Df=1$; $p<0.001$), reduce the duration of drainage from 7.1±1.8 to 5.3±1.9 days ($t=9.44$;$p<0.001$) and total hospital period from 8.6±2.7 to 7.1±1.5 days ($t=7.60$;$p<0.001$).

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