

Evaluation of the Effect of Glucocorticosteroid Therapy with Diprospan, for the Prevention of Complications in Ventral Hernias with the Dynamic Study of Humoral Bioregulators

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Abstract The leaders in the incidence of hernia and further recurrence of ventral hernias are elderly and senile patients with obesity, reduced ability to regenerate, signs of anatomical and functional insufficiency of the anterior abdominal wall, as well as the presence of many associated factors. According to the Poulouse study, it turned out that The United States annually spends an average of about 3.2 billion dollars on the treatment of patients with ventral hernias. Taking into account the indicated areas, all patients are divided into two groups for the study. Patients in the amount of 115 (52.5%) were included in the comparison group who received treatment for the period from 2018 to 2021 inclusive, in which a retrospective analysis of the results of various interventions for ventral hernias was carried out. Based on the data obtained, tactical approaches to the choice of surgical tactics for abdominal wall hernia were optimized, the clinical effectiveness of which was assessed in the main study group - 104 (47.5%) patients treated from 2021 to 2023. A total of 8 (out of 53 patients) patients with early postoperative complications after allohernioplasty of the anterior abdominal wall were identified, and 5 / 62.5% did not receive hormone therapy, the remaining 3 / 37.5% of patients received therapy with the drug diprospan, injection into the surgical cavity, and their frequency is 1.66 times lower than those who did not receive hormone therapy (Between groups: $\chi^2 = 131$; df. = 2; significant $p < 0.05$).

Keywords Postoperative ventral hernia, Ventral hernias, Glucocorticosteroid, Diprospan, Fibrin, Bioregulators, Seroma, Infiltrate, Suppuration

1. Introduction

Elderly and senile patients with obesity, reduced ability to regenerate, signs of anatomical and functional insufficiency of the anterior abdominal wall, as well as the presence of many concomitant factors are leading in the frequency of hernia occurrence and further recurrence of ventral hernias. According to the Poulouse study, it turned out that the United States spends an average of about \$3.2 billion annually on the treatment of patients with ventral hernias [12]. Hernia surgery is the most common excision of performed general surgical interventions. More than 350,000 such operations are performed annually in the USA alone, and in Europe, this figure is 450,000, which leads to high costs for full-fledged treatment and further rehabilitation. Ventral hernias, especially postoperative hernias, account for up to 20-22% of all abdominal hernias and occupy the second place after

inguinal [1]. During the formation of postoperative hernias, as a complication of laparotomy, more than 5% of all patients occur [2,4,5,14,15,16].

Currently, the prevention of seroma formation in postoperative wounds, as well as its treatment, remains relevant. Reliable and high rates of this are shown by prevention and treatment with glucocorticosteroids (GCS). In which the puncture injection of the drug takes place directly into the surgical wound, after surgery, and parenterally before surgery in order to prevent inflammatory processes, such as the formation of seroma, on the surgical wound.

The very first glucocorticosteroid used in the treatment is "Antirheumatic substance X", which was developed in the 20s of the twentieth century. However, at the same time, it was only in the late 40s that Philip Hench drew attention to the improvement of the course of rheumatoid arthritis in jaundice and pregnancy, using GCS. Further, for receiving the 1950 Nobel Prize for discoveries regarding hormones of the adrenal cortex, their structure and biological effects.

A significant disadvantage of traditional methods, in the prevention and treatment of postoperative seroma, is not taking into account the physio – humoral features of the postoperative wound. During the operation, and performing various manipulations, an extensive wound surface appears which in the future will produce exudate in large quantities. Which leads to the development of retention complications, which leads to an elongation of the wound healing period, as well as increases the risk of infection, and other postoperative complications, which is a key mechanism in recurrence, with the formation of a paraprostatic hernia.

Against this background, the use of GCS in the prevention of postoperative complications is an advanced surgical method. When postoperative complications of anterior abdominal wall hernias are observed, GCS drugs are injected in high doses [11]. Against this background, the use of GCS in the prevention of postoperative complications is an advanced surgical method. When postoperative complications of anterior abdominal wall hernias are observed, GCS drugs are injected in high doses. The effectiveness of using GCS has been demonstrated in the medical section of cardiac surgery, in traditional and high-tech operations on various abdominal organs, as well as in traumatology [7,8,9,10,13]. In 2016, K.K. Jensen [8] was one of the first to prove that the use of glucocorticoids in allograftoplasty of anterior abdominal wall hernias significantly reduces the time of hospitalization, the intensity of postoperative pain, nausea and vomiting within the fast-track protocol within the fast-track protocol.

Glucocorticoid Diprosan (betamethasone disodium phosphate and betamethasone dipropionate) which has a number of properties (anti-inflammatory, antiallergic and immunosuppressive). Betamethasone dipropionate has a protonated effect, due to slower adsorption (3-4 weeks), while the pathological process is stopped and a long-term remission occurs. The form of release of the drug in ampoules of 1 ml, which contains 2 mg of betamethasone disodium phosphate and 5 mg of betamethasone propionate [3].

In this regard, we studied the local use of the hormone "Dipraspan", which belongs to the group of glucocorticoids. The latter was injected through a drainage tube directly into the cavity, which actively inhibits the formation of seromas and the effectiveness of this drug was dynamically evaluated.

2. Materials and Methods

To study and evaluate the beneficial effects of Glucocorticoid therapy with Diprosan, for the prevention of complications in ventral hernias.

This method of treatment with serom, in addition to relieving active exudative processes in the postoperative wound, provides for a general anti-inflammatory effect. The proposed method improves the results of surgical treatment of ventral hernias. Based on the patent - RU 2,697,059 C1, the specified technical result is achieved in practice by the fact that the puncture needle is not removed and 1 ml of

Diprosane is injected once into the cavity of the gray, and an aseptic bandage is applied to the wound.

The use of Diprosan was carried out three times as planned:

- Preoperative, parenteral – for the prevention of postoperative inflammatory processes, and in particular the formation of gray;
- On the first day after surgery, directly into the cavity of the surgical wound – for the treatment of postoperative inflammatory processes, and in particular the formation of gray;
- On the third day after surgery, directly into the cavity of the surgical wound – for the treatment of postoperative inflammatory processes, and in particular the formation of seromas.

All other drug administration is carried out based on the course of the postoperative period, if necessary. Dipraspan was used in 29 patients, 12 of them-other methods, 17 - a new method was performed (Table 1).

The dissertation research was performed as part of an open retrospective analysis for the comparison group and a promising one for the main group with randomization by localization, size, and type of performed plastic surgery for ventral hernias. The work is based on the results of treatment of primary as well as recurrent hernias on the abdominal wall in 219 patients treated from 2018 to 2023 in two medical institutions of the Khorezm region:

- Khorezm Regional Multidisciplinary Medical Center – 151 (68.9%) patients;
- Khiva Regional Medical Association – 68 (31.1%) patients.

The criteria for inclusion in the study were:

- The age of patients over 18 years old;
- The presence of a hernia of the anterior abdominal wall, except inguinal;
- Primary and recurrent forms of ventral hernias;
- Patients who have no absolute contraindications to herniation;
- Consent of patients to reconstructive or alloplastic surgical methods for the treatment of ventral hernias.

Criteria for exclusion from the study:

- Age of patients under 18 years of age;
- Herniators who have absolute contraindications to surgery;
- Emergency abdominal wall hernias;
- Patients who have refused surgery who prefer wearing a bandage.

The preoperative complex of diagnostic examination of patients with hernia of the anterior abdominal wall included a detailed study of complaints, anamnesis of illness and life, physical examination. The instrumental part of the diagnosis of abdominal hernias is carried out with the inclusion of ultrasound (ultrasound) and radiation methods of examination

of the abdominal cavity into the complex of examination of the patient, revealing formations, a characteristic chamber, shapes, sizes and the presence of contents. Ultrasound was performed without prior preparation, "Chisom" devices were used, Model: CBIT 8 Sn 123040786 (Germany).

The research material was subjected to statistical processing in spreadsheets. The IBM SPSS statistical 23 computing program was used for comparative analysis, and the Origin Pro 12.69.05326 program was used to draw diagrams. To verify the reliability of the results, the Pearson agreement criterion or χ^2 was used, which is the most convenient method for analyzing frequency changes arranged in conjugacy tables for unrelated groups. Also, finding the number of degrees of freedom D.f. The verification value is reliably $p < 0.05/5\%$.

3. Results and Discussions

Taking into account the indicated directions, all patients were divided into two groups for the study. 115 patients (52.5%) were included in the comparison group who received treatment for the period from 2018 to 2021 inclusive, who underwent a retrospective analysis of the results of various interventions for ventral hernias. According to the data obtained, the optimization of tactical approaches to the choice of surgical tactics for abdominal wall hernia was carried out, the clinical effectiveness of which was evaluated in the main group of the study – 104 (47.5%) patients cured during the period from 2021 to 2023.

The effectiveness of Diprosan GCS therapy on the body is determined by a combination of local and general reactions developing by neurohumoral mechanisms.

Table 1. Distribution of patients in the main group by types of prevention of early postoperative complications

No	Operation	A new method	Other methods	Total
1.	Ultrasound therapy	31	20	51
2.	Diprosan	17	12	29
	Total	48	32	80

By conducting a comparative assessment between the comparison group and the main group, a significant improvement in the outcome of allogenioplasty in patients of the main group was proved.

The following positive results were obtained with the use of a new method of allogenioplasty of anterior abdominal wall hernias and a complex of postoperative therapy and rehabilitation developed by us.

The results of the distribution of the operation position between the groups were close to each other. Allogenioplasty in the on-lay position is the most common method, and it was performed in 75.7% of cases, of which 86/51.8% were patients in the comparison group, and the remaining 80/48.2% ($\chi^2=9.692857143$; $df=2$; significantly $p<0.007$) (Table 2).

Table 2. Distribution of patients according to the main type of surgical treatment of hernias of the anterior abdominal wall

Type of operation	Comparison Group		The main group		Total	
	Abs.	%	Abs.	%	Abs.	%
Onlay	86	74.7	80	76.9	166	75.7
Continuation of table 2						
Sublay	19	16.6	10	9.6	29	13.3
Inlay	10	8.7	14	13.5	24	11
Total	115	100	104	100	219	100
Criteria χ^2	$\chi^2=9.692857143$; $df=2$; reliable $p<0.007$					

When studying the frequency of various postoperative complications, depending on the position of allogenioplasty, between the comparison group and the main group, the following results were obtained:

With the on lay position, which is the most commonly used among both groups, 166 / 75.7% of patients had the lowest incidence of postoperative complications, which had a significant advantage in this aspect in patients of the main group. Comparing each type of postoperative complications between groups with the on-lay position of allogenioplasty, one can see a clear positive trend in patients of the main group. In detail, bleeding was observed in 3.4% of patients in the comparison group, which is 2.61 times more common than in patients of the main group (1.3% of patients). Accumulation of seromas in the formed cavity of the anterior abdominal wall was observed in 10% of patients in the main group, which is 2.09 times less common than in patients of the comparison group (20.9%). The accumulation of infiltrate in the formed cavity was observed in 1.3% of patients in the main group, which is 1.9 times less common than in patients of the comparative group. The development of the process of suppuration of the surgical wound was observed in 2.6% of patients in the main group, which is 1.76 times less frequent than in the comparison group. Postoperative pleura-pulmonal complications were observed in both groups with the same frequency (2.4% of patients). No fatal outcome was observed in both groups at the on lay position. There were also no acute cardiovascular insufficiency in both groups. Overall, postoperative complications occurred in 17.5% of patients in the main group, which is 1.92 times less common than in the comparison group (33.7%) ($\chi^2 = 19.5$; $df = 6$; significantly $p<0.003$);

With the sub lay position, the trend of positive results remains about the same as with the on lay position, except that the only fatal outcome from the entire sample is observed in the comparison group with the sub lay position, but in the main group there are no such negative results. In detail, bleeding was not observed in both groups. Accumulation of seromas in the formed cavity was observed in 10% and 10.5% of patients, respectively, in the comparison group and the main group. The accumulation of infiltrate in the formed cavity was observed in 1 patient in the main group, and in 3 patients in the comparative group. The development of the process of suppuration of the surgical wound was observed in 1 patient in the main group, and in 2

Table 4. Distribution of patients tracked at various times after allogernioplasty

Terms of observation	Comparison Group		The main group		Total	
	Abs.	%	Abs.	%	Abs.	%
Up to 1 year	104	90.4	84	80.7	188	85.8
1-2 years old	91	79.1	73	70.1	164	74.8
2-3 years old	66	57.3	48	46.1	114	52.1
3 years and more	43	37.3	41	39.4	84	38.3
Criteria χ^2	$\chi^2=16,0478219$; $df=3$; reliable $p<0,05$					

With the on lay position, 22/25.9% of cases of various late complications were detected. Upon detailed analysis, the following results were obtained:

Implant wrinkling occurred in 5 patients, 4 / 4.6% of whom were in the comparison group, and only 1 / 1.2% of patients were in the main group, which is 3.8 times less common than in the comparison group;

The development of a cutaneous prosthetic fistula occurred in 9 patients, 7/8.2% of them were in the comparison group, and only 2 / 2.5% in the main group, which is 3.28 times less common than in the comparison group. The development of a cutaneous prosthetic fistula is the most common late complication after allogernioplasty of the anterior abdominal wall in the on lay position;

Recurrent post-prosthetic hernia occurs in 6 patients, and all of them are in the comparison group, in the main group, the development of recurrent post-prosthetic hernias was not observed;

Dormant occluded infiltrate was found in only 1 / 1.2% of patients in the main group;

Table 5. The frequency of diagnosed late complications

Terms of observation	Comparison Group		The main group	
	Abs.	%	Abs.	%
Up to 1 year	8	6.9	2	1.9
1-2 years	9	7.8	3	2.8
2-3 years old	6	5.2	2	1.9
3 years or more	7	6.1	2	1.9
Total	30	26.1	9	8.6
Without complications	85	73.9	95	91.3
Criteria χ^2	$\chi^2 = 50,5$; $df=3$; reliable $p < 0,05$			

As for the development of dormant occluded abscess, the opposite is true here, it was observed only in 1 / 1.2% of the patient in the comparison group ($\chi^2 = 22.5$; $df=4$; significantly $p<0.05$) (Table 5).

In the sub lay position, 10/39.8% of cases of various late complications were detected. Upon detailed analysis, the following results were obtained:

Implant wrinkling occurred in 3 patients, 2/10.5% of whom were in the comparison group, and only 1/10% of

patients were in the main group, which is 2 times less common than in the comparison group;

The development of a cutaneous prosthetic fistula was found in only 1 patient from the comparison group;

Recurrent post-prosthetic hernia does not occur in any patient;

Dormant occluded infiltrate was found in only 3 patients 2 / 10.5% of whom were in the comparison group;

As for the development of dormant occluded abscess, the same story is here, it was observed only in 3 patients, 2 of whom are in the comparison group.

The highest incidence of late postoperative complications after allogernioplasty of the anterior abdominal wall was observed in patients operated in the sub lay position (39.8%) ($\chi^2=8.333333$; $df=4$; unreliable $p>0.05$).

In the in lay position, 7 cases of various late complications were identified. Upon detailed analysis, the following results were obtained:

Implant wrinkling occurred in one 1/10% of the patients in the comparison group;

The development of a cutaneous prosthetic fistula was not found in any patient;

Recurrent post-prosthetic hernia does not occur in any patient;

Dormant occluded infiltration was found in only 3 patients, 2/20% of whom were in the comparison group, and only 1/7.1% in the main group, which is 2.8 times less common than in the comparison group;

As for the development of dormant occluded abscess, the same story is here, it was observed only in 3 patients, 2 of whom were in the comparison group ($\chi^2 = 2$; $df=4$; significantly $p<0.735758882$) (Table 5).

Between the groups: $\chi^2 = 35.3333333$; $df=4$; $p<0.05$ is significant (Fig. 1, 2).

All postoperative complications after anterior abdominal wall allogernioplasty were divided into two 2 groups: early and late complications. Early postoperative complications occurred, only 56/25.5% of patients (out of 219 patients), of which 38/33.04% of patients were in the comparison group, and only 18/17.3% were in the main group, which is 1.9 times less common than in the comparison group ($\chi^2 = 22.222222$; $df=1$; reliably $p<0.05$).

Late postoperative complications developed in 39 / 17.8% of patients (out of 219 patients), of which 30 / 26.08% were in the comparison group, and only 9 / 8.6% of patients in the main group, which is 3 times less frequent than in the comparison group ($\chi^2 = 49$; $df=1$; significantly $p<0.05$).

In total, 95/43.3% of cases of early and late postoperative complications after allogernioplasty of the anterior abdominal wall were recorded. Of these, 68/59.1% were in the comparison group, only 27/25.9% in the main group, which is 2.28 times less than in the comparison group ($\chi^2 = 62.25925926$; $df=1$; significantly $p<0.05$).

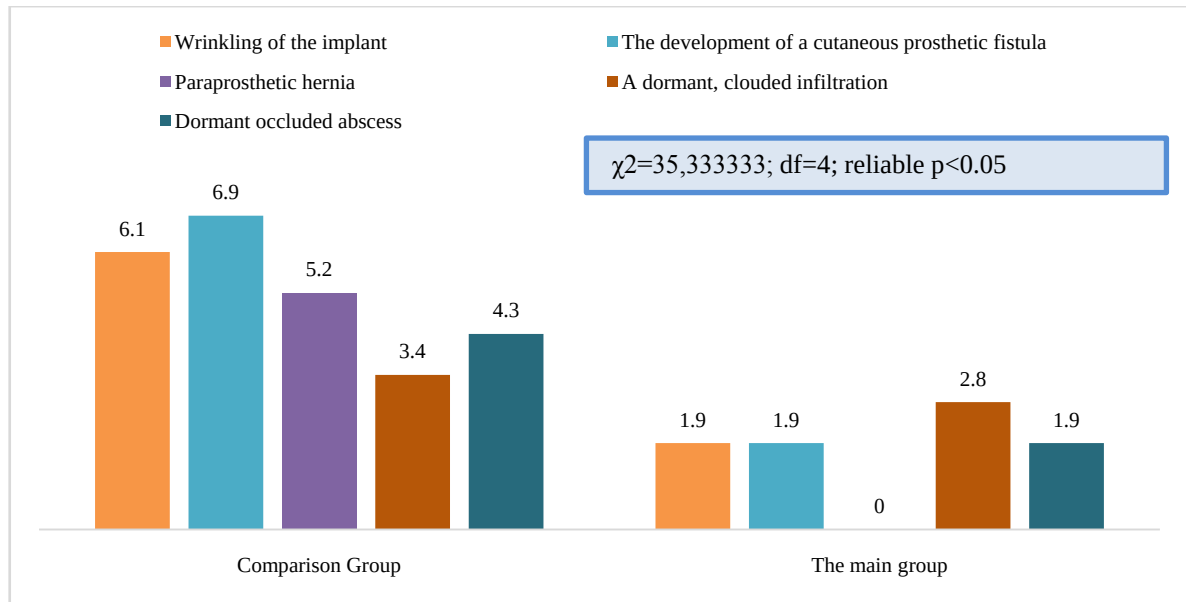


Figure 1. The frequency of late complications between the two groups

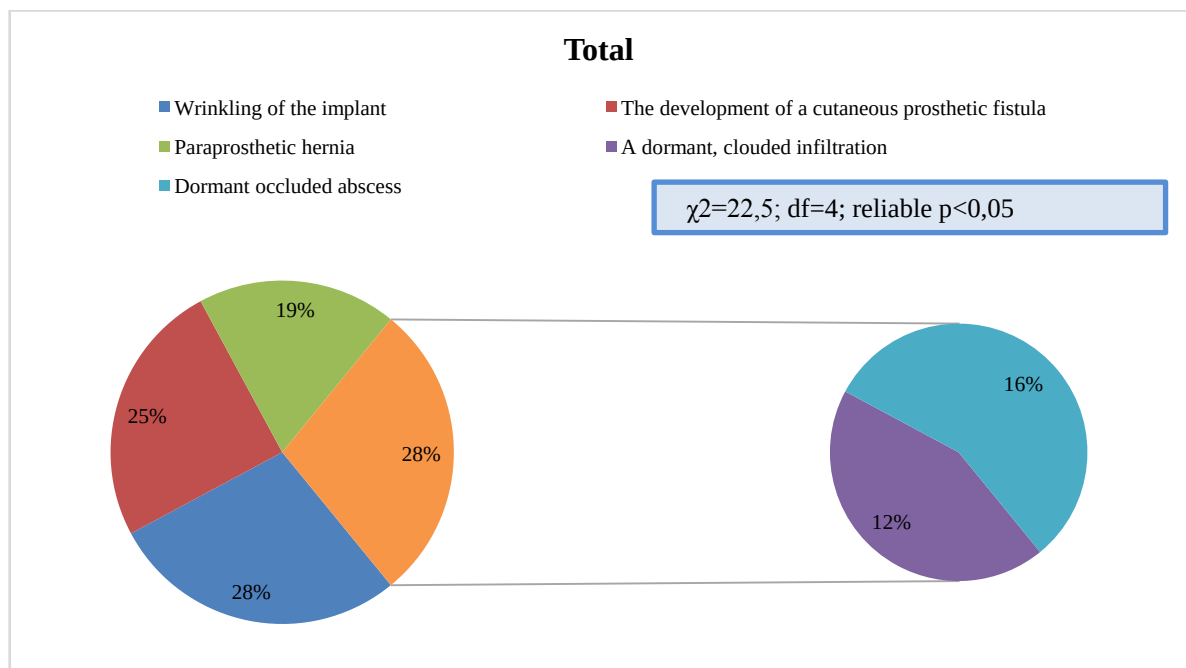


Figure 2. The incidence of all late postoperative complications after allogeneic transplantation

Table 6. The frequency of common complications

A complication	Comparison Group (115)		The main group (104)	
	Abs.	%	Abs.	%
Early	38	33.04	18	17.3
Later	30	26.08	9	8.6
Total complication	68	59.1	27	25.9
Total without complication	47	40.9	77	74.1
Criteria χ^2	73,94757; $df=1$; reliable $p<0,05$			

The number of patients who did not develop early and late complications was 124 / 56.7%. Of these, 47 / 40.9% of patients were in the comparison group, and 77 / 74.1% were in the comparison group, which is 1.8 times more common ($\chi^2 = 11.68831169$; $df=1$; significantly $p<0.05$). Between groups, early and late complications: $\chi^2 = 71.22222222$; $df = 1$; significantly $p<0.05$ (Table 6). Between groups, all complications and without complications: $\chi^2 = 73.94757095$; $df=1$; significantly $p<0.05$.

In a detailed study of the incidence of early postoperative complications, and their dependence on treatment with GCS (diprosan) drugs in the main group, the following data were obtained:

Table 7. The frequency of early complications depends on receiving hormone therapy

Intervention	Have not received hormone therapy (n=24)			They received hormone therapy (n=29)		
	Abs.	Complications	%	Abs.	Complications	%
The main group						
On lay	18	2	8.3	17	1	3.4
Sub lay	2	1	4.1	5	-	-
In lay	4	2	8.3	7	2	6.8
Total complications		5	20.8		3	10.3
Without complications		19	79.2		26	89.7
Criteria χ^2	$\chi^2=131$; df=2; reliable p<0,05					

53 patients from the main group participated in this study, of which 29 patients were treated with GCS (diprosan) drugs, and the remaining 24 patients were not treated with diprosan.

Among these patients, 35 of them were operated on in the on-lay position, and various types of early postoperative complications occurred in only 3 patients. Of these, 2 / 8.3% did not receive hormone therapy, and only 1 / 3.4% received hormone therapy with diprosan, an injection into the operating cavity, which is 2.44 times less common than in those patients who did not receive hormone therapy;

Among the subjects, 7 patients were operated on in the sub lay position, 2 of them did not receive hormone therapy, and 1 of them had an early postoperative complication. As for 5 (out of 7 patients) patients who received diprosan therapy by injection into the operating cavity, there were no cases of early postoperative complications among them;

Among the studied, 11 patients were operated in the in lay position, 4 of them did not receive hormone therapy, and only 7 patients received hormone therapy. 2 / 50% of patients, among those who did not receive hormone therapy, developed various early postoperative complications. Only 2 / 28.5% (out of 7 patients) who received diprosan therapy by injection into the operating cavity, which is 1.75 times less common than in patients who did not receive hormone therapy;

A total of 8 (out of 53 patients) patients with early postoperative complications after allogernioplasty of the anterior abdominal wall were identified, and 5/62.5% did not receive hormone therapy, the remaining 3/37.5% of patients received therapy with diprosan, injection into the operating cavity, and their frequency is 1.66 times lower than those who did not receive hormone therapy. Between the groups: $\chi^2=131$; df=2; significantly p<0.05 (Table 7).

4. Conclusions

1. Glucocorticoids have a pronounced anti-inflammatory effect. Considering that during alloplasty of hernial defects with synthetic mesh explants, active exudative inflammation occurs due to tissue traumatization and implantation of a foreign body into the wound, this

drug creates prerequisites for reducing the severity of local inflammatory reactions if 1.0 ml is administered under the skin before surgery and further the first and third days directly into the cavity of the surgical wound through a drainage tube.

2. The use of glucocorticoids before surgery and in the postoperative period accelerates the healing process of the postoperative wound, thanks to the anti-inflammatory effects of the drug Dipraspan, increases the effectiveness of treatment, and reduces postoperative complications with this pathology from 20.8% to 10.3%.
3. Creating optimal conditions for the healing of damaged tissues is the main goal of the postoperative period, to achieve this goal, at the end of the operation, drainage should be only active according to Redone and after that, the bandage is not removed around the clock for 2 days. Starting on the third day, we remove the bandage at night and during the day, every 3-4 hours, we unbutton the bandage for 30 minutes in a supine position. From the fifth day of postoperative period, we will take half-hour breaks every 2 hours with a daily wearing duration of no more than 6-8 hours, and in this order up to 7-10 days of the postoperative period, taking into account the patient's condition. During the wearing of the bandage in this mode, as we recommend, the external load and intra-abdominal pressure are evenly distributed over the operated area.

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