Т. 7. №12. 2021
https://doi.org/10.33619/2414-2948/73

UDC 617-089.844 https://doi.org/10.33619/2414-2948/73/21

COMPARATIVE ASSESSMENT OF THE DYNAMICS OF IMMUNOLOGICAL REACTIVITY IN PATIENTS WITH POSTOPERATIVE VENTRAL HERNIA

©Kurmanov R., *Kyrgyz State Medical Institute of Retraining and Advanced Training, Bishkek, Kyrgyzstan*
©Osmonbekova N., *M.D., National Surgical Center, Bishkek, Kyrgyzstan*
©Aitiev U., *Kyrgyz State Medical Institute of Retraining and Advanced Training, Bishkek, Kyrgyzstan*
©Ashimov Zh., *M.D., Kyrgyz State Medical Institute of Retraining and Advanced Training, National Surgical Center, Bishkek, Kyrgyzstan,*
©Dinlosan O., *M.D., Kyrgyz State Medical Institute of Retraining and Advanced Training, National Surgical Center, Bishkek, Kyrgyzstan*
©Ibraimov B., *National Surgical Center, Bishkek, Kyrgyzstan*
©Rysbek uulu Z., *National Surgical Center, Bishkek, Kyrgyzstan*

СРАВНИТЕЛЬНАЯ ОЦЕНКА ДИНАМИКИ ИММУНОЛОГИЧЕСКОЙ РЕАКТИВНОСТИ У ПАЦИЕНТОВ ПОСЛЕОПЕРАЦИОННЫМИ ВЕНТРАЛЬНЫМИ ГРЫЖАМИ

©Курманов Р. А., *Киргизский государственный медицинский институт переподготовки и повышения квалификации им. С.Б. Даниярова, г. Бишкек, Кыргызстан*
©Осмонбекова Н. С., *канд. мед. наук, Национальный хирургический центр, г. Бишкек, Кыргызстан*
©Айтиев У. А., *Киргизский государственный медицинский институт переподготовки и повышения квалификации им. С.Б. Даниярова, г. Бишкек, Кыргызстан*
©Ашимов Ж. И., *канд. мед. наук, Киргизский государственный медицинский институт переподготовки и повышения квалификации им. С.Б. Даниярова, Национальный хирургический центр, г. Бишкек, Кыргызстан*
©Динлосан О. Р., *канд. мед. наук, Киргизский государственный медицинский институт переподготовки и повышения квалификации им. С.Б. Даниярова, Национальный хирургический центр, г. Бишкек, Кыргызстан*
©Ибраимов Б. А., *Национальный хирургический центр, г. Бишкек, Кыргызстан*
©Рысбек уулу З., *Национальный хирургический центр, г. Бишкек, Кыргызстан*

Abstract. Postoperative Ventral Hernias to this day remain one of the main pathologies of planned and urgent surgical interventions. *The purpose of the study* is to study the immune response in patients with postoperative ventral hernias who underwent auto and alloplastic hernioplasty methods. The study included 40 patients diagnosed with postoperative ventral hernia, including 25 men (62.25%) and 15 women (37.5%). In men, the average age was 45.6±2.3 years, and in women 57.2±3.2 years. Patients are divided into 2 groups. Group I are patients who underwent autoplastic methods and group II patients who underwent alloplastic hernioplasty methods. The complex of immunological examination included the determination of a subpopulation of lymphocytes with CD3, CD4, CD8, CD20 receptors, interleukin 6, interleukin 10 and immunoglobulins A, M, G. Immunological examination of blood parameters in patients with postoperative ventral hernias revealed the following changes. There is an upward trend in all indicators. In group I, the leukocyte level was increased by +0.2±0.01, and in group II, the indicators were within the normal range. The level of monocytes in patients who underwent

Т. 7. №12. 2021
https://doi.org/10.33619/2414-2948/73

alloplasty increased by +1.5±0.2. There was an increase in the concentration of T and B lymphocytes with GD3, CD4, CD8, CD20 receptors on the 7th day after surgery in patients of the first group was +1.85±0.3, +1.6±0.4, +1.6±0.1, +1.5±0.2. And in patients of the second group, the initial level of indicators was lower and increased by +1.2±0.1, +1.4±0.2, +1.67±0.65, +1.03±0.45. The level of IL6 and IL 10 in the postoperative period increased in patients of the first group by +1.55±0.2 and +1±0.9, in the second group it was IL 6 +0.9±1.2, IL 10 +0.8±1.2. The study shows that the indicators of the humoral cell type tended to increase, which shows the result. *Conclusions.* Patients with postoperative ventral hernias who have undergone autoplastic and alloplastic hernioplasty methods in dynamics, the immunological reactivity indicators significantly increase on the 7th day, in comparison with the initial blood parameters. Namely, in patients who have undergone autoplastic methods of hernioplasty. The use of conventional suture materials in autogernioplasty increases the risk of developing an inflammatory process in the early and long-term postoperative period, in contrast to the use of polypropylene mesh prostheses.

Аннотация. Послеоперационные вентральные грыжи по сей день остаются одной из главных патологий плановых и ургентных хирургических вмешательств. *Целью исследования* является изучение иммунной реакции у пациентов послеоперационными вентральными грыжами которым выполнены ауто- и аллопластический методы герниопластики. В исследование было включено 40 больных с диагнозом послеоперационная вентральная грыжа, из них 25 мужчин (62,25%) и 15 женщин (37,5%). У мужчин средний возраст составил 45,6±2,3 лет, а у женщин 57,2±3,2 лет. Пациенты разделены на 2 группы. I группа это пациенты которым произведены аутопластические методы и II группа больных, которым выполнены аллопластические способы герниопластики. Комплекс иммунологического обследования включал определение субпопуляции лимфоцитов с рецепторами CD3, CD4, CD8, CD20, интерлейкин 6, интерлейкин 10 и иммуноглобулины A, M, G. При иммунологическом исследовании показателей крови у пациентов послеоперационными вентральными грыжами выявлены, следующие изменения. По всем показателям идет тенденция к повышению. В I группе уровень лейкоцита повышен на +0,2±0,01, а во II группе показатели были в пределах нормы. Уровень моноцитов у больных перенесших аллопластику увеличился на +1,5±0,2. Имеется увеличения концентрации Т и В лимфоцитов с рецепторами GD3, CD 4, CD8, CD20 на 7-е сутки после операции у пациентов первой группы составило +1,85±0,3, +1,6±0,4, +1,6± 0,1, +1,5±0,2. А у больных второй группы первоначальный уровень показателей был ниже и увеличились на +1,2±0,1, +1,4±0,2, +1,67±0,65, +1,03±0,45. Уровень ИЛ6 и ИЛ 10 в послеоперационном периоде увеличился у пациентов первой группы на +1,55±0,2 и +1±0,9, во второй группе составило ИЛ 6+0,9±1,2, ИЛ 10 +0,8±1,2. При исследовании видно, что показатели клетки гуморального типа имели тенденции к повышению, что показывает результат. Пациенты послеоперационными вентральными грыжами перенесшие аутопластические и аллопластические способы герниопластики в динамике показатели иммунологической реактивности достоверно увеличиваются на 7-е сутки, в сравнении с исходными показателями крови. А именно у пациентов, перенесших аутопластические способы герниопластики. Использование обычных шовных материалов при аутогерниопластики увеличивают риск развития воспалительного процесса в раннем и отдаленном послеоперационном периоде, в отличие от использования полипропиленовых сетчатых протезов.

Т. 7. №12. 2021
https://doi.org/10.33619/2414-2948/73

Keywords: Postoperative Ventral Hernias, immunological reactivity, immunoglobulin, interleukin.

Ключевые слова: послеоперационные вентральные грыжи, иммунологическая реактивность, иммуноглобулин, интерлейкин.

Introduction

Postoperative Ventral Hernias (POVH) to this day remain one of the main pathologies of elective and urgent surgical interventions. According to statistics in the United States, the daily material costs for the treatment of hernias are 3 billion dollars [1]. Despite the development of new technologies in the field of herniplasty, including the traditional tension-free and laparoscopic methods of surgical treatment popular in recent years, the problem of the development of hernia recurrence and wound infection is still relevant in abdominal surgery. After surgery by laparotomic access, there is a risk of hernia [2, 3].

With planned or urgent laparotomy, POVH can develop in 25% of cases, and when patients have risk factors such as diabetes mellitus, obesity, chronic obstructive pulmonary disease, connective tissue metabolic disorders, etc., the risk reaches 50% of the case [4–6].

According to the literature, patients suffering from POVH for a long time can lead to degenerative changes in the musculoskeletal system, chronic cardiovascular and pulmonary insufficiency, which in turn in specific cases can lead to patient disability [7–9].

Some authors believe that new methods of surgical treatment in the field of herniology made it possible to expand the indications for surgical intervention and improve the immediate results of treatment and reduce the frequency of disease relapses but led to an increase in the frequency of specific wound complications, which significantly reduced the indicators of the quality of life of patients in the long term [10–13].

Basically, patients of working age suffer from POVH, which from the economic point of view affects the economy of the state. The incidence of postoperative complications in patients operated on for POVH in a planned manner reaches 33%, in emergency operations — 54% [14].

Complications such as: suppuration of postoperative wounds — 2.2-7.8%, infiltrates — 1.6–4.1% and seroma — 6.7–50%, but gray can no longer be included in postoperative complications, since it variant of the norm, after extensive separation [15, 16]. Mortality in elective surgery is reached from 3 to 7%, and in emergency operations from 10% and more [17].

Over the past years and accumulated experience, there are sources that the immune system plays a role in the development of various diseases. In the development of a pathological process in the body, including postoperative complications due to disturbances and changes in the parameters of the immune system, such as type 1 T-helpers (Th1) and type 2 T-helpers (Th2). These cells determine the form of a specific immune response, mainly by the cellular or humoral pathway [18].

The purpose of diagnosing and preventing postoperative complications in patients with POVH based on the study of immune parameters in the literature, there are only a few scientific works [19].

Due to the unsatisfactory results of surgical treatment, the patient's immunological status is being actively studied before and after surgery, which is relevant and significant for improving the quality of life in the early postoperative period.

The aim of the study is to study the immune response in patients with incisional ventral hernias who underwent auto and alloplastic hernia repair.

Т. 7. №12. 2021
https://doi.org/10.33619/2414-2948/73

Materials and research methods

Immunological studies were studied in 40 patients with POVH: 25 men (62.25%) and 15 women (37.5%). For men, the average age was 45.6±2.3 years, and for women, 57.2±3.2 years. The patients are divided into 2 groups. Group I consists of patients who underwent autoplastic methods, which amounted to 20 patients. Group II also consisted of 20 patients who underwent alloplastic methods of hernioplasty, using a monofilament polyproline mesh endoprosthesis, non-absorbable, not stained with a standard weave manufactured by Futura Surgicare PVT LTD (Bangalore, India).

Patients were operated on from December 2020 to April 2021 at the National Surgical Center of the Ministry of Health of the Kyrgyz Republic. Studies of immunological parameters were carried out on the basis of the immunological laboratory of the Scientific Center of the Ministry of Health of the Kyrgyz Republic (executors of the head of the laboratory — M.D. E. V. Dudenko and S. Sydykova).

The complex of immunological examination included the determination of a subpopulation of lymphocytes with receptors CD3, CD4, CD8, CD20, interleukin 6, interleukin 10 and immunoglobulins A, M, G.

All patients underwent preoperative preparation in order to exclude postoperative complications. Patients who had concomitant diseases were consulted by narrow specialists and appropriate treatment was prescribed. Patients underwent antibiotic prophylaxis with Cefazolin 1.0 intramuscularly 60 minutes before surgery.

Statistical processing was carried out using the Statistica for Windows 6.0 application package. The mean value, standard deviation, mean error have been determined. The indicators are checked for the fulfillment of the normal distribution law according to the Student's criteria. Differences were considered statistically significant at $p \leq 0.05$.

Results and its discussion

When studying the cellular factors of the immune status, it was found that the indices of type 1 immunocompetent cells did not differ in the studied groups. In patients who underwent autogernioplasty, the percentage of leukocytes and monocytes in the group was 5.4±1.0 and 5.6±2.5, and lymphocytes were within 28.3±6.1. Immunocompetent type 2 cells before surgery were CD3 — 47.2±12.9, CD4 — 26.7±6.1, CD 8 — 30.2±5.5, CD 20 — 12.5±3, 6 (Table 1).

Table 1

DYNAMICS OF INDICATORS OF IMMUNOCOMPETENT CELLS
IN BOTH CLINICAL GROUPS IN COMPARISON

Indicators	*Autoplastic method*			*Alloplastic method*		
	Before	*7 days*	*Validity of*	*Before*	*7 days*	*Validity of*
Leukocytes, 10u / l	5,4±1,0	5,2±1,01	p>0,05	4,8±1,1	4,8±0,9	p<0,05
Monocytes, %	5,6±2,5	5,6±2,4	p<0,05	5,5±2,5	7,0±2,3	p>0,05
Lymphocytes, %	28,3±6,1	30,3±5,8	p>0,05	26,2±4,01	28,2±3,2	p>0,05
GD3 + ×10y cells / l.	47,2±12,9	49,05±12,6	p>0,05	47,4±10,7	48,6±10,8	p>0,05
CD4- ×10y cells / l	26,7±6,1	28,3±5,7	p>0,05	26,9±5,9	28,3±5,7	p>0,05
CO8 + ×10ukl / l	30,2±5,5	31,8±5,6	p>0,05	30,4±4,05	32,07±5,7	p>0,05
CD20 + ×10y cells / l	12,5±3,6	14,0±3,4	p>0,05	12,07±3,05	13,1±2,6	p>0,05

As can be seen in the table, in the early postoperative period, in patients who underwent autoplasty, the leukocyte level decreased by 5.2±1.01, compared to the indicator before surgery,

Т. 7. №12. 2021
https://doi.org/10.33619/2414-2948/73

5.4±1.0, and in patients who underwent alloplasty, the leukocyte count was practically unchanged. Also, in the dynamics, the level of monocytes before and after the operation did not change in patients who underwent autoplasty, in contrast to patients who underwent alloplasty, the indicators of monocytes after the operation were increased and amounted to 7.0±2.3.

The level of lymphocytes was increased in patients who underwent autoplasty after surgery, which was 30.3±5.8, which significantly differs from the initial values (p> 0.05).

As can be seen in the table, in the early postoperative period, in patients who underwent autoplasty, the leukocyte level decreased by 5.2±1.01, compared to the indicator before surgery, 5.4±1.0, and in patients who underwent alloplasty, the leukocyte count was practically unchanged. Also, in the dynamics, the level of monocytes before and after the operation did not change in patients who underwent autoplasty, in contrast to patients who underwent alloplasty; the indicators of monocytes after the operation were increased and amounted to 7.0±2.3.

The level of lymphocytes was increased in patients who underwent autoplasty after surgery, which was 30.3±5.8, which significantly differs from the initial values (p> 0.05).

In a comparative aspect, as reflected in Table 2, the indices of T lymphocyte subpopulations in the group that underwent autoplasty (CD3 — 49.05±12.6, CD4 — 28.3±5.7, CD8 — 31.8±5.6, CD20 — 14.05±3.4) and indices of subpopulations of T lymphocytes in the group that underwent alloplasty (CD3 — 48.6±10.8, CD4 — 28.3±5.7, CD8 — 32.07±5.7, CD20 — 13.1±2.6). These indicators were increased in both groups after surgery, which significantly differs from the initial level (p> 0.05). The study of indicators of cytokines and immunoglobulins in auto and alloplasty revealed the following changes, which are displayed in the table (Table 2).

Table 2

INDICATORS OF CYTOKINES AND IMMUNOGLOBULINS AFTER AUTOPLASTIC AND ALLOPLASTIC METHODS IN COMPARISON

Indicators	*Autoplastic method*			*Alloplastic method*		
	Before	*7 days*	*Validity of*	*Before*	*7 days*	*Validity of*
ИЛ-6, g/ml	7,5±3,6	9,05±3,4	p>0,05	7,2±2,7	8,1±1,5	p>0,05
ИЛ-10, g/ml	4,7±3,4	5,7±2,5	p>0,05	4,4±2,7	5,2±1,5	p>0,05
Ig M, g/ml	5,6±2,5	7,2±2,6	p>0,05	3,6±2,7	4,8±1,3	p>0,05
Ig G, g/ml	10,1±5,5	14,2±3,5	p>0,05	8,1±4,2	9,2±2,5	p>0,05
Ig A, g/ml	2,4±1,3	2,8±3,3	p>0,05	3,2±1,7	3,8±2,01	p>0,05

In Table 2, it is shown that before the operation, the indicators of cytokines and immunoglobulins were within normal values after various methods, but on the 7th day after the operation, the levels of indicators increased. Namely, in patients who have undergone autoplastic methods of hernioplasty. Significantly different from the initial level (p> 0.05).

In patients who underwent autoplasty before surgery, the IL-6 level was 7.5±3.6. On the 7th day after surgery, IL-6 was 9.05±3.4, which is significantly different (p> 0.05).

The IgM index in patients who underwent autoplastic methods was 7.2±2.6 after surgery, than the initial state 5.6±2.5 (p> 0.05).

The IgG level in patients who underwent auto and alloplastic methods before surgery was 10.1±5.5 and 8.1±4.2. And after the operation on the 7th day it was 14.2±3.5 and 9.2±2.5. Patients who underwent autoplastic methods in all parameters are 2% higher from the initial level (p> 0.05).

IgA in both groups before surgery were within the normal range and amounted to 2.4±1.3 and 3.2±1.7. After the operation on the 7th day, the indicator slightly increased and reached the threshold level of 2.8±3.3 and 3.8±2.0.

Т. 7. №12. 2021
https://doi.org/10.33619/2414-2948/73

An immunological study of blood parameters in patients with POVH revealed the following changes. There is an upward trend in all indicators. In group I, the leukocyte level increased by + 0.2±0.01, and in group II, the indicators were within the normal range. The level of monocytes in patients undergoing alloplasty increased by +1.5±0.2.

When comparing the level of lymphocytes in both groups, no special differences were found and the increase in the indicator was only +2±0.3 and +2±0.81 ($p<0.05$).

As you can see, there is an increase in the concentration of T and B lymphocytes with receptors GD3, CD 4, CD8, CD20 on the 7th day after the operation in patients of the first group was +1.85±0.3, +1.6±0.4 , +1.6±0.1, +1.5±0.2. And in patients of the second group, the initial level of indicators was lower and increased by +1.2±0.1, +1.4±0.2, +1.67±0.65, +1.03±0.45. All these indicators are significantly different from each other ($p> 0.05$).

The level of IL6 and IL 10 in the postoperative period increased in patients of the first group by +1.55±0.2 and +1±0.9, in the second group it was IL 6 +0.9±1.2, IL 10 +0,8±1.2. They differ significantly ($p> 0.05$).

The study shows that the indicators of cells of the humoral type had a tendency to increase, which shows the result. The concentration of IgG in the group who underwent autoplasty compared to those in the alloplasty group was higher (+4.1±2.0 g/l versus +1.1±1.7), and in the group after (+0.4±2.0, +1.6±0.1), which is significantly different ($p> 0.05$).

Thus, it was revealed that in patients with POVH who underwent autoplastic and alloplastic methods of hernioplasty in the dynamics, the indicators of immunological reactivity significantly increased on the 7th day, in comparison with the initial indicators of blood. Namely, in patients who underwent autoplastic methods of hernioplasty, in contrast to alloplastic methods of surgery, which used polypropylene, mesh prostheses. The use of conventional suture materials for autogernioplasty increases the risk of developing an inflammatory process in the early and late postoperative period.

This study proved that the dynamics of the indices of immunological reactivity and immune response to the performed operation is higher in patients who underwent autogernioplasty. And with allohernioplasty with the use of polypropylene mesh prostheses, they do not affect the patient's health in any way, but only improve the quality of life indicators, which make it possible for its widespread use in the field of modern herniology.

References:

1. Kubyshkin, V A, Agapov, M A, Davlyatov, M R, & Kakotkin, V V. (2020). Ventral hernias and extracellular matrix of connective tissue. *Khirurgiya,* (2). 62-67. (in Russian). https://doi.org/10.17116/hirurgia202002162

2. Yang, B., Zhou, S., Li, Y., Tan, J., Chen, S., & Han, F. (2018). A comparison of outcomes between lichtenstein and laparoscopic transabdominal preperitoneal hernioplasty for recurrent inguinal hernia. *The American Surgeon*, *84*(11), 1774-1780. https://doi.org/10.1177/000313481808401134

3. Glauser, P. M., Brosi, P., Speich, B., Käser, S. A., Heigl, A., Rosenberg, R., & Maurer, C. A. (2019). Prophylactic intraperitoneal onlay mesh following midline laparotomy—long-term results of a randomized controlled trial. *World journal of surgery*, *43*(7), 1669-1675. https://doi.org/10.1007/s00268-019-04964-6

4. Sevonius, D., Gunnarsson, U., Nordin, P., Nilsson, E., & Sandblom, G. (2011). Recurrent groin hernia surgery. *Journal of British Surgery*, *98*(10), 1489-1494. https://doi.org/10.1002/bjs.7559

Т. 7. №12. 2021
https://doi.org/10.33619/2414-2948/73

5. Brooks, D. C., & Michael Rosen, W. C. (2019). Clinical features, diagnosis, and prevention of incisional hernias. *UpToDate. UpToDate*.

6. Mizell, J. S., Chen, W., & Rosen, M. (2015). Principles of abdominal wall closure. *UpToDate, Waltham, MA*.

7. Ermolov, A. S., Koroshvili, V. T., Blagovestnov, D. A., Yartsev, P. A., & Shlyakhovskii, I. A. (2017). Posleoperatsionnye gryzhi zhivota: rasprostranennost' i etiopatogenez. *Khirurgiya. Zhurnal im. NI Pirogova,* (5), 76-82. (in Russian).

8. Alishev, O. T. (2014). Novye podkhody v profilaktike posleoperatsionnykh oslozhnenii pri proteziruyushchei gernioplastike posleoperatsionnykh ventral'nykh gryzh bol'shikh razmerov. *Vestnik sovremennoi klinicheskoi meditsiny, 7*(Prilozhenie 2). (in Russian).

9. Gogiya, B. Sh., & Alyautdinov, R. R. (2017). Novye tekhnologii v gerniologii. *Vysokotekhnologicheskaya meditsina, 4*(3), 58-60. (in Russian).

10. Babazhanov, A. S., Akhmedov, G. K., Saidullaev, Z. Ya., & Kakhorov, Sh. M. (2019). Analiz rezul'tatov gernioalloplastiki ventral'nykh gryzh. In *World Science: Problems and Innovations* (pp. 224-227). (in Russian).

11. Golovin, R. V., & Nikitin, N. A. (2015). The Assessment of Different Combination Prosthetic Repair Techniques and Prognostic Criteria for Early Wound Complications in Median Incisional Ventral Hernias. *Sovremennye Tehnologii v Medicine, 7*(2), 105-112. (in Russian). https://doi.org/10.17691/stm2015.7.2.14

12. Niyazov, A. A., & Beishenaliev, A. S. (2018). Sovremennaya gerniologiya i kachestvo zhizni khirurgicheskikh bol'nykh. *Vestnik Mezhdunarodnogo Universiteta Kyrgyzstana,* (1), 183-189. (in Russian).

13. Mier, N., Helm, M., Kastenmeier, A. S., Gould, J. C., & Goldblatt, M. I. (2018). Preoperative pain in patient with an inguinal hernia predicts long-term quality of life. *Surgery*, *163*(3), 578-581. https://doi.org/10.1016/j.surg.2017.09.055

14. Makarov, I. V., Kosyakin, V. A., Zaitsev, V. E., & Sidorov, A. Yu. (2018). Plastika posleoperatsionnykh ventral"nykh gryzh. In *Izbrannye voprosy klinicheskoi khirurgii* (pp. 289-298). (in Russian).

15. Dudai, M., & Ittah, K. G. (2019). Intraoperative hypertonic saline irrigation preventing seroma formation and reducing drain secretion in extended endoscopic hernia and linea alba reconstruction glue. *Hernia*, *23*(6), 1291-1296. https://doi.org/10.1007/s10029-019-01956-2

16. Stoikes, N., Roan, E., Webb, D., & Voeller, G. R. (2018). The Problem of Seroma After Ventral Hernia Repair. *Surgical technology international*, *32*, 93-98. PMID: 29791714

17. Styazhkina, S. N., Lopareva, E. E., Babich, E. V., & Nikolaeva, D. S. (2017). Posleoperatsionnye gryzhi. *Problemy sovremennoi nauki i obrazovaniya,* (2 (84)), 94-99. (in Russian).

18. Pushkin, S. Yu., & Belokonev, V. I. (2006). Primenenie immunologicheskikh metodov issledovaniya dlya prognozirovaniya techeniya ranevogo protsessa u bol'nykh s posleoperatsionnoi ventral'noi gryzhei. *Gerniologiya,* (3), 35. (in Russian).

19. Savchenko, A. A. (1996). Narushenie metabolicheskogo statusa limfotsitov i immunoendokrinnogo vzaimodeistviya v patogeneze vtorichnykh immunodefitsitov i giperaktivnogo sostoyaniya immunnoi sistemy: avtoref. dis. ... d-ra med. nauk. Tomsk. (in Russian).

Список литературы:

1. Кубышкин В. А., Агапов М. А., Давлятов М. Р., Какоткин В. В. Вентральные грыжи и экстрацеллюлярный матрикс соединительной ткани // Хирургия. Журнал им. НИ Пирогова. 2020. №2. С. 62-67. https://doi.org/10.17116/hirurgia202002162

2. Yang B., Zhou S., Li Y., Tan J., Chen S., Han F. A comparison of outcomes between lichtenstein and laparoscopic transabdominal preperitoneal hernioplasty for recurrent inguinal hernia // The American Surgeon. 2018. V. 84. №11. P. 1774-1780. https://doi.org/10.1177/000313481808401134

3. Glauser P. M., Brosi P., Speich B., Käser S. A., Heigl A., Rosenberg R., Maurer C. A. Prophylactic intraperitoneal onlay mesh following midline laparotomy—long-term results of a randomized controlled trial // World journal of surgery. 2019. V. 43. №7. P. 1669-1675. https://doi.org/10.1007/s00268-019-04964-6

4. Sevonius D., Gunnarsson U., Nordin P., Nilsson E., Sandblom G. Recurrent groin hernia surgery // Journal of British Surgery. 2011. V. 98. №10. P. 1489-1494. https://doi.org/10.1002/bjs.7559

5. Brooks D. C., Michael Rosen W. C. Clinical features, diagnosis, and prevention of incisional hernias // UpToDate. UpToDate. 2019.

6. Mizell J. S., Chen W., Rosen M. Principles of abdominal wall closure // UpToDate, Waltham, MA. 2015.

7. Ермолов А. С., Корошвили В. Т., Благовестнов Д. А., Ярцев П. А., Шляховскии И. А.. Послеоперационные грыжи живота: распространенность и этиопатогенез // Хирургия. Журнал им. НИ Пирогова. 2017. №5. С. 76-82.

8. Алишев О. Т. Новые подходы в профилактике послеоперационных осложнений при протезирующей герниопластике послеоперационных вентральных грыж больших размеров // Вестник современной клинической медицины. 2014. Т. 7. №. Приложение 2.

9. Гогия Б. Ш., Аляутдинов Р. Р. Новые технологии в герниологии // Высокотехнологическая медицина. 2017. Т. 4. №3. С. 58-60.

10. Бабажанов А. С., Ахмедов Г. К., Сайдуллаев З. Я., Кахоров Ш. М. Анализ результатов герниоаллопластики вентральных грыж // World Science: Problems and Innovations. 2019. С. 224-227.

11. Головин Р. В., Никитин Н. А. Оценка результатов различных способов комбинированной протезирующей пластики и критерии прогнозирования развития ранних раневых осложнений при послеоперационных вентральных грыжах срединной локализации // Современные технологии в медицине. 2015. Т. 7. №2. С. 105-112. https://doi.org/10.17691/stm2015.7.2.14

12. Ниязов А. А., Бейшеналиев А. С. Современная герниология и качество жизни хирургических больных // Вестник Международного Университета Кыргызстана. 2018. №1. С. 183-189.

13. Mier N., Helm M., Kastenmeier A. S., Gould J. C., Goldblatt M. I. Preoperative pain in patient with an inguinal hernia predicts long-term quality of life // Surgery. 2018. V. 163. №3. P. 578-581. https://doi.org/10.1016/j.surg.2017.09.055

14. Макаров И. В., Косякин В. А., Зайцев В. Е., Сидоров А. Ю. Пластика послеоперационных вентральных грыж // Избранные вопросы клинической хирургии. 2018. С. 289-298.

15. Dudai M., Ittah K. G. Intraoperative hypertonic saline irrigation preventing seroma formation and reducing drain secretion in extended endoscopic hernia and linea alba reconstruction glue // Hernia. 2019. T. 23. №6. C. 1291-1296. https://doi.org/10.1007/s10029-019-01956-2

16. Stoikes N., Roan E., Webb D., Voeller G. R. The Problem of Seroma After Ventral Hernia Repair // Surgical technology international. 2018. V. 32. C. 93-98. PMID: 29791714

17. Стяжкина С. Н., Лопарева Э. Е., Бабич Е. В., Николаева Д. С. Послеоперационные грыжи // Проблемы современной науки и образования. 2017. №2 (84). С. 94-99.

18. Пушкин С. Ю., Белоконев В. И. Применение иммунологических методов исследования для прогнозирования течения раневого процесса у больных с послеоперационной вентральной грыжей // Герниология. 2006. №3. С. 35.

19. Савченко А. А. Нарушение метаболического статуса лимфоцитов и иммуноэндокринного взаимодействия в патогенезе вторичных иммунодефицитов и гиперактивного состояния иммунной системы: автореф. дисс. ... д-ра мед. наук. Томск, 1996. 34 с.

Работа поступила
в редакцию 04.11.2021 г.

Принята к публикации
08.11.2021 г.

Ссылка для цитирования:

Kurmanov R., Osmonbekova N., Aitiev U., Ashimov Zh., Dinlosan O., Ibraimov B., Rysbek uulu Z. Comparative Assessment of the Dynamics of Immunological Reactivity in Patients With Postoperative Ventral Hernia // Бюллетень науки и практики. 2021. Т. 7. №12. С. 151-159. https://doi.org/10.33619/2414-2948/73/21

Cite as (APA):

Kurmanov, R., Osmonbekova, N., Aitiev, U., Ashimov, Zh., Dinlosan, O., Ibraimov, B., & Rysbek uulu, Z. (2021). Comparative Assessment of the Dynamics of Immunological Reactivity in Patients With Postoperative Ventral Hernia. *Bulletin of Science and Practice, 7*(12), 151-159. https://doi.org/10.33619/2414-2948/73/21