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OVARIAN FUNCTION IN PATIENTS WHO UNDERWENT THE UTERINE ARTERIES EMBOLIZATION

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Abstract
The effect of uterine artery embolization on the ovarian function and blood flow in the ovaries was studied immediately after surgery and during the long-term postoperative period. Interruption of blood flow in the ovarian arteries immediately after UAE was noted. Restoration of blood flow was observed in women during 6-12 months of the postoperative period.

Keywords: uterine artery embolization, ovarian blood flow, ovarian arteries, postoperative period

The introduction of new minimally invasive surgery techniques made uterine artery embolization (UAE) an alternative to traditional hysterectomy and myomectomy [1; 2. p. 260-261; 3, p. 99-100]. In the past few years, UAE has been applied in Obstetrics: this method is especially important for hypo-atonic postpartum hemorrhage [4, p. 436]. It was also first applied in Ukraine in the postpartum period as a preventive stage of the integral method of treatment of the true fused placenta. The proposed method of integral therapy was patented (Patent of Ukraine for utility model No. 96783 "Method of treatment of placental invasion", dated 10 Feruary 2015).

The purpose and objectives of the research. The aim of the research was to study and assess the effect of UAE on the blood flow in the ovaries and on the ovarian function in general. There are contradictory reports on this subject in the literature [6, p. 694; 7, p. 510]. Taking into consideration the anatomical features of the ovarian blood supply: the ovarian artery (OA) and the ovarian branch of the uterine artery, it is possible for the emboli to enter the ovarian vessels [7, p. 512-513].

Research design. We examined and treated 220 patients with uterine leiomyoma, whose average age was 32,7 ± 8,9. Axiom Artis MP angiograph ("Siemens", Germany) was used to perform the embolization surgery.

The uterine arteries were accessed according to the standard Seldinger technique with the use of polyvinyl alcohol (PVA) and "Biosphere" beads. The state of the blood flow in the ovarian arteries after the treatment was assessed by transvaginal sonography with CFM (color flow mapping) immediately before and after UAE.

Research results and their discussion. According to the sonography made immediately after the surgery, all the women showed interruption of blood flow in the ovarian arteries, which is comparable with that in other authors' results [4, p. 934-935]. In cases of involuntary embolization (due to the utero-ovarian arterial anastomoses), the function of the ovary decreases, which is clinically expressed in anovulation [5, p. 435-436; 7, p. 512].

One may judge about the restoration of the blood flow in the OA due to the direct visualization of the blood flow during CFM (color flow mapping), as well as by the presence of echographic signs of adequate folliculogenesis, perifollicular blood flow, formation of the corpus luteum with characteristic peripheral blood flow [2, p. 260]

A *B* *C*

A) ovary without signs of blood flow in the OA; B) a few weeks after the surgery, the blood flow in the ovarian artery is restored, but there are no signs of perifollicular vascular changes that are characteristic of ovulation; C) ovary with restored blood flow in the ovarian artery and restored ovulatory function; adequate perifollicular blood flow is visualized.

The median follow-up after UAE equaled 28 weeks (from18 to 42 weeks). The index of resistance (IR) allows us to view the adequate blood supply to the ovary during the periovulatory period. Doppler examination indicated that after 6 months, 16 % of patients showed no arterial blood flow in the ovarian arteries, while it was restored in 59 % of patients. During the first months after the surgery, the IR values were monotonic: 0,55 - 0,62, and did not reduce to the pre-ovulatory level.

Blood flow parameters were reduced in 25 % of patients (compared to the preoperative parameters). In this group 6 % of women showed reflux of singular emboli into the ovaries. They showed typical origin of uterine and ovarian arteries. Even in the presence of small hyperechoic inclusions of PVA in the ovarium stroma, recorded by the sonography and color Doppler mapping, no violation of microcirculation in the ovaries was registered, as well as the violation of their function.

Ovarian dysfunction in patients, who underwent UAE, is parenthetic [3, p. 101-102; 4, p. 929-931). Restoration of blood flow in the ovarian arteries after UAE occurs in the postoperative period from 6 to 13 months. After 12 months, blood flow restored in more than 90 % of patients, who had been operated on.

12 % of women got pregnant, and 23 cases of childbirth were reported.

Findings. The cumulative analysis of the results showed that restoration of the blood flow in the ovarian arteries after UAE occurs in the first year after surgery. The preservation of fertility, the capability to get pregnant and to deliver healthy children is a reliable confirmation of the correct choice of the method of treatment.

REFERENCES:

1. Masciocchi C, Arrigoni F, Ferrari F, Giordano AV, Iafrate S, Capretti I et al. Uterine fibroid therapy using interventional radiology mini-invasive treatments: current perspective. Med Oncol. Apr 2017;34:52. DOI: https://doi.org/10.1007/s12032-017-0906-5.

2. Hromova AM, Hromova OL, Ketova OM. Rol ultrazvukovykh parametriv pry vybori reproduktyvno-plastychnykh operatsiy pry leiomiomakh matky. Visnyk problem biolohii i medytsyny. 2014;2(3):260-2. [in Ukrainian]

3. Lytvynenko OV. Kharakterystyka perebihu postembolizatsiynoho syndromu u zhinok z leyomiomoyu matky ta suputnimy somatychnymy zakhvoryuvannyamy. Aktualni problemy suchasnoi medytsyny. 2011;11.4-1(36):99-102. [in Ukrainian]

4. Oyelese Y, Smulian JC. Placenta previa, placenta accreta, and vasa previa. Obstet Gynecol 2006; 107: 927–941.

5. Japaraj RP, Mimin TS, Mukudan K. Antenatal diagnosis of placenta previa accreta in patients with previous cesarean scar. J Obstet Gynaecol Res 2007; 33: 431–437.

6. Fishman SG, Chasen ST. Risk factors for emergent preterm delivery in women with placenta previa and ultrasound findings suspicious for placenta accreta. J Perinat Med 2011; 39: 693–696.

7. D'Antonio F., Iacovella C., Bhide A. Prenatal identification of invasive placentation using ultrasound: systematic review and meta-analysis. Ultrasound in Obstetrics & Gynecology. 2013; 42(5): 509-517.

THE USE OF NEGATIVE PRESSURE VACUUM THERAPY IN THE TREATMENT OF SOFT TISSUE DEFECTS IN THORACIC INJURY

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Abstract

Thoracic injury accounts for 6-8% of all traumatic injuries and belongs to the category of particularly severe lesions of the body. About 90% of victims with thoracic injury are of working age, whose treatment and rehabilitation are quite long due to the large number of purulent-septic complications (up to 20%), which often lead to disability or cause high mortality (17-30%). In peacetime, closed thoracic injuries are more common in the road accidents and in industries that are accompanied by multiple rib fractures and damage to internal organs. The mortality of the closed thoracic injury reaches 5-17%, and with a severe injury - 40%. In modern military armed conflicts, the frequency of combat thoracic injury (CTI) is 8-12% [2]. During the JFO (Joint Forces Operations) in Eastern Ukraine, CTI accounted for 11.7% of the combat casualties of the surgical profile, from which 79.4% were nonpenetrating, and 20.6% were penetrating and usually with damage to internal organs [1]. Severe CTI is accompanied by massive blood loss, traumatic shock, acute respiratory failure, other complications and high mortality to 37% [8]. Large and very large wounds of the chest damages not only skin and hypodermic cellulose, but also fascia, muscles and other important anatomic structures of the chest. In such cases, these are soft tissue defects. Treatment of gunshot wounds of the chest wall complicated by purulent process has a number of features, which are the development of infection in the wound and the occurrence of complex soft tissue defects, which is determined by the phase of the wound process. Peculiarities of the course of the wound process in this category of wounded are the development of traumatic disease, which affects the prolongation of all phases of the wound process and the accession of surgical infection [1,2,6].

During the JFO 9.3% of wounded with CTI, who had significant damage of the chest soft tissues. The peculiarities of combat surgical injury of the chest during the JFO in eastern Ukraine that they were all high-energy, received by bullets with high flight speed. Such injuries were characterized by the formation of a soft tissue defect, multiple fragmentary fractures with a bone defect. Combat surgical injury of the chest, given the different ballistic characteristics by the wounding shells, refers to severe damage of the chest, which in addition to the occurrence of defects in the chest wall causes severe damage of the chest internal organs. Despite the large number of such wounded with significant soft tissue defects, a clear classification of wounds based on their metric parameters has not yet been [3].

In the complex of systemic surgical treatment of wounded and injured with soft tissue defects in thoracic injury an important place is occupied by the treatment of complications both postoperatively and clinically by the chest: the development of purulent-necrotic processes, pleural empyema, broncho-pleural fistulas, infection chest wall wounds. Treatment of such wounds at CTI and a thoracic injury of peace time with soft tissues damage includes primary, repeated and secondary surgical debridements with the subsequent imposing of bandages. Therefore, the purpose of surgical treatment of such patients with soft tissue defects is fast closure in the simplest way with minimal losses, which involves the widespread concept of "reconstructive ladder", which reflects the distribution of plastic wound closure depending on the technical complexity of surgery [5]. This allows to replace small, large soft tissue defects in almost every anatomical area from the imposition of linear sutures to displaced pieces of soft tissue resistant to functional loads.

Modern principles of the treatment of wound defects of soft tissues of the chest are based on the following provisions: reduction of necrobiotic processes in damaged tissues, reduction of infectious complications, reduction of treatment time, reduction of disability of the wounded.

One of the modern world standards in the treatment of chest wounds with large soft tissue defects is the widespread using of VAC therapy (Vacuum Assisted Closure), or more known as NPWT (Negative pressure wound therapy), the treatment of soft tissue wounds by the negative pressure with the formation of vacuum dressings in the wounds (VAC-dressings) [4]. In the complex surgical treatment, this method allows to effectively clean

and prepare to close the wounds of the chest soft tissues by stimulating granulation and reducing the area of the wound defect - dermotension [6]. Therefore, the main purpose of the treatment of such wounds is to reduce the frequency of purulent complications, reduce the duration of treatment and fast returning wounded to service, or to recovering and other working activities. [7].

Keywords: combat surgical injury, combat thoracic injury, soft tissue deffects, negative pressure wound therapy.

Objective: to improve the results of complex surgical treatment of wounded and injured with soft tissue defects (STD) of thoracic wall in thoracic injury by application the negative pressure of vacuum therapy.

Materials and methods. The results of complex surgical treatment of 127 wounded and injured with defects of soft tissues of the chest wall in the period 2014-2019 were analyzed. Wounds and a closed injury were sustained both by wounded military servicemen during the JFO - combat surgical injury of the chest, and by civilians - a peacetime injury. All patients entered to the treatment facilities with bullet, shrapnel and explosive injuries of the chest, complicated by the inflammatory process and the formation of a defect in the chest soft tissues. Also included in the general study array were civilians who received a severe closed thoracic injury, who were subject to thoracotomy, during the postoperative period, who were also complicated by the purulent-inflammatory process of the wound with formation a defect in the soft tissues of the chest. Criteria for inclusion in the study: wounded and injured in the chest, the course of an injury or wound process in which was accompanied by the formation of a medium, large or extra-large soft tissue defect and violation of the integrity of the chest wall.

Two clinical groups were formed: main and comparison groups. The groups of the wounded and injured were comparable in the age, in the severity of the injury, the character of the wound channel, the number and localization of wounds,

The main group of clinical observation included 54 people with soft tissue defects and violation of the integrity of the chest wall due to injury of the chest in the treatment of which differentiated surgical treatment was used depending on the objective assessment of the severity of the injury, determining the leading injuries, which were used with negative pressure therapy by applying vacuum therapy in combination with different physical and chemical factors.

The comparison group of clinical observations included 73 wounded and injured, who were treated according to the traditional scheme (emergency and planned surgical interventions, daily dressings with antiseptics and ointment components, staged surgical treatments). All patients, depending on the severity of the injury were admitted to the surgical clinic in not heavy, severe and extremely severe severity. The age of the wounded ranged from 18 to 62 years and averaged 40.85 ± 4.29 years in the main group and 40.48 ± 3.50 years in the comparison group.

Table 1

Characteristics of wounded and injured by age

Age	Main group		Comparison group	
	n	%	n	%
18-29	12	22,2	15	20,5
30-39	15	27,8	23	31,5
40-49	15	27,8	20	27,4
50-59	3	5,6	4	5,5
More 60	9	16,7	11	15,1
Average age	40,85±4,29*		40, 48±3,50*	
Totally	54	100%	73	100%

* - age observation groups are comparable (t Student = 0,07; p = 0,943)

The majority of patients in both groups of clinical observations related to people of working age.

The ratio of patients in the groups of clinical observation of the mechanism of injury of the chest did not differ. The ratio of gunshot wounds to closed injuries was about 50/50 (table 2).

Table 2

Characteristics of wounded and injured depending from the mechanism of injury

	Main group		Comparison group		Σ^2 / p
	n	%	n	%	
Gunshot wounds:	28	51,9	33	45,2	0,549 / 0,46*
- bullets	12	22,2	10	13,7	
- fragments (multiple)	16	29,6	23	31,5	
Closed injury	26	48,1	40	54,8	
Totally	54	100	73	100	

* - calculation of the value of p by Pearson's criterion x2

In both groups, among the gunshot wounds, the vast majority were multiple shrapnel: 16 (29.6%) in the main group and 23 (31.5%) in the comparison group, which often had the character of an explosive combined wound with primary widespread chest wall damage. Bullet wounds: 12 (22.2%) in the main group and 10 (13.7%) in the comparison group, always had a penetrating nature, also 9 (16.7%) and 9 (12.3%) in the groups accordingly – through wounds. The course of all wounds was complicated by a purulent-inflammatory process in the gunshot wound (exit hole), thoracotomy wound (in cases when thoracotomy was performed for urgent indications) or combined in both wounds. Therefore, the combination of primary defects of gunshot wound and secondary defects as a consequence of purulent-inflammatory and necrotic processes in the wound formed the final defect of the chest wall tissues, as the object of our study and curative effect.

With closed mechanism of injury: 26 (48.1%) in the main group and 40 (54.8%) in the comparison group, all patients underwent immediate or urgent thoracotomy according to the relevant clinical indications (massive hemothorax, chest instability, curled hemothorax, etc.), and defects in the tissues of the chest wall were the result of complicated by purulent-necrotic process of the thoracotomy wound. As part of the provision of emergency and urgent surgical care, all patients of the study groups in the acute period of traumatic illness underwent surgical operations. In this case, thoracentesis (from one or 2 sides) was performed in all patients. Thoracotomy was performed in 29 (53.7%) patients in the main group and 49 (67.1%) in the comparison group. In cases of gunshot wounds, primary surgical treatment of the inlet and outlet holes was also performed.

Data on the localization of chest wall tissue defects in the wounded and injured were important for effective planning of the treatment process (table 3).

Table 3

Distribution of wounded and injured in groups for location of defects in the chest tissues

Localization of damage	Main group (n=54)		Comparison group (n=73)		Totally (n=127)	
	Number	%	Number	%	Number	%
Anterior surface of the chest	4	7,4	7	9,6	11	8,7
Anterior-lateral surface of the chest	27	50,0	40	54,8	67	52,8
Lateral surface of the chest	9	16,7	10	13,7	19	15,0
The posterior surface of the chest	12	22,2	7	9,6	19	15,0
Two-focus defect - anterior-lateral and posterior surface	2	3,7	9	12,3	11	8,7

In both groups of clinical observation anterolateral defects of a thorax as a result of the complicated course of anterolateral thoracotomies prevailed – 52,8%.

Defects of the anterior, lateral and posterior surfaces were the result of a complicated course of gunshot wounds - 38.7%, and bifocal defects - a synchronous complicated course of anterior-lateral thoracotomy wound and gunshot wound - located at a distance from the thoracotomy. There was an area of undamaged tissue between the wound defects. The greatest difficulty in the treatment of localization were wounds that were located on the posterior surface of the chest: it was due to the difficulty of maintaining aseptics, wound care, and also a large array of damaged tissues.

In all victims in our sample thoracic injury was accompanied by damage to the internal organs of the chest. But at the time the inclusion of patients in the study, the acute manifestations of most of these injuries have already been stopped, and did not directly affect the treatment of wound defects of the chest wall. Anatomical and morphological features of these injuries and their specific weight in the subgroup of gunshot wounds differed from the subgroup with a closed mechanism of injury (table 4).

Table 4

Characteristics of damage of organs and structures of the chest in the study groups

	Main group		Comparison group	
	n	%	n	%
Gunshot wounds:	28		33	
- fractures ≤ 3 ribs	2	7,1	4	12,1
- - fractures> 3 ribs	18	64,3	22	66,7
- - bifocal fractures of the ribs (inlet and outlet holes)	8	28,5	7	22,6
- - lung injury	26	92,9	29	87,9
- - hemothorax	5	17,9	9	27,3
- - hemopneumothorax	23	82,1	24	72,7
Closed injury	26		40	
- - fractures> 3 ribs	17	65,4	22	55,0
- - multiple bilateral fractures of the ribs	4	15,4	12	30,0
- - unstable chest	5	19,2	6	15,0
- - lung contusion	24	92,3	40	100
- - heart attack	10	38,4	19	47,5
- - hemothorax	1	3,8	4	10,0
- - hemopneumothorax	25	96,2	36	90,0
Totally	54	-	73	-

Most patients in the study group with thoracic injury had combined character: 46 (85.2%) in the main group and 62 (84.9%) in the comparison group, but the thoracic component was always leading.

Table 5 presents the distribution of patients by the number of damaged anatomical and functional areas.

Table 5

Characteristics of the study array by the number of damaged anatomical and functional areas (AFA)

AFA damage	Main group		Comparison group		p
	n	%	n	%	
One	8	14,8	11	15,1	0,969*
Two	27	50,0	38	52,1	0,819*
Three or more	19	35,2	24	32,8	0,786*
Totally	54	100%	73	100	

Despite the comparability of groups by the number of damaged AFA, there was a need to compare them by severity of injury. For this, we chose two anatomical scales - based on determining the degree of morphological damage to organs and tissue structures: Anatomic trauma score (ATS) – allows to assess the severity of isolated and combined injury, taking into account the severity of its individual components, and Injury Severity Score (ISS) – designed to assess mostly combined injuries, but the most widely used anatomical scale of injury severity in the world. The use of two scales increases the reliability of the results. In addition, they have the same number of comparable nominal gradations (tables 6 and 7).

Table 6

Criteria for assessing the severity of injuries in patients in the study array

The severity of the injury	ATS	ISS	Forecast for life
not heavy	≤ 24	≤15	favorable
heavy	25 – 41	16-25	questionable
extremely heavy	≥ 42	>25	unfavorable

Table 7

Severity of injury and the ratio of groups by severity of injury

The severity of the injury	Main group		Comparison group		p
	n	%	n	%	
ATS severity	23,1±2,8		24,8±2,1		t = 0,63*; p = 0,49
ISS severity	15,9±1,3		16,8±1,4		t = 0,47*; p = 0,64
Not heavy	22	40,7	26	35,6	x^2 = 0,347** p=0,56
Heavy	28	51,9	43	58,9	x^2 = 0,625** p=0,43
Extremely heavy	4	7,4	4	5,5	x2 = 0,195** p=0,66
Totally	54	100%	73	100	

* Calculation according to Student's t test

** Calculation by criterion x2

The vast majority of patients in the study groups were seriously injured - a total of 71 (55.9%) and victims with not heavy injuries - 48 (37.8%), while there were few victims with extremely severe injuries - 8 (6.3%). This is due to the high mortality of the latter category of patients in the acute period of traumatic illness, and they were simply not included in the study according to the inclusion / exclusion criteria.

Thus, the age, mechanism of injury, the character of defects in the tissues of the chest wall, the consequences and complications of thoracic injury, and also the severity of the injury of the clinical observation group were homogeneous and comparable. That is, the results of their management and surgical treatment can be compared and statistically processed.

Results. The method of treatment with negative pressure in the complex surgical treatment of soft tissue defects of the chest wall is one of the main methods of preparing wounds for closure, which is a set of measures aimed at creating conditions in which the wound defect can be closed with minimal risk of complications and minimal losses in functional terms. The main condition for successful wound healing is the transition of the wound process to the second (reparation) phase. It is established that treatment by vacuum therapy with negative pressure gives some advantages. It improves the course of all stages of the wound process, which is characterized by a decrease in local interstitial soft tissue edema, improved tissue microcirculation, increased local blood and lymph circulation, reduced microbial contamination in the wound, reducing

the severity of wound exudation, which is necessary to stimulate angiogenesis, enhance fibrinolysis and improve the functioning of growth factors for normal wound healing.

Vacuum therapy with negative pressure was performed using devices KCI, HEACO, GomCo, in combination with irrigation with solutions of antiseptics, antibiotics, oxygen insufflation, ultrasonic cavitation for additional stimulation of repair processes. The technique of vacuum therapy is universal and has been used in various phases of the wound process to prevent infection, and in cases of treatment of infectious complications. Also, the method of applying negative pressure was used as a temporary stage for preparation of wound defects for plastic closure and after reconstructive surgery, as a method of wound management in the postoperative period.

All wounded and injured in the comparison group (73 patients) used traditional wound healing tactics. After preoperative preparation, surgical treatment of wounds was performed. It included the opening of wounds, removal of foreign bodies, non-viable tissues, active washing with antiseptic solutions. Wound surfaces of the soft tissues of the chest were tamponade with gauze wipes with solutions of antiseptics. Bandages were replaced 1-2 times a day. Various solutions of antiseptics were used, such as betadine, decasan. When the signs of the inflammatory process were reduced, the wound was cleaned, and the amount of exudate was reduced, the defects were closed with the help of local tissues and skin plasticity methods.

In the main group (54 patients) the method of negative pressure was used. Indications for the use of vacuum therapy for chest injuries were infected chest wall wounds, chest wall defects with open pneumothorax, the presence of a chest wall wound in combination with pleural empyema and as a stage of temporary wound closure in preparation for thoracoplastic. Contraindications to the application of a vacuum bandage were necrotic tissue, bleeding in the wound area, unexamined fistulas. The initial use of this method in the complex surgical treatment of soft tissue wound defects is most effective, in our opinion, in the period that corresponded to the second phase of the wound process (3-7th day). Carrying out vacuum drainage of wounds once or several times was carried out in a constant or intermittent mode. Repeated sessions of vacuum therapy varied depending on the clinical manifestations. Replacement of bandages was performed in 3-4 days. Criteria for positive use of NPWT were the following factors: reduction local tissue edema, wound cleaning from necrotized tissues, fibrin plaques, purulent contents, formation of young forms of granulation tissue, reduction of purulent secretions from wounds, improvement of clinical blood test.

When the wound defects of the soft tissues of the chest wall were temporarily closed, liquid sutures were applied, which were covered on the outside with a gauze napkin, and the skin was protected with a tread. A polyurethane sponge was applied on top, which was sutured to the edges of the wound for more secure fixation. In the presence of large and deep vast defects of the soft tissues of the chest wall, the sponge was laid in several layers for completely closure them. In the presence of non-viability of the ribs with signs of osteomyelitis at the bottom of the wound defects of the chest, they were perforated, or according to the indications, the outer cortical plate of the rib was removed and soft tissue defects were closed with a polyurethane sponge. This accelerated the elimination of osteomyelitis, stimulated regional blood flow and growth of granulation tissue.

Picture 1.

Infected wound with a defect in the soft tissues of the front of the chest. Osteomyelitis V-VI ribs on the left.

Picture 2. Surgical treatment of the wound with resection of the V rib on the left.

Picture 3. Imposition of a functioning VAC bandage on the wound defect of soft tissues at treatment of a gunshot fragment wound at CTI.

After autodermoplastic in some cases, in order to fully closure the defects of the soft tissues of the chest and secure fixation of the split autodermograft with a complex relief of the wound surface used the application of polyvinyl alcohol vacuum dressings with absorbent and bacteriostatic effect with negative pressure. It is helped to heal wound defects, evacuate wound exudate and prevent graft injury. A feature of the application of vacuum therapy with negative pressure on the chest was the constant monitoring of its implementation, as there was a risk of bleeding.

All patients in both groups of clinical observation underwent general drug therapy, which was aimed at compensating for general disorders. Antibacterial therapy was performed in all patients with an antibioticogram.

The study found that the course of wound healing in wounded with defects of the soft tissues of the chest wall in thoracic injury had significant differences depending from microbial contamination (clean, contaminated, purulent wounds), the mechanism of injury and its location. Already in the first sessions of vacuum therapy in the main group there were significant changes, manifested by increase in exudation from the wound and changes the character of secretions from purulent to serous. For 5-7 days during which vacuum therapy was performed, in most patients the elimination of the intoxication syndrome was observed, the wound was cleared from purulent and necrotic secretions. In addition, to a large extent the process of eliminating intoxication contributed to the rapid reduction of microbial contamination of the wound [10].

In contrast to the comparison group in the main group at the local level, the characteristic features were the appearance of active forms of granulation on the surface of the wound defect on average 6-8 days of treatment, which meant reducing the duration of phase I inflammation and its faster transition to phase II of the wound process.

Characteristic changes occurred on the part of blood parameters, which were initially manifested by leukocytosis with a shift of the leukocyte formula to the left and the appearance of young forms of neutrophils, then the number of leukocytes to 7-9 days decreased to normal.

This positive dynamics of these indicators in the shortest possible time of complex treatment of wound defects of soft tissues of the chest wall using VAC therapy was characterized by cleaning the wound surface, removing the causative agent of purulent infection, and early appearance of active granulations, followed by signs of marginal epithelialization. Characteristic signs of stoping the using NPWT were the change of the exudation phase to the phase of proliferation, wound cleaning, reduction of microbial contamination and improvement of microcirculation, which was characterized by improved local circulation.

During the second week of treatment there was also a further normalization of clinical blood counts - decreased white blood cell count and the percentage of

rod neutrophils. As a result of the favorable development of the treatment process, the length of stay of patients of the main group in the hospital was (15.75 ± 4.27) bed-day.

Thus, based on research and treatment results, the data indicate significant advantages in the positive and effective treatment of patients with large defects of the soft tissues of the chest wall with thoracic injury using VAC dressings, characterized by reduced duration of treatment, accelerated reduction of bacterial wound contamination, reduction of local tissue edema, improvement of local lymph and blood circulation.

Conclusiones.

1. The use of negative pressure vacuum therapy in complex surgical treatment of soft tissue defects of the chest wall as a result of gunshot wounds and injuries leads to improvement of microcirculation in soft tissues, fluid evacuation and reducing interstitial edema, reduction of wound defect and its preparation for the plastic closure of tissues.

2. The use of vacuum therapy for closure wound defects of the thoracic injury, and also postoperative wounds has a positive curative effect not only on the wound defect, but also on the internal organs of the thoracic cavity.

3. Thus, the success in the treatment of patients with wound defects of the soft tissues of the chest wall of various etiologies is due not only to high-quality surgery with plastic closure, but also the constant use of comprehensive surgical treatment with adequate antibacterial therapy and active involvement and constant monitoring NPWT, which allows in the shortest terms to reduce the duration of treatment, the number of complications and improve the functional results of the wounded and injured at the level of medical care.

REFERENCES:

1. Military field surgery / ed. Y.L. Zarutskyi, V.Ya. Bilyi. - K .: Phoenix, 2018. - 552 p.

2. Instructions of military field surgery / S.A. Aslanyan, V.Ya.Bilyi, I.S. Bogdan [etc.]; for order. Ya.L. Zarutskyi, A.A. Shudrak. - K .: Chalchynska N. V., 2014. - 400 p.

3. Military field surgery: a textbook / Ya.L. Zarutskyi, V.M. Zaporozhyan, V.Ya. Bilyi [etc.], ed. Y.L. Zarutskyi, V.M. Zaporozhye. - Odessa: ONMedU, 2016. - P.359-389.

4. M.A. Kashtalyan, S.V. Tertishny, K.L. Masunov, "The use of VAC therapy in the treatment of gunshot wounds" Bulletin of Marine Medicine, No. 1 2, p. 187–192, 2016.

5. Optimization of stage surgical treatment of the wounded on the basis of metric classification of soft tissue defects / Ya.L. Zarutskyi, I.B. Plis, S.O. Korol, A.O. Kompaniets // Clinical Surgery. - 2018. - №2. - P.55 - 57.

6. Immediate and Early Tissue Expander Placementf or Acute Closure of Scalp Wounds / A. Turko, G. Fuzaylov, V. L. Savchyn, D. Driscoll // Annals of Plastic Surgery. – 2013. – Vol. 71, N 2. – P. 160–165.

7. Hirshberg A. Top Knife: The Art and Craft of Trauma Surgery / A. Hirshberg, K.L. Mattox. – Shrewsbury, UK: tfm Publishing Ltd, 2005.

8. Buchanan P.J. Evidence-Based Medicine: Wound Closure / P.J. Buchanan, T. A. Kung, P.S. Cederna // Plastic and Reconstructive Surgery. – 2014. – Vol. 134. – P.1391 – 1404.

9. Patent of Ukraine for a utility model № 128624 dated September 25, 2018. A method of measuring the area of skin defects in their diagnosis and treatment. Inventors: Aslanyan S.A., Zarutskyi Y.L., Karpenko K.K., Korol S.O., Fomin O.O., Vovk M.S., Goncharuk V.S., Musenko O.Ya., Gangal I.I.

10. Patent of Ukraine for a utility model № 132410 dated February 25, 2019. Method of irrigation-injection therapy of purulent soft tissue wounds. Inventors: Aslanyan S.A., Zarutsky Y.L., Sapa S.A., Fomin O.O., Kompaniets A.O., Sidoruk D.P., Vovk M.S., Goncharuk V.S., Musenko O.Ya., Dmytruk E.P., Lavrenchuk O.A.