School of Professor V.G.Makats
(Ukraine - prof.Makats@gmail.com)

NAGAICHUK V.V.[1], ONYSHCHENKO M.S[2].

BIOACTIVATING THERAPY AFTER SURGICAL NECRECTOMY BURN WOUNDS

[1] PhD (Vinnytsia National medical university named after Pirogov M.I., Ukraine)
[2]Regional Clinical Hospital named after M.I. Pirogov, Ukraine)

Summary. *The article deals with the course of wound healing during early surgical treatment of dermal superficial burns of maxillofacial region. The basis of the clinical trials is the monitoring of the 120 patients. It was established that in the burns of maxillofacial area, the maximum therapeutic effect is due to early surgical necrectomy in a moist environment under a silicone coating using bioactivation therapy without external sources of current.*

Key words: superficial dermal burns, early necrectomy, the course of wound healing, bioactivation therapy.

Резюме. *Стаття присвячена питанню перебігу ранового процесу при ранньому хірургічному лікуванні хворих з дермальними поверхневими опіками щелепно-лицевої ділянки. Основу клінічних досліджень становлять спостереження за 120 хворими. Встановлено, що при опіках щелепно-лицевої ділянки максимальний терапевтичний ефект обумовлений ранньою хірургічною некректомією в умовах вологого середовища під силіконовим покриттям і використанням біоактиваційної терапії без зовнішніх джерел струму.*

Ключові слова: *дермальні поверхневі опіки, рання некректомія, перебіг ранового процесу, біоактиваційна терапія.*

Резюме. Статья посвящена вопросу течения раневого процесса при раннем хирургическом лечении больных с дермальными поверхностными ожогами челюстно-лицевой области. Основу клинических исследований составляют наблюдения за 120 больными. Выявлено, что при ожогах челюстно-лицевой области максимальный терапевтический эффект обусловлен ранней хирургической некрэктомией в условиях влажной среды под силиконовым покрытием с использованием биоактивационной терапии без внешних источников тока..

Ключевые слова: дермальные поверхностные ожоги, ранняя некрэктомия, течение раневого процесса, биоактивационная терапия.

Introduction

Rehabilitation of patients with burn injuries of maxillofacial area (isolated and combined) remains an urgent problem [7]. Local treatment of such patients is conditioned [6]:

- general condition, area and depth of burn injury;
- localization and the stage of the wound process;
- planned surgical treatment tactics;
- the presence of appropriate equipment, medicated drugs and dressing material ...

One of the problems in the treatment of burn wounds remains "wound infection". It is due to the ideal environment of burn infections for the development of microorganisms. Therefore, infectious complications deepen the burn wounds, increase the number of scarring and other complications [1]. According to the world and domestic literature, a tendency towards a decrease in the effectiveness of antibacterial drugs and a general increase in resistance to common antibiotics is observed, which makes conventional modern therapy less effective [5,8]. At the same time, treatment of burns on the basis of "self-rejection of necrotic tissues" provokes the development of infectious and cicatricial complications [9] and inhibits early recovery of the skin [2,9].

Recently, "early surgical necrectomy" has been actively implemented in Ukraine for 2-3 days after burning with a one-time closure of postoperative wounds "lyophilized xenodermotransplants". This should be the "first and last operation" in patients with dermal surface burns (regardless of their area and localization). It interrupts and facilitates the course of burn disease, improves the aesthetic and functional results of treatment [3].

Discussion questions remain about the use of methods for further rehabilitation of burn consequences: conservative or surgical; open (without bandage) or closed (under the bandage); wet or dry. The course of the wound process during dermal surface burns after early surgical necrectomy with different means of local treatment of postoperative wounds and aesthetic results in this case have not been studied. Separately there is the question of the effectiveness of "bioactivation therapy without the use of external sources of current" in the burn clinic [4]. All of the above suggests a high socio-medical significance of the problem of improving the quality of treatment of patients with burns of the maxillofacial di-blisters.

Purpose: to study the course of the wound process after "early surgical necrectomy" using "bioactivation therapy" in a "damp camera".

Materials and methods

Under supervision were 120 patients with dermal superficial burns of the maxillofacial area (8 persons male group and 40 persons - female). In order to evaluate the optimal course of the wound process after the "early surgical necrectomy," burn patients of the main (1 st group) were divided into three subgroups ("1a", "1b", "1v"). Patients whose wounds after early surgical necrectomy were treated in a moist environment under a silicone coating using low intensity currents without external sources was a "1a" subgroup. Patients who did not have bioactivation in the "wet environment under silicone coating" were "1b" subgroup. In subgroup "1v", wounds after "early surgical necrectomy" were covered with lyophilized xenodermic implants (under wet-drying bandages with betadine, independent detachment of necrotic tissues and subsequent epithelization).

The study of "wound imprints" from the surface of burn wounds of the 1st main group ("1a" subgroup of 20 patients; "1b" subgroup of 18 patients; "1в" subgroup of 16 patients) and 2nd control group (16 patients) was conducted in 70 patients . The cytomorphological study was conducted on 1, 5, 11 days by the method of M.P. Pokrovsky in the modification of D.M. Steinberg

The dynamics of microflora of burn wounds was studied in 50 patients ("1a" main subgroup - 10 patients, "1b" main subgroup - 12 patients, "1в" main subgroup - 18 patients, group comparison - 10 patients). The species composition of the microflora was determined by the method A.S. Labinskaya (1978). The sensitivity of the identified microflora to the antibiotics was estimated by the diameter of the "zone of growth retardation of microorganisms under standard disks." Microbial contamination of wounds was determined by the method of sectoral crops by Golda (in the modification of Shelkova NG, Prokopets VF, 2011).

The statistical processing of the obtained results was carried out using STATISTICA (Stat Soft Inc, USA) and Ms Excel programs in Windows-2007 (Microsoft, USA) with a mean value of M, an average error **±m** mean, probability t.

Results and discussion

1.CYTOLOGICAL CHARACTERISTICS OF "EARLY DISEASES" IN POULTRY PATIENTS.

1.1.Dynamics of cytological indicators of wound imprints "1a" subgroups (using bioactive therapy).

In the study of wound imprints for 1 day after injury in patients with "1a" subgroups, the prevalence of neutrophil granulocytes 92.06 ± 7.22% with unfinished (or distorted) phagocytosis, the presence of lymphocytes up to 6.13 ± 0.45%, monocytes 1.11 ± 0.07% and eosinophils 0.73 ± 0.06% (Fig. 1). In addition, "wound imprints" noted the presence of a significant amount

of detritus, filaments of fibrin, microbial bodies (located in the middle or extracellular). Type of cytograms is defined as "degenerative-inflammatory".

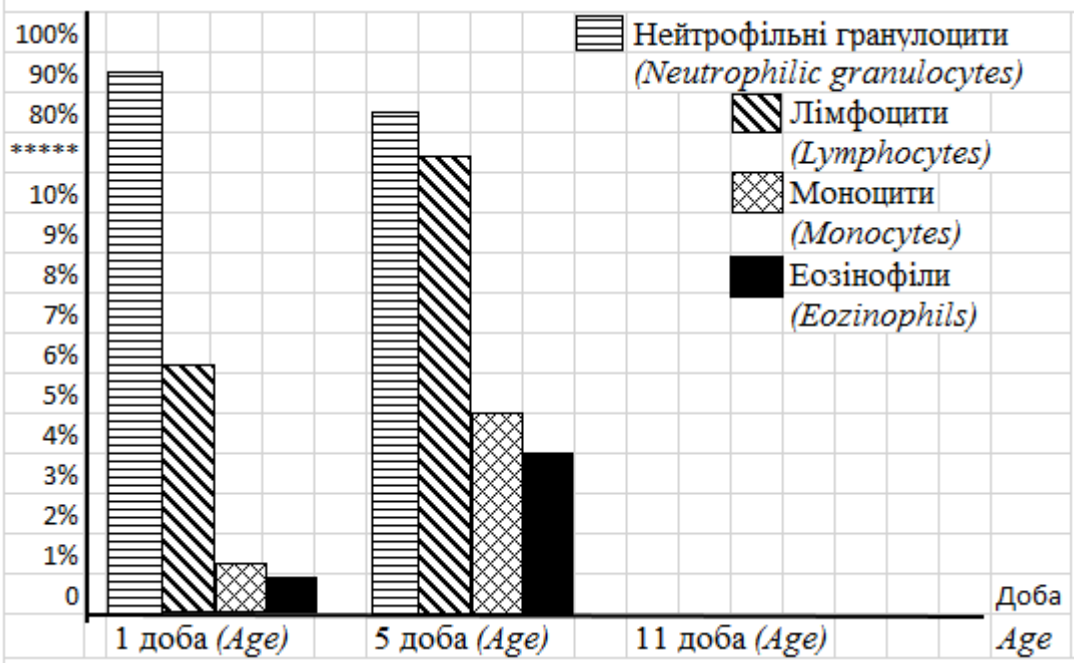

Fig.1 Dynamics of cytological indicators of wound imprints in the zone of thermal Trauma "1a" subgroups.

At day 5 in patients with subgroup "1a" the decrease in the number of neutrophil granulocytes was determined in 1,12 times (P> 0,05), the increase in the number of lymphocytes in 2,16 times (P <0,001) and monocytes in 4,40 times (P < 0.001) in relation to the initial data. Indicators of lymphocytes and monocytes were 1.88-2.10, probably higher, relative to the comparison group. The content of neutrophil granulocytes with complete phagocytosis was noted at the level of 82.5%. An insignificant amount of cellular detritus and microbial bodies was determined. Type of cryptogram "ignition regenerator".

1.2. Dynamics of cytological indicators of wound imprints "1b" subgroups (without the use of bioactivation therapy).

In the study of wound imprints for 1 day after injury in patients with "1b" subgroups, the prevalence of neutrophil granulocytes 91,87 ± 6,53% with incomplete (or spontaneously rhenium) phagocytosis, the presence of lymphocytes to 5,77 ± 0,48% monocytes 1.23 ± 0.07% and eosinophils 0.79 ± 0.04%. (Fig. 2). In addition, "wound imprints" noted the presence of a significant amount of detritus, filaments of fibrin, microbial bodies (located in the middle or extracellular). Type of cytogram is defined as "degenerative-inflammatory".

At day 5 in patients with subgroup "1b," the neutrophil granulocyte count decreased by 9.93% (P> 0.05) and amounted to 82.75 ± 2.94%, of which 69.7% were in complete phagocytosis. In "wound imprints" the number of lymphocytes, monocytes and eosinophils increased in 2.54-3.78-1.32 times, respectively. The index of lymphocytes and monocytes relative to the comparison group increased by 44.75% and 50.11% respectively, and the eosinophils were 66.88% less (P <0.001). An insignificant amount of detritus and microbial bodies was determined. Type of cryptogram "ignition regenerator".

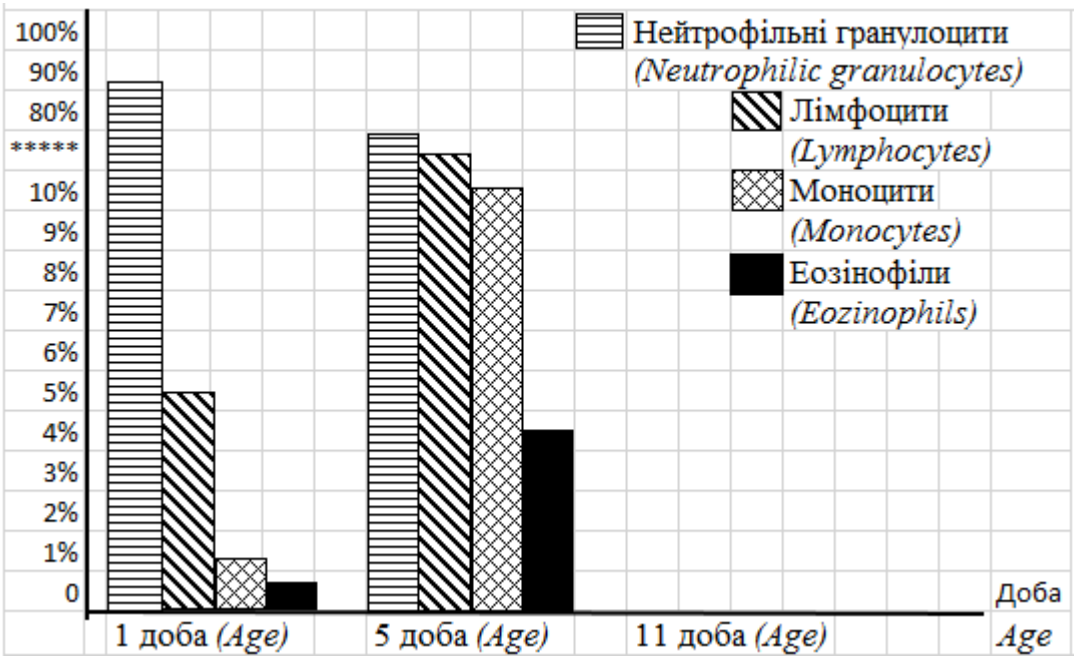

Fig.2. Dynamics of cytological indicators of wound imprints in the zone of thermal trauma "1b" of the main subgroup.

1.3. Dynamics of cytological indicators of wound imprints "1v" subgroups (without use of bioactive treatment). In patients with the group "1v" for 1 day after injury, the rate of neutrophilic granulocytes was 93.11 ± 7.14% with incomplete or distorted phagocytosis (Fig.3). The imprints also showed lymphocytes up to 4.98 ± 0.52%, monocytes to 1.00 ± 0.05 and eosinophils-0.82 ± 0.02%.

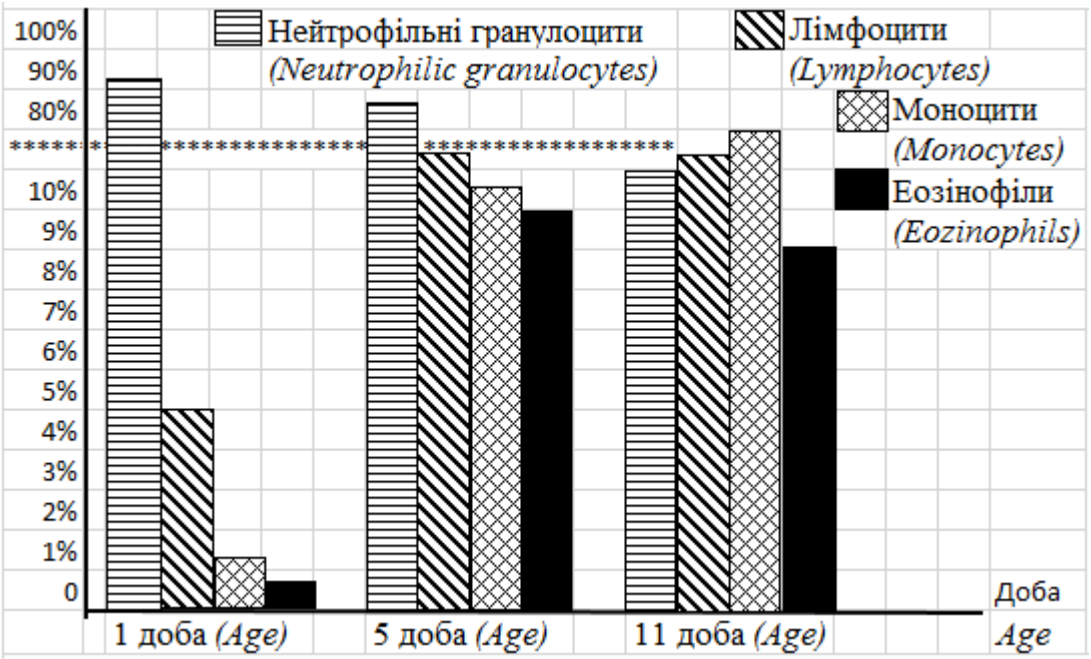

Fig.3 Dynamics of cytological indicators of wound imprints in the zone of thermal trauma "1v" subgroups.

At day 5 after injury in patients with subgroup 1v, the number of neutrophilic granulocytes decreased by 6.11% (P> 0.05) compared to the baseline and was 2.09% lower than the control group (P> 0.05). The number of lymphocytes increased by 45.39% (P <0.001) relative to the baseline and was 1.12 times higher in the control group. The number of monocytes increased

4.10 times and was 43.41% higher, relative to the control group (P <0.001). The number of eosinophils decreased by 47.56% and 86.17%, according to the baseline and the comparison group (P <0.05).

At 11 days after injury, a decrease in the number of neutrophil granulocytes in relation to the baseline values was set at 18.24% and 10.67% (P> 0.05). At the same time, the number of neutrophilic granulocytes in the state of complete phagocytosis increased by 70.15%. The further increase of the content of lymphocytes and monocytes in relation to the initial values is determined at 2.88-8.16 times. The presence of certain microorganisms located intracellularly is noted. Type of cytogram "regenerator".

1.4. Dynamics of cytological indicators of wound imprints of the control group (without the use of bioactivation therapy).

In the group of "wound imprints" comparison, for 1 day after injury, a high neutropenic granulocyte count (91.67 ± 8.57%) was detected in incomplete phagocytosis (Fig. 4). There was a decrease in the number of lymphocytes to 6.22 ± 0.57% and monocytes to 1.52 ± 0.09%. The number of eosinophils was insignificant (0.59 ± 0.03%). The content of detritus and microbial bodies (located intracellular and extracellular) was high. Type of cytogram "degenerative-necrotic".

At day 5 after injury in the control group, the number of neutrophil granulocytes was 89.29 ± 5.07%, of which 45.37% was complete phagocytosis. The number of lymphocytes and monocytes increased 1.30-1.53 times and amounted to 8.11 ± 0.23% and 2.32 ± 0.02%, respectively. The number of eosinophils increased by 5.27 times and amounted to 3.11 ± 0.11%. The content of detritus and microbial bodies (located intracellular and extracellular) were still observed. Type of cytogram "degenerative;

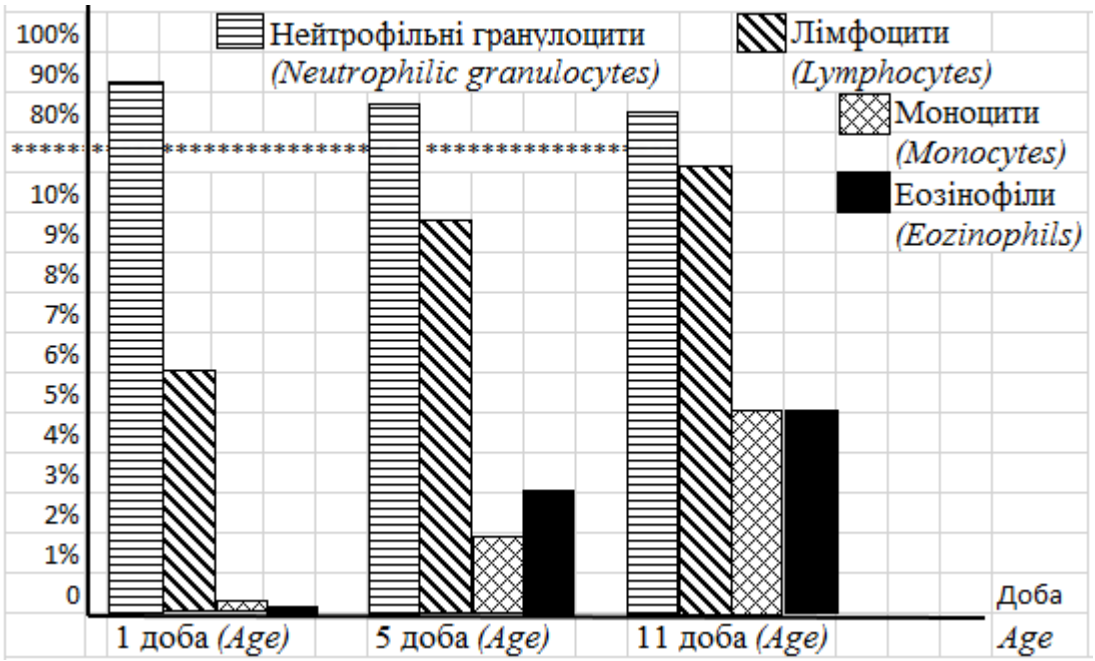

Fig.4 Dynamics of cytological indicators of wound imprints in the zone of thermal trauma control group.

At day 11 after injury in the control group, a decrease in the number of neutrophilic granulocytes was determined at 7.04%, in relation to the baseline values (P> 0.05). Their content in the state of complete phagocytosis reached 64.25%. The number of lymphocytes and monocytes (in

terms of baseline values) were higher in 1.64-2.84 times, respectively (P <0.05). A further increase in the number of eosinophils (4.84 ± 0.07%) was established. The intracellular reduction of microorganisms content has been determined. Type of cytogram "degenerative-inflammatory".

Thus, significant differences were observed in the analysis of wound imprints in patients with primary (1 g.) And control (2 g.) Groups at day 5 of treatment. Thus, in patients with control group at day 5 the type of cytogram was "degenerative" with high content of neutrophil granulocytes in the state of incomplete (distorted) phagocytosis, the presence of a significant amount of detritus and microorganisms. Patients in the main group marked a significant decrease in the number of neutrophil granulocytes, an increase in the number of neutrophil granulocytes in the state of complete phagocytosis, a significant content of lymphocytes and monocytes. Such differences indicate a high curative effect of "early surgical necrectomy" as a source of infection and intoxication.

The difference in the rates of "wound imprints" in "1a" - "1b" - "1в" subgroups indicates the importance of choosing a method of local treatment for the outcome of healing postoperative wounds. At day 5 of treatment in "1a" - "1b" subgroups of the main group of patients type of cytogram was "inflammatory regenerator" and in "1v" subgroup - "inflammatory". For 6-7 days in "1a" - "1b" subgroups of wound epithelized, and in "1v" subgroup marked "regenerator" type of cytogram (in the control group type of cytogram "degenerative-inflammatory").

2. MICROBIOLOGICAL CHARACTERISTICS OF BURN WOUNDS.

Dynamics of microbiological indicators of burn wounds.

Verification of pathogens for 1 day after injury indicates that the surface burn wounds of the face were contaminated with "gram positive" (St. Aureus, St.Epydermidis) and "gram negative" (E. coli) microflora. Microbial contamination of wounds in all observation groups was within 10^2-10^3 CFUs in 1 ml (*colonies-forming units*). Investigation of microflora resistance to antibiotics revealed its sensitivity to most semi-synthetic antibiotics (penicillin's, cephalosporin's of the I-II generation, aminoglycosides, etc.).

In the main subgroups for 5 days, the same "gram positive" (30,0-41,7% of cases) and gram negative "microflora" were sown (15,0-30,0% of cases). At that, in 8.6-28.3% of cases, "gram of positive" microflora was sown in wounds, which, up to 10.0% of cases, was in associations with "gram negative" (16.7-30.0% of growth was not given). Microbial wound infiltration in patients with major subgroups was within 10^3-10^4 CFUs in 1 ml. At the same time, the pathogenic "gram positive" and "gram negative" microflora was associated in the associated forms in the wound control group. Microbial contamination of wounds was determined within the limits of 10^4-10^6 CFUs in 1 ml. Sensitivity to antibiotics was moderate, and the number of antibiotics with cross-sensitivity of the microflora was limited.

At 6-7 days after injury in patients with "1a"-"1b" subgroups of wounds completely healed. In the "1" subgroup, "gram positive" microflora was sown (38.9% in monoculture, mainly St.Aureus). Microbial contamination of wounds was within 10^2-10^3 CFUs in 1 ml. Up to 27.8% of the wounds did not give rise to growth.

In the control group at day 11, a tendency towards a decrease in the number of patients with "gram positive" microflora (from 90.0% to 50.0%) and a simultaneous increase in the number of patients with "gram negative" microflora in monoculture (up to 20.0%) was found. and associate forms (up to 30.0%). Microbial wound infiltration was in the range of 10^6-10^8 CFUs in 1 ml, with high microflora resistance, which contributed to the development of the septic state.

The study of microbiological parameters in patients of all subgroups revealed microbial wound contamination at the beginning of treatment. At the same time, the degree of their microbial contamination, the frequency of associations "grams positive" and "gram negative" microflora and its resistance to antibiotics directly depended on the methods of treatment used.

The best course of the wound process in patients with superficial burns was observed after "early surgical necrectomy" followed by "bioactivation without external sources of current" under conditions of a moist environment under a silicone coating.

Conclusions and prospect of research

1. "Early surgical necrectomy" reduces the development of degenerative-inflammatory processes and translates the "contaminated" burn wound into a conditionally clean "postoperative."

2. Prevalence of wound process after "early surgical necrectomy" indicates a decrease in microbial contamination (from 10^6-10^8 to 10^2-10^3 CFUs/ml), which reduces the development of infectious complications and prevents the burn wounds.

3. Analysis of the results of treatment of superficial burns indicates the optimal course of wound process in patients with the complex application of early surgical necrectomy and bioactivation in a humid environment, which confirms their healing for 6-7 days with significantly better aesthetic results.

4. The prospect of further research is the controlled rehabilitation of burn patients on the basis of conservative correction of vegetative disorders.

Використана література: References:

1.Абрамова Н.В. Особенности возбудительной раневой инфекции у пациентов с термической травмой / Н.В. Абрамова, Н.А. Гординская, Е.В. Сабирова // II Съезд комбустиологов России : сб. науч. тр. – М. : Ин-т хирургии им. А.В. Вишневского РАМН, 2008. – С. 75-76.

2.Коваленко О.М. Вибір тактики лікування поверхневих дермальних опіків за допомогою ранових покриттів / О.М. Коваленко, А.О. Коваленко, О.І. Осадча // Клінічна хірургія. – 2014. - №11.3 – С. 48-49.

3.Козинець Г.П. Опікова травма та її наслідки: керівництво для практичних лікарів / Г.П. Козинець, С.В. Слесаренко, О.Ю. Сорокіна та ін. – Дніпропетровськ : Преса України, 2008.- 224 с.

4.Макац В., Нагайчук В., Макац Є. Невідома китайська голкотерапія (проблеми функціональної вегетології) Том III // Україна, Вінниця: видавництво "Наукова ініціатива", редакція Ніланд-ЛТД, 2017, 204С. ISBN 978-966-2932-80-5

5.Салманов А.Г. Антибіотик резистентність клінічних штамів STAPHYLOCOCCUS AUREUS у хірургічних стаціонарах України в 2010 році / А.Г. Салманов, В.В. Лазоришинець, В.Ф. Марієвський // Хірургія України. – 2011. - №3. – С. 26-31.

6.Степанович В.В. Особенности местного лечения ожоговых ран у детей / В.В. Степанович, Г.В. Мирзоян, С.С. Коренькова, О.И. Старостин // II Съезд комбустиологов России : сб. науч. тр. – М. : Ин-т хирургии им. А. В. ВишневскогоРАМН, 2008. – С. 150-151.

7.Фісталь Е.Я. Пластична хірургія : підручник / Е.М. Фісталь, В.Г. Мішалов, Г.Є. Самоленко та ін.; за ред. проф. Е.Я. Фісталя. – К.: ВСВ «Медицина», 2010. – 376 с.

8.Штанюк Є.А. Вивчення антимікробної активності мазей, які містять офлоксацин та левофлоксацин, щодо основних збудників ранової інфекції / Є.А. Штанюк, В.В. Мінухін, М.О. Ляпунов, О.А. Лисокобилка // BIOMEDICAL and BIOSOCIAL ANTROPOLOGY. – 2014. –№ 22. – С. 64-67.

9.Lad A.R. Epidermiological study of 3341 burn patients during three years in Tehran Iran / A.R. Lad, R. Alaghehbandan, R. Nikui // Burns. – 2001. – Vol. 26. – P. 49-53.