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THE USE OF BIOCOMPOSITE COLLAGEN IN THE TREATMENT OF PURULENT WOUNDS IN SOFT TISSUES (LITERATURE REVIEW)

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Numerous dressings, ointments, and solutions are used to treat purulent wounds. Until the second half of the 20th century, an experimental approach predominated in the creation of wound dressing materials. Currently, the pathogenetically justified selection of wound dressings involves not only ensuring protective functions for wounds but also optimizing and stimulating the wound healing process. By the 1980s, the main requirements for dressing materials had been developed. However, due to the specific characteristics of the healing process of purulent wounds, creating a universal dressing remains impossible.

Currently, there are more than 3000 types of dressings, consisting of several components, and coatings that stimulate wound healing are being classified into a separate group. This group includes dressings based on natural and synthetic polymers, in some cases combined with immobilized drugs or growth factors. Matrix proteins, growth factors, and living skin cells (keratinocytes and fibroblasts) are used to create biological equivalents of human skin - this is considered one of the most promising directions. However, products of advanced biopharmaceutical technologies are not widely implemented in practical medicine due to the complexity of their preparation, short shelf life, and high cost.

One of the primary objectives of modern medicine is the study of reparative regeneration. The management of tissue reparative regeneration processes is transitioning from an empirical level to scientifically grounded methods of stimulating reparative processes. Understanding the mechanisms of regenerative histogenesis and how stimulatory substances affect specific cells and tissues at certain stages of purulent processes will serve as a foundation for developing more effective treatment methods.

At the end of the 20th century, active research began on the properties and functions of resident stem cells in adult organisms. Data collected in recent years has allowed for a fresh perspective on the process of damaged tissue regeneration, taking into account the role of tissue stem cells and their less differentiated progeny. When assessing the pathogenetic features of a wound, the preservation of the resident stem cell compartment is considered, and the importance of the microenvironment's influence (growth factors, chemokines, and cytokines) on stem cell activity is evaluated at all stages of the wound healing process.

In the current era, various methods, techniques, and antimicrobial agents are being utilized in the treatment of purulent wounds and wound infections. Nevertheless, the search for new medications to stimulate regeneration processes remains an urgent issue.

The literature known to us presents information about the specific properties of collagen. Firstly, collagen activates spontaneous platelet aggregation and is considered an effective hemostatic agent. Secondly, collagen easily forms complexes with many drugs and biologically active substances, maintaining their effect at the site of application for an extended period. Thirdly,

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collagen, which forms the basis of the preparations, is completely absorbed in the body, with the possibility of regulating its breakdown timing. The breakdown products actively participate in wound healing processes, stimulating the regeneration of the body's own tissues. Fourthly, collagen does not possess toxic or carcinogenic properties. There is information on the use of collagen to stimulate healing processes in skin and muscle wounds in dogs during the postoperative period. However, the application of a collagen-based preparation in the treatment of infected wounds has not been sufficiently studied.

The treatment of purulent wounds remains one of the most pressing challenges in surgery. This is largely attributed to the high prevalence of this condition, which occupies a leading position in outpatient care structures. The increasing relevance of the complex wound treatment problem is significantly amplified by several factors: the development of antibiotic-resistant microorganisms, cases of immunodeficiency, industrial growth, technological disasters, military conflicts, and the consequent rise in injuries.

Against the background of purulent local processes, patients may develop systemic inflammatory response syndrome, sepsis, and multiple organ dysfunction. This significantly reduces the effectiveness of ongoing treatment, increases the length of hospital stay, and raises treatment costs. Currently, various approaches to the complex treatment of soft tissue injuries are being proposed. These include hydropressive, ultrasonic, laser and vacuum treatments, sorption therapy, metallotherapy, ozone therapy, and others. However, to date, according to the literature available to us, it is not possible to implement an individualized approach to treating patients with this pathology that takes into account their age, the type and location of the defect, the stage of the wound healing process, the degree of microbial contamination, identified comorbidities, and other factors.

Thus, purulent wounds of soft tissues, being the most severe manifestation of the wound process, remain one of the urgent problems in modern surgery. This is confirmed by their frequency of occurrence, high probability of complications developing, including generalized complications and cosmetic defects. Consequently, this necessitates the search for new methods of treating this pathology.

The treatment of purulent wounds remains an urgent problem for healthcare systems worldwide. According to literature data, purulent wound diseases occupy one of the leading positions in the structure of general surgical pathology, accounting for approximately 35-45%. The majority of elderly individuals and patients with diabetes mellitus are prone to prolonged and severe courses of purulent soft tissue wounds. Complications of postoperative wounds are observed in 33-38% of cases. Soft tissue injuries are considered the main issue among postoperative complications in hospitals, comprising about 40% of all hospital-acquired infections. The increase in the number of purulent diseases is leading to a rise in the incidence of infection spread.

Unfortunately, traditional methods of preventing and treating soft tissue infections using antibiotics do not always justify themselves. This situation can be explained by the rapid changes in the biological properties of bacterial cells, which, in turn, leads to increased resistance of microorganisms to antibacterial drugs. To ensure an adequate amount of medication at the site of infection and overcome resistance to antibacterial agents, higher doses are being forced into use. This, consequently, has a negative impact on the patient's entire organism.

Despite all efforts aimed at eliminating purulent foci and preventing the spread of the process, deaths are frequently recorded. Currently, a trend towards effective treatment of purulent wounds is emerging, which is based on eliminating the infectious agent at the site of inflammation. From

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a practical standpoint, the method of treating wounds with bandages retains its priority due to the simplicity and convenience of application.

Nanofibrous polymer materials prepared by the electrospinning method are attracting interest as multifunctional binding materials. These materials possess the ability to ensure controlled release of antibacterial substances at specified therapeutic doses, absorption of wound exudate, and gas exchange in the wound. Electrospinning or electrostatic spinning is a universal method for obtaining thin polymer fibers of nano and micrometer dimensions from polymer solutions or melts through the action of electrostatic forces. Both synthetic and natural polymers can serve as raw materials for electrospinning. Unlike natural polymers, synthetic polymers provide mechanical properties that allow them to be used as a reliable framework for nanofibrous materials. Furthermore, they possess biologically inert and biocompatible characteristics.

The history of surgery is inextricably linked to the treatment of purulent wounds. Wounds, injuries, purulent-ulcerative diseases of soft tissues, and postoperative purulent complications remain the primary factors determining the prevalence of patients with purulent wounds today. In recent years, significant changes have occurred in the methodology of treating purulent wounds. Incorrectly chosen strategies and tactics, the absence of a comprehensive approach, and prolonged conservative therapy often lead to unfavorable progression and outcomes of the disease. Therefore, according to V.D. Fedorov and A.M. Svetukhin, developing a strategy and tactics for the complex treatment of extensive purulent wounds is considered the most crucial task.

Today, there is no doubt that surgery remains the primary method for treating purulent wounds. This approach allows for the rapid removal of necrotic tissues and creates conditions for adequate drainage within a short time. However, it has become evident that in many cases, surgical intervention alone is insufficient. Typically, surgical cleansing of a purulent wound focus in soft tissues is complemented by subsequent local treatment aimed at thoroughly cleaning the wound surface, eliminating inflammatory conditions, and stimulating the development of granulation tissue. All of these measures, in general, create the necessary conditions for eradicating wound infection and promoting wound healing.

Although the basic principles of surgical treatment for purulent wounds have already been established, local treatment methods are distinguished by their diversity. One of the modern and promising approaches in wound treatment is the use of biologically active wound dressings, which include combined preparations based on collagen. When exogenous collagen enters the wound, it breaks down and stimulates the growth of granulation tissue, thus contributing to faster wound healing. As a result of studying the structural properties of collagen, it has been proven that the most effective method of using it as a wound covering is in the form of a sponge, which allows for the absorption of a large amount of exudate. The immobilization of proteolytic enzymes and antiseptics on a collagen base creates conditions for the use of such wound dressings in the first phase of the purulent wound process. The restorative function of exogenous collagen can be enhanced by incorporating regeneration-stimulating medications into the preparation.

In recent years, surgeons' greatest attention has been drawn to the possibility of using external nitric oxide in the treatment of purulent wounds. This was based on the discovery of endogenous nitric oxide's role in regulating various biological processes, including the healing of purulent wounds. It can be noted that as a result of recent research in this field, a new direction in surgery - nitric oxide therapy - has emerged and is rapidly developing. This approach is aimed at treating purulent wounds and has been studied by a number of scientists.

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The treatment of acute purulent wounds remains one of the most complex and pressing issues in surgical infection management. This problem is associated with the distinctive characteristics of infectious foci, the frequent occurrence of septic complications and disease recurrence, as well as the social significance of this pathology, which predominantly affects individuals of working age. Purulent complications are observed in 5.3-75.4% of cases involving mechanical injuries, with purulent wounds developing in 3-24% of cases where soft tissues are affected. In 15-45% of patients, acute purulent wounds progress to a chronic form, accounting for 6-12% of musculoskeletal and purulent-septic diseases, respectively. Recurrence of acute purulent wounds is detected in 20-30% of cases, with approximately 70% of patients losing their ability to work and 50-90% becoming disabled. The annual increase in traumatic injuries, severe combined injuries, immunodeficiency states, and other factors further elevate the significance and prevalence of this pathology.

The traditional method of treating patients with acute purulent wounds is based on the strategy of active sanitation of infection foci in soft tissues and the application of appropriate antibacterial therapy. In recent years, autologous, allogeneic, xenogeneic, and synthetic materials, as well as their combinations, have been increasingly used in soft tissue plastic surgery. However, despite new approaches, improved standards of medical care, and the use of modern pharmacological preparations, the complex treatment of acute purulent wounds cannot be considered sufficiently effective.

From the perspective of improving treatment methods for acute purulent wounds, approaches that enhance reparative angiogenesis, the search for anti-inductive and anti-conductive materials, and methods of local mechanical and physical effects on soft tissues are generating significant interest.

LITERATURE USED.

1. Yusufjanovich, E. U., Rafiqovich, Z. A., & Irsalievich, E. K. (2023). Assessment of the Process of Epithelialization After Complex Treatment of Diabetic Foot Syndrome. Texas Journal of Medical Science, 16, 19–23.
2. Yusufjanovich, E. U., & Rafiqovich, Z. A. (2023). Treatment of purulent-necrotic lesions of the lower extremities with modern drugs. Conference, 88–94.
3. Zohirov, A. R., Abdusalomov, B. A., & Mominov, A. T. (2022). Improving complex treatment taking into account pathophysiological changes in purulent-necrotic lesions of the lower extremities in diabetes mellitus.
4. Ergashev, U. Y., Zokhirov, A. R., & Ernazarov, K. I. (2022). THE STUDY OF PATHOMORPHOLOGICAL DIAGNOSIS OF VITAL ORGANS AFTER MODERN TREATMENT OF DIABETIC FOOT SYNDROME.
5. Ergashev, U. Yu., & Zokhirov, A. R. (2023). Evaluation of the effectiveness of minimally invasive surgeries for obstructive jaundice and application of the algorithm. European Journal of Interdisciplinary Research and Development, 12, 6-16.
6. Ergashev, U. Yu., & Zokhirov, A. R. (2023). STUDY OF LIVER PATHOMORPHOLOGY IN EXPERIMENTAL DIABETIC FOOT SYNDROME. European Journal of Interdisciplinary Research and Development, 12, 27-31.
7. Yusufjanovich, E. U., Irisbaevich, M. G., Rafiqovich, Z. A., & Irsaliyevich, E. K. (2023). Evaluation of Effectiveness of Splenectomy in Chronic Leukemias.World Bulletin of Public Health, 19, 79-83.

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 5,October ,2025

8. Yusufjanovich, E. U., Rafiqovich, Z. A., & Tohirovich, G. B. (2023). PRINCIPLES OF STUDYING LIVER MORPHOLOGY IN EXPERIMENTAL DIABETIC FOOT SYNDROME.World Bulletin of Public Health, 19, 63-65.
9. Ergashev, U. Y., Minavarkhujayev, R. R., Gafurov, B. T., Malikov, N. M., Ortiqboyev, F. D., & Abdusalomov, B. A. (2022). Efficiency of Percutaneous Minimally Invasive Technologies in the Treatment of Patients with Obstructive Jaundice.
10. Mominov, A. T., Malikov, N. M., Yakubov, D. R., & Abdusalomov, B. A. (2022). Problems of pain relief in outpatient surgery. European Journal of Interdisciplinary Research and Development, 10, 81–89.
11. Ergashev, U. Y., Abdusalomov, B. A., Minavarkhojayev, R. R., Ortiqboyev, F. D., & Malikov, N. M. (2023). Evaluation of the pathomorphology of regeneration in diabetic foot syndrome and determination of its dependence on biochemical processes.World Bulletin of Public Health, 19, 66-78.
12. Abdusalomov, B. A., & Rafiqovich, Z. A. (2023). THE MECHANISM OF ACTION OF THE GEL FORM OF COLLAGEN IN DIABETIC WOUNDS.International Journal of Medical Sciences And Clinical Research, 3(03), 96-103.
13. Ergashev, U. Y., Malikov, N. M., Yakubov, D. R., Abdusalomov, B. A., & Gafurov, B. T. (2023). Use of Collagen and Fibroblasts in Modern Medicine. Eurasian Research Bulletin, 17, 78–84.
14. Ergashev, U. Y., Mominov, A. T., Malikov, N. M., Yakubov, D. R., & Abdusalomov, B. A. (2023). MODERN APPROACH TO COMPLEX TREATMENT OF DIABETIC FOOT ULCERS. LITERATURE REVIEW.
15. Ergashev, U. Y., Abdusalomov, B. A., & Zohirov, A. R. (2023, May). Eksperimental diabetik tavon sindromida hayotiy muhim a'zolarning morfologik o'zgarishlarini nazorat qilish. /Material of International scientific and practical conference" An integrated approach to the treatment of complications of diabetes".
16. Abdusalomov, B. A. (2023). USE OF MODERN METHODS IN THE TREATMENT OF CHRONIC WOUNDS.Journal of Academic Research and Trends in Educational Sciences, 2(3), 213-220.
17. Abdusalomov, B. A. (2023). The Role of Collagen in The Mechanisms of Chronic Wound Healing for Diabetic Foot Syndrome.Texas Journal of Medical Science, 26, 86-94.
18. Ergashev, U. Y., Mominov, A. T., Malikov, N. M., Yakubov, D. R., & Abdusalomov, B. A. (2023). MODERN APPROACH TO COMPLEX TREATMENT OF DIABETIC FOOT ULCERS. (LITERATURE REVIEW).
19. Ergashev, U. Yu., Zohirov, A. R., Minavarkhuzhaev, R. R., Abdusalomov, B. A., & Ortikboev, F. D. (2023). Evaluation of the effectiveness of minimally invasive surgeries for obstructive jaundice and application of the algorithm. European Journal of Interdisciplinary Research and Development, 12, 6-16.
20. Ergashev, U., Malikov, N., Yakubov, D., Abdusalomov, B., & Gafurov, B. (2023). Use of Collagen and Fibroblasts in Modern Medicine. Eurasian Res. Bull, 17, 78-84.
21. Zohirov, A. R., Abdusalomov, B. A., & Mominov, A. T. (2022). Improving complex treatment taking into account pathophysiological changes in purulent-necrotic lesions of the lower extremities in diabetes mellitus.