Impact Factor: 4.9

ISSN: 2181-0664
DOI: 10.26739/2181-0664
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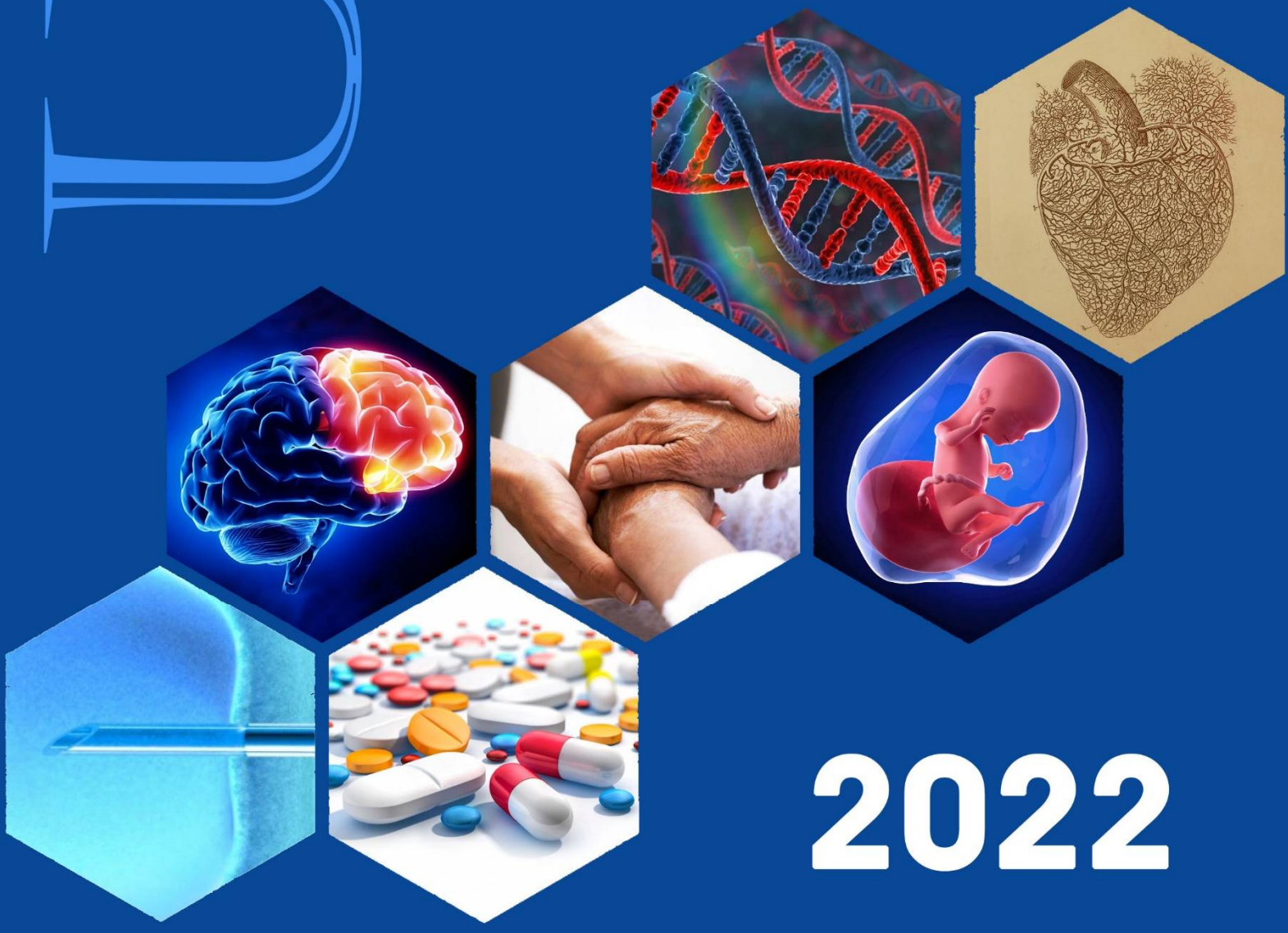
UZBEK MEDICAL JOURNAL

Volume 3, Issue 3



2022

ISSN 2181-0664

Doi Journal 10.26739/2181-0664

ЎЗБЕК ТИББИЁТ ЖУРНАЛИ

3 ЖИЛД, 3 СОН

УЗБЕКСКИЙ МЕДИЦИНСКИЙ ЖУРНАЛ

ТОМ 3, НОМЕР 3

UZBEK MEDICAL JOURNAL

VOLUME 3, ISSUE 3

ТОШКЕНТ-2022

ЎЗБЕК ТИББИЁТ ЖУРНАЛИ | УЗБЕКСКИЙ МЕДИЦИНСКИЙ ЖУРНАЛ | UZBEK MEDICAL JOURNAL
№3 (2022) DOI http://dx.doi.org/10.26739/2181-0664-2022-3

Page Maker | Верстка | Саҳифаловчи: Ҳуршид Мирзахмедов

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ISSN: 2181-0664
www.tadqiqot.uz

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RESULTS OF THE EXPERIMENTAL STUDY OF THE ANTI-ADHESIVE PROPERTIES OF THE NEW DOMESTIC "HEMOBEN" DRUG

http://dx.doi.org/10.5281/zenodo.6618481

ABSTRACT

Many methods have been proposed to prevent adhesion, but the problem has mainly remained unresolved. Currently, there is a number of barrier-type anti-adhesion agents that do not have sufficient effectiveness and have limitations of use. The study assessed the coating effectiveness of the "HEMOBEN" drug in the prevention of the formation of adhesions with surrounding tissues. Experimental studies were performed on white outbred rats of both sexes. The state of the abdominal cavity organs and effusion, the presence and severity of the adhesive process were monitored. The adhesive process was assessed by the number, area and severity of adhesions. An experimental evaluation of the anti-adhesion efficacy of the "HEMOBEN" drug use is characterized by the absence of the development of a pronounced adhesive process with surrounding organs against the background of prolonged fixation to the area of injury of the parenchymal organ. There were no signs of the formation of infiltrates and effusion in the abdominal cavity.

Keywords: internal injury, adhesive process, anti-adhesion drug, "HEMOBEN" fine powder.

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РЕЗУЛЬТАТЫ ЭКСПЕРИМЕНТАЛЬНОГО ИССЛЕДОВАНИЯ АНТИАДГЕЗИВНЫХ СВОЙСТВ НОВОГО ОТЕЧЕСТВЕННОГО ПРЕПАРАТА «HEMOBEN»

АННОТАЦИЯ

Для того чтобы предотвратить спаечный процесс, было предложено большое количество методов, но проблема осталась в основном неразрешенной. В настоящее время есть ряд противоспаечных средств барьерного типа, которые не обладают достаточной эффективностью и имеют ограничения к применению. В проведенном исследовании дана оценка эффективности покрытия препарата «HEMOBEN» в профилактике формирования спаек с окружающими тканями. Экспериментальные исследования выполнены на белых беспородных крысах обоего пола. Произведен контроль состояния органов брюшной полости и выпота, наличие и выраженность спаечного процесса. Спаечный процесс оценивался по количеству, площади и выраженности спаек. Экспериментальная оценка противоспаечной эффективности применения препарата «HEMOBEN» характеризуется отсутствием развития выраженного адгезивного процесса с окружающими органами на фоне пролонгированной фиксации к зоне травмы паренхиматозного органа, при этом не отмечено признаков формирования инфильтратов и выпота в брюшной полости.

Ключевые слова: повреждения внутренних органов, спаечный процесс, противоспаечный препарат, мелкодисперсный порошок «HEMOBEN».

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YANGI MAHALLIY "XEMOBEN" DORINING ANTIADGEZIV XOSSALARINI EKSPERIMENTAL O'RGANISH NATIJALARI

ANNOTASIYA

Yopishqoq jarayonining oldini olish uchun ko'plab usullar taklif qilingan, ammo muammo asosan hal qilinmagan. Hozirgi vaqtda etarli samaradorlikka ega bo'lmagan va ulardan foydalanish bo'yicha cheklovlar mavjud bo'lgan bir qator to'siqli turdagi yopishqoqlikka qarshi vositalar mavjud. Tadqiqotda "XEMOBEN" preparatining qoplanishining atrofdagi to'qimalar bilan yopishqoqlik hosil bo'lishining oldini olish samaradorligi baholandi. Eksperimental tadqiqotlar ikkala jinsdagi zotsiz oq kalamushlarda o'tkazildi. Qorin bo'shlig'i organlarining holati va nazla, yopishqoq jarayonning mavjudligi va zo'ravonligi kuzatildi. Adgeziv jarayoni yopishqoqliklar soni, maydoni va zo'ravonligi bilan baholandi. "XEMOBEN" preparatini qo'llashning antiadgeziv samaradorligini eksperimental baholash parenximal organning shikastlangan joyiga uzoq vaqt fiksatsiya qilish fonida atrofdagi organlar bilan aniq yopishqoq jarayonning rivojlanishining yo'qligi bilan tavsiflanadi, qorin bo'shlig'ida infiltratlar va nazla shakllanishining belgilari yo'q edi.

Kalit so'zlar: ichki organlarning shikastlanishi, yopishqoq jarayoni, yopishqoqlikka qarshi dori, "XEMOBEN" mayda dispersion kukuni.

Introduction.

The appearance of adhesions, or fibrous masses, which form between adjacent tissues that have undergone trauma or ischemia due to surgery, is still one of the most severe complications in many surgical procedures [1, 5].

The adhesive process in the abdominal cavity develops at different times of the postoperative period in 67–95% of patients who have undergone at least one surgical intervention on the abdominal organs [2, 4, 7].

Many methods have been proposed to prevent adhesions, but the problem has mainly remained unresolved. Currently, there are several anti-adhesion agents of the barrier type that do not have sufficient effectiveness and have limitations of use (low biodegradation rate, inability to use in peritonitis, etc.). In addition, commercially available anti-adhesion agents (Interceed, Seprafilm, Adept, and others) are expensive and make the country dependent on imports of these agents [3, 6, 8].

Purpose:

The study assessed the coating effectiveness of the "HEMOBEN" drug in the prevention of the formation of adhesions with surrounding tissues.

Material and research methods:

Experimental studies were performed on white outbred rats of both sexes. The animals were kept in a vivarium equipped according to the Sanitary Rules and Regulations requirements for experimental laboratories.

The method to prevent adhesions using "HEMOBEN" was used after the spleen wound bleeding control.

Withdrawal from the experiment - the sutures were removed from the skin wound and aponeurosis under general halothane vapor anesthesia. The state of the abdominal cavity organs and effusion and the presence and severity of the adhesive process was monitored. The spleen was removed for histological studies.

The studies were carried out by photo-documentation of the macroscopic pattern of the healing of the wound process in the abdominal cavity at various times after the operation. The adhesive process was assessed by the number, area, and adhesions severity.

Experimental studies were carried out in compliance with the rules adopted by the European Convention for the Protection of Vertebrate Animals used for experiments or other scientific purposes (ETS N 123), Strasbourg, 18.03.1986.

A morphological assessment of the "HEMOBEN" drug in the formation of various adhesions in the abdominal cavity after hemostasis was given.

At the same time, biomaterials obtained from experimental animals after surgery were examined on days 3, 7, and 14.

Gradual impregnation of the powder with blood and tissue fluid leads to the formation of an elastic film tightly adhered to the wound. In subsequent periods, 3, 7, and 14 days after the operation, the study of the abdominal cavity organs state made it possible to report the absence of a pronounced adhesive process, signs of infiltrates, and effusion formation in the abdominal cavity (Fig. 1-4). Adhesion of the omentum strand to the wound surface can be attributed to low-grade adhesions since in none of the observations we were able to ascertain the formation of adhesions with the intestine and the corresponding complications.

Fig. 1. 3 days after the spleen wound bleeding control. The wound surface is covered with an omentum. The adhesion process is absent.

Fig. 2. 7 days after the operation. The spleen is not deformed, can be traced along the entire contour. There is no hematoma and no adhesions with other organs.

Fig. 3 Abdomen 14 days after hemostasis with the "HEMOBEN" drug. There are no adhesions with the anterior abdominal wall.

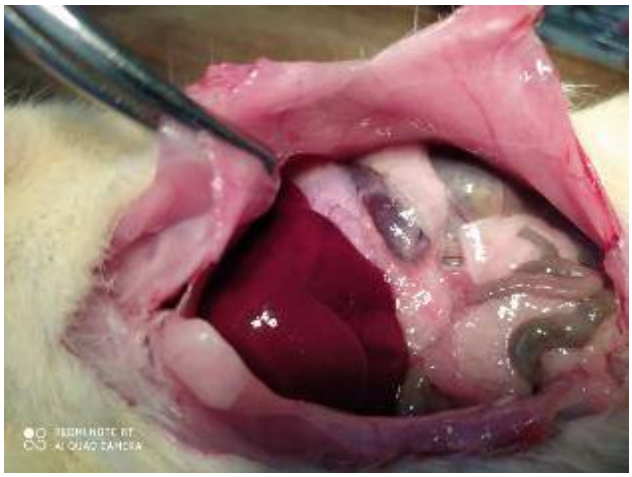
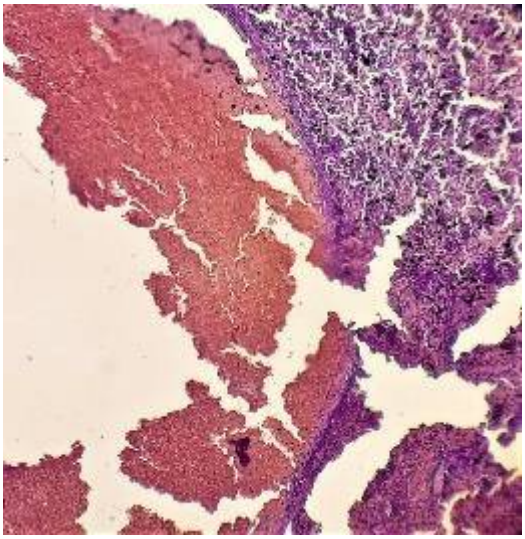


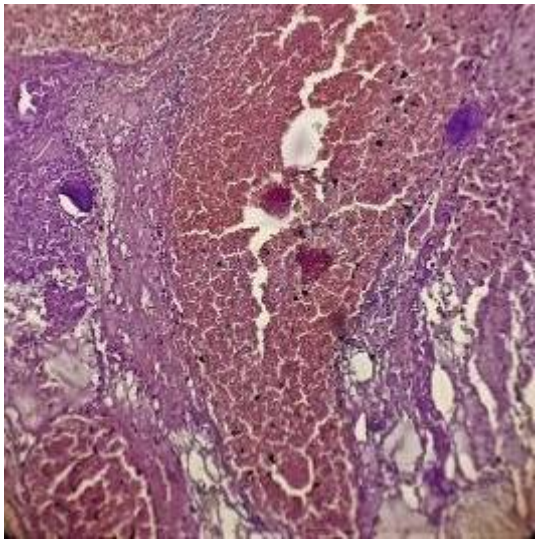
Fig. 4. The state of the abdominal cavity after "HEMOBEN" hemostasis. The spleen is visible, covered with a thin film of omentum.

Conclusion: On the 3rd day of the experiment, the "HEMOBEN" fine powder formed from absorbable Na-carboxymethylcellulose (Na-CMC), viscose and calcium ions attached to them, was detected with an inflammatory process by microscopic examination in the form of low-cell inflammatory elements: some macrophages, minimal capillary proliferation and a thin fibrous connective layer. No fatty infiltrate was observed (Fig. 5A and 5B).

The prevalence of the proliferative phase of the inflammatory process was noted by the 7th day. There were practically no changes in the cellular infiltration reaction of inflammation. At the same time, the formation of fine fibroblasts continued mainly in the wound area Fig. 5A). An increase in the regenerative process in the parenchyma, especially in the affected area, was histologically noted after 14 days. Wherein it was manifested by the restoration of the structure of organs, the loss of tissue swelling, and a decrease in vascular congestion. Remains of the "HEMOBEN" agent were found in the wound area in some cases. This once again indicates that the hemostatic properties of this drug persist for a long time (Fig. 5B).

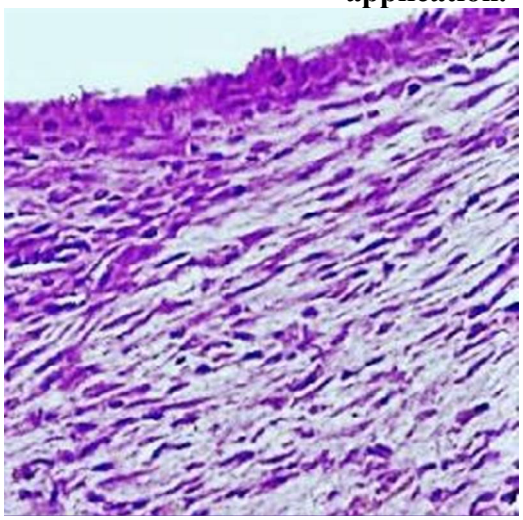


A. Affected areas of liver sprayed with "HEMOBEN" powder. Intravascular stasis and sludge. Numerous infiltrates of macrophages around the vessel.

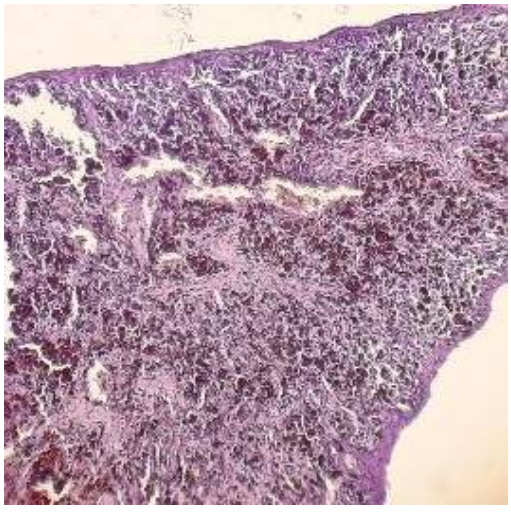


B. Spleen wound areas sprayed with the "HEMOBEN" powder. Stable stasis and congestion in the vascular cavity. The colloidal mass is located around and inside the vessels. Soft fibrous connective tissue began to form.

Fig. 4. The area of parenchymal wounds after the "HEMOBEN" powder application. 3 days. H&E. 10x20.



A. Wound surface of the liver: soft fibrous connective tissue is formed. 7 days. H&E. 10x20.



B. Spleen damage area. Proliferative-regenerative tissue regeneration. Homogeneous masses of coating elements are found in the wound. 14 days. H&E. 10x20

Fig. 5. The area of parenchymal wounds after applying the "HEMOBEN" powder. H&E. 10x20.

Conducted studies showed that the predominance of the macrophage process in tissues when using a hemostatic sponge based on collagen indicates its strong interaction with the tissue. Another feature is that the acid contained in it, as was mentioned previously, leads to coagulative necrosis on the surface of the affected tissue, a strong inflammatory process in the tissue, resulting in gross fibrosis. This, in turn, manifests itself in the form of various cicatricial adhesions in other organs and areas around the wound.

Fine "HEMOBEN" powder, formed from absorbable Na-carboxymethylcellulose (Na-CMC), viscose and calcium ions attached to them, practically does not cause inflammatory reactions, forms a colloidal layer of blood in the wound area, and completely coats the wound. Its high adhesion and pseudo-plasticity suppress the surface of injured tissues and prevent interaction with neighboring organs and the formation of adhesions between them.

Conclusions:

Experimental evaluation of the anti-adhesion efficacy of the use of the "HEMOBEN" drug is characterized by the absence of the development of a pronounced adhesive process with surrounding organs on the background of prolonged fixation to the parenchymal organ damage area. Wherein there were no signs of the formation of infiltrates and effusion in the abdominal cavity.

Microscopic studies showed the formation of fine fibroblasts mainly in the area of the simulated wound without local inflammatory manifestations and restoration of the structure of organs (in the wound area), regression of tissue swelling, and a decrease in vascular plethora.

Thus, a new domestic wound coating with prolonged action, along with a good hemostatic effect, can significantly reduce the risk of developing an adhesive disease in the subsequent periods after surgery.

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ISSN 2181-0664

Doi Journal 10.26739/2181-0664

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