

EXPERIMENTAL ASSESSMENT OF THE INFLUENCE OF ANTISEPTIC WITH A COMBINATION OF LASER ON PROTOSCOLEXES

¹Nishanov M.F., ²Sadikov R.A., ³Nabiev I.M.

^{1,2,3}Andijan State Medical Institute

<https://doi.org/10.5281/zenodo.10493197>

Abstract. *The article presents the results of experimental and morphological studies aimed at solving the issue of treating the cavity of an hydatid cyst with various antiseptics, and assessing the effectiveness of laser radiation. The main objective of the experimental study was to evaluate the effect of laser exposure in combination with treatment with various antiseptics on the germinal elements of echinococcal fluid and the fibrous layer of the capsule of parasitic cysts.*

Keywords: *microscopy, echinococcus, fibrous capsule, processing, laser irradiation.*

Actuality. Many studies have found that germinal elements occur in the fibrous layer of the capsule. This, in turn, leads to relapses of echinococcosis [2,5,7,9,10]. For this purpose, at present, during surgery for liver echinococcosis, it is recommended to treat the residual cavity with various chemical antiseptics (formalin solution, iodine, alcohol, hydrogen peroxide, etc.) and physical factors (ultrasound, laser radiation, thermal exposure, etc.). This in turn leads to an increase in the number of methods, but can lead to various conflicting opinions about which one is more effective [3,4,6,8]. But the exact conclusions of the above methods and their effectiveness can only be assessed using morphological methods.

The purpose of study. To study the effect of antiseptics on the fibrous capsule of the cyst cavity in a model of liver echinococcosis, treating their cavities with various antiseptics.

Materials and methods. The main objective of the experimental study was to evaluate the effect of laser exposure in combination with treatment with various antiseptics on the germinal elements of echinococcal fluid and the fibrous layer of the capsule of parasitic cysts. For this purpose, the study is divided into 2 large series.

Each series was carried out sequentially. In the first series we gave a macroscopic (visual) and microscopic assessment of each sample.

A. First series studies:

The purpose of this series: Macroscopic (visual) and microscopic assessment of the viability of scolex in the native fluid of echinococcal cysts under the influence of various antiparasitic antiseptics.

The influence of various antiseptics on the viability of scolex obtained from cystic fluid was studied. For this purpose, 5 test tubes with 3 ml of native echinococcus fluid were taken and antiseptics were added to them:

1st tube: 3 ml of native echinococcus fluid (control group);

2-tube: 3 ml of native echinococcosis liquid and 2 ml of solution FarGALS;

3-tube: 3 ml of native echinococcus liquid and 2 ml of 80% glycerol solution;

4- test tube: 3 ml of native echinococcus liquid and 2 ml of 3% alcohol solution of iodine;

5- test tube: 3 ml of native echinococcus liquid and 2 ml of 96% ethanol;

The liquid in each tube was examined macroscopically (visually) and microscopically after 3, 5 and 7 minutes.

Macroscopic (visual) assessment:

When each tube was placed with antiseptic and visually assessed, especially in tubes 2, 3 and 4 (antiseptic liquid FarGALS, glycerin and iodine antiseptic), scolex in the native fluid of echinococcus rolled into different aggregate forms and formed bundles in the upper part of the test tube.

Microscopic Evaluation: As mentioned above, the liquids in each tube were also microscopically evaluated at 3, 5, and 7 minutes. At the same time, changes in the shape of the scolex, changes in their external volume and mobility in native echinococcal fluid were assessed.

When examining the scolex in the test tube of the control group at the 3rd minute, the shape is round, the edges are smooth, contractile movements are preserved at intervals.

From the 7th minute, it was established that their wall was slightly curved, their movement was slow, the internal elements were eccentrically located, and in some samples the integrity of the wall was compromised, and initial internal cracks began to be detected.

During a microscopic examination of echinococcal fluid in the remaining groups treated with various antiseptics, significant changes in the morphology of the scolex were observed, especially in samples treated with antiseptics in test tubes 1, 2 and 3, and even more so in the sample treated with a solution FarGALS in test tube 1. In the first 3 minutes, the scolex began to lose shape and smoothness. At the 5th minute, the integrity of the wall was compromised, and eccentric placement and protrusion of the internal inserts began to be observed.

In the 96% ethanol solution group, such changes were microscopically noticeable after 7 minutes. In this case, the same changes were observed as above, the integrity of the form was violated, and the movement became invisible. In most cases, the scolex membrane remained intact.

B. Second series studies:

Purpose of the series: first measured the light absorption level of the antiseptic liquid FarGALS using a spectrophotometer and selected the laser beam accordingly. Then, using a selected light-emitting laser device, a solution was added to the liquid of the native echinococcal cyst. FarGALS and assessed changes in scolex under the influence of LILR (Low intensity laser radiation).

Absorption level and photosensitizing properties of antiseptic liquid FarGALS tested and confirmed by several previous scientific studies [1]. However, we checked this again using a spectrophotometer. In this case, local antiseptic liquid FarGALS showed a high absorption spectrum in the 330-550 nm mode. This once again confirmed the results of several previous scientific works.

Results and their discussions. Based on the obtained result, as a radiation source for PT (Photodynamic therapy) used a laser machine «LAKHTA-MILON» (Russia) with radiation in the green spectrum with a wavelength of 520 nm, power 0.5-1.0 mW in continuous mode.

Initially, we determined how long destructive changes last in the native fluid of an hydatid cyst containing an antiseptic fluid FarGALS.

In this case, 3 preparations were taken, 1 ml of native echinococcus liquid was added to each of them, and 1 ml of antiseptic liquid was added to them FarGALS and irradiated for 1, 3 and 5 minutes in conditions of the most reduced illumination.

At the 3rd minute of the experiment, their complete denaturation, a violation of the integrity of the wall, and the release of internal inclusions into the surrounding liquid were observed. These changes mean that they have completely lost their vital signs.

At the 5th minute of irradiation, this process continued without changes. This showed that LILR (Low intensity laser radiation) was the main effect mainly at the 3rd minute of irradiation and that it did not change at subsequent times.

Studies have shown that the effect PT (Photodynamic therapy) characterized by strengthening and acceleration of the antiparasitic effect of the antiseptic FarGALS under the influence of laser irradiation in the green spectrum. It should be noted that similar experiments with dilution of the native solution FarGALS in a ratio of 1:1, 1:3, 1:5, 1:6, 1:8 with water for injection showed indicators virtually identical to the primary results. This is important from the point of view of the pH of the solution; in its native form it has an acidic environment, but diluting the drug does not lead to the loss of its antiparasitic properties.

Conclusion. Macroscopic and microscopic assessment of the effect of various antiseptics and, in particular, domestic antiseptics FarGALS native hydatid fluid once again confirmed the primary results of our previous studies. In doctoral work of F.R.Yakubova “Medical and social aspects and improvement of surgical tactics for echinococcosis of the abdominal organs” the effect of the solution was studied FarGALS when treating the residual cavity after echinococcectomy from the liver. These studies were continued in this work and new data were obtained that were of both scientific and practical interest.

The main effect of the concentrated solution FarGALS on native echinococcus fluid begins within 3 minutes, and the germicidal effect is observed after 5 minutes.

REFERENCES

1. Абдуллажанов Б. Р., Бабаджанов А. Х., Юсупов Ж. К. Анализ динамики результатов планиметрических исследований при лечении длительно незаживающих гнойных ран мягких тканей //Re-health journal. – 2021. – №. 1 (9). – С. 196-203.
2. Амонов Ш.Ш. и др. Современные аспекты диагностики и хирургического лечения эхинококкоза печени //Вестник Авиценны. – 2019. – Т. 21. – №. 3. – С. 480-488.
3. Ахмадалиев С.М., Кадиров Ш.Н. Принципы и современные методы обработки полости эхинококковой кисты //Re-health journal. – 2020. – №. 3-2 (7). – С. 163-165.
4. Краснов А. О. и др. Актуальное состояние вопросов диагностики и хирургического лечения эхинококкоза печени (обзор литературы) //Acta Biomedica Scientifica. – 2022. – Т. 7. – №. 1. – С. 171-181.
5. Хамдамов Б.З. и др. Лазерная фотодинамическая терапия как метод обработки остаточной полости после эхинококкэктомии печени //журнал биомедицины и практики. – 2022. – Т. 7. – №. 4.
6. Шевченко Ю.Л., Назыров Ф.Г.. Хирургия эхинококкоза / Ю.Л.Шевченко, Ф.Г. Назыров – М.: Издательство. «Династия», 2016. – 288 с.: ил.
7. Vaybekov I., Kartashev V., Mardonov J. Influence of laser irradiation on interaction of prolen sutures with the wound tissues and their healing //Economic and Social Development: Book of Proceedings. – 2017. – С. 15-24.
8. Craig PS, Hegglin D, Lightowlers MW, Torgerson PR, Wang Q. 2017. Echinococcosis: control and prevention. *Adv Parasitol* 96:55–158. doi: 10.1016/bs.apar.2016.09.002.
9. Panteleyev V.S. Analysis of Early and Distant Results of Various Options for Eliminating the Residual Liver Cavity Following Echinococcectomy. *Creative surgery and oncology*. 2018;8(3):203–207.

10. Yakubov FR, Sapaev DS. Surgical treatment of liver echinococcosis. J Med Life. 2022 Nov;15(11):1409-1414. doi: 10.25122/jml-2022-0268.