Intraoperative express diagnostics of the effectiveness of antiparasitic treatment during Echinococcectomy

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ABSTRACT

To increase the reliability, simplify the assessment of the viability of protoscolexes, significantly reduce the duration of testing, we have developed and used a simple and reliable "Method for determining the effectiveness of antiparasitic treatment of echinococcal cysts" in this study, which allows to determine the viability of protoscolexes during the operation and in a short time. The essence of the invention lies in the fact that after antiparasitic treatment of an echinococcal cyst, 2 drops of wash water are poured into the well of a glass slide, followed by microscopy at 1000-fold magnification. Microscopic examination assesses the motor activity and morphistructure of the parenchyma of protoscolexes and acephalocysts. Lack of motor activity in combination with destruction and smoothing of the parenchyma structure, destruction of the crown of the protoscolex hooks indicate irreversible destructive changes and death of the parasite, in these cases antiparasitic treatment is recognized as effective. Revealing even insignificant motor activity, as well as maintaining the shape, morphistructure of the parenchyma, demonstrate the viability of the protoscolex and indicate the ineffectiveness of antiparasitic treatment.

Keywords: assessment of the viability of protoscolexes, antiparasitic treatment, echinococcal cysts, morphistructure.

Introduction

At the initial stages of this study, the adequacy of the germicidal treatment of the residual cavity during echinococcectomy was assessed by testing protoscolexes in vitro under a microscope (Patent for invention No. IDP 20010647 dated 07/27/2001, issued to A.M. Shamsiev et al.). The method was slightly modified by us in 2010 (Patent for invention No. IAP 2010 0419 dated 29.08.2010). In this case, the washout from the treated cavity of the fibrous capsule is placed in a pH 7.5 nutrient medium and incubated in a thermostat at 37 ° C for 10 minutes.

Then, under a microscope, the mobility and morphology of protoscolexes are examined. In the absence of motor activity, clearing of the parenchyma and a decrease in the size of protoscolexes, the loss of their viability is noted. This method of rapid assessment of the quality of scolexicidal treatment of residual cavities takes into account the limited criteria for the viability of protoscolexes; the 80-100x optical magnification used in this case does not allow clear visualization of acephalocysts.

Main Part

The changes in protoscolexes detected using this technique are nonspecific, difficult to distinguish and are judged subjectively, depending on the training of the surgeon. It is almost impossible to assess the irreversibility of the detected morphological changes. In addition, to obtain a washout, incubation, microscope adjustment and microscopy, it takes at least 8-10 minutes, which, taking into account the time for the actual treatment of the chitinous membrane and the cavity of the fibrous capsule, significantly lengthens the main stage of the surgical intervention.

To increase the reliability, simplify the assessment of the viability of protoscolexes, significantly reduce the duration of testing, we have developed and during this study used a simple and reliable "Method for determining the effectiveness of antiparasitic treatment of echinococcal cysts" (application for invention No. IAP 20120244 dated 20.06.2012), which allows during the operation and in a short time to determine the viability of the protoscolexes.

The essence of the invention lies in the fact that after antiparasitic treatment of an echinococcal cyst, 2 drops of wash water are poured into the well of a glass slide, followed by microscopy at 1000-fold magnification. Microscopic examination assesses the motor activity and morphistructure of the parenchyma.
of protoscolexes and acephalocysts. Lack of motor activity in combination with destruction and smoothing of the parenchyma structure, destruction of the crown of the protoscolex hooks indicate irreversible destructive changes and death of the parasite, in these cases antiparasitic treatment is recognized as effective.

Revealing even insignificant motor activity, as well as maintaining the shape, morphostructure of the parenchyma, demonstrate the viability of the protoscolex and indicate the ineffectiveness of antiparasitic treatment.

In order to compare the informative value of the traditional method of express diagnostics with 80-fold magnification and the method developed by us for assessing the viability of echinococcus embryos in flushing waters from the residual cavity, we examined the same preparation from two angles (Fig. 1-4).

Fig. 1. Protoscolexes are not inverted - according to the analogue, they are dead. After antiparasitic treatment. Magnification 10x8.

Fig. 2. The same preparation at 10x100 magnification. The structure of the parenchyma of the protoscolex is preserved, which indicates its viability.
Fig. 3. Inverted protoscolex (indicated by an arrow) - according to the analogue, it was not perished. After antiparasitic treatment. Magnification 10x8.

Fig. 4. Inverted protoscolex at 10x100 magnification. The structure of the parenchyma is disturbed and smoothed, it has acquired an inhomogeneous granular appearance.

At the same time, irregular shapes, non-inverted protoscolexes with a violation of the integrity and smoothness of the parenchyma structures were noted, which reliably indicates irreversible destructive changes and the death of the parasite.

Thus, non-inverted protoscolexes can be either dead or alive. At the same time, the evertedness of protoscolexes does not always indicate their preservation of vitality. The foregoing unambiguously testifies to the extreme unreliability of the traditional method of microscopic assessment of the usefulness of scolexicidal treatment of the residual cavities of echinococcus.

It is known that the assessment of the viability of protoscolexes by their mobility by traditional microscopy methods is rather subjective and cannot be reliably documented.

The use of video microscopy of a native preparation with a magnification of up to 1000 times serves not only as one of the most objective methods for assessing their viability, but also makes it possible to present convincing documentary evidence in the form of video photomicrographs (Fig. 5).

Fig. 5. Fragments of video microscopy: live inverted and non-inverted protoscolexes with contractile and oscillatory movements. Magnification x1000.
Conclusion

Thus, in order to increase the reliability, simplify the assessment of the viability of protoscolexes, significantly reduce the duration of testing, we have developed and used a simple and reliable "Method for determining the effectiveness of antiparasitic treatment of echinococcal cysts", which allows during the operation and in a short time to determine the viability of protoscolexes. We were convinced that the use of video microscopy of a native preparation with a magnification of up to 1000 times is not only one of the most objective methods for assessing their viability, but also allows us to present convincing documentary evidence in the form of video microphotographs.

References