

## **SURGERY AND CHEMOTHERAPY OF COMPLICATED FORM OF LIVER ECHINOCOCCOSIS**

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### **ABSTRACT**

The results of treatment of 328 (51.4%) patients with liver echinococcosis are presented. The use of the ultrasonic dissector of the SONOCA 300 aspirator makes it possible to make wider use of radical modern methods of surgical interventions for echinococcosis, to perform them bloodlessly, with good final aero-, hemo- and cholestasis with minimal tissue trauma in the affected area. The developed algorithms for choosing tactics for surgical treatment of echinococcosis, taking into account an integrated approach to the choice of access, mainly to radical echinococcectomy and elimination of the residual cavity, as well as preventive chemotherapy, made it possible to improve the quality of care provided by reducing the frequency of immediate postoperative complications from 14.3% to 3.7 % ( $p=0.027$  by  $\chi^2$  criterion) and disease relapse from 13.4% to 2.8% ( $p=0.031$  by  $\chi^2$  criterion).

**Key words:** Liver echinococcosis, surgical treatment, chemotherapy.

### **INTRODUCTION**

According to WHO (1), at any given time in the world, more than 1 million people are affected by echinococcosis. Due to the lack of a downward trend in the number of patients and the existence of endemic regions where the incidence rate varies from 1.2 to 9.0 per 100,000 population, this parasitic disease continues to be a serious medical and social problem. At the present stage, the diagnosis of echinococcosis does not present significant difficulties, largely due to the advent of non-invasive imaging methods, the information content of the complex application of which reaches 95-100% (3). However, the lack of alertness regarding echinococcosis contributes to late diagnosis, and, consequently, an increase in complicated forms of the disease. At the same time, treatment of echinococcosis of the abdominal cavity and chest organs is a serious surgical problem. The most common method of surgery remains echinococcectomy with various options for eliminating the residual cavity, which is performed in the vast majority (90.6%) of

cases (4). As a result, the postoperative mortality rate of surgical patients averages 2.2%, and relapses after surgery occur in 3-54% of cases (2.5). In light of the above, the need to improve known and develop new effective measures for the prevention and treatment of this terrible disease becomes obvious.

**Purpose of the study:** to improve the results of treatment of complicated liver echinococcosis by improving surgical tactics and developing effective methods for reducing disease relapse.

**Material and methods.** The basis for the study consisted of 328 (51.4%) patients with liver echinococcosis. Depending on the number of cysts, patients with multiple parasitic cysts predominated - 486 (76.2%). Single parasitic cysts were found in 152 (23.8%) patients. The size of cysts in the liver varied from 5 to 30 cm in diameter and contained from several milliliters to 3 liters of fluid; the bulk (63.3%) were patients with cysts from 5 to 10 cm.

Among the complications, cystobiliary fistulas were found in 56 (8.8%) patients. Suppuration of the cyst contents was observed in 64 (10.0%) patients. Due to cyst rupture into the intrahepatic bile ducts, 6 (0.9%) patients had obstructive jaundice. In 3 (0.5%) patients there was such a serious complication as a cyst breaking into the abdominal cavity.

Until 2013, the multidisciplinary clinic of SamSMU used exclusively traditional wide incisions of the anterior abdominal wall, which greatly facilitated the surgeon's performance of the main stage of the operation. After evacuation of the cyst contents, the fibrous capsule was excised if possible. Next, the residual cavity was treated with a germicide. Patients in the comparison group operated on from 2005 to 2012. treatment of the residual cavity was carried out with a 2-5% formaldehyde solution, and 100% glycerin at room temperature was also used.

After treatment of the residual cavity, the cavity was inspected for the presence of biliary fistulas and, if detected, they were eliminated with Z-shaped sutures. There were a couple of cases where biliary fistulas were not detected, but in the early postoperative period bile was observed in the control tube.

With open echinococcectomies, the next step was the choice of eliminating the residual cavity. 225 cysts were removed using the open method. According to the classification of A.Z. Vafina (2000) eliminated the residual cavity during open operations in two ways, i.e. complete elimination of the residual cavity (127 - 51.2% of cysts out of 248) and incomplete elimination with drainage of the residual cavity (57 -22.9% of cysts out of 248).

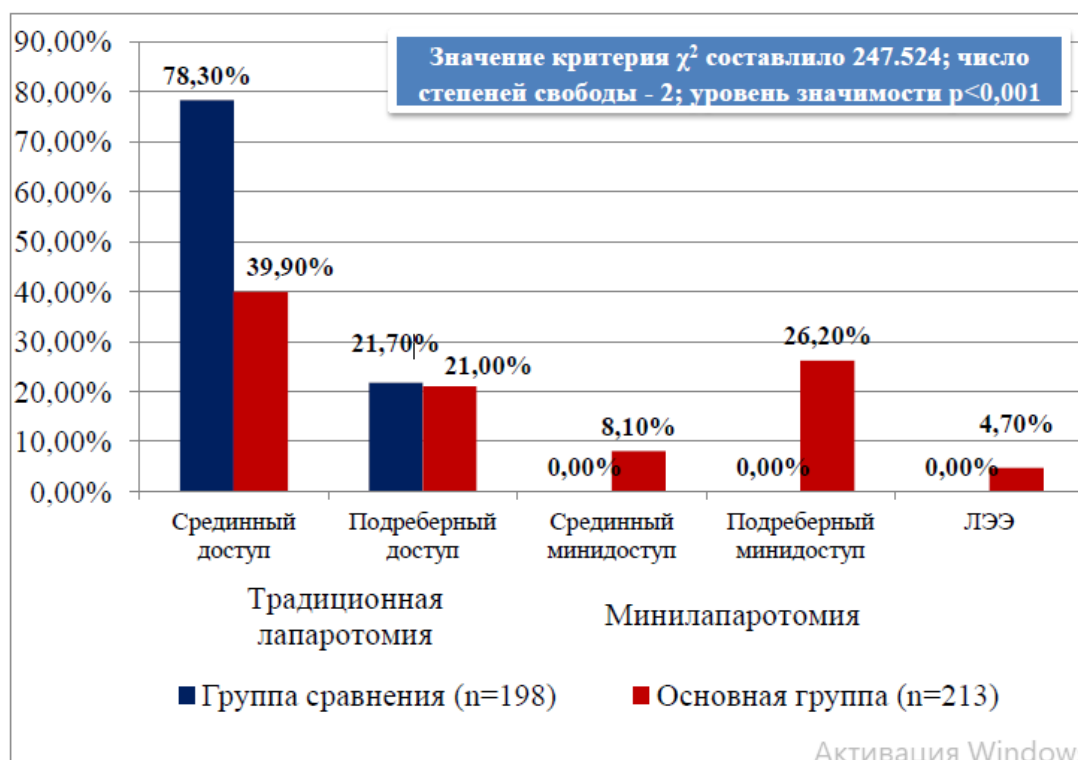
### **Results.**

In the surgery of liver echinococcosis, since 2013, our clinic, taking into account the individual characteristics of each patient, began to widely use the so-

called “topical mini-access”. Factors that influence treatment results were assessed using a special scoring scale.

In the main group, 142 (60.9%) patients out of 233 with a total score of 21 to 30 underwent wide laparotomy from the median and oblique subcostal approach. In 80 (34.3%) patients with scores from 11 to 20, echinococcectomy was performed from a topical mini-access. For patients with a score of up to 10, echinococcectomy was planned using the laparoscopic method. Initially, laparoscopic echinococcectomy from the abdominal cavity was planned for 18 (7.7%) patients. Of these, in 7 (38.9%) cases, conversion was made for various reasons, i.e. echinococcectomy was completed with open access through a mini-access in 3 patients and with a wide access in 4 patients.

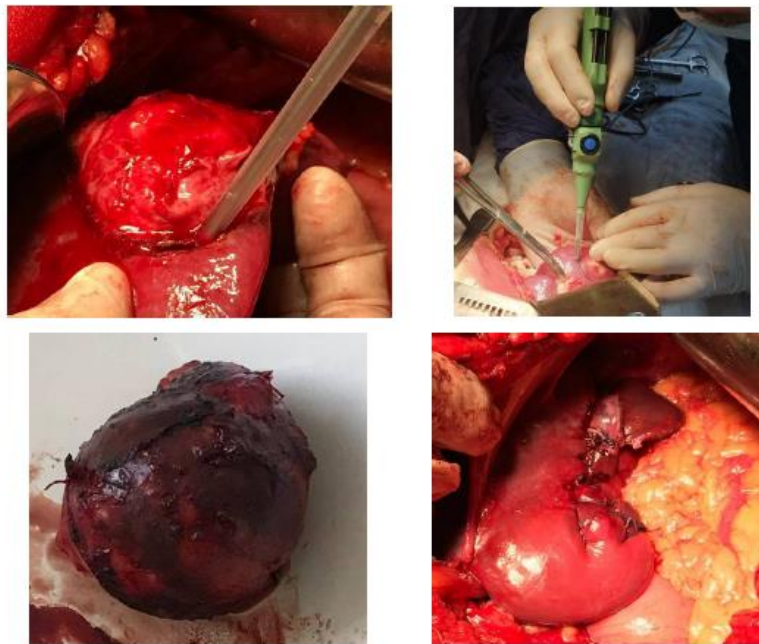
In general, in the comparison group, 78.3% of cases had a wide midline approach, and 21.7% of patients had a wide subcostal approach. In the main group of wide laparotomy, echinococcectomy was performed in 60.9% of cases and 39.1% of cases, echinococcectomy was performed using minimally invasive methods, in particular through mini-access and laparoscopic in 34.3% and 4.7% of cases, respectively. The difference between the groups turned out to be significant with a high degree of significance -  $p < 0.001$  (Fig. 1).



**Fig. 1. Access options for surgical treatment of liver echinococcosis**

Since 2020, radical operations have been performed using a cavitation ultrasonic aspirator dissector. The operation of the ultrasonic dissector - aspirator Sonoca 300 is based on the principle of selective treatment of parenchymal tissue with ultrasound. In this case, the parenchymal tissue is destroyed and removed

using suction. Destruction that occurs under the influence of cavitation, fluid supply and tissue aspiration occur simultaneously, due to the design features of the working tool and apparatus (Fig. 2).



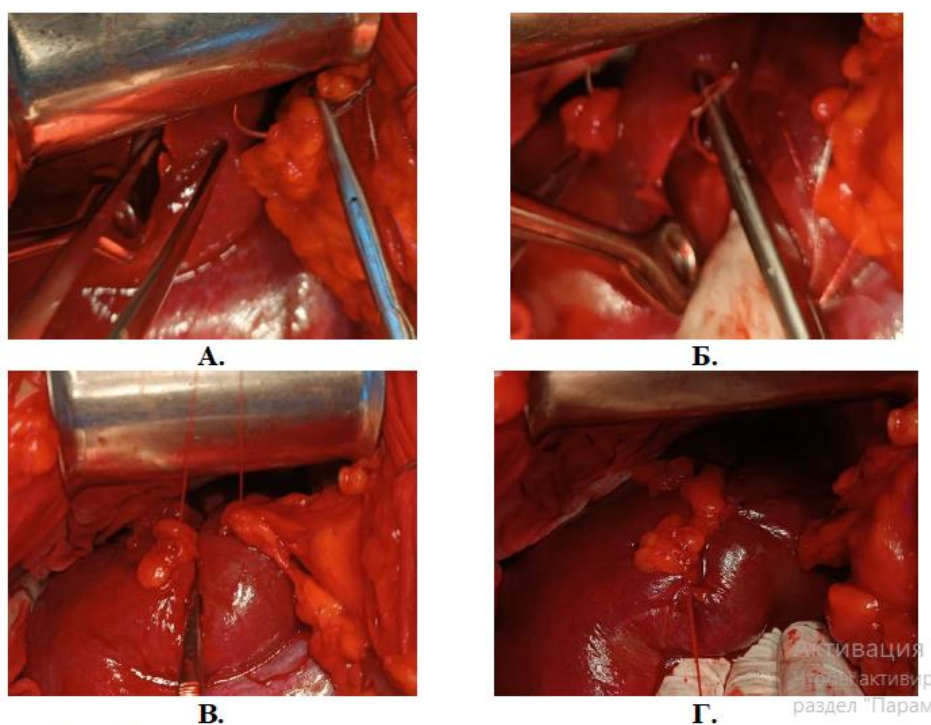
**Pic. 2. Enucleation of the cyst using an ultrasonic dissector aspirator – SONOCA 300**

After the widespread introduction of the ultrasonic aspirator dissector into practice, total pericystectomy (18.6%) and ideal echinococcectomy (11.4%) began to be performed, which had a positive effect on immediate and long-term results.

In patients after ideal echinococcectomy and total pericystectomy, the wound surface of the liver was tamponed with a hemostatic sponge treated with a 10% albendazole solution, which achieved a long-term local effect of the drug on the pathological focus. In accordance with it, we soaked a sterile sponge measuring 7x5x1 cm with 50 ml of 0.9% physiological solution with albendazole dissolved in it at a concentration of 10 µg/mL.

In case of a thin-walled fibrous capsule, we suggest treating the residual cavity with hot glycerin heated to 60°C. For old, dead hydatid cysts, with a thick calcified wall or complicated by suppuration, whenever possible, we suggest performing an ideal echinococcectomy or open echinococcectomy followed by a total pericystectomy. Next, pack the wound surface of the liver with a hemostatic sponge Spongostan treated with a 10% albendazole solution.

The advantage of using a suture on biological pads is that in areas of maximum tension it helps distribute the load on the liver tissue through the safety pads, protecting it from excessive tension when tying and reducing the risk of cutting through the sutures (Fig. 3).



**Pic. 3. Stages of applying immersion sutures on biological pads**

Improving the choice of tactics for surgical treatment of patients with echinococcosis of the abdominal organs, the use of an ultrasonic aspirator dissector for ideal echinococectomy and total pericystectomy, and tamponade of the wound surface of the liver with a hemostatic sponge impregnated with albendazole, as well as other innovations developed and implemented within the framework of this study, had a positive impact on the immediate results management of this category of patients. So, compared to 2005-2012. Intraoperative complications such as anaphylactic shock, parenchymal bleeding, and contamination of surrounding tissues with daughter blisters were rare. Intraoperative complications decreased from 7.1 to 2.1%, and complications in the early postoperative period from 15.6 to 4.7%.

Chemotherapy with albendazole was started no later than 1 month after surgical treatment. In the comparison group, 129 (43.6%) patients received postoperative chemotherapy according to the traditional regimen. Parenchymal jaundice was observed in 4 (3.1%) patients, dyspeptic symptoms were observed in 47 (36.4%) patients and reversible alopecia developed in 2 (1.5%) patients, while in 18 (13.9%) cases it was necessary to cancel preventive treatment. It should be emphasized that an increase in transaminases was typical for patients suffering or previously suffering from liver diseases. Of the 129, 42 (32.5%) patients were found to have concomitant chronic diffuse liver pathology.

Taking this fact into account, based on the studies presented in the third chapter, in the main group the dose of albendazole was adjusted taking into



account the initial functional state of the liver. For liver cirrhosis, as well as in cases with an initial (preoperative) increase in liver enzymes, albendazole was used at a dose of 5 mg/kg/day. In turn, a reduction in the traditional dose due to biochemical changes was required in another 63 (18.4%) patients. In general, 96 (28.1%) patients of the main group received chemotherapy with albendazole according to the proposed regimen. Dose adjustment in patients with side effects contributed to the normalization of biochemical parameters and reduced the risk of toxic manifestations during chemotherapy.

Thus, the probability of developing adverse reactions during chemotherapy with albendazole according to clinical and laboratory parameters was 52.7% (68 patients in the comparison group), which was due to the toxic effect of the drug and the presence of concomitant chronic diffuse liver pathology, while in 14.3% it was necessary to cancellation of treatment, in turn, the possibility of dose adjustment, made it possible to reduce this value to 18.4% (63 patients in the main group) and, accordingly, provide a full course of antiparasitic therapy ( $\chi^2$  criterion = 26.703;  $p < 0.001$ ). Monitoring of hepatic aminotransferases also showed a significant difference in these indicators in the comparison groups. Thus, the ALT level in the comparison group was  $0.88 \pm 0.08$  mmol/l versus  $0.51 \pm 0.04$  mmol/l in the main group ( $p < 0.001$ ), AST values did not differ significantly, while among patients with concomitant chronic liver pathology, ALT values were  $1.14 \pm 0.11$  versus  $0.62 \pm 0.05$  mmol/l ( $p < 0.001$ ) and AST values were  $0.72 \pm 0.07$  versus  $0.52 \pm 0.04$  mmol/l ( $p < 0.05$ ).

**Conclusions.** 1. The proposed diagnostic algorithm for topical verification of the localization of echinococcosis in the liver with a score for the severity of the disease, taking into account the number of cysts, their size, as well as the nature and presence of complications, allowed in 39.1% of cases in the main group to perform adequate echinococcectomy using minimally invasive methods, in particular from mini-access (34.3%) and endovideosurgical method (4.7%) and thereby reduce the frequency of traditional wide approaches to 59.1% ( $\chi^2$  criterion value was 247.524; number of degrees of freedom - 2; significance level  $p < 0.001$ ), and the duration of the operation from  $87.8 \pm 4.9$  to  $63.5 \pm 2.9$  and  $37.7 \pm 3.1$  minutes, respectively, from the mini-access and endovideosurgical method (t-criterion = 4.23;  $p < 0.001$ ).

2. The use of the ultrasonic dissector of the SONOCA 300 aspirator makes it possible to make wider use of radical modern methods of surgical interventions for echinococcosis, to perform them bloodlessly, with good final aero-, hemo- and cholestasis with minimal tissue trauma in the affected area. After tamponing with a hemostatic sponge Spongostan treated with a 10% albendazole solution for 7-10

minutes, in all cases only dead and destroyed germinal elements of the parasite were found in the washout from the wound surface of the liver.

3. The developed algorithms for choosing tactics for surgical treatment of echinococcosis, taking into account an integrated approach to the choice of access, mainly to radical echinococectomy and elimination of the residual cavity, as well as preventive chemotherapy, made it possible to improve the quality of care provided by reducing the frequency of immediate postoperative complications from 14.3% to 3.7% ( $p=0.027$  by  $\chi^2$  criterion) and disease relapse from 13.4% to 2.8% ( $p=0.031$  by  $\chi^2$  criterion).

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