

Role of Laparoscopy in the Treatment of Liver Echinococcosis Complicated with Peritonitis in Children

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Abstract The goal is to select opportunities to expand the indications for laparoscopic liver echinococectomy in children and improve the results of surgical treatment of complicated liver echinococcosis in children. Results. From 2009 to 2023, we performed laparoscopic echinococectomy for hydatid liver disease complicated by peritonitis in 16 patients. Analysis of the results of examination of patients who underwent laparoscopic echinococectomy of the liver, complicated by peritonitis, which showed a more favorable course of the postoperative period due to the minimal invasiveness of laparoscopic surgery, pain was relieved earlier, intestinal motility was restored more quickly, leukocytosis was early normalized and neutrophilia decreased to normal levels in peripheral blood tests. All this made it possible to reduce the length of hospital treatment. Conclusion. Thus, when performing laparoscopic echinococectomy complicated by peritonitis, a more favorable course of the postoperative period is promoted.

Keywords Echinococcosis, Children, Peritonitis, Echinococectomy, Endoscopy

1. Introduction

Hydatid echinococcosis of the liver is a widespread parasitic disease in humans, which is much more severe in childhood than in adults [1]. During the course of the disease, the development of various complications is possible, among which an important place is occupied by rupture of the wall of the liver cyst with the development of peritonitis and anaphylactic shock, which determine the severity of the patients' condition [2,3]. The developed serious complication requires adherence to rational treatment tactics aimed at preparation, gentle surgical treatment, postoperative management and prevention of disease relapse [4,5].

The primary objective of this study is to explore and recommend strategies aimed at broadening the scope of indications for laparoscopic liver echinococectomy in pediatric patients. Furthermore, the research seeks to enhance the efficacy and overall outcomes of surgical interventions for complex cases of liver echinococcosis in children through the implementation of innovative approaches and refined surgical techniques. By identifying and implementing these advancements, the study aims to contribute significantly to the improvement of treatment outcomes and the overall quality of care provided to pediatric patients with complicated liver echinococcosis.

2. Material and Research Methods

From 2009 to 2023, we performed laparoscopic echinococectomy for complicated peritonitis of hydatid liver disease (ELD) in 16 patients at the Republican Scientific Center for Medical and Epidemiology. 13 (81.2%) boys and 3 (18.8%) girls aged 6 to 18 years. The time of admission of patients was 6.5 ± 3.5 hours after the appearance of the first clinical symptoms of peritonitis. In 10 (62.5%) patients, the development of peritonitis was preceded by trauma, after which abdominal pain and repeated vomiting were noted. The clinic was characterized by signs of anaphylactic reaction and peritonitis. During the clinical examination, in addition to the serious condition and characteristic peritoneal symptoms, attention was drawn to the appearance of urticaria in the form of a polymorphic rash on the face, trunk and limbs. Blood tests revealed neutrophilic leukocytosis within 17.6 ± 0.6 10⁹/l, eosinophilia up to $9.2 \pm 0.8\%$. Ultrasound made it possible not only to detect free fluid in the abdominal cavity, but also to establish the cause of peritonitis - the presence of cystic formations in the liver. Preoperative preparation was aimed at correcting disturbances in homeostasis and included detoxification, desensitization and anti-shock therapy.

Surgical treatment in all cases began with diagnostic laparoscopy. After the installation of laparoscopic optics, an inspection of the abdominal cavity was performed, the extent of the process was determined, and intraoperative tactics were outlined. At the diagnostic stage, a cloudy effusion was

visualized in the abdominal cavity, with perforation of the cyst with fragments of the chitinous membrane (Fig. 1-2). After the introduction of an additional trocar, an inspection of the abdominal cavity was performed, the cause and extent of the process were determined. The accumulated effusion and fragments of the chitinous membrane were evacuated with an electric suction, and the abdominal cavity was sanitized with antiseptic solutions (ozonated water, decosan) to “clean waters.”

Then the localization of the cysts was determined, and

additional working trocars were installed, the insertion points of which depended on the location of the EC. Upon instrumental palpation, ECs had increased density compared to liver tissue. Indirect signs of the localization of liver EC were multiple adhesions between the Glissonian capsule and the diaphragm, as well as between the fibrous membrane of the cyst and the greater omentum (Fig. 3-4).

After dissection of part of the adhesions using monopolar electrocoagulation, the operating angle of view increased and access to the cyst expanded, sufficient for manipulation.



Figure 1-2. Visualization of free fluid (pus) in the abdominal cavity during perforation of a liver cyst

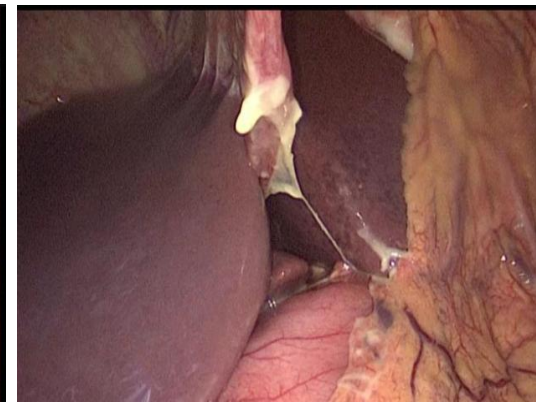


Figure 3-4. Multiple adhesions between the Glissonian capsule and the diaphragm, as well as between the fibrous membrane of the cyst and the greater omentum

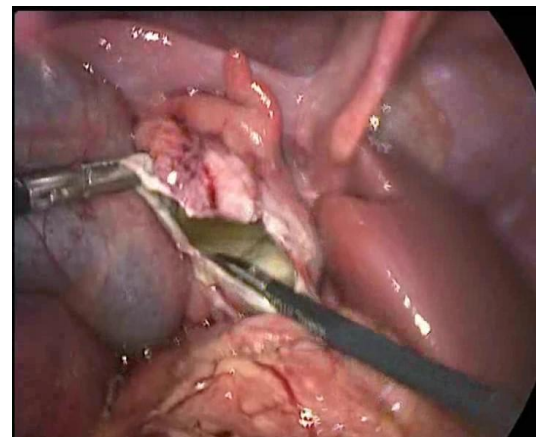
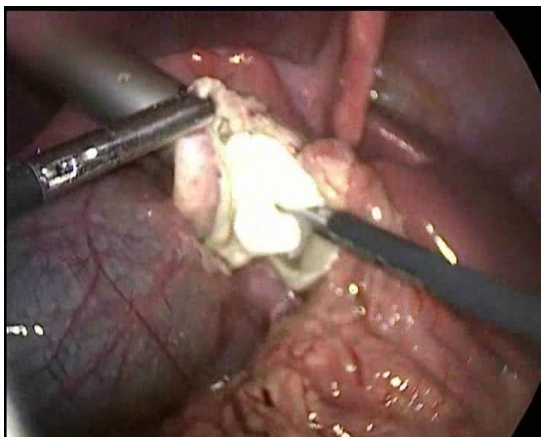


Figure 5-6. Dissection of the fibrous membrane of the cyst, aspiration and antiparasitic treatment of the inner surface of the cyst

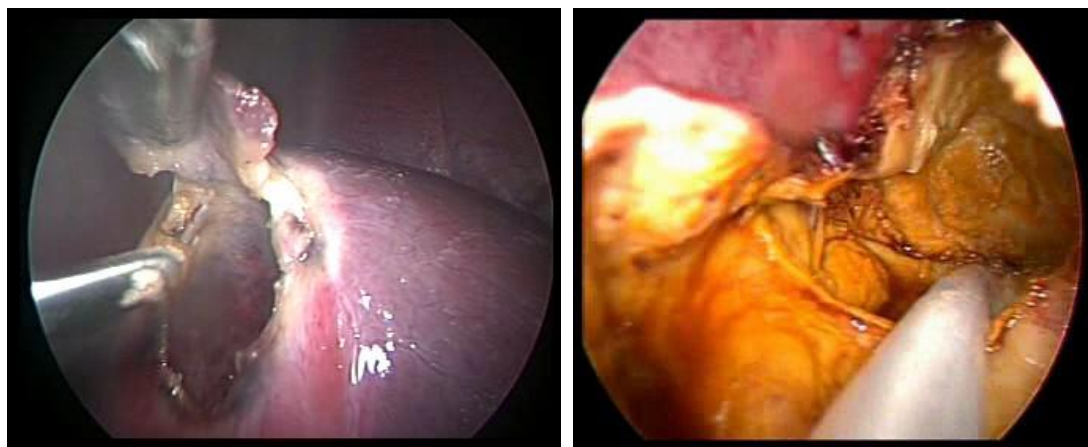


Figure 7-8. Antiparasitic treatment and drainage of the residual cyst cavity

After bipolar coagulation, a wide dissection of the fibrous membrane of the opened cyst was performed, aspiration of residual fluid and the remains of the chitinous membrane by vacuum extraction (Fig. 5-6), then antiparasitic treatment of the inner surface of the fibrous capsule was performed with 80-100% glycerol solution, 3% hydrogen peroxide solution, 960 alcohol, followed by drainage of the liver and abdominal cavity (Fig. 7-8).

If other cysts were detected (in 4 (25%) cases) that were not the cause of peritonitis, laparoscopic echinococectomy was also performed, followed by drainage of the residual cavities of the liver and abdominal cavity.

Some difficulties are caused by laparoscopic visualization in multiple and combined EC of the abdominal organs, especially when they are intraparenchymal, as well as when cysts are localized on the diaphragmatic surface of the liver (VII-VIII segments). In some cases, intraoperative ultrasound was performed in cases of suspected EC, which were not visualized during survey laparoscopy, to clarify the topography of the focal formation, marking the sectoral and segmental boundaries of the liver.

In 5 (31.2%) cases, conversion was performed during laparoscopic surgery due to the complete intrahepatic location of multiple liver ECs in a segment technically inaccessible for laparoscopy.

The operation was completed by drainage of the cyst cavity and abdominal cavity. In the postoperative period, in addition to antibacterial and detoxification therapy, chemotherapy was administered with the anthelmintic drug albendazole at a dose of 12 mg/kg body weight for 28 days. After completing inpatient treatment on an outpatient basis, patients after laparoscopic echinococectomy took albendazole at the same dose for two courses of 28 days with a 30-day break. Control examinations were carried out within 3 – 6 – 9 -12 months.

3. Results and Discussion

When analyzing the results of examination of patients who underwent laparoscopic echinococectomy, sanitation, and drainage of the abdominal cavity for liver cysts complicated

by peritonitis, a more favorable course of the postoperative period was noted. Body temperature returned to normal at 2.5 ± 0.15 days. As a result of the minimal invasiveness of laparoscopic surgery, pain was relieved in patients earlier (1.8 ± 0.2 days), and intestinal motility was restored faster (by 1.7 ± 0.16 days). Analysis of the motor activity of patients in the postoperative period showed that earlier activation of patients, at 3.5 ± 0.17 days, occurred after endovideosurgical intervention. A decrease in leukocytosis and a decrease in neutrophilia to normal levels in peripheral blood tests of patients after laparoscopic surgery occurred on days 2.5 ± 0.2 . The drains were removed on 3.6 ± 0.2 days (due to the cessation of discharge), the duration of their treatment in the hospital was 14.5 ± 0.2 days. The obtained treatment results allow us to recommend endovideosurgical intervention as the method of choice in the treatment of patients with liver echinococcosis complicated by peritonitis.

4. Conclusions

Thus, the implementation of minimally invasive techniques, such as laparoscopic echinococectomy, which aim to reduce trauma to surrounding tissues and organs, coupled with ensuring an optimal extent of surgical intervention tailored to the specific needs of the patient, and the meticulous sanitation of the abdominal cavity to address liver echinococcosis complicated by peritonitis, collectively play a pivotal role in enhancing the overall postoperative recovery trajectory. This approach is observed to yield superior outcomes and a more favorable clinical course in comparison to traditional surgical modalities, underscoring the importance of precision, minimization of trauma, and thoroughness in the management of such complex cases.

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