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MINIMALLY INVASIVE METHODS IN THE TREATMENT OF HEPATIC ECHINOCOCCAL DISEASE

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Abstract

Nowadays, the surgical approach remains the treatment of choice for managing echinococcal cystic lesions. Preventing disease recurrence necessitates the complete elimination of viable scolixes from the parasitic cyst prior to surgical drainage procedures. Among human organs, the liver represents the predominant site for echinococcal colonization. Historical medical literature dating back to antiquity contains references to hydatid cysts, notably in the Hippocratic collection and the writings of classical physicians such as Celsus (1st century A.D.) Aretaeus (2nd century A.D.), and Galen (2nd century A.D.) [1]. Currently, echinococcosis ranks among the most underrecognized parasitic conditions worldwide [2]. Echinococcus granulosus is the most common form of echinococcal pathology in humans. This parasitic organism maintains its lifecycle through canine definitive hosts and ovine intermediate hosts [3]. Within the intestinal tract of infected canines, mature parasites release ovaries or oncospheres through fecal elimination [4]. Humans serve as intermediate hosts similar to sheep within the parasitic lifecycle, acquiring infection through consumption of eggs shed by infected carnivorous animals [5].

Advances in minimally invasive surgical technologies have substantially broadened the indications for laparoscopic management of hepatic hydatid disease. Existing literature predominantly emphasizes the advantages and feasibility of laparoscopic approaches, ignoring its specific treatment algorithm, which is extremely important for clinical surgeons.

Clinical manifestations of hepatic hydatid disease primarily present as cystic lesions within liver tissue. Modern therapeutic strategies incorporate laparoscopic techniques for managing two forms of hepatic echinococcal pathology. Radical curative outcomes in hepatic hydatid disease can be provided through either complete laparoscopic pericystectomy or laparoscopic liver resection, with the former being favored due to reduced invasiveness. Alternative approaches including laparoscopic subtotal pericystectomy and laparoscopic partial pericystectomy, serve as supplementary options when encountering complex cystic lesions or in facilities with limited advanced laparoscopic capabilities. The laparoscopic cyst removal itself, despite technical ease, currently lacks recommendations for hydatid disease management due to suboptimal outcomes and complication rates.

Early and intermediate stages often remain clinically silent, resulting in delayed diagnosis and elevated mortality rates [6]. Despite advances and widespread adoption of treatment techniques, hepatobiliary surgeons continue to favor more radical surgical interventions due to concerns about potential adverse effects and substantial financial implications [7,10]. Traditional open surgical techniques have demonstrated established safety and efficacy profiles; however, associated drawbacks including extensive tissue trauma, prolonged recovery periods, and wound-related complications have motivated the pursuit of less invasive alternatives.

In 1992, Kathouda and colleagues pioneered the first successful complete pericystectomy using laparoscopic techniques, marking the beginning of minimally invasive management for hepatic hydatid disease [8]. Contemporary research by Wan et al. demonstrated that laparoscopic approaches in carefully selected patients achieve equivalent radical outcomes compared to conventional surgery while offering superior benefits including reduced tissue trauma, enhanced cosmetic outcomes, decreased postoperative complications, and abbreviated hospitalization [9, 11]. Thus, standardized criteria for patient selection and contraindications remain undefined due to variable anatomical distribution patterns of hydatid lesions.

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Materials and Methods

The work presents the experience of treating 48 patients with hepatic echinococcosis who underwent treatment in the surgical departments of City Clinical Hospital No. 1 in Tashkent from 2022 to 2024 and in the private clinic "Dusel".

The main research objective was to evaluate the results and, based on the results, develop a differentiated approach to the treatment of hepatic echinococcosis.

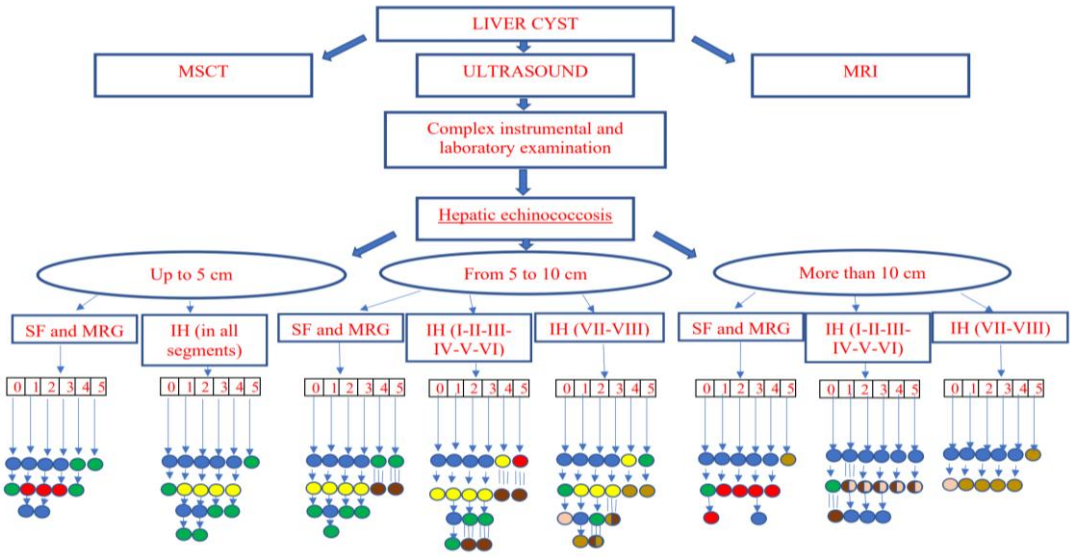
The basis for improving treatment results was the proposed tactical algorithm for preoperative preparation and differentiated surgical tactics in patients with hepatic echinococcosis **DGU No. 19464**, Fig. No. 1, aimed to reduce specific and non-specific complications, as well as pathology recurrence.

Results

Laparoscopic intervention variations included: omental reinforcement performed in all cases of partial pericystectomies (16 subjects). Total cystectomy was performed in 1 patient, laparoscopic partial pericystectomy and subtotal cystectomy in 5 patients. Surgical interventions selected for open treatment of the residual cavity were partial pericystectomy and omentoplasty (7 cases), total pericystectomy (3 cases), and partial and total pericystectomy (3 cases). Then, drainage was placed in the subhepatic or subdiaphragmatic space. Omental reinforcement was universally applied except in cases of complete cyst excision during open procedures.

Demographic parameters, including age distribution and gender ratios, showed no significant variations between laparoscopic and open surgical cohorts.

Fig №1



SF- superficial, MRG- marginal (edge), IH-intrahepatic, MSCT-multislice computed tomography, MRI-magnetic resonance imaging.

- chemotherapy (albendazole therapy)
- dynamic observation
- laparoscopic echinococcectomy
- PAIR
- PAIR drainage
- minilaparotomy echinococcectomy
- laparoscopic drainage
- if necessary
- PAIR drainage or laparoscopic drainage
- PAIR drainage or minilaparotomy echinococcectomy

0 - CL, 1-CE1, 2- CE2, 3- CE3, 4-CE4, 5- CE5

Taking into account the complexity of the presented calculations for the convenience and ease of widespread clinical application, an algorithm for differentiated tactics of surgical treatment of liver echinococcosis was developed, which allows optimizing the choice of tactics for surgical treatment of liver echinococcosis. Based on scientific research, we have developed an Algorithm for differentiated tactics of surgical treatment of liver echinococcosis.

Average cystic dimensions measured 11.6 ± 2.3 cm in the open surgical group versus 10.9 ± 2.4 cm in the laparoscopic group. Statistical analysis revealed significantly reduced cyst dimensions in the laparoscopic group ($p = 0.012$). No significant differences emerged regarding biliary-cystic communications between surgical approaches. Cyst location significantly influenced surgical selection, with laparoscopic techniques favored for peripherally situated lesions while open surgery was selected for centrally positioned cysts. As open surgical techniques were reserved for cysts larger than 15 cm in diameter, the average cyst size was consequently higher in the open surgery group versus the laparoscopic cohort.

For intraparenchymal cystic lesions, partial pericystectomy with omental reinforcement predominated in open procedures, while cyst excision and incomplete pericystectomy were preferred laparoscopically. Laparoscopic cyst removal was reserved for superficial to moderately deep parenchymal lesions. Partial pericystectomy was selected when cysts approached the hepatic capsule or demonstrated parenchymal bulging, regardless of surgical approach. Our strategic approach revealed no significant differences in surgical or prognostic parameters between techniques.

A key benefit of laparoscopic visualization involves direct intracystic inspection capabilities. The threefold magnification enhances visualization of bile duct leakage within the cyst cavity. When bile leaks are identified, they can be managed using clips or suture repair.

Our analysis demonstrated multiple advantages in the laparoscopic cohort: reduced hospitalization duration, decreased operative time, minimal hemorrhage, superior aesthetic outcomes, accelerated recovery, and reduced wound infection incidence. Drainage prevented biloma formation, abscess development, and biliary peritonitis. Persistent biliary drainage exceeding ten days is defined as biliary fistula formation.
Operative duration averaged 70.5 ± 11.4 minutes for open procedures versus 56.4 ± 10.4 minutes laparoscopically ($p = 0.001$). Intraoperative blood loss measured 85.5 ± 5.5 ml in open cases compared to 58.8 ± 18.5 ml laparoscopically ($p = 0.005$). Hospitalization periods were 4.2 ± 2.5 days following laparoscopic surgery versus 6.8 ± 2.6 days after open procedures ($p = 0.01$).

Conclusion:

Minimally invasive surgical management of hepatic hydatid disease demonstrates safety and efficacy in appropriately selected cases. This approach offers a valuable therapeutic option for managing hepatic echinococcal pathology.
Laparoscopic techniques should be reserved exclusively for peripherally located hepatic hydatid cysts.

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