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TREATMENT OF PATHOLOGICAL CAVITIES OF THE LIVER BY MODERN SURGICAL METHODS

Ergashev Ulugbek Yusufjanovich
DSc., professor Head of department General surgery №2, Tashkent Medical Academy
Mustafakulov Gaybulla Irisbaevich
PhD, dotsent of General surgery department №2, Tashkent Medical Academy
Zokhirov Adkhamjon Rafiqovich
Assistant of General surgery department №2, Tashkent Medical Academy
Malikov Nodir Muzaffar ugli
Assistant of General surgery department №2, Tashkent Medical Academy
Gafurov Behzod Tohirovich
Assistant of General surgery department №2, Tashkent Medical Academy

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Abstract:

The aim of the work is to improve the results of surgical treatment of patients with cavitary liver masses using ultrasonic percutaneous puncture-drainage interventions.

Keywords:

INTRODUCTION. Diagnostics and treatment of cavitarymassesof the liver is a rather difficult issue due to the polyetiological occurrence of the pathological process and need for differentiated treatment (2,4,10,14). There are several methods of treatment of cavitary livermasses: surgical treatment (cystectomy, atypical liver resections, combined surgery, cystoenteroanastomosis), single and multiple percutaneous, trans-hepatic puncture under control of modern intrascopicequipment (ultrasound examination, X-ray television, computed tomography - CT), percutaneous trans-hepatic drainage (1,3,9). In the surgical treatment of a nonparasitic liver cyst, mortality remains high - 5-30%, the number of complications in these patients in the near and long term after the surgery reaches 40% (7,13,17). Despite the existing advances in the surgical treatment of parasitic liver cysts, the frequency of its recurrence reaches 22%; after surgery, residual cavity develops in 7-15% of cases, suppuration - up to 40%, mortality in open surgical treatment - 2.5-7% (8,15,19).

The successful development of medical imaging methods (ultrasound, CT, video laparoscopy) contributed to the formation of a new perspective direction in surgery - minimally invasive diagnostic and therapeutic methods for various diseases, in particular, with liver cavitary diseases (5,6,11,12). Ultrasound examination not only developed the diagnosis of cavitarymasses in the liver, but also made it possible to effectively perform therapeutic manipulations without resorting to laparotomy: it does not give radiation exposure and allows you to control the course of the intervention. The development of low-traumatic percutaneous puncture-drainage methods for the treatment of liver cavitary diseases should be considered as an urgent issue of hepatology, since they will significantly improve the immediate and long-term outcomes of treatment, primarily in patients with an increased surgical risk, and reduce the incidence of postoperative complications, eliminate (without reoperations) residual cavities and recurrent parasitic cysts.(16,18,20). The published publications on puncture-drainage methods of treatment cavitaryliver masses under control of echography are rare, mostly descriptive and reflect a small number of clinical observations. A number of serious questions remain unresolved: indications and contraindications for the use of this method, the choice of the method of intervention (puncture or drainage). Therefore, in-depth studies of the possibilities of ultrasound technology in the treatment of liver cavities are necessary.

THE AIM of the work is to improve the results of surgical treatment of patients with cavitary liver masses using ultrasonic percutaneous puncture-drainage interventions.

MATERIALS AND RESEARCH METHODS. Examined 102 patients with various cavitarymasses of the liver (table 1). Among the patients, there were 43 (42.2%) men, 59 (57.8%) women. A third of the patients had complicated residual cavities after echinococcectomy. All of them had previously undergone operations for liver echinococcosis, which were completed with external drainage of the cyst cavity.

Recurrence of an echinococcal cyst of the liver was detected a year after surgery - in 6 (40%)patients, after 2-2.5 years - in 5 (33.3%), after 5 and more years - in 4 (26.7%) patients

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Table 1

Variety of cavitaryliver masses	**Number of patients**	
	abs.	%
Residualcavityafterechinococcectomy	38	37,3
Recurrentechinococcalcyst	15	14,7
Abscess	12	11,8
Residualechinococcalcyst	11	10,8
Polycysticliverdisease	9	8,8
Solitarycyst	9	8,8
Hematoma	8	7,8
Total	**102**	**100**

Distribution of patients by the character of the pathological process

Residual echinococcal cyst was detected in 2 (18.2%) patients after 2-5 months after surgery, in 4 (36.4%) - after 6-8 months, in 3 (27.2%) - after 10-12 months, in 2 (18.2%) - after 1-1.5year. With polycystic liver disease, 4 (44.5%) patients had a medium-caliber liver cyst (10-30 mm), 3 (33.3%) had large-caliber (more than 30 mm), and 2 (22.2%) had mixed. Solitary cysts had a diameter of up to 50 mm - in 2 (22.2%) patients, 50-100 mm - in 6 (66.7%), more than 100 mm - in 1 (11.1%) patient.

Abscesses of parasitic origin (suppurative echinococcal cysts) were detected in 9 (75%) patients, cysts of bacterial origin - in 3 (25%). Hematoma of the liver in 6 patients had post-traumatic etiology, in 2 - it was formed after surgery. In all cases, it was located in the right lobe of the liver. On clinical examination of patients, pain syndrome was noted in 58 patients, general weakness and malaise - in 59, fever - was detected in 53, jaundice of the skin and visible mucous membranes - in 6 patients. Liver cavities were most often localized in segment VII - in 41 (40.2%) patients, in VII and VIII - in 20 (19.6%), in VI and VII - in 11 (10.8%) patients. In 87 (85.3%) patients, one cavity masses of the liver was found, in 7 (6.8%) - two, in 2 (1.9%) - three, and in 6 (5.9%) - multiple. The diameter of the cavities in the liver varied from 10 to 100 mm or more, but most often it was 40-80 mm - in 58 (57%) patients. With cavities of the liver, various concomitant diseases were diagnosed in 59 (58.0%) of the examined patients. Anamnestic data were studied in all patients, echographic and X-ray studies of the gastrointestinal tract, organs of the pancreatoduodenal zone, clinical laboratory and microbiological studies of the cavity contents for aerobic and optional microflora, dynamic microbiological monitoring of the sensitivity of microflora to antibiotics were performed. Comparison of ultrasound and laboratory data made it possible to determine differential diagnostic, clinical and echographiccriteria of cavities inthe liver for verification of the diagnosis in the preoperative period. It was important to studythe anamnesis: living in an endemic area, previous operations, the professional character of infection (Table 2). Ultrasound examinations of the abdominal organs were carried out using the "Interscan-250" (Germany), "Toshiba-SAL-50A" (Japan) and "Sim-5000" (Germany) devices with sensors with a frequency of 2.5-5.0 Hz. Percutaneous puncture-drainage interventions under control of echography were carried out using various material and technical devices (Table 3). During puncture under the control of echography, the following operations (stages) were performed:

1) the choice of the trajectory of propulsion of the puncture needle;

2) holding the needle into the cavity formation;

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Table 2
Clinical and echographic criteria for the differential diagnosis of cavitaryliver masses

Criteria	Polycystic	Solitary cysts	Residualcavityafterechinaccocectomy	Echinoccosis	
				Residual	Recurrent
Localization of cysts	Mostofall, totally	Most in the right half of the liver	In place of the postoperative area of the liver	In place of the postoperative area of the liver	Other areas
Cystwall	Thin	Thin	Increasedechodensity	Increasedechodensity	Increasedechodensity
Cystcontent	Homogenous	Homogenous	Heterogenous	Heterogeneous due to echinococcal sand and membranes	Heterogeneous due to echinococcal sand and membranes
Blood leukocytes	Not changed	Not changed	Increased	Not changed	Not changed
Eosinophilia	Absent	Absent	Absent	Exist	Exist
Cytological examination	Leukocytes	Leukocytes	Leukocytes	Scolex, chitin	Scolex, chitin
Detachment of the chitinous membrane	Absent	Absent	Absent	Local or total	Local or total

3) control of the needle in the cavity;
4) aspiration of the contents of the cavity, drug exposure, sclerotherapy;
5) removing the puncture needle from the liver.

Puncture-drainage treatment of cavitarymasses in the liver provides for the following stages of the surgery:

1) the choice of the trajectory of propulsion of the puncture needle;
2) holding the needle into the cavity;
3) control of the needle in the cavity;
4) conducting a drainage tube (catheter) into the cavity formation;
5) aspiration of the contents of the cavitaryformation, drug exposure, sclerotherapy;
6) removing the drainage tube (catheter).

The results were statistically processed using standard methods of variation statistics, using the Student's t-test to assess the reliability of differences and using the Exce1 2016 program on an ASUS computer. Average values are presented as M + m (mean ± mean error of the mean). Differences were considered significant at P <0.05.

Table 3
The sheet of material-technical procuring for percutaneous puncture-drainage treatment

Material-technical equipment	Appointment
1	2
Equipment: ultrasound devices working in real time with special sensors and attachments to them	Visualization of cavitary formation and control of the passage of the puncture needle from the punctured point of the skin into the object

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Tools: 1) puncture needles: Chiba needles 22-23 G, length 10, 15, 20 cm; conductive needles 14-18 G, length 9.5 cm. 2) percutaneous drainage catheters: a set of subclavian catheters made of siliconizedfluoroplastic with a length of 180-200 mm; stylet catheter No. 22 F, trocars. 3) metal conductors: soft metal conductors 0.25, 0.35; 0.38 I; silicone and scalpels.	Provision of punctures Getting punctate from cavities of the liver; ensuring the passage of catheters into the cavity Drainage of cavitary mass Passage into the cavity formation of catheters and drainage tubes
Medicines: 1) anesthetics: novocaine solution 0.5%; morphine hydrochloride solution 1% (omnopon 2%, promedol 2%, etc.) 2) antihistamines: diphenhydramine solution 1%; (suprastin 2%, diprazine 2.5%, etc.), prednisolone. 3) anticholinergic: atropine solution 0.1% 4) antiseptics: furacillin aqueous solution 0.02% (1: 50,000) dioxidine solution 1% or 0.5%; solution sodium chloride 30% 5) antibiotics: according to the sensitivity of microflora 6) hemostatics: dicinone solution 12.5%; vicasol solution 1% 7) mebendazole: 20 mg / kg; 80% glycerin solution and 30% NaCl solution 8) sclerosing agents: ethyl alcohol 96 °; alcohol solution of iodine 2.5%	Anesthetic and pharmacological provision of punctures. Ensuring painless punctures Prevention of allergic reactions Prevention of reflex (vagal) reactions Prevention of the spread of infection through the puncture canal Preventing the development of a bacterial infection Prevention of bleeding (internal and external) from the puncture canal Antiparasitic chemotherapy Antiparasitic treatment of cavitary formation Eliminationofcavitymass
Laboratory equipments: syringes; test tubes; banks; slide; cover glass	Aspiration of contents, collection of punctates, making smears

RESULTS. Puncture treatment was carried out in 25 patients and puncture-drainage treatment - in 77 patients. In 10 patients with nonparasitic liver cysts (7 - with polycystic liver and 3 - with solitary liver cysts), puncture treatment sharply reduced the size of the cavity formation. After aspiration and sanitation of the contents, all patients underwent sclerotherapy. After exposure, the remaining mixture was removed first by passive and then by active aspiration. This made it possible to prevent the development of sclerosing cholangitis, which we did not observe in any case. In 5 patients with liver hematomas (3 - with post-traumatic, 2 - postoperative) after puncture treatment, the cavity was completely eliminated, which was confirmed by echographic analysis. During puncture, blood clots were aspirated, followed by sanitation with antiseptic solutions and administration of broad-spectrum antibiotics. 10 patients with parasitic liver cysts (6 - with recurrent and 4 - with residual echinococcosis), reoperated on the background of chemotherapy (2 courses of 10 days 20 mg / kg mebendazole) underwent puncture of cysts with antiparasitic treatment with 80% glycerin solution (exposure - 10 min.) And 30% solution NaC1 (exposure - 20 min.). After aspiration, the hydatid fluid was urgently examined. During with the injection of germicide, the chitinous membrane peeled off (which was monitored by ultrasound) and subsequently calcified. Subsequent chemotherapy (1 course of 20 mg / kg of mebendazole), which affects echinococcus attrition, had a great influence on the results of treatment. Our proposed method of percutaneous puncture treatment of liver echinococcosis can be successfully used in patients with an increased risk of surgery for small and single cysts with a diameter of up to 40 mm. Puncture-drainage treatment of liver cavities was performed in 77 patients. In 12 patients with liver abscesses, puncture and drainage treatment completely eliminated the cavity. At the same time, detoxification, antibacterial and restorative therapy was carried out. Duration of drainage was 15-30 days. There were no complications. Puncture-drainage treatment was performed in 38 patients with residual complicated cavity after echinococcectomy. The reasons for the formation of the residual cavity were: early removal of drainage tubes from the residual

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cavity, loss of drainage due to carelessness of the patients themselves.

Residual cavities after echinococcectomy were localized in most cases in the right lobe of the liver - in 27 (71%) patients, in other cases - in the left lobe. Their size in 31 (82%) patients was up to 100 mm, and in the remaining 7 - more than 100 mm. Puncture-drainage treatment of the residual cavity included aspiration, sanitation with antiseptic solutions, followed by sclerotherapy. In all patients, the drains were removed after the elimination of the residual cavity and complete cessation of the drainage outflow along the drain. The course of treatment is 20-40 days. There were no lethal outcomes or complications. In 16 patients with cavities of the liver, parasitic etiology (9 - with recurrent and 7 - with residual echinococcal cysts of the liver), puncture-drainage treatment was successfully performed. The sizes of the cysts ranged from 50 to 100 mm. All patients were operated on earlier, 7 of them were operated repeatedly. All patients with recurrent and residual echinococcal cysts on the background of ongoing chemotherapy underwent puncture and drainage treatment. In the background of antiparasitic treatment of the cyst cavity, the chitinous membrane peeled off, defragmented; it was removed in parts by active aspiration. All this was monitored on an echographic monitor. Subsequently, the residual cavity was sclerosed until it was completely obliterated. In 6 patients during the period of puncture-drainage treatment, biliary fistulas were revealed. Bile leakage stopped during the sanation process until the catheter was removed, the fistulas closed on their own, without additional surgery.

After puncture and drainage treatment, local and general complications occurred. Local complications: bleeding from the drainage tube in 1 patient and suppuration around the drainage tube in 2. The bleeding from the drainage tube was stopped after hemostatic therapy. It should be noted that these complications took place at the stage of developing the technology of puncture-drainage treatment methods under the control of echography. Of the general complications, allergic reactions were noted in 3 patients, which were eliminated by drug therapy; there were no deaths. Within three years after the puncture-drainage treatment, no recurrences of liver cavitary masses were observed. Based on the research results, we have identified indications and contraindications for puncture-drainage methods of treating cavities in the liver (Table 4). Indications for puncture treatment of cavitary masses of the liver under the control of echography are: nonparasitic (solitary cysts, polycystic liver), hematomas of the liver and parasitic hydatitic echinococcal cysts up to 40 mm in diameter. With cavities less than 40 mm, fixation of the drainage in the cavity is technically impossible. Puncture drainage was performed in patients with liver cavitary masses: parasitic hydatid echinococcal cysts, hematomas of the liver and nonparasitic cysts with a diameter of more than 40 mm, as well as liver abscesses and residual cavities after liver surgery. Puncture-drainage methods of treatment of cavitary masses of the liver are contraindicated in cystic tumors of the liver, since in this category of patients, puncture does not provide as a pathogenetic therapy of the disease. Both methods are contraindicated in case of an echinococcal cyst with multiple daughter cysts, a dead maternal cyst and calcification of the walls of an echinococcal cyst due to the impossibility of complete evacuation of the cyst contents and the low probability of cavity elimination. With a cyst that has broken through the biliary tract, abdominal or pleural

Table 4
Indications and contraindications for percutaneous puncture-drainage methods of treating cavitary masses in the liver

Typeoftreatment	Indications	Contraindications
Punctural	- nonparasitic cyst (polycystic and solitary) with a diameter less than 40 mm; - hematoma less than 40 mm; - hydatidechinaccoccal cyst less than 40 mm.	- echinococcal cyst with multiple daughter cysts; - dead maternal cyst; - calcification of the walls echinococcal cysts;

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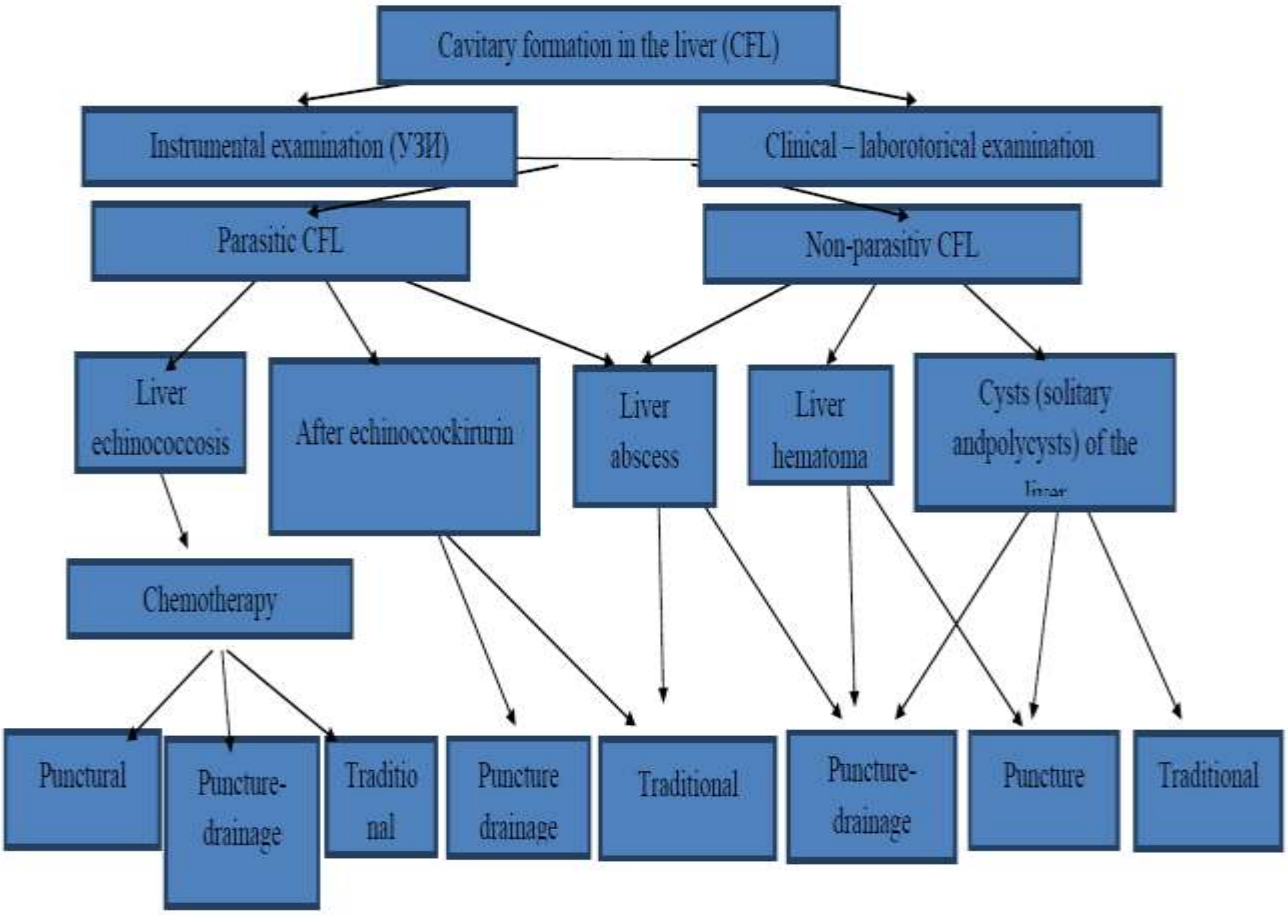
Puncture-drainage	- hydatidechinococcal cyst more than 40 mm - hematoma more than 40 mm - residual cavity after liver surgery - nonparasitic cyst (polycystic and solitary) more than 40 mm - liverabscesses	- a cyst that has broken through into the biliary tract, abdominal or pleural cavity - cystictumor

cavity, puncture is also not able to provide aspiration of the contents and eliminate the communication of the cyst cavity with the lumen of hollow organs. Taking into account the indications and contraindications contributed to the implementation of ultrasonic puncture-drainage methods of treatment of cavitary masses of the liver with great efficiency and low complications.

DISCUSSION. A significant number of clinical observations, a wide range of clinical, laboratory and instrumental methods of differential diagnosis, analysis of treatment results and dynamic observations made it possible to develop a treatment and diagnostic algorithm in patients with liver cavitary masses ant other diseases also (Table 5).

Table 5
Therapeutic and diagnostic algorithm in patients with cavitaryliver masses



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CONCLUSION. 1. Minimally invasive puncture-drainage methods of treatment of cavitary masses of the liver under the control of echography (diagnostics, treatment and monitoring) - are low-traumatic, effective; allow to save patients from the risk of reoperation, in most cases they are an alternative to traditional surgical intervention.
2. Puncture treatment is indicated for small sizes of parasitic liver cysts, as well as for liver abscesses and residual cavities after liver operations. Contraindications to the implementation of minimally invasive methods of treatment of cavities of the liver are: cystic tumor of the liver, echinococcal cyst with multiple daughter cysts, dead maternal cyst, calcification of the walls of the echinococcal cyst, cyst that has broken through into the biliary tract, abdominal or pleural cavity.
3. Puncture-drainage treatment of nonparasitic liver cysts significantly reduced their size, which created the most favorable background, expanding the indications for the use of radical operations.
4. The developed algorithm of therapeutic and diagnostic measures made it possible to establish a diagnosis in the shortest possible time and select the optimal method for treating cavitary masses of the liver.

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