

Admissibility of Diaplectic Methods in the Surgical Treatment of Cystic Locations of the Liver

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Abstract Introduction. An analysis of modern literature shows that there are several directions in the treatment of liver cysts: traditional surgical interventions, endo-videosurgical methods and percutaneous puncture-drainage treatment of cysts under ultrasound or CT control with pre- and postoperative chemotherapy for parasitic liver cysts. The PAIR technique is widely used and approved by WHO. Nevertheless, attempts to modify percutaneous methods in order to improve treatment results continue. **The purpose of the study** is to improve the results of diagnosis and surgical treatment of patients with parasitic and non-parasitic liver cysts based on the use of diaplectic methods. **Materials and methods of research.** The study is based on a clinical and laboratory examination of 39 patients with cystic liver formations who underwent diaplectic and surgical interventions in the surgical department of the multidisciplinary clinic of Samarkand State Medical University for the period from 2016 to 2023. **Research results.** The immediate results of percutaneous interventions for cystic liver formations were assessed by the presence of intraoperative complications and unsatisfactory results in the early postoperative period. **Conclusions.** Analysis of the long-term results of diaplectic interventions for liver cysts showed the radicality of the method, being more preferable in patients with non-parasitic liver cysts and can be the operation of choice in patients with severe concomitant diseases.

Keywords Liver cysts, Diaplectic interventions

1. Introduction

An analysis of modern literature shows that there are several directions in the treatment of liver cysts: traditional surgical interventions, endovideosurgical methods and percutaneous puncture-drainage treatment of cysts under ultrasound or CT control with pre- and postoperative chemotherapy for parasitic liver cysts [1]. The PAIR technique is widely used and approved by WHO [3,5,8]. Nevertheless, attempts to modify percutaneous methods in order to improve treatment results continue. Thus, new types of minimally invasive interventions for echinococcosis have appeared - PEVAC, PAI, Örmeci, MoCaT. The PEVAC technique involves replacing the Seldinger drainage, which carries the risk of contamination of the puncture canal. PAI and Örmeci involve leaving the germicide in the cavity, which does not help reduce the residual cavity and increases the risk of suppuration [2,6,8]. According to the MoCaT method, the cyst is punctured immediately with a thick

drainage, which is dangerous due to detachment of the chitinous membrane and rupture of the cyst [5,7]. Despite the fact that the authors of these methods declare their effectiveness and safety, the small number of patients and the short period of postoperative observation do not allow us to draw objective conclusions. Thus, the decision on the choice of the optimal method of surgical intervention and the method of its implementation remain relevant.

2. The Purpose of the Study

The purpose of the study is to improve the results of diagnosis and surgical treatment of patients with parasitic and non-parasitic liver cysts based on the use of diaplectic methods.

3. Materials and Methods of Research

The study is based on a clinical and laboratory examination of 39 patients with cystic liver formations who underwent diaplectic and surgical interventions in the surgical department of the multidisciplinary clinic of Samarkand State Medical University for the period from 2016 to 2023.

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Puncture-drainage cystectomy methods known as PAIR (Punction-Aspiration-Injection-Reaspiration percutaneous method of puncture treatment) and PEVAC (Percutaneous-Evacuation of cyst contents percutaneous method of puncture evacuation and drainage of the cavity). Percutaneous puncture and sclerotherapy of non-parasitic liver cysts under ultrasound guidance was performed in 39 patients. A total of 6 (15.4%) men and 33 (84.6%) women with serous liver cysts from 4 to 15 cm in diameter were operated on. Solitary cysts, localized in the vast majority of cases in the right lobe of the liver, were diagnosed in 4 (10.2%) men and 17 (43.6%) women; multiple cysts were diagnosed in 2 (5.1%) men and 25 (25, respectively). 64.1% patients.

Percutaneous puncture and sclerosis of liver cysts under ultrasound control were considered indicated in the presence of solitary and multiple true non-parasitic liver cysts measuring 5 cm or more in diameter in the presence of contraindications to laparoscopic operations. Echosonographically, true cysts were round or oval cavities limited by a thin wall (0.1 - 0.2 cm) without echogenicity of the internal space with clear, even contours and the presence of a clearly visible posterior wall, the absence of internal reflections and a characteristic increase in echo signals directly behind cystic formation. In the presence of an intraluminal septum of the cyst, a characteristic spotty pattern was visualized. Intraluminal echo signals indicated hemorrhage into the cyst cavity or its infection.

Percutaneous puncture was also performed in patients with severe concomitant pathology, who were contraindicated for operations through laparotomy access.

The procedure was carried out in an operating room equipped with high technology, including an ALOCA SSD-630 ultrasound machine (Japan). Depending on the location of the cyst, the patient was placed in a special position in order to prevent the needle from passing through the pleural sinus and for convenient manipulation without damaging the hollow organs of the abdominal cavity.

In 4 (10.2%) patients, only aspiration of the cyst contents was performed (Table 1).

Table 1. Puncture methods of treatment of non-parasitic liver cysts

Puncture methods of treatment	Number of patients (%)
Puncture and aspiration of cyst contents	4 (10.2%)
Puncture, aspiration of contents and sclerosis of the cyst	31 (79.5%)
Puncture, aspiration of contents, sclerosis and drainage of the cyst	4 (10.2%)
Total	39 (100%)

The main puncture method of treatment in the studied patients was percutaneous puncture and sclerosis of liver cysts, which was performed in 31 (79.5%) patients. We used 96% alcohol as a sclerosing agent, introducing it into the cyst cavity in a volume of 40-45% of the amount of evacuated fluid. For large cysts, instillation of 40-60 ml of alcohol was performed to prevent intoxication. The exposure lasted

5 minutes, while the patient was asked to change his body position several times to increase the contact of the inner lining of the cyst with the sclerosant, after which a full evacuation of the contents of the cyst was repeated, followed by removal of the needle. It should be noted that most authors also suggest using 96% alcohol in combination with iodine as a sclerosant.

When developing and practical application of the technique for treating the epithelial lining of a cyst, we were guided by two basic rules:

Rule 1. Complete emptying of the cyst before sclerosing therapy. Otherwise, a forced decrease in the concentration of administered ethyl alcohol may cause the ineffectiveness of sclerotherapy with subsequent relapse of liver cysts.

Rule 2. Taking into account the literature data on the possibility of developing sclerosing cholangitis during alcoholization of the cyst cavity after its puncture, or puncture and catheterization, the presence of cystobiliary fistulas was excluded before the introduction of 96% alcohol. For this purpose, first of all, a visual assessment of the color of the contents of the liver cyst was performed. According to the literature, yellow color reliably indicates the presence of bilirubin in the cystic fluid. At the same time, if there is an admixture of blood in the contents of the cyst due to bleeding into its cavity, or after possible damage to a blood vessel during transparenchymal puncture, visual diagnosis of the presence of bile is not possible. In this situation, at the beginning of our study, a biochemical study of the cystic evacuation was used to determine the bilirubin content in it.

The effectiveness of the methods used for diagnosing cystobiliary fistulas during sclerosing alcoholization of NPKP is evidenced by the complete absence of complications of this kind in our patients.

Rule 3. Mandatory bacteriological examination of the contents of the cyst and intracystic administration of a broad-spectrum antibiotic with subsequent correction of puncture antibiotic therapy over time according to the results of bacteriological studies.

In 3 (7.7%) cases, additional puncturing of residual cavities was required, in 2 patients - twice, in another observation - three times. In 1 (2.6%) patient with large NPCPs with a primary diameter of more than 9.5 cm, re-hospitalization was required to continue puncture treatment due to a persistent cystic cavity. The formation of residual cavities was not considered a complication of the operation and was regarded as a delayed reaction of the liver parenchyma to perifocal inflammation. At the same time, recurrent accumulation of fluid in the residual cavity could indicate incomplete destruction of the epithelial lining of the cyst. In this regard, repeated puncturing was supplemented each time with alcoholization of the cavity.

In 3 (7.7%) cases, puncture, aspiration of the contents and sclerosis of the cyst were supplemented by drainage of the residual cavity using a Pigtail catheter. Drainage was carried out for large NPCP, as well as to ensure the possibility of repeated treatment of the epithelial lining with alcohol. In 1

(2.6%) case, this method was used due to suppuration of the residual cavity of the cyst, and in the remaining 2 (5.1%) cases - for large cysts measuring more than 9.5 cm in diameter. Every day, a 96% solution of ethyl alcohol in a volume of up to 50 ml was injected into the cyst cavity for 5-10 minutes. The duration of drainage ranged from 3 to 7 days, depending on the dynamics of obliteration of the cystic cavity.

4. Research Results

The immediate results of percutaneous interventions for cystic liver formations were assessed by the presence of intraoperative complications and unsatisfactory results in the early postoperative period.

Intraoperative complications were assessed using the following indicators:

- bleeding
- damage to the bile ducts and bile leakage
- puncture of the pleural sinus
- damage to hollow organs
- allergic complications.

Unsatisfactory results in the early postoperative period were assessed by the following indicators:

- contamination of the abdominal cavity
- infection of the residual cavity
- biliary peritonitis
- subphrenic abscess
- pleurisy.

Intraoperative complications were noted in 3 patients with liver echinococcosis. As noted in Chapter 3 of the dissertation, in 2 cases of patients with liver echinococcosis during diapaetic intervention due to profuse bleeding in one case and profuse bile leakage in another case due to direct puncture of the lumen of the gallbladder through the lumen of the cyst, emergency laparotomy was required with continuation of the operation in an open manner. The puncture of the gallbladder wall was assessed according to intraoperative sonography, which revealed a sharp shrinkage of the tense bladder. In 1 patient, during diapaetic intervention, an allergic reaction was noted in the form of skin hyperemia, urticaria, and mild tachycardia. The symptoms resolved on the operating table with the use of desensitizing drugs and glucocorticosteroids. We did not observe such reactions in the postoperative period. In other cases, not a single patient developed any significant allergic reaction, not to mention anaphylactic shock. A special role in the absence of pronounced allergic reactions is played by the fact that all patients underwent desensitization therapy on an outpatient basis before the surgical period. Before the operation, antihistamines were started for 10 days, then glucocorticosteroids were started three days before the operation.

Intraoperatively, we did not notice a puncture of the pleural sinus or damage to the hollow organs, but in the early postoperative period, exudative pleurisy on the right was

noted in 1 patient. Perhaps there was a puncture of the pleural sinus during percutaneous puncture of a non-parasitic cyst localized in the diaphragmatic surface of the VII segment of the liver. In 2 cases, 3-4 days after catheterization drainage of the cyst, suppuration of the residual cavity occurred. Of these, in 1 case after catheterization and drainage of a non-parasitic cyst, which required urgent hospitalization of the patient and repeated puncture drainage. It should be noted that there is an extremely low level of complications, of which only 1 (2.6% of 39 patients) can be regarded as caused by the procedure, or more precisely by non-compliance with the third of the above rules (Table 2).

Table 2. Methods of surgical treatment of cystic liver formations

Complications	Solitary cysts (n= 32)	Multiple cysts (n= 7)	Total (n= 39)
Intraoperative complications			
Pleural sinus puncture	1 (3.1%)	-	1 (2.6%)
Complications in the early postoperative period			
Pleurisy	1 (3.1%)	-	1 (2.6%)
Suppuration of the residual cavity		1 (14.3%)	1 (2.6%)
Total complications	2 (6.2%)	1 (14.3%)	3 (7.7%)

As presented in Table 2, after diapaetic interventions, no possible complications such as contamination of the abdominal cavity, bile peritonitis, subdiaphragmatic abscess and damage to the hollow organs of the abdominal cavity were noted.

Prolonged and abundant discharge from the control drains extended the time the drains were in place, which undoubtedly affected the quality of life of the patients, and in some cases led to infection of the contents of the residual cavity in the liver. In this regard, in each case, they sought to remove the drains early, but they were removed only after the discharge had almost completely stopped.

We also present important data characterizing the time course of treatment for patients with liver cysts, which indirectly indicates the necessary financial costs (Table 3).

Table 3. Temporary parameters for the use of percutaneous puncture treatment of liver cysts

Timing parameters	Solitary cysts (n= 32)		Multiple cysts (n= 7)
	PAIR (n=25)	PEVAC (n= 7)	PAIR (n=7)
Total length of hospital stays (hours)	8.3 ± 3.2	16.2 ± 4.4	8.1 ± 2.8
Operation duration (min)	20.1 ± 8.3	30.6 ± 7.8	22.4 ± 7.2
Length of hospital stay after surgery (hours)	5.3 ± 1.2	6.2 ± 2.4	5.1 ± 1.8

The total length of stay of patients in the hospital, the duration of the operation and the period of postoperative hospital treatment were noticeably reduced than in patients with traditional methods of treatment.

5. Conclusions

Analysis of percutaneous puncture methods of surgical operations has revealed wide possibilities for treatment and diagnostic tactics for managing patients with liver cysts, which allows, in most cases, to perform surgical intervention in conditions more favorable for the patient. Patients with non-parasitic solitary cysts or a dominant cyst in polycystic disease up to 5 cm in diameter require dynamic monitoring. Indications for puncture cystectomies are non-parasitic solitary and multiple liver cysts measuring 5 cm or more. Contraindications are the localization of cysts on the posterior surface of the liver, as well as intraparenchymal location.

Percutaneous puncture cystectomy is a modern minimally invasive method of surgical treatment of parasitic and non-parasitic liver cysts, which has great clinical effectiveness, which has an important social significance and economic effect in comparison with laparoscopic and traditional methods. The advantages of the intervention include early postoperative rehabilitation of patients, reduction or prevention of various types of complications characteristic of laparoscopic and open traditional operations, as well as a reduction in hospital stay.

Analysis of the long-term results of diapeutic interventions for liver cysts showed the radicality of the method, being more preferable in patients with non-parasitic liver cysts and can be the operation of choice in patients with severe concomitant diseases.

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