Original
ISSN 2521-8492

Tactical and Technical Features of Performing Laparoscopic Echinococcectomy from the Liver

Yakubov Farkhod Radjabovich*, Sapaev Duschan Shukhratovich, Khaitbaev Sardor Kuronbaevich, Khayitboeva Komila Khujayazovna, Matkurbonov Navruz Odilbek Ogli

Urgench Branch of Tashkent Medical Academy, Urgench, Republic of Uzbekistan.
*Correspondence to: Yakubov Farkhod Radjabovich (E-mail: dr.r.f@mail.ru)
(Submitted: 28 August 2024 – Revised version received: 15 September 2024 – Accepted: 10 October 2024 – Published online: 26 December 2024)

Abstract
Objective: To determine the tactical and technical features of laparoscopic echinococcectomy (LapEE) in liver echinococcosis (LE).
Methods: The study included patients with the primary form of EP - 46 patients who underwent LapEE at the State Institution "RSSPMCS named after acad. V.Vakhidov".
Results: Taking into account the stage of cyst development, various difficulties with aspiration or removal of the cyst contents occurred in only 14 (30.4%) cases, more often with type II-IV CE. Another problem was the difficulty with adequate revision and treatment of residual cavity (RC) (in 6 (13.0%) patients) with predominantly intraparenchymal localization. Difficulties with performing percytectomy with sufficient excision of the fibrous capsule were noted in 9 (19.6%) cases. In the period up to a week after the operation, the drainage was removed for cysts up to 8 cm in 11 (36.7%), with more than 8 cm - in 5 (31.3%). By 3 weeks of observation, the drains were removed in all cases with cysts up to 8 cm, while with large sizes in 12.5% (2 patients) cases, the drainage was removed on days 21–28 and in 1 (6.3%) patient more than late period. In general, in the group, complications from the RC on days 9–27 after LapEE were noted in 10 (21.7%) of 46 patients, fluid accumulation in 8 (17.4%) and suppuration in 2 (4.3%).
Conclusion: Among the main factors that technically complicate LapEE, in addition to localization, difficulties with aspiration or removal of cyst contents in CE II, III, and IV are highlighted due to the presence of many daughter cysts that completely fill the maternal membrane (CE II, III) or thick viscous discharge (CE IV), as well as difficulties in performing a pericystectomy for adequate elimination of the RC when the hydatid is located 3/4 or more in the liver parenchyma.
Keywords: Liver echinococcosis, surgical treatment, laparoscopic echinococcectomy, tactical and technical features

Introduction

The choice of treatment tactics for liver echinococcosis depends on several factors: the general condition of the patient, the number and location of cysts, the doctor's experience and the availability of special services. At the same time, by now numerous studies have shown the high effectiveness of antiparasitic drugs, then there is still no single generally accepted protocol in surgical treatment that takes into account the form and stage of the disease, which is due to insufficient evidence base in terms of developing indications for various surgical approaches (minimally invasive, puncture, drainage procedures, traditional operations) and methods of elimination and treatment of residual cavity after echinococcectomy.[1–5]

LapEE has already firmly entered the arsenal of surgical treatment of primary liver echinococcosis, however, the possibilities of this method are strictly limited by the localization of the cyst due to difficulties with technical aspects with insufficient visualization and access for manipulation.

LapEE is most often used for localization in the anterior-upper surface of the liver. The method allows not only to perform echinococcectomies, but also to clip or stitch bile fistulas in a fibrous capsule. In turn, the question of options for eliminating the residual cavity remains debatable, since it is quite difficult to suture the cavity laparoscopically, especially with large cysts with predominantly intraparenchymal localization. In this regard, in most cases, drainage and (or) abdominization of the residual cavity is carried out.[6–10] Also, according to the authors, small incisions that reduce postoperative pain and shorten the duration of hospitalization are the advantages of a laparoscopic procedure for liver echinococcosis. LapEE is usually accompanied by a partial pericystectomy. The closed type of LapEE is defined as the removal of cyst contents without opening the cyst, and the open type is defined as the complete elimination of the residual cavity and scolexes by scolicidal physical or chemical means with the evacuation of the contents of the echinococcal cyst.[11]

A meta-analytical comparative study by M. Sokouti et al. (2019) confirmed the WHO protocol for laparoscopic treatment of liver echinococcal cyst at stages CE1 and CE3a, but it remains controversial whether PAIR should be recommended for stages CE2 and CE3b. Most of the articles reviewed in this study do not contain reports on the stages of surgical treatment of liver echinococcosis according to the WHO classification.[12]

The recurrence rate for laparoscopy and PAIR procedures ranged from 3.64% and 3.89%, respectively. The mortality rate during laparoscopic interventions was 0.25%. However, in the literature, these values range from 0.01% to 0.9%.[12,13] The overall incidence of postoperative complications after laparoscopic echinococcectomy was 19.2%.[13]

The purpose of this study was to determine the tactical and technical aspects of LapEE in liver echinococcosis.

Materials and Methods

The article provides an analysis of the effectiveness of LapEE depending on the localization, size and stage of development of the echinococcal hand, as well as taking into account the

performance of drainage or abdominal interventions in relation to the residual cavity. The study included patients with the primary form of echinococcosis of the liver – 46 patients who underwent LapEE at the State Medical Institution "RSSPMCS named after acad. V.Vakhidov". Solitary cyst was diagnosed in 26 (56.5%) cases and multiple cysts in 20 (43.5%) patients (Table 1).

Type CE I cysts were verified in 22 (47.8%) patients, type II – in 12 (26.1%), type III – in 9 (19.6% and type IV (due to complicated course) – in 3 (6.3%) patients (Table 1). Out of 46 cases, cysts of 5–6 sizes cm was in 14 patients, 6–8 cm in 16, 8–10 cm in 12 and more than 10 cm in 4 patients (Table 2).

Results and Discussion

The technical aspects of LapEE implementation play a leading role in the effectiveness of the methodology. Taking into account the stage of cyst development, various difficulties with manipulations occurred more often in type CE II-IV. Thus, difficulties with aspiration or removal of cyst contents were noted in only 14 (30.4%) cases, while for type CE II this indicator was 50% (6 out of 12 patients), for CE III – 44.4% (in 4 out of 9 patients), for type IV – 100% (3). This is due to the fact that in these cases problems arose with aspiration of the contents due to the presence of multiple daughter cysts, thick maternal chitinous membrane, or their mushy degradation, as well as thick contents with fragments of chitin in type IV. Another problem was difficulties with adequate revision and treatment of the residual cavity with predominantly intraparenchymatous localization. Even the use of optics with different angles of inclination, such localization did not always allow for adequate revision of the residual cavity, especially when attempting laparoscopy for cysts along the posterior slope of the right lobe of the liver. In total, these difficulties were noted in 6 (13.0%) patients, of which two cases in type CE I were 9.1%, type II – 16.7% and III – 22.2%. Biliary fistulas were detected in 8 (17.4%) patients, of whom 4 had clipping, 2 had fistula suturing, and in the other 2 patients the source of bile discharge could not be determined due to structural changes in the fibrous capsule with a complicated course of liver echinococcosis. Manipulation options with respect to the residual cavity implied drainage and (or) abdominization, while difficulties with performing a recystectomy with sufficient excision of the fibrous capsule were noted in 9 (19.6%) cases (Table 3).

To assess the effectiveness of the tactical aspects undertaken during LapEE, all cysts were divided by size – up to and more than 8 cm, which will allow evaluating the effectiveness of drainage or abdominal interventions in terms of the frequency of complications from the residual cavity. At the same time, the quality of abdominization was assessed based on the total volume of the residual cavity. A wide excision of the fibrous capsule allows abdominization to be performed without the risk of subsequent collapse of the edges of the residual cavity, which can lead to their adhesion with subsequent accumulation of fluid with the development of a complicated postoperative course. Of course, the fact of the volume of pericystectomy is influenced by many aspects, in particular, the proportion of extraorgan cyst localization, the thickness of the fibrous capsule, the presence of an irregularly shaped residual cavity with intraparenchymal chambers, etc. Taking into account the frequent predominantly intrahepatic localization of most of the cyst, the analysis of the effectiveness of abdominization of the residual cavity was carried out based on the excised volume of the fibrous capsule – pericystectomy for at least 1/4 of the volume of the residual cavity or less than 1/4. Of 46 patients, 30 had cysts up to 8 cm, drainage was performed in 53.3% (16) patients, abdominization of the residual cavity at least 1/4 of the volume was performed in 8 (26.7%) patients and less than 1/4 in 6 (20.0%). Of the 16 patients with cysts larger than 8 cm, 75.0% (12) underwent drainage (Fig. 1), 18.8% (3) had

Table 1. **Distribution of patients by stages of development of liver echinococcosis during laparoscopic interventions in the comparison group**

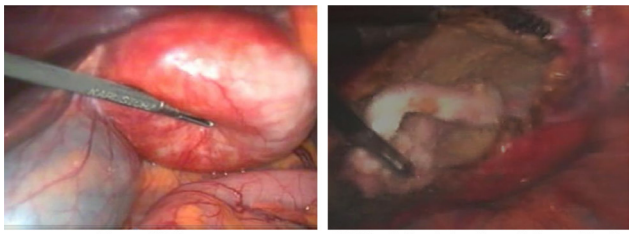
Type	Solitary echinococcosis of the liver		Multiple echinococcosis of the liver		Total	
	Abs.	%	Abs.	%	Abs.	%
CE I	15	32.6%	7	15.2%	22	47.8%
CE II	6	13.0%	6	13.0%	12	26.1%
CE III	2	4.3%	7	15.2%	9	19.6%
CE IV	3	6.5%	0	0.0%	3	6.5%
Total	26	56.5%	20	43.5%	46	100.0%

Table 2. **Distribution of echinococcal cyst in LapEE by size**

Type of cyst	5–6 cm	6–8 cm	8–10 cm	>10 cm	Total
CE I	7	7	6	2	22
CE II	3	4	4	1	12
CE III	3	3	2	1	9
CE IV	1	2	0	0	3
Total	14	16	12	4	46

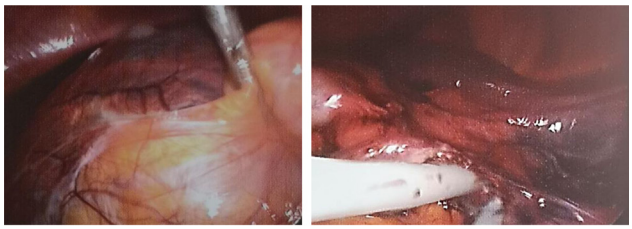
Table 3. **Intraoperative difficulties depending on the type of echinococcal cyst**

Criteria		CE I	CE II	CE III	CE IV
Difficulties with aspiration or removal of cyst contents	Abs.	1	6	4	3
	%	4.5%	50.0%	44.4%	100.0%
Difficulties with adequate revision and treatment of the residual cavity with predominantly intraparenchymatous localization	Abs.	2	2	2	0
	%	9.1%	16.7%	22.2%	0.0%
Biliary fistula	Abs.	3	2	1	2
	%	13.6%	16.7%	11.1%	66.7%
Difficulties with perekystectomy (excision of the fibrous capsule)	Abs.	4	2	2	1
	%	18.2%	16.7%	22.2%	33.3%



Type CE I cyst | Wide abdominization of the residual cavity

Fig. 1 **LapEE with abdominization of the residual cavity by 1/3 of the volume, the edges of the excised fibrous capsule do not fall off.**



Type CE I cyst | Drainage of the residual cavity after limited pericystectomy

Fig. 2 **LapEE with drainage of the residual cavity, the edges of the partially excised fibrous capsule completely collapse.**

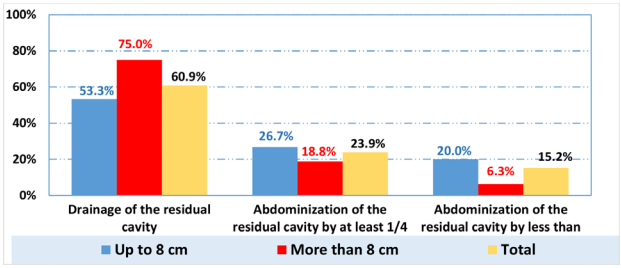


Fig. 3 **The proportion of abdominization or drainage of the residual cavity in LapEE.**

Table 4. **Timing of drainage removal after LapEE**

The timing of drainage	Up to 8 cm		More than 8 cm		Total	
	Abs.	%	Abs.	%	Abs.	%
Drainage removal for up to 7 days	11	36.7%	5	31.3%	16	34.8%
Drainage removal for 7–14 days	3	10.0%	2	12.5%	5	10.9%
Drainage removal for 14–21 days	2	6.7%	2	12.5%	4	8.7%
Drainage removal for 21–28 days	0	0.0%	2	12.5%	2	4.3%
Drainage removal after more than 28 days	0	0.0%	1	6.3%	1	2.2%
Without drainage of the residual cavity	14	46.7%	4	25.0%	18	39.1%

extensive abdominization (Fig. 2) and 6.3% (1) of cases had partial abdominization (Fig. 3).

It should be noted that in most cases, drainage of the residual cavity is accompanied by excision of the fibrous capsule, however, its limited performance, usually for 2–4 cm, cannot be recognized even as partial abdominization, which is why these manipulations were attributed specifically to drainage interventions.

Within a week after surgery, drainage was removed for cysts up to 8 cm in 11 (36.7%), and for cysts over 8 cm in 5 (31.3%). By 3 weeks of follow-up, drains were removed in all cases with cysts up to 8 cm, whereas with large sizes in 12.5% (2 patients) cases, drainage was removed on day 21–28 and in 1 (6.3%) patient at a later period (Table 4). All patients were without complications during hospitalization.

In the whole group, complications from the sides of the residual cavity on days 9–27 after LapEE were noted in 10 (21.7%) of 46 patients, fluid accumulation in 8 (17.4%) and suppuration in 2 (4.3%) (Fig. 4).

Taking into account the type of residual cavity elimination, the incidence of complications during drainage interventions after drainage removal was 17.9% (in 5 out of 28 patients), of which fluid accumulation was in 14.3% (4) and suppuration of the residual cavity in 1 (3.6%) case. With wide abdominization (at least 1/4 of the volume of the residual cavity), 1 (9.1%) complications in the form of fluid accumulation were noted, with limited abdominization, 4 (57.1%) complications were noted in total, of which in 3 cases there was fluid accumulation and in 1 suppuration of the residual cavity.

Most of the complications were resolved conservatively – 13.0% (in 6 patients), minimally invasive drainage of the residual cavity was performed in 6.5% (3 patients), 1 (2.2%) patient was operated on with an abscess of the residual cavity (Fig. 5).

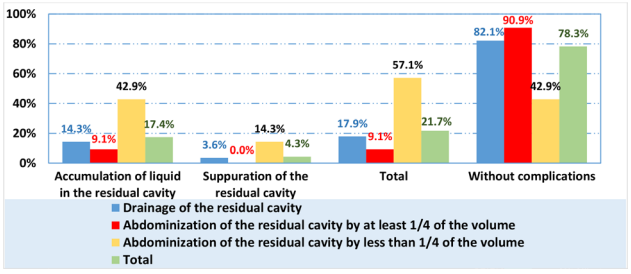


Fig. 4 **The frequency of complications after LapEE (9–27 days).**

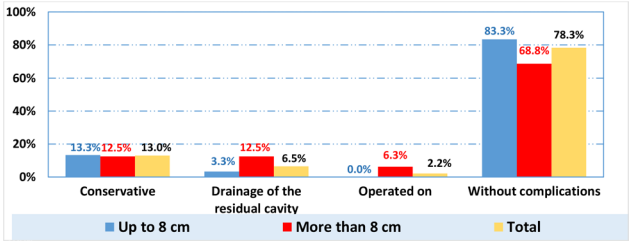


Fig. 5 **The method of resolving complications after LapEE, depending on the initial size of cysts.**

Conclusion

Among the main factors technically complicating LapEE, in addition to localization, difficulties with aspiration or removal of cyst contents were identified in 54.2% of cases at the stage of development - CE II, III and IV (in 13 out of 24 patients with these types) due to the presence of many daughter cysts completely filling the mother shell (CE II, III) or thick viscous discharge (CE IV), as well as difficulties with performing perekystectomy for adequate abdominization of the OP with the location of the hydatide 3/4 or more in the liver parenchyma - 19.6% (in 9 of all 46 operated). At the same time, a combination of factors of failed abdominization and initial cysts of more than 8 cm cause an increased risk of complications from the residual cavity from 16.7% to 31.2%, among which repeated interventions will be required in 18.8% of cases.

Conflict of Interest

None.

References

1. Dietrich CF, Lorentzen T, Appelbaum L, Buscarini E, Cantisani V, Correas JM, Cui XW et al. EFSUMB Guidelines on Interventional Ultrasound (INVUS), Part III - Abdominal Treatment Procedures (Long Version). Ultraschall Med 2016; 37: E1–E32.
2. Rinaldi F, Brunetti E, Neumayr A, Maestri M, Goblirsch S, Tamarozzi F. Cystic echinococcosis of the liver: A primer for hepatologists. World J Hepatol 2014; 6: 293–305.
3. Sapaev D.Sh., R.Yu. Ruzibaev, B.N. Kuryazov, F.R. Yakubov. Problems of diagnostics, treatment and prevention of multiple hydatid echinococcosis of the liver // Vestnik of Saint Petersburg university. Medicine. –Sankt -Peterburg, 2019. –No 1 (14). –pp. 42–48.
4. M.M. Akbarov, R.Yu. Ruzibaev, D.Sh. Sapaev, P. Yu. Ruzmatov, F.R. Yakubov. (2020). Modern Trends in the Prevention of Liver Echinococcosis. Indian Journal of Forensic Medicine & Toxicology, 14(4), 7433–7437. DOI: https://doi.org/10.37506/ijfmt.v14i4.12823
5. Murod Sh. Khakimov, Sardor K. Khaitbaev, & Anvar P. Rakhimov. (2022). Improvement of tactics and diagnostics in surgical treatment echinococcosis of the liver with the introduction of our development. Central Asian Journal of Medicine, (2), 144–152. Retrieved from https://mail.journals.tma.uz/index.php/cajm/article/view/476
6. Chen X, Cen C, Xie H, et al. The comparison of 2 new promising weapons for the treatment of hydatid cyst disease: PAIR and laparoscopic therapy. Surg Laparosc Endosc Percutan Tech. 2015;25:358–62.
7. Pandey A, Chandra A, Masood S. Abdominal echinococcosis: outcomes of conservative surgery. Trans R Soc Trop Med Hyg. 2014;108:264–8.
8. Sapaev DS, Yakubov FR, Yakhshiboev SS. Evaluation of the factors influencing the choice of laparoscopic echinococcectomy in liver echinococcosis (LE) and its impact on postoperative outcomes. Exp Parasitol. 2023 May;248:108495. doi: 10.1016/j.exppara.2023.108495. Epub 2023 Mar 5. PMID: 36871791.
9. Babadjanov, A.K., Yakubov, F.R., Ruzmatov, P.Y., Sapaev, D.S., 2021. Epidemiological aspects of echinococcosis of the liver and other organs in the Republic of Uzbekistan. Parasite Epidemiol. Control. https://doi.org/10.1016/j.parepi.2021.e00230.
10. Khakimov M. Sh, Khaitbaev S. K., Imamov A. A., Liver Echinococcosis: Improving of Surgical Tactics, American Journal of Medicine and Medical Sciences, Vol. 10 No. 6, 2020, pp. 400–404. doi: 10.5923/j.ajmms.20201006.11.
11. Tuxun T, Aji T, Tai Q, et al. Conventional versus laparoscopic surgery for hepatic hydatidosis: a 6-year single-center experience. J Gastrointest Surg. 2014;18:1155–60.
12. Sokouti M, Sadeghi R, Pashazadeh S, Abadi SEH, Sokouti M, Ghojazadeh M, Sokouti B. A systematic review and meta-analysis on the treatment of liver hydatid cyst using meta-MUMS tool: comparing PAIR and laparoscopic procedures. Arch Med Sci. 2019 Mar;15(2):284–308. doi: 10.5114/aoms.2018.73344.
13. Köroğlu M, Erol B, Gürses C, et al. Hepatic cystic echinococcosis: percutaneous treatment as an outpatient procedure. Asian Pac J Trop Med. 2014;7:212–5.