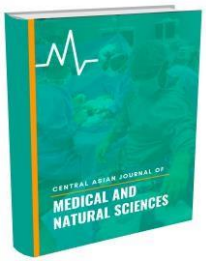

CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES
https://cajmns.centralasianstudies.org/index.php/CAJMNS
Volume: 05 Issue: 02 | Mar 2024 ISSN: 2660-4159

Article

Clinical Evaluation of the Results of Organ-Preserving Operations in Liver Echinococcosis with Elastic Fibrous Capsule

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Abstract: One of the urgent issues in the surgery of echinococcosis of the liver remains the option of treatment of the residual cavity, implying both antiparasitic efficacy and the possibility of accelerating the processes of obliteration of the fibrous capsule. The article highlights the results of echinococcectomy from the liver, analyzed taking into account the method of treatment of residual cavities with an elastic fibrous capsule. The proposed method for treating the residual cavity in uncomplicated forms of liver echinococcosis in the presence of an elastic fibrous capsule that subsides after extraction of the parasite, includes laser radiation, which makes it possible to treat cavities of any configuration, inhibition of the growth of pathogenic flora, as well as in combination with the use of a powdered composition "HEMOBEN". The technique promotes local hemo and lymphostasis, sealing of the bile duct microspheres and strengthening of the processes of obliteration of the walls of the fibrous capsule both during suturing and vacuum drainage. The method can be used as an alternative to pericystectomy and liver resection.

Keywords: echinococcosis of the liver, treatment of the residual cavity, pericystectomy and liver resection, antiparasitic efficacy, HEMOBEN

Citation: Khasanovich, B. A., & Iskandarovich, T. A. Clinical Evaluation of the Results of Organ-Preserving Operations in Liver Echinococcosis with Elastic Fibrous Capsule. Central Asian Journal of Medical and Natural Science 2024, 5(2), 97-105.

Received: 10th March 2024
Revised: 17th March 2024
Accepted: 24th March 2024
Published: 1st April 2024

1. Introduction

Currently, the Republic of Uzbekistan, along with other Central Asian countries, China and India, belongs to the regions endemic for echinococcosis [1]. The most frequently affected organ is the liver (70%), followed by the lungs (20%) and other organs [2], [3]. Treatment of echinococcosis of the liver is based on the type of cyst according to the WHO-IWGE classification of the USA, which takes into account the size, location and presence/absence of complications, as well as the experience of the doctor and the equipment of the clinic [4]. Based on the classification of the stages of development of liver echinococcosis, various treatment options are possible, these are: surgical intervention, minimally invasive interventions, antiparasitic drugs, the "watch and wait" approach [5].

For countries endemic to echinococcosis of the liver, in addition to relapse, an equally important aspect is the problem of reducing the risk of developing immediate and long-term postoperative complications, the frequency of which ranges from 10-26%, but in some cases this indicator reaches 60% [6]. In the Republic of Uzbekistan, organ-preserving minimally invasive and traditional interventions continue to dominate in clinics of various levels of healthcare, which also emphasizes the relevance of reducing the frequency of complications from the residual cavity [7], [8]. Against this background, one of the urgent

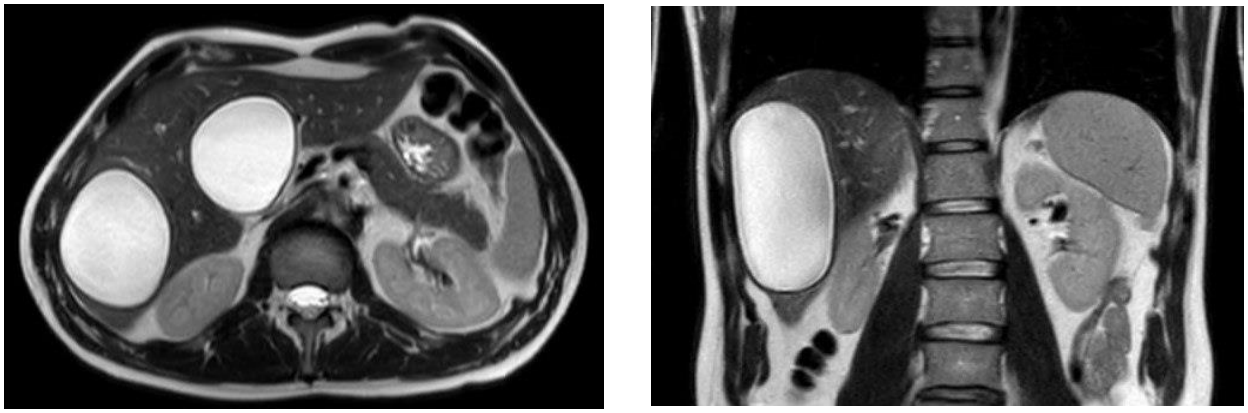
issues remains the option of treating the residual cavity after echinococcectomy, implying both antiparasitic efficacy and the possibility of accelerating the processes of obliteration of the fibrous capsule [9], [10]. This article is devoted to the analysis of the results of echinococcectomy from the liver, supplemented by the proposed method of treatment of residual cavities with an elastic fibrous capsule.

2. Materials and Methods

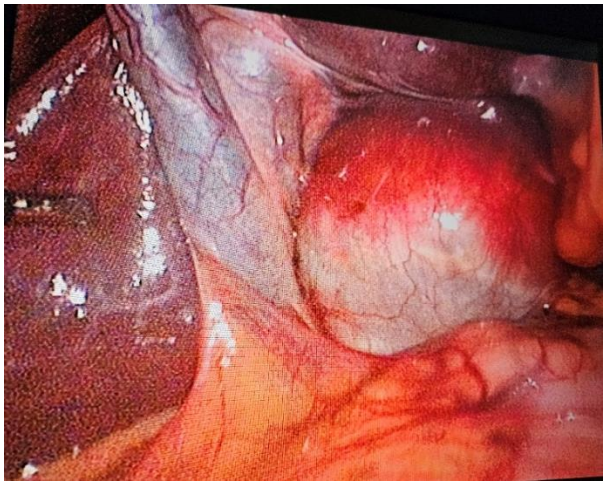
Based on the results of preliminary experimental morphological studies, some points were identified that allowed for clinical practice to identify new technical aspects in operations for liver echinococcosis. The method of processing a fibrous capsule in uncomplicated forms of liver echinococcosis includes the following technical aspects: the use of a domestic bioabsorbable hemostatic agent HEMOBEN, the use of a Matrix laser therapy device, as well as a Redon type drainage kit and postoperative laser irradiation Pulse-100 percutaneously.

The method of treatment of the residual cavity after echinococcectomy from the liver in uncomplicated forms of lesion includes the following stages (Figure 1):

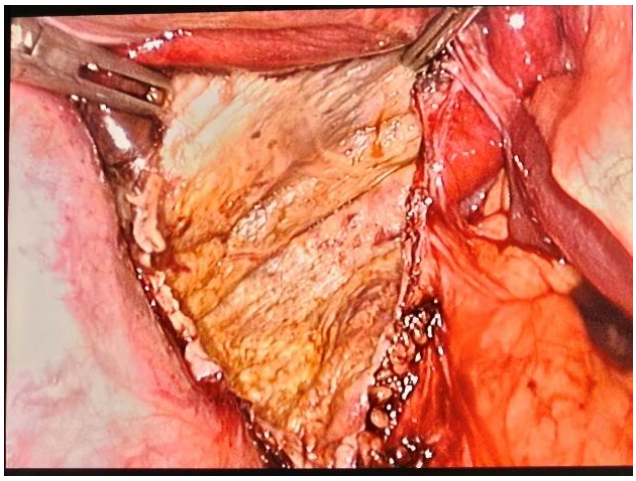
- access to an echinococcal cyst can be laparotomic or laparoscopic;
- after revision, the echinococcal cyst is removed by puncture of the cyst shell with suction of echinococcal fluid, opening of the cyst cavity with removal of the chitinous membrane and, if present, daughter blisters;
- perform antiparasitic treatment of the residual cavity with 3% H_2O_2 solution, alcohol and iodine;
- revision of the fibrous capsule for the presence of biliary fistulas and suturing of the latter;
- next, the free edges of the fibrous capsule are excised /pericystectomy within healthy liver tissue;
- the residual cavity of the echinococcal cyst is treated with Matrix-2 laser radiation in the spectrum of 360-380 nm, with a power of 2 MW, in continuous mode with a spot area of 3 mm in scanning mode at the rate of 5 minutes per 12 cm2 of the fibrous capsule area;
- a powdered composition "HEMOBEN" is applied to the surface of the fibrous capsule at the rate of 10 mg per 1 cm^2 of the treated surface, and, after polymerization for 2-3 minutes, either complete suturing of the residual cavity is performed, or suturing on drainage, or drainage (with laparoscopic access);
- drainage of the abdominal cavity and suturing of the surgical wound are performed;
- further, in the postoperative period, in the case of drainage of the residual cavity, a vacuum system is connected to the drainage by using a vacuum device of the "Redon" type, the capacity of which creates a vacuum in the residual cavity of 70-100 Kpa;
- also, in the postoperative period, Pulse-100 laser irradiation is performed percutaneously in the projection of a residual cavity with a wavelength of 980 nm, a frequency of 100 Hz, a pulse power of 80-100 W for 2-3 minutes on the field daily once for 4-7 days;
- after a 3-day break, if there are areas of non-obliterated fibrous capsule on ultrasound, the Pulse-100 laser irradiation course is percutaneously repeated;
- drainage from the residual cavity is removed for 3-5 days.



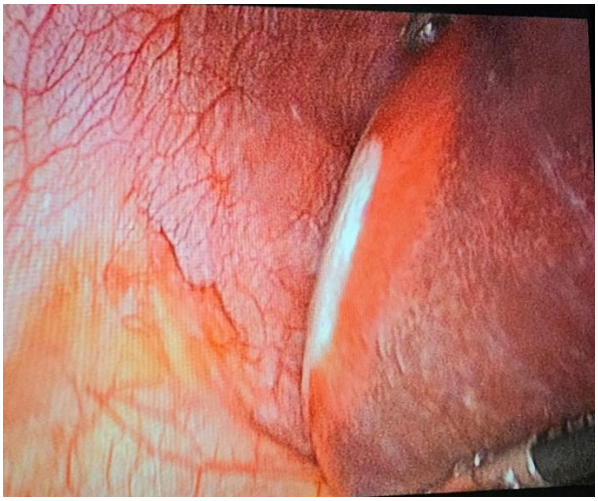
Multispiral computed tomography picture of echinococcosis of the V and VI segments of the liver



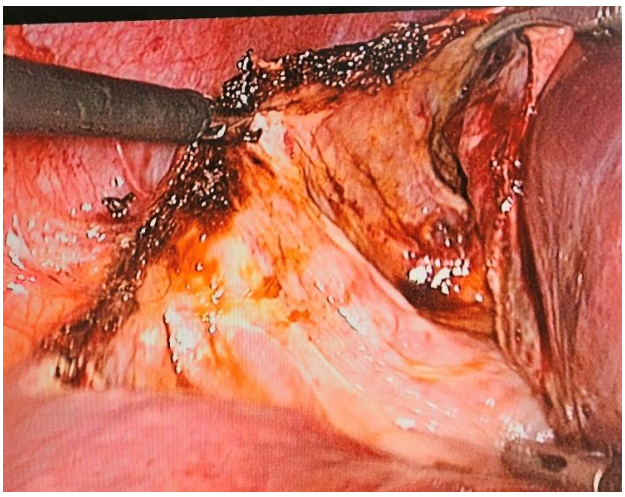
Type of cyst in the V segment of the liver



Treated abdominal residual cavity



Type of cyst in the VI segment of the liver



Treated abdominal residual cavity

Figure 1. Stages of laparoscopic echinococcectomy in echinococcosis of the V and VI segments of the liver

The advantages of the method are: the possibility of using traditionally and laparoscopically, laser treatment of cavities of any configuration; inhibition of the growth of pathogenic flora, along with stimulation of regeneration; application both when suturing the residual cavity tightly, and during drainage or abdominization for faster and more stable obliteration; application of "HEMOBEN" powder provides hemo and lymphostasis, sealing of bile microviscules the created vacuum in the residual cavity ensures its complete

collapse and acceleration of obliteration; and Pulse 100 laser radiation promotes anti-inflammatory activity and accelerated resorption of scar and fibrous tissue.

To assess the effectiveness of the proposed method, 2 groups were formed. There were 104 patients in the main group, 117 in the comparison group. The majority of patients were with CE1 and CE2 stages of parasite development according to ultrasound data with sizes medium (5-10 cm) and large (>10 cm). In total, 135 cysts were removed in the comparison group, 123 cysts in the main group.

In the comparison group, traditional echinococcectomy was performed in 81 (69.2%) cases, in the main group in 62 (59.6%) patients, LapEE in 34 (29.1%) and 40 (38.5%) patients, respectively, to assess the proportion of potential resection interventions, liver resections (marginal or anatomical) were included in the study groups, which produced in 2 (1.7%) and 2 (2.0%) patients.

3. Results and Discussion

In the subgroup of laparoscopic echinococcectomy in the comparison group, partial pericectomy with drainage of the residual cavity was performed in 57.9% of cases, in the main group in 31.1%, abdominization at 42.1% and 68.9%, respectively. The actual difference between partial pericystectomy and abdominization is that in the first case, the fibrous capsule is excised limited, no more than 1/5-1/4 of its circumference. In these cases, it is necessary to drain the residual cavity, since failure to drain will lead to early subsidence or compression of the excised fibrous capsule zone and the outflow from the cavity will be disrupted, which will lead to fluid accumulation and often to suppuration of the residual cavity. Abdominization (or aplatization) of the residual cavity is considered cases when the fibrous capsule is widely excised (1/3 or more of its area), which allows you to create a wide junction of the fibrous capsule with the abdominal cavity, significantly reduces the risks of limiting the residual cavity and the development of complications in it. Also, the advantage of this type of residual cavity elimination before partial pericystectomy is the absence of the need for drainage of the fibrous capsule cavity, drainage is installed either in the area of communication of the residual cavity with the abdominal cavity, or by the type of through drainage – from the residual cavity into the abdominal cavity, which avoids the need for prolonged drainage.

In the main group, a reduction in drainage time was obtained with partial pericystectomy. Thus, the average indicator in the comparison group was 5.1±2.7 days, in the main group 3.1±1.3 days ($t = 3.03$; $p<0.05$). In turn, the duration of drainage of the abdominal cavity was 3.8±2.0 days versus 2.2±1.2 days ($t = 4.05$; $p<0.05$) (Figure 2).

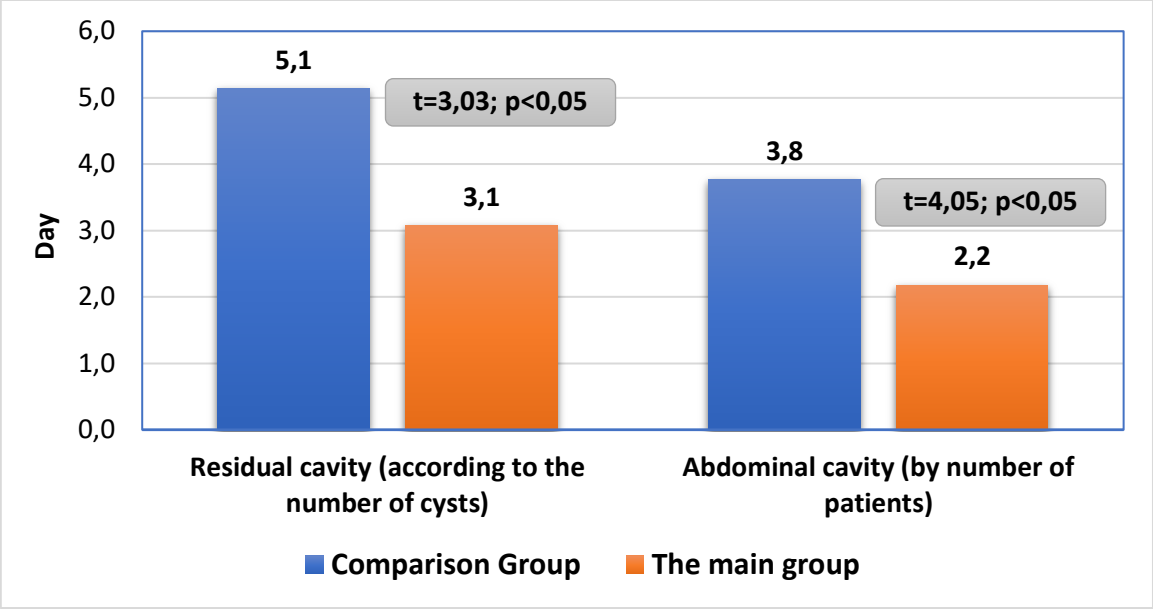


Figure 2. Average duration of drainage after laparoscopic echinococcectomy (day)

Various early postoperative complications developed in 6 (17.6%) patients in the comparison group and 1 (2.5%) patient in the main group ($\chi^2 = 4.923$; df = 1; p = 0.027) (Figure 3). Accumulation of fluid in the residual cavity was noted in 3 (8.8%) and 1 (2.5 Accordingly, biliary fistula occurred in 2 (5.9%) patients in the comparison group, limited fluid accumulation in the abdominal cavity and reactive pleurisy were noted in 1 (2.9%) case also in the comparison group. Most complications were not difficult to treat, in particular, in the comparison group of 5 (14.7%) cases and in the main group of 1 (2.5%) patient, complications were resolved conservatively. Percutaneous puncture with limited fluid accumulation in the residual cavity and in the abdominal cavity was performed in 2 (5.9%) patients in the comparison group.

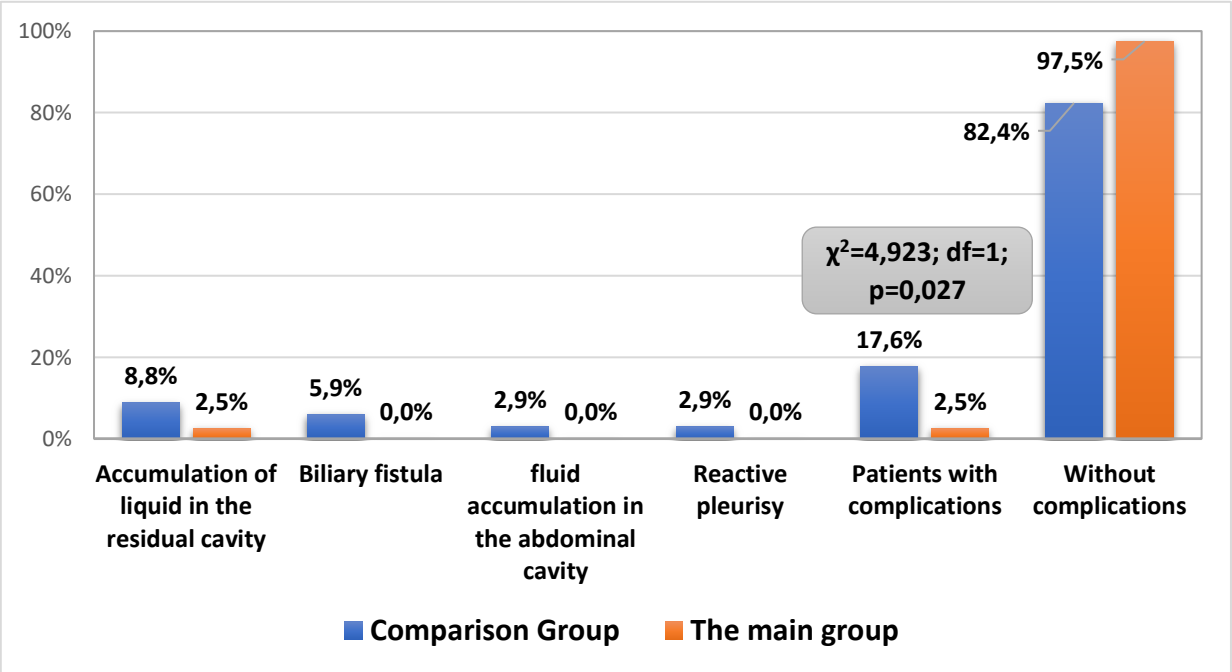


Figure 3. The frequency of immediate complications after laparoscopic echinococcectomy

Up to 3 months after LapEE, the results were followed in all patients. It should be noted that in this work, the task in terms of tracking the recurrence of echinococcosis was not identified, since this requires a longer follow-up period. In the comparison group, fluid accumulation in the residual cavity and fluid accumulation in the abdominal cavity were noted in 1 case, suppuration of the residual cavity and reactive pleurisy in 2 cases. In the main group, fluid accumulation was detected in 1 patient. The total number of complications was 11.8% in the comparison group and 2.5% in the main group. In all cases of fluid accumulations, percutaneous puncture was performed.

In the comparison group, fluid accumulation in the residual cavity was noted in 1 (2.9%) patient, suppuration of the residual cavity in 2 (5.9%), limited fluid accumulation in the abdominal cavity in 1 (2.9%) case and reactive pleurisy in 2 (5.9%) patients. In the main group, limited fluid accumulation in the abdominal cavity was detected in 1 (2.5%) patient. There were 4 (11.8%) patients with complications in the comparison group and 1 (2.5%) in the main group. There were no significant differences in this feature (χ^2= 2.504; df = 1; p = 0.114).

In the next subgroup, open echinococcectomy (OEE) were performed for cysts with an elastic fibrous capsule, in 81 patients in the comparison group (94 cysts were removed) and 62 patients in the main group (75 cysts). Partial pericystectomy with drainage was performed for 12 (12.8%) cysts in the comparison group and 7 (9.3%) in the main group, abdominization of the residual cavity at 12 (12.8%) and 9 (12.0%), respectively, suturing of the residual cavity on drainage in 19 (20.2%) and 7 (9.3%) complete suturing of the residual cavity in 51 (54.3%) and 52 (69.3%) cases.

The average duration of drainage of the residual cavity (from among the cysts) in the comparison group was 6.7±3.6 days, in the main group 3.6±2.1 days (t = 3.73; p<0.05). The duration of abdominal drainage (among patients) was 4.0±1.8 days versus 2.8±1.4 days (t = 4.49; p<0.05) (Figure 4).

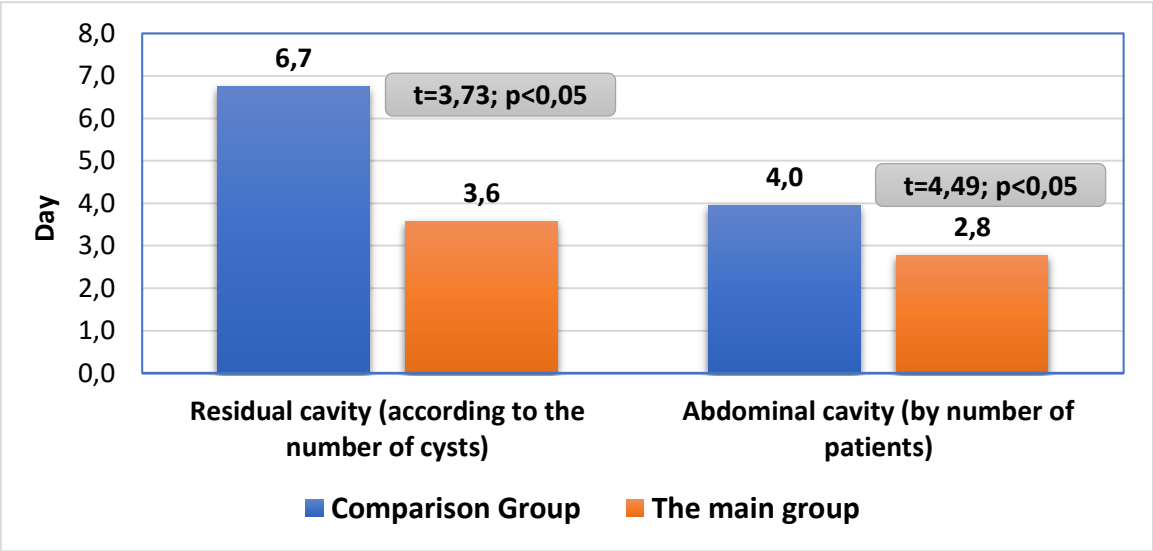


Figure 4. Average duration of drainage after open echinococcectomy (day)

With complete adequate suturing of the residual cavity or wide abdominization, the risk of a complicated course was minimal, in turn, partial elimination of the residual cavity on drainage or drainage can lead to the presence of non-drainable zones in the residual cavity. In these observations, various complications developed in 11 (13.6%) patients in the comparison group and 2 (3.2%) patients in the main group (χ^2 = 4,556; df = 1; p = 0.033). Most of the complications were resolved conservatively, percutaneous puncture was required in 6 (7.4%) and 1 (1.6%) patients, respectively (Figure 5).

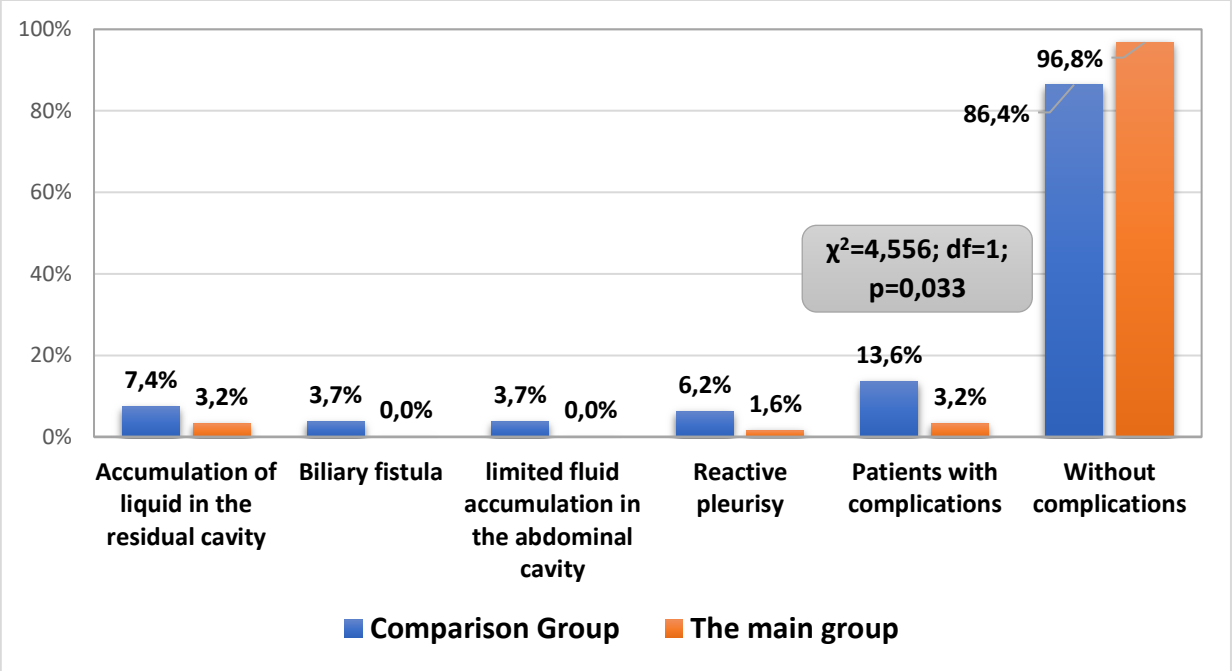


Figure 5. The frequency of immediate complications after open echinococcectomy

By analogy with LapEE in these subgroups, the results of the operations were tracked up to 3 months after the operation. In the comparison group, fluid accumulation in the residual cavity was noted in 6 (7.4%) patients, suppuration of the residual cavity in 2 (2.5%), limited fluid accumulation in the abdominal cavity in 3 (3.7%) cases and reactive pleurisy in 4 (4.9%) patients. In the main group, fluid accumulation in the residual cavity was detected in 2 (3.2%) patients and in 1 of them reactive pleurisy occurred. There were 11 (13.6%) patients with complications in the comparison group and 2 (3.2%) in the main group (χ^2 = 4,556; df = 1; p = 0.033). Puncture treatment was performed in 7 cases in the comparison group and in 1 in the main group.

Summarizing the general results of echinococcectomy with elastic fibrous capsule, in general, it can be noted that the incidence of immediate complications after various variants of echinococcectomy in the comparison group was 17.6% (in 6 out of 34 patients) after LapEE, 13.6% (in 11 out of 81 patients) after OEE, there were 17 (14.5%) complications out of 117 patients. In the main group, after LapEE, the nearest complication developed in 1 (2.5%) patient (out of 40 patients), after OEE in 2 (3.2%) out of 62 patients, there were 3 (2.9%) complications per 101 patients. There were 100 (85.5%) patients without complications in the comparison group and 101 (97.1%) patients in the main group (χ^2 = 9.072; df = 1; p = 0.003).

Within 3 months of follow-up, various complications were noted in 15 (12.8%) patients in the comparison group and 3 (2.9%) in the main group (χ^2 = 7,265; df = 1; p = 0.008). Among them, in the comparison group, complications after LapEE amounted to 4 (11.8%) cases, OEE – 11 (13.6%) cases, in the main group after LapEE in 1 (2.5%) patient and after OEE in 2 (3.2%) patients. Minimally invasive interventions were performed in 7 (6.0%) and 1 (1.0%) cases, respectively, combined treatment (conservatively and minimally invasive) was performed in 4 more (3.4%) and 1 (1.0%) patients.

4. Conclusion

In patients with echinococcosis of the liver, the presence of an elastic fibrous capsule allows for open operations in 74.5-78.7% (for both groups) to perform complete suturing of the residual cavity (54.3-69.3%) or drainage (9.3-20.2%), in 12-12.8% of patients it is possible to perform abdominization of the residual cavity and only in 9.3-In 12.8% of cases, due to the difficult localization of the cyst (more often deeply intraparenchymatous), the

operation is limited to drainage of the residual cavity with a minimum volume of pericystectomy. In turn, with the availability of echinococcal cysts for laparoscopic intervention, the probability of performing wide abdominization was 42.1-68.9%, and in other cases only partial pericystectomy with drainage is performed. At the same time, the use of the proposed method of treating the residual cavity with an elastic fibrous capsule in both open and laparoscopic interventions reduces the risk of early and late specific complications. Thus, the incidence of complications in the early postoperative period in the comparison group was 14.5%, whereas in the main group it was 2.9% ($\chi^2 = 9.072$; df = 1; p = 0.003), and in the period up to 3 months after surgery this indicator was 12.8% versus 2.9% ($\chi^2 = 7.265$; df = 1; p = 0.008), which reduced the need for repeated minimally invasive interventions in these periods from 9.4% to 2.0%.

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