

Evaluation of the Clinical Effectiveness of FarGALS in the Residual Cavity Treatment after Echinococectomy

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Abstract **Aim of the research** was to assess the clinical efficacy of residual cavity (RC) treatment with FarGALS in terms of the frequency of complications and recurrence of liver echinococcosis (LE). **Material and Methods.** The study included 308 patients in whom RC after echinococectomy (EE) was treated with FarGALS according to the proposed method, and 301 patients in whom RC was treated with other drugs and methods. The groups were matched by sex, age, structure of the main and concomitant diseases. **Results.** After traditional interventions in the FarGALS group, complications occurred in only 1.8% cases, while in the group of other methods, complications were noted in 4.2% cases. Also, a lower incidence of complications was noted in the FarGALS group with the use of PAIR and PEVAC techniques: 10.5% versus 25.0% in the group of other RC treatment methods. After laparoscopic EE, the mean drainage times were also shorter after RC treatment with FarGALS, amounting to 4.6 ± 2.3 days versus 8.0 ± 3.7 days after other treatments ($p < 0.05$). A statistically significant difference ($p < 0.01$) regarding the timing of drainage removal after treatment with RC with FarGALS was also obtained after conventional EE. The recurrence rate of LE in the main group after treatment with RC with FarGALS was 2.0%, which was statistically significantly ($p = 0.041$) lower than with other methods of RC treatment (5.3%). The overall frequency of relapse-free course was 98.0% in the main group and 94.7% in the comparison group. **Conclusion.** The clinical efficacy of treatment of RC after EE with the FarGALS is characterized by decrease in the frequency of specific complications, the average drainage time, as well as a reduction in the risk of recurrence.

Keywords FarGALS

1. Introduction

According to the estimates of the World Health Organization, on a global scale, vector-borne and parasitic diseases affect more than 2 billion people, including the incidence of echinococcosis, a tapeworm infection of the genus *Echinococcus* (Taeniidae family), reaching up to 200 people per 100 thousand population annually [1,2,3]. Echinococcosis most often affects the liver. The main characteristic of liver echinococcosis (LE) is its high invasion causing cysts and cystic ruptures aiding spread of helminth eggs throughout the human body [4,5].

There is no single generally accepted protocol for surgical treatment of LE, based on shape and stage of the disease, which is due to insufficient evidence base in terms of developing indications for various surgical approaches (minimally invasive or traditional operations) and methods of eliminating and treating the residual cavity (RC) after echinococectomy (EE) [3,6,7].

One of the main principles of LE treatment is the inactivation of living scolexes, while the challenge of modern LE surgery remains the issue of RC treatment, especially in cases of giant or multiple echinococcal cysts, since cyst size is defined as an important predictor of morbidity and mortality, and large RCs are associated with an increased risk of disease recurrence [2,5,8]. However, the known methods for the elimination and treatment of RC are ineffective for calcification or increased rigidity of the cystic chitinous membrane. Chemical, physical and biological agents are widely used as antiseptic solutions for the treatment of RC and scolicidal agents (2% formalin solution; 96% ethanol solution; 20% hypertonic saline solution; 5% iodine solution; 30% sodium thiosulfate solution; 1% dioxidine solution; 0.05% chlorhexidine; 0.1% furagin; laser irradiation; ultrasonic cavitation; heat treatment with steam and cryodestruction) with varying efficiency in different forms and localizations of LE [3,9,10]. At the same time, the question of the penetrating ability of known antiseptics to influence the scolexes located in the thickness of the fibrous capsule remains unknown. This is due to the fact (25% and more) with high recurrence of LE after interventions [11,12]. Thus, despite significant advances in the surgical treatment of LE, many of its aspects that have a potentially decisive

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influence on the postoperative outcome and patients' quality of life are far from definitive and are the subject of further research and discussion.

Aim of the research was to assess the clinical efficacy of RC treatment with FarGALS in terms of the frequency of complications and recurrence of LE.

2. Material and Methods

The study included 308 patients in whom RC after EE was treated with FarGALS according to the proposed method, and 301 patients in whom RC was treated with other drugs and methods. A total of 609 patients. The groups were matched by sex, age, structure of the main and concomitant diseases. Female patients predominated. In terms of age, most of the patients were of working age, from 18 to 44 years old. Echinococcosis in the form of a primary solitary cyst was detected in the right lobe of the liver in most cases. The majority of patients (57.8%; 352 out of 609) were diagnosed with primary solitary LE. Further, according to the frequency of occurrence, primary-multiple, recurrent solitary and recurrent-multiple forms of LE were identified. The study also included complicated forms of LE, among which cases of cyst suppuration predominated. With solitary LE, cysts of 8-10 cm in size were most often detected. In multiple LE,

cysts of 8-10 cm were most often diagnosed.

The patients were also classified according to the sonographic classification recommended by the WHO (2010). So, intermediate stages of the disease (CE III) accounted for half of the cases, both in the comparison group and in the main group. The inactive stage of the disease (CE IV) was detected least of all.

All patients included in the study underwent surgical treatment of LE. At the same time, a significant part of the patients underwent traditional LE.

3. Results

From table 1, it can be seen that after traditional interventions in the FarGALS group, complications occurred in only 1.8% (4 out of 225) cases, while in the group of other methods, complications were noted in 4.2% (11 out of 263) cases. After laparoscopic EE in the FarGALS group, complications were observed in 4.4% (2 of 45) patients, and in the group of other methods - 13.3% (4 of 30). Also, a lower incidence of complications was noted in the FarGALS group with the use of PAIR and PEVAC techniques: 10.5% (4 out of 38) versus 25.0% (2 out of 8) in the group of other RC treatment methods.

Table 1. Frequency of complications from the OP during treatment with FarGALS

Type of surgery	Treatment of the residual cavity with FarGALS (n=308)				Other methods (n=301)			
	Complications		Without complications		Complications		Without complications	
	n	%	n	%	n	%	n	%
Traditional EE	4	1.8%	221	98.2%	11	4.2%	252	95.8%
Laparoscopic EE	2	4.4%	43	95.6%	4	13.3%	26	86.7%
PAIR and PEVAC	4	10.5%	34	89.5%	2	25.0%	6	75.0%
Total	10	3.2%	298	96.8%	17	5.6%	284	94.4%

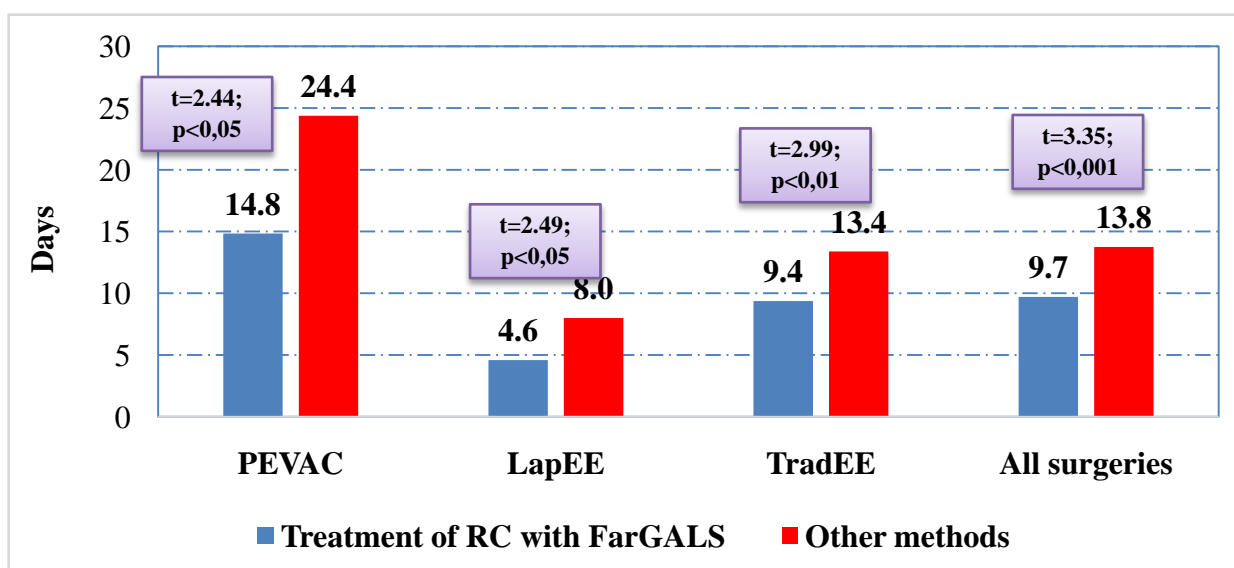


Figure 1. Timing of drainage removal when treating OP with FarGALS

Table 2. Frequency of EP recurrence in the study group after treatment with RC with FarGALS

Type of surgery	Treatment of the residual cavity with FarGALS (n=256)				Other methods in main group (n=262)				Other methods in comparison group (n=488)			
	Recurrence		Without Recurrence		Recurrence		Without Recurrence		Recurrence		Without Recurrence	
	n	%	n	%	n	%	n	%	n	%	n	%
Traditional EE	3	1.7%	174	98.3%	12	5.4%	212	94.6%	30	7.3%	383	92.7%
Laparoscopic EE	1	2.4%	41	97.6%	1	3.3%	29	96.7%	4	9.1%	40	90.9%
PAIR and PEVAC	1	2.7%	36	97.3%	1	12.5%	7	87.5%	3	9.7%	28	90.3%
Total	5	2.0%	251	98.0%	14	5.3%	248	94.7%	37	7.6%	451	92.4%
χ^2	4.212; df=1; p=0.041											
	1.348; df=1; p=0.246											
	9.998; df=1; p=0.002											

Repeated interventions after RC treatment with FarGALS were performed in 2 of 308 (0.6%) patients, which was significantly less than in the group of other RC treatment methods (1.7%; 5 of 301).

The average time of drainage removal was 14.8±5.1 days with RC treatment with FarGALS and 24.4±10.7 days with other methods in cases of using the PEVAC technique (t=2.44; p<0.05). After laparoscopic EE, the mean drainage times were also shorter after RC treatment with FarGALS, amounting to 4.6±2.3 days versus 8.0±3.7 days after other treatments (t=2.49; p<0.05). A statistically significant difference (t = 2.99; p<0.01) regarding the timing of drainage removal after treatment with RC with FarGALS was also obtained after conventional EE (Fig. 1).

The recurrence rate of LE in the main group after treatment with RC with FarGALS was 2.0% (5 of 256), which was statistically significantly ($\chi^2=4.212$; df=1; p=0.041) lower than with other methods of RC treatment (5.3%; 14 out of 262), both after traditional and after minimally invasive interventions (Table 2).

In the same area of interventions, relapse of the disease occurred with a lower frequency in the main group after treatment with RC with FarGALS, however, as in cases of relapses in other localizations. The overall frequency of relapse-free course was 98.0% in the main group and 94.7% in the comparison group (Table 3).

Table 3. Localization of recurrence of echinococcosis relative to the primary location

Localization of recurrence	Main group		Comparison group	
	n	%	n	%
In the same area	1	0.4%	6	2.3%
In other segments within the share	3	1.2%	6	2.3%
In another share	0	0.0%	1	0.4%
In the liver and abdomen	1	0.4%	1	0.4%
No relapse	251	98.0%	248	94.7%

4. Conclusions

The clinical efficacy of RC treatment with FarGALS is

characterized by a decrease in the frequency of specific complications from 5.6% to 3.2%, the average drainage time from 13.8±11.2 to 9.7±7.2 days (t=3.35; p<0.001), as well as a reduction in the risk of recurrence when combined with postoperative chemotherapy from 7.6% and 5.3% to 2.0% ($\chi^2=4.212$; df=1; p=0.041), while the frequency of local recurrence in the area of the previous intervention decreased from 2.3% to 0.4%.

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