Our 30 Years Of Experience In The Treatment Of Pulmonary Echinococcosis Tashkent Medical Academy

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Relevance. Echinococcosis is a fairly common disease throughout the world [6,7,9]. Unfortunately, Uzbekistan is regarded as one of the endemic countries in accordance with this disease. So, according to the combined statistics, it was revealed that in the country the intensive incidence rate of echinococcosis is 5.82 people per 100,000 populations, up to 4.5 thousand people undergo surgical treatment every year, and more than a quarter of them suffer from developed complications [4.5 ,6]. However, this problem, today, concerns not only Uzbekistan. This is evidenced by the fact that the WHO has organized an information center for its prevention and treatment [7].

According to the information by WHO, more than 1 million people are affected by echinococcosis at every concrete time. The WHO Foodborne Disease Burden Epidemiology Reference Group (FERG), which was established in 2015, estimates that globally, echinococcosis causes 19 300 deaths and approximately 871 000 disability-adjusted life years each year. The annual costs associated with the treatment of patients and losses in livestock production due to cystic echinococcosis are estimated at 3 billion US dollars [9].

At present, conservative and surgical methods are used to treat echinococcosis [1,8,9]. The latter, according to the majority, are the most effective [1,2,3,4,8]. At the same time, when choosing a method of surgical intervention, taking into account the possibility of reinvasion, majority prefer organ-preserving operations [3,4,5]. According to others, for the radical intervention in echinococcosis, it is considered necessary to perform only closed echinococcectomy - without opening the cyst ("ideal", resection of the organ with a cyst, removal of the lobe), justifying this choice by the fact that with the long-term existence of cystic formation, the fibrous membrane of the parasite can be impregnated germinal elements up to exogenous budding of the larvocyst [1,2,8].

An essential component of the treatment of echinococcosis, according to many researchers, is chemotherapy [1,3,5,7,9]. Chemotherapy with albendazole has reduced the frequency of recurrence of echinococcosis, according to some authors, up to 2% of cases [6].

In this article, we would like to share our own 30-year experience in the treatment of pulmonary echinococcosis (PE) and changes in its treatment.

Materials and research methods. For the period from 1991 to 2021, 1886 patients with PE were examined in the multidisciplinary clinic of the Tashkent Medical Academy, who underwent surgical interventions in 1824 (96.7%) cases, in other cases, patients received only conservative treatment with albendazole.

In order to assess the effectiveness of PE treatment, we conditionally divided our 30-year experience into 3 periods of activity: I - from 1991 to 2000, II - from 2001 to 2010 and III - from 2011 to 2021.

488 patients in period I, 755 in period II, 643 in period III were treated. The difference between these periods is that in period I, the use of chemotherapy in the postoperative period was not mandatory, and the proportion of minimally invasive interventions was minimal. In the II and III periods, the appointment of chemotherapy in the postoperative period was mandatory as the proportion of the latter increased. At the same time, in period III, in cases of planned operations, chemotherapy was also carried out 10 days before the upcoming intervention.

The age of the patients varied from 18 to 75 years (mean age 36.7±2.4 years). Among the treated patients, there were 796 (42.2%) men and 1090 (57.8%) women. According to these indicators, the compared groups were representative.

There were 331 (17.6%) patients, who live in city, and 1555 (82.4%) residents of the village of the total amount. It was noted that the number of urban population among patients with PE is growing from year to year, which, in our opinion, is associated with the relocation of villagers to cities. So, if at the beginning of our work, the ratio of the urban population to the rural population was approximately 1:8, then by the end it became like 1:4.

From those who applied, PE was detected in 377 (20%) patients during a preventive examination or with detected liver echinococcosis, and in the rest - during examinations that were carried out in connection with existing complaints. It should be noted that 262 (13.9%) patients were previously operated on for PE in other clinics, and in 40 cases in ours. The number of transactions transferred earlier in the compared periods is shown in Table 1.

Table 1. The number of previously transferred operations for EL by periods

Number of previous operations	Period I (n=488)	Period II (n=755)	Period III (n=643)	Total
1 time	62	87	85	234 (12,4%)
2 times	10	21	20	51 (2,7%)
3 times	2	8	7	17 (0,9%)
Total	74 (15,2%)	116 (15,4%)	112 (17,4%)	302 (16%)

Solitary cysts were detected in 1523 (80.5%) cases, and in the remaining 363 (19.5%) cases they were multiple. At the same time, 2 cysts were detected in 218 patients, 3 - in 84, 4 or more - in 61. Bilateral lesions were noted in 221 (11.7%) patients.

In 238 (12.6%) patients, a combined lesion of other organs was revealed: in combination with liver echinococcosis in 211 (11.2%) cases, spleen - in 19, brain - in 3, myocardium - in 5 cases.

Complicated course of echinococcosis was noted in 624 (33.1%) cases. The most frequently noted breakthrough of the cyst in the bronchus was observed in 368 (19.5%) cases. Cyst suppuration was noted in 174 (9.2%) cases, breakthrough into the pleural cavity - in 82 (4.3%) cases. With the development of these complications, hemoptysis was noted in 62 (3.2%) cases. Their frequency in the compared periods was approximately the same.

As a rule, operations were carried out in a planned manner. In cases of cyst rupture into the bronchus or into the pleural cavity, urgent operations were performed.

With a bilateral lesion, a phased operation was performed with an interval of 1 to 2 months. At the same time, the intervention was performed from the side at the first stage where there was a complication, with an intact cyst on the other side.

Staged intervention-+ was also used for combined echinococcosis. At the same time, 6in cases of close location of cysts (combination of echinococcosis of the lower lobe of the right lung and the right lobe of the liver, lower lobe of the left lung and spleen) and the impossibility of performing a minimally invasive intervention, one-stage operation by thoracophrenolaparotomy was preferred.

When choosing the type of surgical intervention, given the endemicity of our region in relation to echinococcosis (possibility of reinvasion), frequent multiple lesions, preference was given to organ-preserving surgery - echinococcectomy (EE). The latter, given the rapid rehabilitation and cosmetic effect, in patients with PE, of course, sought to perform minimally invasive, especially in the II and III periods of activity. Resection methods of interventions were used less frequently. Indications for lobectomy were cases of multiple lesions of one lobe, giant

cysts, cysts with severe pneumosclerosis. The types of interventions performed for PE in different periods of activity are presented in Table 2.

If necessary, the treatment of the residual cavity used 100% glycerol.

Results and discussions. Video-assisted echinococcectomy (VAEE) was performed in 658 (36.1%) cases of those operated. The cases of conversions observed during the introduction of VAEE (5 cases: 2 cases of adhesions, 2 cases of deep cyst location, 1 case of severe perifocal inflammation) and developed complications in the postoperative period (in 8 cases a residual cavity developed: 4 cases of severe perifocal inflammation, 3 cases of with a cyst size of more than 15 cm, 1 case with a complex cyst shape) allowed us to develop criteria for selecting patients for it. Thus, when selecting patients with PE for VAEE, the following factors were taken into account: the size, number of cysts, the nature of the lesion of the lung tissue, and the presence of a history of surgical interventions on the side of the lesion.

Table 2. Types of interventions performed at different periods in EL

Types of interventions	Period I	Period II	Period III	Total
Echinococcectomy	313(65,7%)	122 (16,8%)	99 (15,9%)	534 (29,3%)
Echinococcectomy with atypical lung resection	78 (16,4%)	168 (23,1%)	143 (23%)	389 (21,3%)
Echinococcectomy with pleurectomy	19 (4%)	41 (5,6%)	22 (3,6%)	82 (4,5%)
Lobectomy	18 (3,8%)	64 (8,8%)	79 (12,7%)	161 (8,8%)
VAEE	48 (10,1%)	332 (45,7%)	278 (44,8%)	658 (36,1%)
Total	476	727	621	1824

Our experience in performing minimally invasive interventions for PE has allowed us to develop the following contraindications for it:

- the presence of multiple cysts located in different lobes of the lung;
- cysts with a diameter of more than 15 cm;
- complicated cysts: cyst suppuration with severe perifocal inflammation; breakthrough of the cyst into the pleural cavity;
- recurrent echinococcal cysts, or a history of, for another reason, thoracotomy on the side of the lesion.

With the aim of reducing the number of residual cavities after VAEE, we have developed a new original capitonnage method with a deep residual cavity (more than 7 cm). The essence of this method lies in the fact that after removing the chitinous membrane of echinococcus and processing its residual cavity, the central part of the bottom of the residual echinococcal cavity is captured by suturing. One end of this thread is axial, the other end is a spiral seam. Starting from the captured area of the central part of the bottom of the residual cavity, a suture is applied in a clockwise spiral, capturing the walls of the residual echinococcal cavity. In this case, after the whole completion of the helix turn, and subsequently after each turn, the seam is tied with the axial end of the thread, which is involved in the creation of a spiral coil. Then, the next turn of the spiral is performed, while the pitch of each of the turns of the helix should be as minimal as possible, not exceeding 2 cm (Fig. 1). One of the defining moments of the application

of this method of capitonnage is its execution around one axis, which is important when performing VAEE of the lungs.

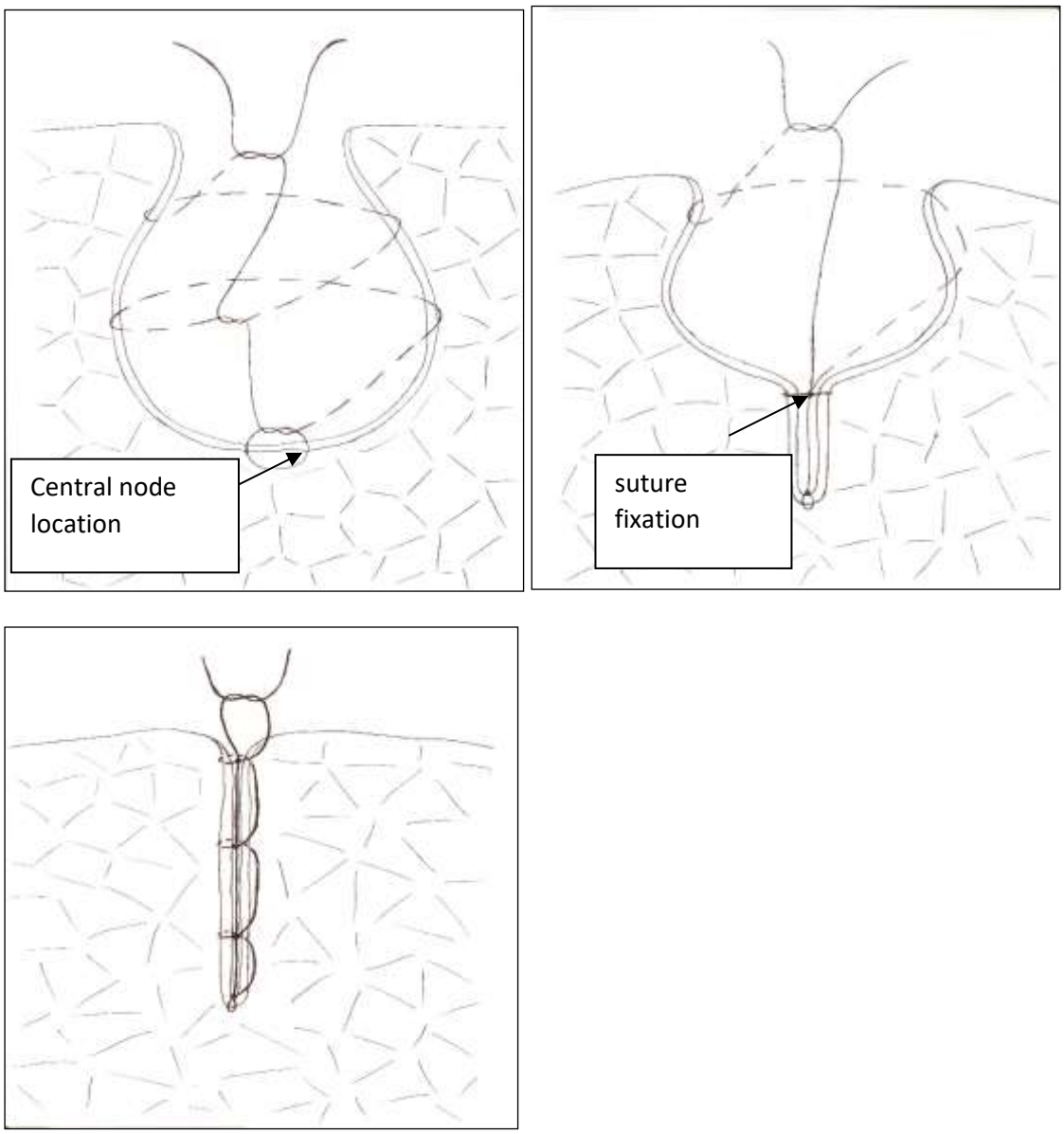

Fig. 1. Scheme of our proposed capitonnage method.

The advantages of VAEE mentioned above and the minimum number of relapses of the disease, while taking albendozole, allowed us to widely use them in the II and III periods of activity, replacing, with the available indications, echinococcectomy by thoracotomy access (EETA). As can be seen from Table 2, the number of EETA decreased by 2.5 times in period II, and by 3 times in period III. In addition to this factor, the decrease in the number of EETAs was also facilitated by the fact that after their implementation in cases of severe perifocal inflammation, a giant cyst, the development of a residual cavity or pneumocirrhosis with hemoptysis was noted, which subsequently required repeated surgical intervention at various times of the long-term period. Taking this into account, in such cases in the II and III periods, either atypical lung resection or lobectomy was performed more often (Table 3).

Table 3 Comparative incidence of residual cavity and segmental pneumocirrhosis complicated by hemoptysis after various surgical interventions for EL

Types of interventions	Period 1 (n=476)	Period 2 (n=727)	Period 3 (n=621)	Total
Echinococcectomy	15	3	2	20

Echinococcectomy with atypical lung resection	3	2	2	7
Echinococcectomy with pleurectomy	2	1	1	4
Lobectomy	-	-	-	
VAEE	8	1	1	10
	28 (5,9%)	7 (0,9%)	6 (0,9%)	36 (2,2%)

An obligatory component of the PE treatment in the II and III periods of activity after the performed VAEE, as well as after the EETD, was the appointment of chemotherapy. Against its background, recurrence of the disease after VAEE was noted only in 3 (0.5%) cases.

Chemotherapy was performed depending on the condition of the echinococcal cyst. Thus, in case of uncomplicated cysts, albendozole after surgery was prescribed at a dose of 10-12 mg per 1 kg of the patient's weight for 2 months with a week break, which corresponded to 1 course of chemotherapy. For complicated cysts, 2 courses of chemotherapy were prescribed with a one-month break.

In 62 cases, albendozole was prescribed not for prophylactic purposes, but for therapeutic purposes. At the same time, chemotherapy courses ranged from 3 or more. As a rule, such treatment was resorted to in cases of small cysts (up to 2 cm) with intraparenchymal location (11 cases), as well as in cases of multiple lesions (dissemination (51 cases)). It would be better to note that of all cases of dissemination, one case developed after our surgical intervention (intraoperative seeding occurred). Taking the latter into consideration, in the III period of our activity, albendozole was also prescribed 10 days before the proposed surgical intervention.

Carrying out the above selective treatment tactics and the PE prevention scheme in stages II and III of activity, we achieved a decrease in the number of relapses of the disease, the data on which are shown in Table 4.

As can be seen from Table 4, the frequency of PE recurrence decreased from 4.2% in period I to 1.2% in period II. In period III, although this indicator is lower than period I, it increased to 1.7% compared to period II.

An analysis of the dynamics of PE recurrence by years in different periods of activity showed that out of 11 cases of PE relapse in period III, 6 patients entered to our clinic in the period from 2020 to 2021 (diagram 1).

Table 4 Comparative incidence of EL recurrence after various surgical interventions

Types of interventions	Period 1 (n=476)	Period 2 (n=727)	Period 3 (n=621)	Total
Echinococcectomy	8	3	4	15
Echinococcectomy with atypical lung resection	6	2	3	11
Echinococcectomy with pleurectomy	4	2	2	8
Lobectomy	1	1	1	3
VAEE	1	1	1	3
Total	20 (4,2%)	9(1,2%)	11 (1,7%)	40 (2,2%)

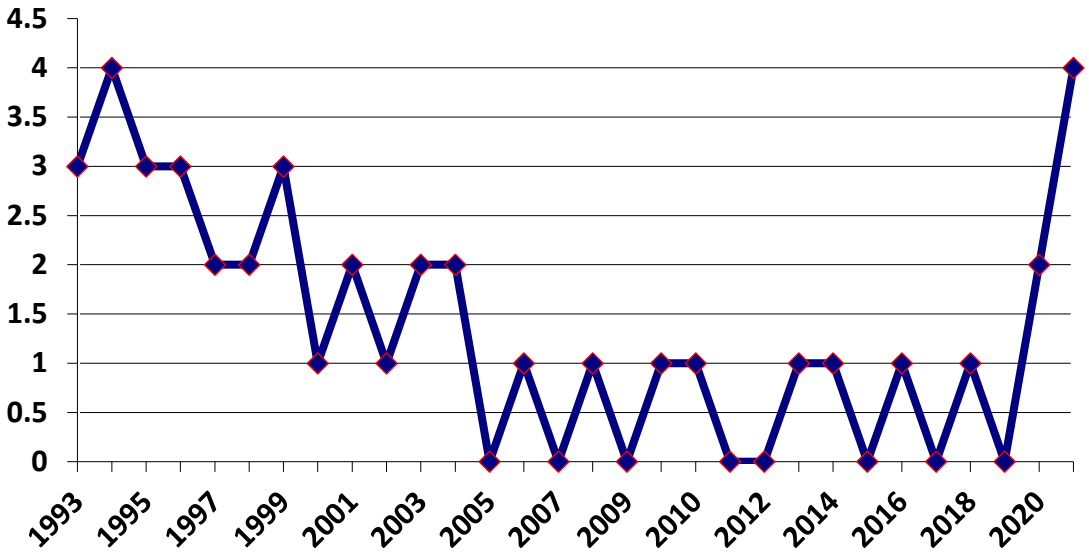

Diagram 1. Dynamics of cases of PE recurrence.

All these 6 patients were previously operated on in 2012 (1 patient - was performed for recurrent echinococcosis EE with atypical resection), in 2015 (2 patients: in 1 case after EETD due to multiple cysts, in 1 case after VAEE), in 2016 (2 patients: 1 case each after EE with pleurectomy and EE with atypical resection after multiple recurrent EL (Fig. 3)), in 2017 (1 patient - a lobectomy was performed, PE was found on the contralateral side). All of them received appropriate chemotherapy in full and were under our supervision for 3 years after the surgical intervention. Given the absence of recurrence, they were subsequently removed from our observation.

All these patients in 2020-2021 suffered a new coronavirus infection, as a rule, in a moderate form, the treatment of which was carried out according to the protocol applied at that time. A persistent cough for more than 1 month with no dynamics on the radiograph contributed to a CT scan, which revealed a recurrence of PE in them. Two of them were operated on due to the associated hemoptysis, and in the rest, the prescribed conservative therapy with albendazole was successful.

In our opinion, the transferred new coronavirus infection, as well as the drugs used to treat it, contributed to a decrease in immunity in these patients. The latter, in patients who had an aggravating factor for the development of PE recurrence, intensified this process.

Thus, analyzing our 30-year experience in the treatment of pulmonary echinococcosis, we believe that among the various types of surgical intervention currently existing, organ-preserving echinococcectomy is a justified method. Under the existing conditions (uncomplicated cysts up to 15 cm, located peripherally), it is preferable to perform it minimally invasively using video endoscopic technique.

In cases of small complicated cysts, we consider it expedient to perform echinococcectomy with partial resection of lung tissue. Lobectomy is advisable in the presence of several cysts in one lobe or a giant cyst, as well as in a complicated cyst with severe pneumosclerosis.

We believe that a mandatory condition for the surgical treatment of PE is the postoperative chemotherapy with albendazole according to the established schemes, and before planned surgery, it is necessary 10 days before the upcoming intervention.

In cases of impossibility (high risk) or inexpediency (intraparenchymal location of small cysts, multiplicity of lesions) of surgical intervention, chemotherapy with albendazole is used as an independent treatment for PE.

The applied tactics of EL treatment made it possible to reduce the number of reoperations associated with developed complications from 5.9% to 0.9%, as well as the number of relapses of the disease from 4.2% to 1.2%. At the same time, in cases of multiple or combined lesions, in our opinion, dispensary observation with preventive chemotherapy courses should be carried out for at least 5 years, especially against the background of a new coronavirus infection.

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