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IMPROVEMENT OF HYGIENIC AND SURGICAL ASPECTS OF PREVENTION OF ECHINOCOCCAL DISEASE

(monograph)

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ANNOTASION

Echinococcosis is the most common parasitic disease, endemic for Central Asian countries, including Uzbekistan. Preventive measures currently applied against echinococcosis, to a certain extent effective, but insufficient. Insufficient public awareness of the EB, its causes of the occurrence and clinical manifestations, non-compliance with the elementary prophylaxis rules contributed to the development of a "card - questionnaire" of surveys of patients suffering from EB. The choice of therapeutic - diagnostic tactics in eb in most cases depends on the nature of the lesion, the number and size of the EC, as well as in the choice of the most optimal access and methods of isolation of the operating field, the anti-parasitic treatment of cysts and the rational drainage of residual cavities based on the principles of adipasitarity and echinockelectomy antiparasitarity, Enhance the radicals of operations and sharply reduce the likelihood of recurrence of the disease.

АННОТАЦИЯ

Эхинококкоз является наиболее распространенным паразитарным заболеванием, эндемичным для стран Центральной Азии, включая Узбекистан. Профилактические меры, применяемые в настоящее время против эхинококкоза, в определенной степени эффективные, но недостаточны. Недостаточная информированность населения о ЭБ, его причин возникновения и клинических проявлений, несоблюдении элементарных правил профилактики способствовало к разработке “Карты – анкеты” обследования больных, страдающих ЭБ. Выбор лечебно – диагностической тактики при ЭБ в большинстве случаев зависит от характера поражения, количества и размеров ЭК, а также в выборе наиболее оптимального доступа и методов изоляции операционного поля, антипаразитарной обработки кисты и рационального дренирования остаточных полостей, основанные на принципах апаразитарности и антипаразитарности эхинококкэктомии, повышают радикальность операций и резко снижают вероятность рецидивов заболевания.

АННОТАЦИЯ

Эхинококкоз Марказий Осиё давлатлари, жумладан Ўзбекистон учун кенг тарқалган эндемик, паразитар касаллик ҳисобланади. Ҳозирги кунда эхинококкозга қарши қўлланилган профилактик чоралар маълум даражада самарали, аммо бу етарли эмас. ЭК, унинг келиб чиқиш сабаблари ва клиник намоён бўлиши, элементар прафилактика қоидаларига амал қилмаслик ҳақидаги маълумотларнинг аҳоли учун етарли эмаслиги ЭК билан касалланган беморларни текшириш учун “Саволнома карта”сини ишлаб чиқишга сабаб бўлди. ЭК да даволаш-диагностик тактикани саралаш кўпинча эхинококкдан шикастланиш, эхинококк миқдори ва ҳажмига, шунингдек апаразитлик ва эхинококкэктомия антипаразитлик тамойилларига асосланган ташриҳ майдонини ажратишнинг мақбул усулларини танлаш, кистага антипаразитар ишлав бериш ва қолдиқ бўшлиқни рационал дренирлашга боғлиқ бўлиб, ташриҳ радикаллигини оширади ҳамда касаллик қайталаниш эҳтимолини кескин камайтиради.

LIST OF ABBREVIATIONS

CHWC - cholelithiasis without calculi

CHL - cholelithiasis

GE - germinal elements

IHD - ischemic heart disease

IOUSE - intraoperative ultrasound examination

ELISA - enzyme-linked immunosorbent assay

PEE - perfect echinococectomy

RLL - round ligament of the liver

CT - computerized tomography

SRC - suppurative residual cavity.

SRLC - suppurative residual liver cavity

RC - residual cavity

PCT - prophylactic chemotherapy

ELISAR - enzyme-linked immunosorbent assay reaction

LAR - latex agglutination reaction

IHR - indirect hemagglutination reaction

REL - recurrent echinococcosis of the liver

REA - retrospective epidemiologic analysis

Ultrasound - ultrasound examination

FC - fibrous capsule

CSH - chitinous sheath

CT - chemotherapy

PPN - percutaneous puncture nephrostomy

EC - echinococcal cyst

ECL - echinococcal cyst of the liver

EL - echinococcosis of the liver

EE - echinococcectomy

INTRODUCTION

Echinococcal disease is an endemic pathology in a number of regions of the world, including the Republic of Uzbekistan (46, 47, 49, 50, 55, 89). The disease is registered in all regions of the republic. According to the Republican Center for State Sanitary and Epidemiological Surveillance in 2017, the number of people suffering from echinococcosis in Uzbekistan was 2.1%, and the incidence among children under 14 years of age was 1.2 per 100,000 population (Suvonkulov U.T., et al., 2018). The current trend is due to a number of factors, which primarily include the deterioration of the sanitary and epidemiological situation, primarily in regions endemic for echinococcosis, problems with the clinical examination of the population, including in risk groups (29, 32, 37, 38, 50, 101, 112, 137).

Uzbekistan is one of the regions endemic for echinococcosis. The prevalence of echinococcosis in the republic, detected by seeking medical care, is 5.82 per 100 thousand people and has a steady upward trend. Over 1,500 people with echinococcosis are diagnosed in the republic per year. The causative agent of echinococcosis is the tapeworm Echinococcocus granulosus, people become infected by ingesting the parasite's eggs contained in contaminated food products, water, or direct contact with animals that are hosts of the parasite.

Among the risk factors for infection with Echinococcosus granulosus, the leading ones are sanitary and hygienic conditions, overcrowding of living space, poor personal hygiene, and poor nutrition.For their nutrition, echinococcal cysts use proteins, fats, vitamins, microelements of the host organism and disrupt the absorption of vitamins. The echinococcus larva lives at the expense of the host, feeding on nutrients, microelements and other important bioelements extracted from it. Protective and adaptive reactions develop between the host and the parasite, and metabolic processes are ensured. The leading role in the development of echinococcal disease should be attributed to sanitary and hygienic living conditions, violation of rational nutrition and failure to comply with personal hygiene rules.

[1]Echinococcosis. - World Health Organization "https;\\\\www.who.ipt..." fact sheet" WHO is working towards approval by 2020 and "On a strategy to control cystic echinococcosis"

In the fight against echinococcosis, increasing the level of sanitary and hygienic skills of the population is important (60, 61, 77, 78, 86).

Despite the improvement in the standard of living in general, a steady increase in the incidence of echinococcosis is noted with the expansion of the geographical boundaries of the disease (71, 72, 86, 87). Preventive measures currently used against echinococcosis are effective to a certain extent, but insufficient; there is no tendency to reduce the incidence of the disease among the country's population, which often leads to chronic diseases, unpleasant complications and disability. The main reason for this is the lack of awareness of the population about this invasion and the factors of its transmission, as well as violations of food hygiene.

To improve the diagnostics, treatment and prevention of echinococcal disease, a number of screenings are carried out in the world for early detection of patients and provision of timely treatment and preventive care, development of various methods of echinococcectomy and elimination of the residual cavity, including tactical aspects of performing surgical interventions.

Diagnostics of echinococcosis presents significant difficulties in a number of cases, since the issues of repeated reinvasion and forgotten untreated cysts remain unresolved, and the long-term, often atypical clinical course of the disease creates certain difficulties in modern diagnostics and leads to the development of severe complications that pose a threat to the lives of patients (22, 23, 58, 122). A number of issues of diagnostics and treatment of echinococcosis are far from being resolved and the proportion of complicated forms of the disease remains high (25.4–84.65%), the number of postoperative complications and relapses ranges from 3 to – 54%, mortality 3.1–8.6% (4, 5, 48, 58, 50, 85).

Despite significant progress in surgery in recent decades and improvement of surgical techniques for echinococcal disease, there is a high incidence of recurrence of echinococcosis [4, 5,19, 27, 31]. Many aspects concerning the causes of disease recurrence, peculiarities of its clinical manifestation, as well as methods of prevention and treatment, have not been solved and need further study.

Thus, such factors as insufficient awareness of residents of endemic areas, especially in the rural sector, about the ways of transmission of this disease, neglect of elementary methods of prevention and violations of food hygiene cause an increase in the number of patients with echinococcal disease.

All of the above is a reason to continue the study of this very important and urgent problem. Severe disease outcomes associated with late diagnosis and inadequate treatment, as well as insufficiently developed therapeutic and preventive measures dictate the need to improve methods of detection of patients at early stages of the disease.

CHAPTER I. EPIDEMIOLOGIC, HYGIENIC AND UNRESOLVED ISSUES OF TREATMENT AND PREVENTION OF ECHINOCOCCAL DISEASE AT THE PRESENT TIME

§1.1 Prevalence, etiology of echinococcosis and characterization of its causative agent

Echinococcal disease (ED) is an endemic pathology in a number of regions of the world, including the Republic of Uzbekistan [1, 5, 32, 46, 49, 71, 72, 84]. Echinococcosis is widespread on all continents of the globe, except Antarctica, and in all climatic zones - from the northern Arctic latitudes to the south of Argentina. The World Health Organization (WHO) and other international organizations (FAO, UNEP) consider echinococcosis as one of the most urgent health problems [13].

The current trend is caused by a number of factors, which, first of all, include the deterioration of the sanitary and epidemiological situation, primarily in regions endemic for echinococcosis, problems with the dispensary of the population, including those in risk groups [1, 4, 10, 15, 22, 35, 78, 81, 98, 100, 102]. In addition, in the last decade there has been an expansion of the geographical boundaries of the disease, i.e., the presence of the disease occurs outside endemic zones, due to population migration [58, 48, 84].

At any given time, the number of people with the disease worldwide may exceed one million Many of these individuals may have severe clinical syndromes that can be life-threatening if untreated. Even with EB treatment, the quality of life of people often deteriorates [58, 66, 71, 101].

The tendency to increase the number of detected cases of echinococcosis in recent years is noteworthy. At the same time, the greatest number of cases was noted in the administrative centers of cities - Andijan, Fergana, Samarkand, Bukhara, where there are no treatment and preventive and sanitary-epidemiological centers engaged in the diagnosis of echinococcosis [71, 85, 87].

Infection of people occurs by ingestion of parasite eggs contained in contaminated food, water, direct contact with animals that are hosts of the parasite [1, 9, 10, 16, 29, 10, 72, 79, 83].

According to most authors, there are three subspecies of echinococcosis: E. veterinorum - characterized by the presence of brood capsules and echinococcal fluid in the larvocyst cavity, without daughter bubbles; E. hominis - inside which in addition to the fluid there are brood capsules and protoscolexes, from which subsequently formed daughter and granddaughter bubbles. In favorable conditions of development, which is more often observed in the localization of echinococcal cysts in the lung tissue, daughter bladders and germinal scolecules are absent, and such cysts are called acephalocysts - E.acephalocystis [49, 50, 110, 111, 113,].

. In recent decades, significant genotypic and phenotypic variability within E. granulosus species has been identified. Several genetic variants of the pathogen are distinguished: G1 - “common”, “domestic sheep”; G2 - “Tasmanian sheep”; G3 - “buffalo”; G4 - “horses”; G5 - “cattle”; G6 - “camels”; G7 - “pigs”; G8 - “reindeer”; G9 - “lions”; G10 - “Fennoscandinavian reindeer” [6, 7, 39, 56, 57, 72, 75, 83, 114, 115, 127].

A characteristic feature of all the above biological variants (biovars) of the helminth (except for the lion helminth) is the use of dogs and other members of the family Canidae as definitive hosts, but each strain differs in its intermediate hosts, peculiarities of geographical distribution, morphology of sexually mature individuals and metacestodes, time of maturation in the organism of the definitive host, organ localization of metacestodes, and intensity of protoscolex production [20, 23, 62, 75, 79, 92, 95, 95, 116, 117].

§1.2 Epidemiologic features of echinococcosis

Human echinococcosis is a severe parasitic disease, which has the character of endemic foci and which include the republics of Central Asia, the entire North Caucasus, the southern regions of Russia and Stavropol Krai [6, 7, 19, 37, 41, 46, 46, 47, 49, 50, 51] According to an estimate created in 2015 by the WHO Reference Group on the Epidemiology of the Burden of Foodborne Diseases (FERG), worldwide EB causes 19300 deaths and about 871000 disability-adjusted life years lost annually. At the same time, a period of decline in the incidence of echinococcosis has been replaced by an increase in its incidence, which has led to its almost ubiquitous distribution, making the traditional ideas about the endemicity of the pathology very conditional. WHO worked on the approval of effective strategies to combat echinococcal disease in 2020 [13].

Since the 1990s in Uzbekistan, the incidence of echinococcosis in people has been registered more frequently, also due to the expansion of instrumental diagnostics capabilities. The prevalence of echinococcosis in the republic, detected on the basis of demand for medical care for 2003-2017, is 2.4-6.01 per 100 thousand population and has a steady tendency to increase [71, 85, 86]. More than 1500 persons with echinococcosis are detected in our country per year.

The increase in the growth of echinococcal disease among the population is also noted not only among people in rural areas, but also among the urban population, which is largely due to the increased migration of the population, the unsatisfactory state of the sanitary service and health authorities, the low level or lack of dispensaryization of the population, unresolved sanitary-epidemiological and socio-economic problems [25, 38, 67, 68, 75, 77, 83].

Changed socio-economic conditions of life of the population, active introduction of private property, development of farming and individual production, increasing migration of population from near and far abroad countries, intensification of the processes of anthropogenic transformation of nature, leading to changes in the habitat of parasitic pathogens in the environment, make it necessary to review and adjust existing approaches to the prevention of human parasitic diseases [29, 41, 45, 59, 61, 65, 106, 110, 118, 119, 119, 120, 123].

At the same time, a key role in improving the epidemiologic situation of echinococcosis is played by large-scale sanitary-educational and preventive measures [6, 7, 12, 35, 66, 79, 124, 125,]. The relevance of this problem is also related to the fact that the currently applied complex of preventive measures, including only detection, treatment of patients and sanitary and educational work, cannot provide high and sustainable results [74, 79, 89, 91, 93, 100, 106, 128, 129, 136].

Due to the increased costs of disease diagnosis, costs associated with hospitalization, care, treatment and patient disability, which is most pronounced in endemic regions [70, 71, 84, 98, 124, 131, 133, 139] duration of hospitalization and recovery are very important indicators in this regard.

It is estimated that the duration of hospitalization for echinococcosis ranges from 2 weeks to one month or more. In economically prosperous regions, where diagnosis and treatment are carried out with modern means, the duration of hospitalization can be halved [1, 3, 5, 8, 74, 140, 148, 148, 150, 153, 155].

The total annual damage from human and animal lesions in endemic countries can range from several tens of millions to two billion dollars [88, 89, 93, 110, 126, 135, 140,]. When studying the socioeconomic damage of echinococcosis, it was shown that the worldwide DALY (disability-adjusted life years - the number of lost life years adjusted for the duration of the disease) is 1-3 million annually [8, 9, 22, 33, 91, 99, 126, 134, 137]. According to authors' calculations, in case of incomplete registration of echinococcosis, economic losses from the disease may be 4 times higher than the expected value [88, 101, 105, 111, 125, 126].

The variability of socio-economic and natural conditions contributes to the diversity of factors operating in different micro- and macro-territories and determines the originality of epidemiological and epizootological features of invasion in each of them [15, 16, 19, 20, 48, 69, 72, 138, 140, 142, 144]. For this reason, much of the research on the problem of echinococcosis is devoted to the determination of contingents and risk factors in relation to human infection with the helminthiasis.

In some cases, differences in the sex structure of the diseased are also revealed. A study in China [9 3] found that women were significantly more likely to contract echinococcosis. According to [46, 58], the proportion of female people with a predominance of working age increased in the structure of morbidity, which indicates the intensity of transmission and ineffectiveness of the conducted measures. These facts dictate the need to improve approaches to the prevention of echinococcosis. According to a study conducted in Iran by N.A. Ahmadi et al. (2006)

[91], it was found that 55.9% of those who contracted echinococcosis were women. The main share of the diseased fell on housewives (47.3%) and farmers (16.6%) in the total population structure and, accordingly, was an indicator of their greatest involvement in the epidemic process.

In a study by C.N.L. Macpherson et al. (2004) [124] conducted in Morocco, it was determined that women accounted for 59.5% of cases and men for 40.5%.

A study in the Kyrgyz Republic found that 62.9% of those who became ill had dogs in their households. Among the sick owners of farm dogs, 98.7% of them had dogs with access to vegetable gardens [2, 38].

According to the data of D. Carmena et al. (2008) [101] in areas where the proportion of affected farm animals with echinococcosis was more than 20% of the population, the incidence rate exceeded 1.1 per 100 thousand population. Thus, the authors showed the relationship between echinococcosis infestation of farm animals and human morbidity.

Biological protection of the parasitic system, including Echinococcus, can be provided by cross-infection of wild and domestic ungulates. Thus, in the Kabardino-Balkar Republic, echinococcus circulation has been detected in the system "spotted deer-dog-large/small horned cattle", "roe deer-dog-large/small horned cattle", "Caucasian tour-dog-large/small horned cattle" [3, 7, 30, 34, 43, 45, 64, 68, 81]. [3, 7, 30, 34, 43, 45, 63, 64, 65, 68, 81].

Maintaining a high level of echinococcosis infestation in farm animals may be a consequence of extensive contamination of the territory with the feces of dogs, both domestic and stray [1, 3, 6, 7].

In the Russian Federation, all three types of echinococcosis foci have been found: natural, mixed, and synanthropic. Natural foci of echinococcosis predominate in the northern part of the taiga zone and tundra, from Karelia to the Bering Strait and northeastern Siberia. In these areas, circulation of echinococcus occurs between moose and reindeer as intermediate hosts and wolves as definitive hosts. In the Republic of Sakha-Yakutia, the infestation of wolves amounted to 40%, moose - 68%, and reindeer - 1.0%. It has been shown that human infestation from wild animals in the territory of the Russian Federation is possible in natural foci of echinococcosis through contact with cut hides of carnivores [9, 10, 75, 77, 78, 79, 80, 81].

Prevention programs focus on deworming of dogs, which act as definitive hosts of the parasite. In the case of cystic echinococcosis, control measures also include hygiene in abattoirs and public education campaigns. Vaccination of sheep is also used as an additional preventive measure [9, 11, 12, 14].

In Uzbekistan, according to the authors' data, the most frequently occurring outbreaks for the period 2003-2017 were also recorded. At the same time, the highest rates were recorded in Khorezm region with an intensity of 12.5 per 100 thousand population in 2003 and 3.0 per 100 thousand population in 2017. In Bukhara region, the incidence rates of echinococcosis were 11.3 and 4.9 per 100 thousand population, respectively. The incidence in these oblasts was twice as high as the national average. Relatively high incidence rates of echinococcosis were observed in Kashkadarya oblast - 7.7 in 2003 and 2.3 in 2017, as well as in Jizzak, Navoi and Fergana oblasts. The intensive incidence rate was lowest in Andijan and Tashkent oblasts and in the city of Tashkent [72, 88].

In some districts of Uzbekistan with the most developed sheep breeding, such as Samarkand province, echinococcosis had the highest prevalence: in Nurabad district - 509, Urgut district - 512 and Taylak district - 503. The survey showed that in most farms the sanitary condition of sheep farms is not in order, in some cases farms do not meet veterinary requirements, not everywhere there are disposal pits [71, 84, 85]. In some farms, the extensiveness of this infestation among sheep reached 80-90% and more with high intensity of infestation.

To date, infectious and parasitic diseases remain one of the most frequent causes of human disease in the world [13, 73, 74, 78, 88, 105, 145, 146, 148]. Emphasizing the importance of parasitic pathology, WHO Director General Margaret Chan 7 years ago in her first public speech said: “Parasitic diseases are not new 'scare' diseases. This 'invisible' pathology is ever-present among the poor, causing immeasurable suffering. The number of patients is difficult to count, although it runs into the millions. Politicians, the media and health organizers neglect these diseases, dubbed “neglected diseases”, partly because their names are difficult to pronounce. The damage caused by parasitic pathology is immeasurably greater than the few hundred identified cases of avian influenza that have been scaring us for 10 years” [13, 15, 16, 22]. [13, 15, 16, 22, 25, 32, 36, 77, 83, 149, 150, 151, 152]. Changed socio-economic conditions of life of the population, active introduction of private property, development of farming and individual production, increasing migration of the population from near and far abroad countries, intensification of the processes of anthropogenic transformation of nature, leading to changes in the habitat of parasitic pathogens in the environment, make it necessary to review and adjust existing approaches to the prevention of human parasitic diseases [29, 31, 58, 60, 61, 67, 83, 91, 93, 153, 154, 155, 156].

The interaction between medical and veterinary organizations plays an important role. It implies, first of all, a comprehensive analysis of indicators characterizing the epidemic process of echinococcosis and epizootological aspects in the endemic territory, which has not been previously conducted in the Fergana Valley of the region.

§1.3. Hygienic Factors and Preventive Measures in Echinococcosis

Throughout life, almost every person suffers from a parasitic disease, with children being the most affected. School-aged children and younger children account for 90-95% of all cases of enterobiasis.

Helminthiases are parasitic diseases caused by worms (from the Greek "Helmins" - worm, helminth), characterized by prolonged, chronic courses and a wide range of clinical manifestations. The list of human parasitic worms includes 384 species of helminths.

The development of echinococcosis is influenced by a number of negative ecological, social, domestic, and specific physical, chemical, and other environmental factors. All of this negatively affects metabolism, immunity, and subsequently the state of health, work capacity, and lifespan of individuals [21, 35, 41, 59, 68, 69, 73, 86, 88, 92, 96].

A multifactorial analysis conducted in Jordan [107], Uzbekistan [46, 49, 50, 70, 71, 86], and Kyrgyzstan [3, 38, 119] concluded that the consumption of contaminated water is a significant risk factor for humans. Additionally, it was noted that consuming vegetables and fruits from personal gardens reduced the risk of human infection [78, 83]. The authors point out the low awareness of the population regarding the possibility of echinococcal invasion and the routes of disease transmission.

According to U.V. Bagaeva (2009) [6], the unfavorable epizootiological and epidemiological situation regarding echinococcosis may be due to the lack of hygienic education for the population on the prevention of invasions in humans and animals.

According to authors [70, 71, 72], a study involving 2022 residents of the Nurabad (509 people), Urgut (512 people), and Taylak (503 people) districts of the Samarkand region and Samarkand city (498 people) indicated that an epidemiologically significant indicator characterizing the degree of contact between hosts and infectious material was the proportion of individuals with antibody titers of 1:320 and higher.

According to the Institute of Nutrition of the RAMN, the majority of patients admitted to surgical hospitals have significant nutritional status disorders manifesting as malnutrition and undernourishment (20%), hypovitaminosis and avitaminosis (90%), and changes in immune status (50%). Initial nutritional disorders, insufficient patient nutrition, and inadequate correction of metabolic disturbances significantly reduce the effectiveness of treatment measures, especially after surgical interventions, while increasing the risk of postoperative complications, which negatively affect the length of hospital stays and recovery processes.

Moreover, as demonstrated by the experience of both domestic and foreign clinicians, eliminating nutritional deficiencies significantly improves treatment outcomes, reduces the frequency and severity of postoperative complications (from 46% to 17%), and mortality (from 17% to 6%), significantly shortens hospital stays (by 25%), and enhances the quality of life of operated patients.

Insufficient nutrition in surgical patients, due to stress and surgical interventions, leads to a significant decrease in the body's reserve and adaptive capabilities, contributing to the emergence of complications post-surgery [20, 78, 83]. The likelihood of postoperative complications increases in patients, making up 30-50% of all surgical hospital patients [19, 31, 52, 82]. Addressing the issue of insufficient nutrition in surgical patients from a hygienic perspective requires a balanced intake of essential nutrients, adequate to the body's altered needs [20].

At the same time, the insufficiently studied characteristics of actual nutrition in patients with echinococcosis do not allow for the development of a system of hygienic measures to optimize therapeutic nutrition for this category. In patients who have undergone surgery, there is a sharp increase in energy metabolism in the immediate postoperative period, mainly due to an inadequate increase in actual basal metabolism. In this case, energy deficits often reach levels such that even with the consumption of an ordinary diet (2500-3000 kcal/day), patients still experience pronounced protein-energy malnutrition [76]. This results in a shift to complete or partial endogenous nutrition, leading to rapid depletion of carbohydrate and fat reserves, as well as significant protein loss. These phenomena significantly worsen the course of the regeneration process, prolong the postoperative wound healing process, consequently creating prerequisites for the development of postoperative complications [17, 76].

According to Gumenyuk V.T. and Fetisov G.K. [17], the nutrition of the population is excessively caloric, imbalanced in quantitative and qualitative terms, and eating patterns are disrupted. The data obtained laid the groundwork for developing measures to enhance public awareness of the basic principles of healthy nutrition and measures for personal and public prevention of alimentary-dependent diseases.

Surveying the population to assess the role of hygienic education and training in increasing the sanitary literacy of various population groups and the importance of leading a healthy lifestyle is a crucial aspect of preventing the development of parasitic diseases such as echinococcosis [Appendix 1].

Efforts in hygienic education and training require a continuous search for new information technologies and the improvement of the sanitary education system in the most relevant areas to ensure sanitary and epidemiological well-being [9, 17, 64, 88].

Thus, conducting sanitary and educational work in urban branches allows for the rapid deployment of intensified targeted sanitary and educational work for specific infections in the event of a deteriorating epidemic situation, taking into account the forms of work that have proven effective. In our opinion, at the level of primary health care, depending on the epidemiological analysis, families with dogs, close contact with dogs or other pets should be identified as at-risk groups: urban residents whose families own carnivorous animals; urban residents who migrated from rural areas; rural residents; and residents from endemic regions.

§1.4. Clinical and Diagnostic Aspects of Echinococcosis

The diagnostic capabilities related to echinococcosis at the national level have been significantly influenced by social factors: in Uzbekistan, screening studies using radiological and ultrasound methods have become widely used, allowing for the early diagnosis of echinococcosis [5, 8, 19, 23, 27, 28, 33, 37, 46].

During the period of restructuring and subsequently, the registration of invasions was carried out at the stage of pronounced cyst growth and the development of complications. In cases of late detection of echinococcus, the duration of treatment increased, and the course of the disease less frequently had a favorable prognosis [4, 5, 24, 35, 51, 97, 98, 100].

Echinococcal cysts, regardless of their localization, may remain asymptomatic for an indefinite period, and only with the onset of inflammatory processes in the cyst and surrounding tissue do clinical symptoms appear [5, 37, 47, 52, 53, 55, 69].

The first signs of echinococcosis may appear years or even decades after it first develops. Early diagnosis of invasion was quite challenging due to the late onset of complaints from patients. The clinical signs of invasion that arose were extremely nonspecific: the most common laboratory sign, eosinophilia, was reported to occur in 25-33% of cases according to some authors, and up to 83% according to others.

The situation was complicated by the fact that many doctors placed parasitic diseases last in differential diagnoses [10, 15, 47, 55, 62, 82].

Ultrasound diagnostics, due to its safety, low cost, and convenience, has been used for screening in many countries [10, 14, 87, 139, 145]. However, a drawback of ultrasound examination (US) was that cysts in the liver could go unrecognized in the early stages of the disease, and there were also difficulties visualizing cysts in extrapulmonary locations (lungs, brain, etc.), where they also went undetected [109].

Serological studies aimed at detecting antibodies to the echinococcosis pathogen in the body represent an important direction in the early diagnosis of echinococcosis and allow for obtaining more objective data on the epidemiological situation regarding the disease.

Currently, the most modern serological methods for determining the content of anti-echinococcal antibodies are enzyme-linked immunosorbent assay (ELISA), immunoblotting, and immunoelectrophoresis [121].

A.M. Qaqish et al. (2003) [141] found the highest number of positive results among agricultural workers and semi-nomadic populations in individuals aged 11-20 years, confirming the diagnostic value of serological studies for earlier detection of pathology. O.T. Kuttubayev et al. (2010) [38] showed that the proportion of individuals with antibodies to echinococcus in their blood could reach 6.4% of the total population.

Despite this, studies dedicated to examining the serological prevalence and prevention of echinococcosis in endemic areas of Uzbekistan are quite limited.

§1.5. Surgical Treatment Methods for Echinococcosis

The primary medication used for the treatment of echinococcosis was mebendazole. However, its relatively low efficacy and significant side effects prompted researchers to develop more effective and less toxic drugs for the chemotherapy of echinococcus.

The combination of chemotherapy with hepatoprotective agents and infusion therapy has shown good therapeutic effects in some cases [42, 46, 47]. Albendazole is currently the most studied and effective drug [42, 46, 156]. In the preoperative period, 54 patients with liver echinococcosis underwent antiparasitic therapy with albendazole at a dose of 10 mg/kg of body weight for 20-30 days. As a result, the combination with developed cavity sanitation methods ensured the performance of radical surgical interventions and the absence of disease recurrence in the postoperative period.

Currently, surgical intervention is considered the gold standard for the treatment of liver echinococcosis according to several authors [42, 47, 49, 51]. However, an important task remains the choice of the correct preoperative preparation strategy, surgical approach, and anesthetic support.

The most common type of surgical intervention for liver echinococcosis, including complicated forms, is echinococcectomy with various methods of eliminating the residual cavity [42, 46, 51, 62].

In preventing disease recurrence in patients with liver echinococcosis, intraoperative chemical treatment of the echinococcal cyst is an important factor [48, 100]. Many various methods of acting on the residual cavity have been developed and widely used. For instance, hypertonic solutions, povidone-iodine, liquid forms of albendazole, glycerin and dimethyl sulfoxide solutions, ethanol, and formalin are commonly used in practice [42, 48, 62]. One of our objectives was to determine complications with the possibility of their exclusion after liver echinococcectomy, as well as to identify the capabilities of ultrasound examination for detecting and correcting these complications, since readiness for them significantly contributes to timely prevention and correction [4, 5, 47, 49].

Resume

Thus, the existing literature data at the present stage indicate a lack of consensus on echinococcosis and its causes. Several factors influence the incidence of echinococcosis in the population, including climatic-geographical, socio-economic, therapeutic-preventive aspects, as well as an insufficient level of preventive measures against this invasion.

Considering the conditions that determine the intensity of invasion transmission, as well as the groups at high risk of infection, is necessary for developing scientifically justified plans to combat echinococcosis. The variety of known treatment methods and the ambiguous attitudes towards them complicate the formulation of the right tactical decision in each specific case.

The stages, dispensarization, and development of therapeutic-diagnostic tactics for patients with echinococcosis using modern diagnostic, hygienic, and therapeutic technologies, as well as their clinical evaluation, are insufficiently reflected in the literature and require further study.

Given all of the above, improving diagnostics and surgical treatment tactics, educational and preventive measures in regions with high morbidity of echinococcosis patients, and postoperative rehabilitation in the context of developing complications is one of the urgent directions in modern medicine.

Chapter II. MATERIALS AND METHODS OF RESEARCH

§2.1. General Characteristics of Patients and Research Methods

The foundation of this work is based on the experience accumulated over many decades in the surgical clinics of the Andijan State Medical Institute, which are specifically focused on the treatment and rehabilitation of patients with echinococcosis. To achieve the set goals and objectives, the results of operated patients with complicated and uncomplicated forms of echinococcal disease were analyzed.

The study included patients treated between 2010 and 2020 in the surgical clinics of Andijan State Medical Institute and the surgical departments of the Fergana and Namangan regions of the Republic of Uzbekistan.

In particular, an analysis of morbidity and the effectiveness of hygienic and therapeutic-preventive measures for both adult and pediatric populations with echinococcosis was conducted across various districts of the Andijan region, characterized by different climatic conditions and agricultural focuses (the cities of Asaka and Shahrikhan) over the period from 2010 to 2020. The analysis encompassed key parameters such as the level and structure of morbidity; long-term dynamics of morbidity; and the intensity of epidemic manifestations across different age and socio-professional groups within the population.

A review was conducted on the examination, surgical treatment, and study of the actual nutrition of 486 patients with echinococcosis of various localizations at the surgical clinics of Andijan State Medical Institute during the period from 2010 to 2020.

To address the outlined tasks, hygienic, epidemiological, clinical-instrumental, and statistical methods were employed, along with a population survey.

The long-term morbidity of echinococcosis in the population of Andijan region from 2010 to 2020 was examined based on data from Form No. 2 of the state statistical observation "Information on Infectious and Parasitic Diseases." Data were collected from Form No. 003/u "Inpatient Card" for the years 2010-2020 from the following medical organizations: the

Children's Surgery Center of the Andijan region, the Andijan branch of the Republican Scientific Center for Emergency Medical Assistance, the Multi-Profile Medical Center of the Andijan region, the Central City Hospital of Andijan city, the surgical departments of the Andijan State Medical Institute, and other central district hospitals (CDH) in the region, where surgical treatment of echinococcosis was performed.

In accordance with the objectives of the study, patients were divided into two groups.

The comparison group consisted of 658 individuals with echinococcal disease in the Andijan region who had undergone treatment for echinococcosis. This group was further divided into two subgroups:

Subgroup A included 402 individuals with echinococcosis, in which an analysis of morbidity was conducted and the effectiveness of sanitary-hygienic measures for the prevention of echinococcal disease was studied for the period from 2010 to 2017.

Subgroup B included 256 operated patients with echinococcosis who received inpatient treatment using standard diagnostic and preventive methods in clinics based at the surgical department of Andijan State Medical Institute from 2010 to 2017.

The main group consisted of 622 patients residing in the aforementioned districts (Asaka, Shahrikhan, Pakhtabad, Izboskan, Oltiinkul, and Andijan districts) where measures for early detection and prevention of echinococcal disease among the population were implemented. This group also involved studying the actual nutrition and dietary behavior of individuals suffering from echinococcal disease, as well as applying preventive measures and tactical-technical principles of antiparasitic therapy in conjunction with improved treatment methods. The patients in the main group were also divided into two subgroups:

Subgroup A comprised 392 individuals with echinococcosis who underwent measures to enhance the quality of medical examinations and prevention of echinococcal disease among the population, studying the actual nutrition and dietary behavior from 2018 to 2020.

Subgroup B included 230 operated patients with echinococcosis who were subjected to developed hygienic and preventive measures with individualization of actual nutrition based on echinococcosis according to a questionnaire developed by us, as well as tactical-technical principles of antiparasitic therapy combined with improved treatment methods at the surgical clinics of Andijan State Medical Institute from 2018 to 2020.

All patients were categorized by gender and age according to WHO classification (see Tables 2.1 and 2.2).

Table 2.1

Distribution of patients with echinococcosis depending on gender and age in the study groups (subgroup A)

Age (years)	Comparison group (n=402)						Main group (n=392)					
	men		women		Total		men		women		Total	
	Abs	%	abs	%	abs	%	abs	%	abs	%	abs	%
Up to 20	59	14,6	77	19,1	136	33,8	57	14,5	66	16,8	123	31,3
21-40	71	17,6	91	22,6	162	40,2	63	16,1	79	20,1	142	36,2
41-59	26	6,5	37	9,2	63	15,6	39	9,9	49	12,5	88	22,4
Older than 60	18	4,5	23	5,7	41	10,1	16	4,1	23	5,8	39	9,9
Total	174	43,2	228	56,7	402	100	175	44,3	217	55,3	392	100

As can be seen from the table, women slightly prevailed in the compared groups (56.2% and 43.8%). In the comparison and main groups, the proportion of patients aged 19-41 years was significantly predominant: 71% and 77.7%, respectively. The proportion of patients aged 41-60 years was 21.4% and 15.6%, and in the elderly 7.7% and 6.5%, respectively (see Tables 2.1 and 2.2).

The main contingent consisted of persons of working age, which determined the importance of the problem from both medical and social points of view.

Table 2.2

Distribution of patients with echinococcal disease depending on sex and age in the studied groups (subgroup B)

Age (years)	Comparison group (n=256)						Main group (n=230)					
	men		women		Total		men		women		Total	
	abs	%	abs	%	abs	%	abs	%	abs	%	abs	%
Up to 20	33	12,8	48	18,7	81	31,6	32	13,9	42	17,8	74	32,1
21-40	48	18,7	53	20,7	101	39,4	48	20,8	57	24,3	105	45,6
41-59	22	8,5	33	12,8	55	21,4	15	6,5	21	9,1	36	15,6
Older than 60	9	3,5	10	3,9	19	7,4	6	2,6	9	3,9	15	6,5
Toyal	112	43,7	144	56,2	256	100	101	43,9	129	56	230	100

Considering the high incidence of EB in rural areas, we analyzed EB patients by place of residence in a comparative aspect (see Table 2.3).

Table 2.3.

Frequency of echinococcosis morbidity in the studied groups depending on place of residence

Patients	Groups			
	Comparisons (n=658)		Main (n=622)	
	abs	%	abs	%
	Subgroup A (n=402)		Subgroup A (n=392)	
Rural	285	70,8	278	70,9
Urban	117	29,2	114	29,1
Total	402	100	392	100
	Subgroup Б (n=256)		Subgroup Б (n=230)	
Rural	158	61,8	128	55,6
Urban	98	38,2	102	44,4
Total	256	100	230	100

As can be seen from Table 2.3, in both groups of patients there was a prevalence of rural residents compared to the urban population. Thus, in the comparison group, EB among residents of rural areas was 70.8% and 61.8%, urban - 29.2% and 38.2%. In the main group, this rural population was 70.9% and 55.6 and urban population was 29.1% and 44.4%, respectively.

The length of history in this contingent of patients played an extremely significant role in determining risk factors: the longer the EB had existed, the more often unfavorable conditions were created for the organism to adapt to the increase in complications in the pre- and postoperative period (see Table 2.4).

Table 2.4.

Duration of echinococcosis disease in urban and rural population in the studied groups of patients

Indicators	Subgroup A (n=794)							
	Comparison group (n=402)				Main group (n=392)			
	Urban population		Rural population		Urban population		Rural population	
Duration of the disease	abs	%	abs	%	abs	%	abs	%
Up to 1 year	15	3,7	47	11,6	13	3,4	42	10,7
1 – 5 years	63	15,6	123	30,6	62	15,8	125	31,8
More than 5 years	39	9,7	115	28,6	39	9,9	111	28,4
Total	117	29,1	285	70,9	114	29,1	278	70,9
Indicators	Subgroup B (n=486)							
	Comparison group (n=256)				Main group (n=230)			
	Urban population		Rural population		Urban population		Rural population	
Duration of the disease	abs	%	abs	%	abs	%	abs	%
Up to 1 year	10	3,9	12	4,7	17	7,4	14	6
1– 5 years	51	19,9	88	34,4	48	20,8	69	30
More than 5 years	37	14,4	58	22,7	37	16,1	45	19,6
Total	98	38,2	158	61,8	102	44,3	128	55,6

As can be seen from Table 2.4, in the comparison group only 62 (subgroup A - 15.4%) and 22 (subgroup B - 8.6%) patients with EB had a disease duration of less than 1 year by the time of surgery. At that, EB duration from 1 to 5 years was revealed in 186 (subgroup A - 46,25%) and 139 (subgroup B - 54,2%), more than 5 years - in 154 (subgroup A - 38,3%) and 95 (subgroup B - 37,1%) patients.

In the main group a similar picture was observed: EB with duration of disease by the moment of operation up to 1 year was in 55 (subgroup A - 14,1%) and 31 (subgroup B - 13,5%) patients, EB with duration from 1 to 5 years was in 187 (subgroup A - 47,7%) 117 (subgroup B - 50,8%), and more than 5 years - in 150 (subgroup A - 38,2%) and 82 (subgroup B - 35,6%) patients. At the same time, residents of rural areas prevailed in terms of EB duration from 1 to 5 years: in the comparison group 238 (subgroup A - 59.2%) and 146 (subgroup B - 57.1%) patients, and in the main group were 236 (subgroup A - 60.2%) and 114 (subgroup B - 49.6%) patients.

Clinical manifestations of invasion were nonspecific: weakness and malaise were noted in most cases in 623 (94.6%) patients of the comparison group and in 598 (96.1%) patients of the main group (see Table2.5).

Pain syndrome and a feeling of heaviness in the abdomen as the only factor that prompted the patient to undergo ultrasound were noted in 641 (97.1%) and 615 (98.8%) patients. Increased body temperature observed in 175 (26.6%) and 129 (20.7%) cases, in combination with the data of instrumental examination, made it possible to suspect cyst suppuration. From the general clinical signs the presence of jaundice was noted in 25 (3.7%) and 31 (4.9%) patients. The local symptom-complex at EB depended on the localization and size of EC. Thus, hepatomegaly was diagnosed in 48 (9,8%) patients, pain and heaviness in the chest were noted in 28 (4,2%) and 32 (5,1%) patients, and symptoms were accompanied by cough in 32 (4,8%) and 38 (6,1%) patients.

Table 2.5.

Results of the study in the investigated groups by clinical manifestations of EB

Clinical manifestations	Comparison group (n=658 (402+256)		Main group (n=622 (392+230)	
	abs	%	Abs	%
Weakness and malaise	623	94,6	598	96,1
Decrease in performance	432	65,6	407	65,4

Headache	375	56,9	358	57,5
Increase in temperature with chills (periodically)	175	26,5	129	20,7
Subfebrility (periodically)	98	14,8	101	16,2
Nausea (periodic)	237	36,1	197	31,6
Bloating and abdominal enlargement	75	11,3	65	10,4
Feelings of discomfort, heaviness in the right hypochondrium (epigastrium)	641	97,1	615	98,8
Short-term skin itching, urticaria	18	2,7	28	4,5
Jaundice of the skin and sclera of a transient nature	25	3,7	31	4,9
Moderately intense dull (sharp pain in the right hypochondrium)	510	77,5	475	76,3
Cough (periodic), persistent	32	4,8	38	6,1
Salivation (frequent, periodic)	18	2,7	21	3,3
Hemoptysis	12	1,8	9	1,4
Chest pain	28	4,2	32	5,1
Feeling of shortness of breath	5	0,7	9	1,4
Increase in body temperature to 40-41°C	2	0,3	3	0,4
Chills, profuse sweating	12	1,8	15	2,4

The presence of concomitant therapeutic and combined surgical pathology worsened the course of the primary disease and also caused difficulties in determining the treatment strategy. At the same time, the analysis of concomitant pathology was conducted only for patients receiving inpatient treatment at the Department of Surgical Clinics of AndGosMI (see Table 2.6).

Table 2.6

The nature of comorbidities in the studied groups

Comorbid pathology	Comparison group subgroup A (n=256)		Main group subgroup B (n=230)	
	abs	%	Abs	%
IHD	18	7,1	5	2,2
Hypertensive disease	16	6,2	13	5,6

Chronic bronchitis	10	3,9	9	3,9
Chronic pyelonephritis	4	1,5	4	1,8
Chronic hepatitis	8	3,1	10	4,3
Anemia	36	14,1	45	19,6
GDD	3	1,2	4	1,8
CDC	8	3,1	12	5,2
Choledocholithiasis	3	1,1	3	1,3
Ovarian cystoma	4	1,5	3	1,3
Hernia	3	1,1	2	0,8
Gastrointestinal tract of YBDK and YBZh	5	1,9	3	1,3
Diabetes mellitus	8	3,1	6	2,6

Comorbid therapeutic pathology was diagnosed in 102 (39.8%) in the comparison group and 95 (41.3%) patients in the main group, with cardiovascular diseases (CAD) found in 16 (6.2%) patients and 13 (5.6%) patients, respectively; respiratory diseases were present in 10 (3.9%) in the comparison group and 9 (3.9%) patients in the main group. The largest number were patients with chronic anemia - 14.1% and 19.6%, respectively.

For the patients in the main group, we conducted correction of concomitant therapeutic pathology in collaboration with specialists of the corresponding profile. Combined surgical pathologies, for which simultaneous operations were performed, were diagnosed in 18 (7.0%) patients in the comparison group and in 15 (6.5%) patients in the main group. Cholecystectomy was more frequently performed as a simultaneous operation – in 11 (4.2%) and 16 (6.9%) patients, respectively. The course of EB was complicated in patients with diabetes mellitus, which was found in 8 (3.1%) and 6 (2.6%) patients in the studied groups.

§2.2. Methods and Scope of the Study

Agriculture in the Republic of Uzbekistan, due to the natural and climatic features of the region, plays a significant role in the socio-economic development of the area and is also based on animal husbandry and crop production, including vegetable growing on irrigated lands near major cities.

Despite the weak development of livestock farming, our analysis of the long-term dynamics of human echinococcosis morbidity over a 10-year period (2010-2020) shows a trend of increasing morbidity. The absolute increase in morbidity over 10 years was 1.79; the average absolute increase in morbidity was 0.20; the morbidity growth rate was 107.79%, and the average annual morbidity growth rate was 7.0%. Since 2015, there has been an increase in echinococcosis morbidity among the population of Andijan region. The highest rates were recorded in 2015, 2016, 2017, and 2018 (see Fig. 2.1).

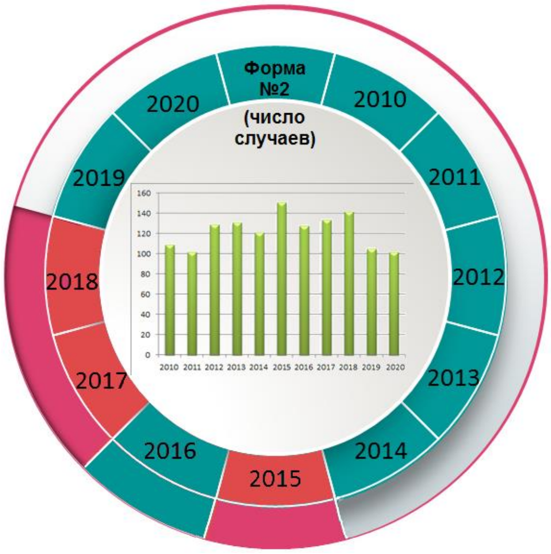


Fig. 2.1. Echinococcosis morbidity rates among the population of Andijan region

As in other regions of the Republic of Uzbekistan, in the Andijan region, the reduction in the incidence of echinococcosis among the population can largely be attributed to the implementation of the orders of the Ministry of Health of the Republic of Uzbekistan "On strengthening measures for the prevention and control of helminthiases" and "On enhancing the activities of the parasitological service," which led to increased efforts in the active detection of patients. Between the maximum incidence rate (3.51) recorded in 2015 and the minimum (1.6) recorded in 2011, there are sharp differences, which may reflect fluctuations in the detection of patients. Nevertheless, the analysis of the epidemic trend of echinococcosis incidence in recent years (from 2015 to 2018) shows that the absolute increase in incidence was 0.91; the average absolute increase in incidence was 0.23;

the incidence growth rate was 34.42%, and the average annual growth rate of incidence was 7.34%, which corresponds to a pronounced growth trend and differs from the trend for the region as a whole and for most districts.

During the population survey, it was found that among residents of rural areas, owners of agricultural animals and dogs were more common than among city dwellers. Thus, contact between people and dogs in livestock farming conditions occurred more frequently in rural areas. This factor can primarily explain the difference in morbidity rates between rural and urban populations.

Due to the fact that the morbidity rate in rural areas exceeded that of urban populations, the study of factors maintaining the epidemic process of echinococcosis was conducted in relation to rural areas.

The most affected area was the Shahrihan district (1st zone with a high level of morbidity). The intensity rate varied from 8.37 to 12.09 per 100,000 population, while the long-term (over 10 years) average rate for the region was 2.5. In terms of echinococcosis invasiveness, the second place was taken by the Asaka district, where the long-term average morbidity rate ranged from 4.65 to 8.36 per 100,000 population; this district was classified as the 2nd zone with an average level of morbidity.

In the analysis of echinococcosis morbidity, we conducted epidemiological, hygienic, and statistical studies (see Table 2.7).

Table 2.7

Analysis of echinococcosis morbidity

Object and materials	Analysis methods	Scope of research
Cases of echinococcosis among the population in Andijan region (form No. 02, form No. 003/u)	Epidemiological	2010-2020 1280 patients
Fragments of echinococcal cysts obtained from sick individuals	Morphological	2018-2020. Model 230
Survey of infected individuals echinococcosis	Survey	2018-2020 622 people

§2.3. Hygienic methods of studying actual nutrition

Evaluation of the results of the study of actual nutrition. In the analysis of the results of the study of actual nutrition, the following were evaluated:

- compliance with the energy value of the diet;
- compliance of the macronutrient content in the diet (proteins, fats, carbohydrates) with the body's needs;
- the content of animal proteins relative to total proteins;
- the content of plant-based fats relative to total fats;
- the contribution of proteins, fats, and carbohydrates to the energy value of the diet;
- the ratio between proteins, fats, and carbohydrates;
- the balance of the amino acid composition;
- compliance of micronutrient content (vitamins, macro- and microelements) with the body's needs;
- the ratio between individual macronutrients (Ca, P, Mg).

Moreover, the dietary regimen was evaluated: the frequency of meals, the intervals between them, and the distribution of the energy value of the diet across meals. When assessing actual nutrition, the food and energy value of the diet were compared with the recommended levels of physiological needs for energy and nutrients in the pre- and postoperative periods.

The study of protein, carbohydrate, and lipid metabolism indicators in patients with echinococcosis upon admission, in the preoperative and postoperative periods was conducted according to the V.D. Vankhanev method, 2003.

§2.4. Comprehensive diagnosis of echinococcosis

In the diagnosis of echinococcosis, general clinical, immunoserological, and instrumental research methods are distinguished. The most informative methods for diagnosing echinococcosis are instrumental imaging techniques—ultrasound (US), computed tomography (CT), and magnetic resonance imaging (MRI)—the emergence and development of which marked a new stage in the diagnosis and surgical treatment of echinococcosis. For the diagnosis of echinococcosis, the ultrasound method was most often used – in 83.3% of the cases. Thus, after a detailed examination of complaints, medical history, and objective research data, general clinical and biochemical blood tests, as well as comprehensive instrumental studies including liver and abdominal organ ultrasounds, were performed. In addition to general clinical and laboratory tests, all patients were required to undergo computed tomography and blood ELISA.

2.4.1. Sonographic characteristics of the stages of development of echinococcal cysts

We applied the ultrasound classification based on H.A. Gharbi (1981) and supplemented by the unofficial WHO working group on echinococcosis (WHO-IWGE, 2003, 2010). According to this classification, the following stages are distinguished: CL (cystic lesion) – cystic formation; CE1 and CE2 (active) – active stages of the cyst with the presence of viable parasites; CE3a and CE3b (transitional) – transitional, intermediate; CE4 and CE5 (inactive) – inactive stages of the cyst with the presence of non-viable parasites. CE1 and CE3a are early stages, CE4 and CE5 are late stages of echinococcal cysts, which determine the differentiated treatment strategy (see Table 2.8). Despite all the advantages of the ultrasound diagnostic method, its informativeness depends on the stage of the parasite's development (alive or dead).

Table 2.8

The results of the study depending on the sonographic classification of the stages of development of echinococcal cysts in the examined groups.

Stages of development of echinococcal cysts	Comparison group (n=256)		Main group (n=230)		Total n=486	
	abs	%	abs	%	abs	%
CE1 and CE2 (active) – active stages with the presence of viable parasites	105	41,1	93	40,4	198	40,7

CE3a and CE3b (transitional) – transitional, intermediate	83	32,4	78	33,9	161	33,1
CE4 and CE5 (inactive) – inactive stages, cysts with viable parasites	68	26,5	59	25,7	127	26,2
Total	256	100	230	100	486	100

As seen in Table 2.8, the largest number of patients were identified with CE1 and CE2 type cysts (41.0% and 40.7%), with live cysts and multiple daughter cysts. At the same time, CE3a and CE3b cysts were diagnosed in 3.4% of cases in the re-infection group and in 33.9% of cases in the main group, while CE4 and CE5 cysts were found in 26.5% and 25.7% of cases, respectively.

2.4.2. Computed tomography of echinococcal cyst

The accuracy of differential and topical diagnosis, the panoramic nature of the image, the ability to assess the size of cysts, their relationship with vascular structures, and the stage of parasite development are undeniable advantages of this method, allowing for the proper planning of surgical tactics. CT allows for the detection of cysts with a diameter of less than 1 cm, as well as the differentiation of dead and small echinococcal cysts from tumors. According to the literature, the informativeness of CT in the diagnosis of echinococcosis is over 95%.

§2.5. Methodology of Cytological and Morphological Studies

Despite advancements in the treatment of echinococcosis, the recurrence rate is 3-54%. The embryonic elements of echinococcosis are responsible for postoperative recurrences, and reliable disinfection of the embryonic elements of echinococcosis plays an important role in preventing reinvasions.

A special section of the research was the cytology of the cyst contents for the presence of scolices and the determination of the lifespan of embryonic elements under the influence of disinfectants. Additionally, we conducted a morphological study of the fibrous capsule before and after disinfection.

And then, taking into account the principles of anti-parasitism, we performed puncture of the echinococcal cyst with a thick needle, evacuated the cyst contents with an electrosuction device, after which the cavity of the fibrous capsule in the comparison group was filled with warm 0.02% furacilin solution and 30% hypertonic solution, while in the main group it was filled with 80% glycerin solution, 0.02% decasan solution, and 10% betadine solution with an exposure of 3-5-10 minutes.

Intraoperative germicidal treatment of the residual cavity of the fibrous capsule was carried out depending on the complications of echinococcal cysts.

In both studied groups, before and after these treatments, the contents of the cyst were taken for cytological examination, and material was excised from the wall of pieces of the fibrous capsule measuring 1.0 x 1.0 cm for histological examination. The specimens were fixed in a 10% formalin solution. Additionally, morphological studies of the fibrous capsule were performed in both groups. The specimens were stained with hematoxylin-eosin.

For conducting cytological studies, native preparations were prepared and stained with hematoxylin-eosin using the Papanicolaou method, which is the global standard for cytological material research.

During the echinococcectomy operation, the contents of the cyst before and after processing the residual cavity of the fibrous capsule were collected in a sterile tube. The material was then centrifuged, and native and stained smears were prepared from the sediment. Romanowsky-Giemsa stain and azure-eosin were used for staining the smears, which were then examined under a microscope at low and high magnification, where echinococcal hooks and fragments of the chitinous shell could be identified.

The viability of the embryonic elements was determined through microscopic examination. Signs of protoscoleces death included: swelling, delamination, and disruption of the tegument's integrity; the release of liquid contents from the parenchyma to the outside through defects in the tegument; the smoothing of the parenchyma structure; deformation or detachment (in evaginated forms) of the hook crown, while signs of acanthocyst death included: a decrease in the turgor of the cysts (down to complete collapse) and disruption of their layered shell integrity.

This method reliably allows for the assessment of the effectiveness of the disinfection method. Microscopic studies were conducted using the "BIOLAM SYAN" light microscope at a magnification of x400 (x10 – eyepiece, x40 – objective, x1000, x1500 on the slide).

2.5.1. Morphological Studies

Histological examination of the fibrous capsule of an echinococcal cyst, pieces of the cyst wall measuring 1.0x1.0 cm of the fibrous capsule of the echinococcal cyst were fixed in neutral formalin. The material for histological examination was embedded in paraffin, and 4-6 μm thick sections were stained with hematoxylin-eosin and picrosirius red according to Van Gieson.

§2.6. Criteria for evaluating the effectiveness of treatment and methods for statistical processing of clinical material

The effectiveness of the treatment was evaluated based on the results of a comprehensive examination conducted 3, 6, and 12 months after preventive and hygienic measures, after the operation, with long-term results tracked over 1-5 years. We divided the patients into 4 main groups, which included excellent, good, satisfactory, and poor treatment outcomes: Group I – excellent result: complete absence of disease symptoms after the operation; the patient is practically healthy, does not follow a diet, and performs previous work.

Group II – good result: the patient is satisfied with the outcome of the surgery, however, experiences a brief feeling of heaviness in the right hypochondrium and epigastric area; no significant changes are detected upon objective examination; the patient is practically healthy, has gained weight, and work capacity is fully restored.

Group III – satisfactory result: the patient requires periodic sanatorium-resort treatment and outpatient examination; adheres to a diet during periods of complaints; body weight is stable or tends to decrease; he can perform his previous work with the limitations specified by the ITC.

Group IV A – poor result: the patient is not satisfied with the outcome of the surgery; requires treatment in a specialized surgical department. The decision regarding reoperation can only be made if antiparasitic chemotherapy and conservative treatment are unsuccessful.

Group IV B – poor result: the clinical picture of EB recurrence arises, requiring repeated surgical intervention.

Resume

Based on the obtained data, it can be concluded that the detection of echinococcosis in the studied area was predominantly passive, that is, it was carried out based on the population's requests for help. At the same time, the clinical manifestations of the invasion were extremely scarce.

The research data were statistically processed on a Pentium-IV personal computer using the Microsoft Office Excel-2010 software package. Methods of variation parametric and non-parametric statistics were used, calculating the arithmetic mean of the studied indicator (M), the standard deviation (s), the standard error of the mean (m), and relative values (P). The statistical significance of the obtained measurements when comparing means was determined using the Student's t-test with the calculation of the error probability (P) when checking for normality of distribution (using the kurtosis criterion) and equality of population variances (using Fisher's F-test).

CHAPTER III. EPIDEMIOLOGICAL ASPECTS, OPTIMIZATION OF COMPREHENSIVE HYGIENIC AND PREVENTIVE MEASURES FOR ECHINOCOCCOSIS

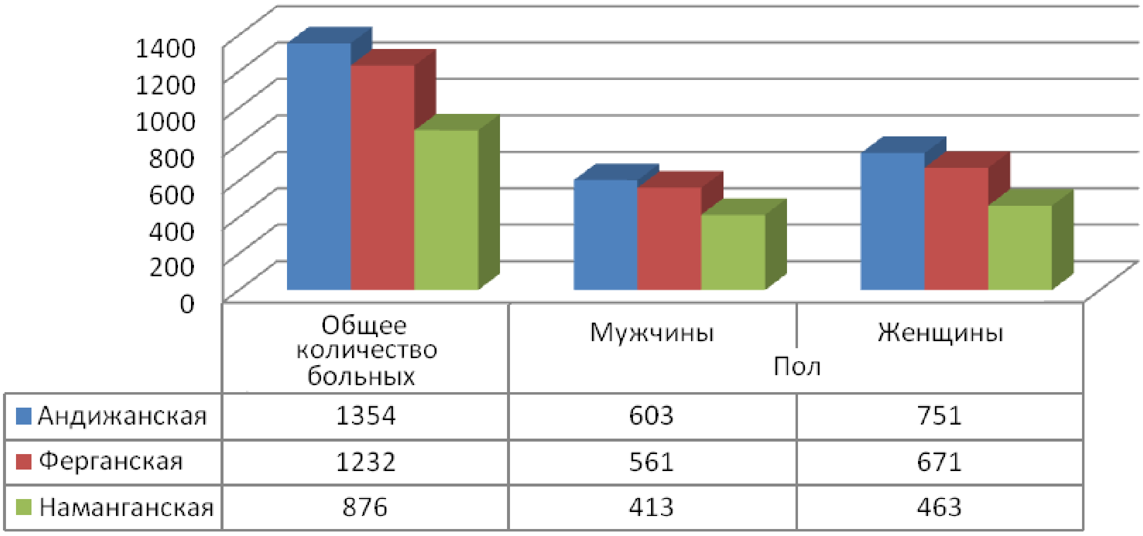
Echinococcosis is the most common parasitic disease endemic to Central Asian countries, including Uzbekistan. The preventive measures currently applied against echinococcosis are somewhat effective but insufficient.

Insufficient public awareness about EB, its causes and clinical manifestations, and the failure to adhere to basic prevention rules contributed to the development of a Questionnaire Map for examining patients suffering from EB.

The questionnaire card allowed for a qualitative assessment of actual nutrition and the targeted development of a plan for conducting preventive and hygienic measures at all stages of diagnosis and treatment of patients suffering from this pathology.

§3.1. The prevalence of echinococcosis in the Fergana Valley

When analyzing the incidence of echinococcosis in the Fergana Valley as a whole and in its subjects, it was found that the average long-term incidence rate of echinococcosis in the population of Andijan region for the years 2010-2020 was 2.8±0.1 per 100,000, which was 0.4±0.1 per 100,000 ($\chi 2=112.3$; $p<0.05$).



	Общее количество больных	Мужчины	Женщины
Андижанская	1354	603	751
Ферганская	1232	561	671
Наманганская	876	413	463

Fig. 3.1. Prevalence of echinococcosis among the population of the Fergana Valley

Despite the weak development of animal husbandry, our analysis of the long-term dynamics of echinococcosis incidence in humans over a 10-year period (2010-2020) shows a pronounced trend of increasing incidence in the Fergana region (see Fig. 3.1).

When analyzing the incidence of disease among the population of the Namangan region, a slight decrease in morbidity was identified, with a fairly stable retention of the main contingent of working-age individuals, which determined the importance of the problem from both medical and social perspectives. Moreover, there was a significant predominance of patients aged 18-45 years, ranging from 58 to 78 with ED.

After analyzing the data from form No. 003/u, we found that the average long-term echinococcosis morbidity rate among the region's residents for the years 2010-2020 was 3.4±0.4 cases per 100,000 population, which exceeded the corresponding rate from form No. 2 by 1.2 times ($\chi2=18.2$; $p<0.05$). A significant trend towards an increase in the region's population morbidity rate was identified ($\chi2=4.1$; $p<0.05$). As a result of the comparative analysis of echinococcosis morbidity among children and adults, it was found that the average long-term population rate was 3.4±0.1 per 100,000, with no differences in the average long-term morbidity rates between the adult and child populations in the studied territories of Fergana and Namangan regions ($\chi2=0.5$; $p>0.05$).

As a result of the analysis of the gender composition of the sick among the adult population, it was found that the male population accounted for 50.7±2.0% (303 cases), while women made up 49.3±2.0% (295 cases). The average long-term morbidity rate for men was 3.5±0.2 per 100,000 population, while for women it was 3.2±0.2 per 100,000 population ($\chi2=1.1$; $p>0.05$).

The absolute increase in morbidity over 10 years was 1.79; the average absolute increase in morbidity was 0.20; the morbidity growth rate was 107.79%, and the average annual morbidity growth rate was 7.0%. Since 2015, there has been an increase in echinococcosis morbidity among the population in Andijan region. The highest morbidity growth rates were recorded in 2015-2018.

According to the data, there has also been an increase in the number of disease relapses compared to the Fergana region (see Fig. 3.2).

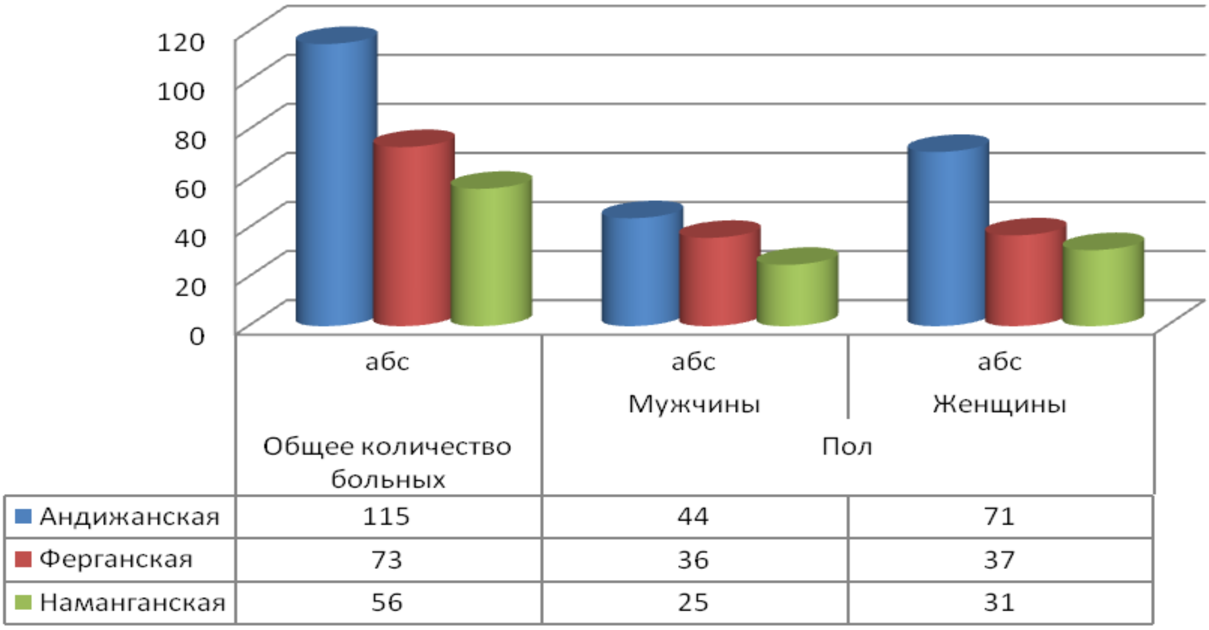


Fig. 3.2. Frequency of echinococcosis relapses among the population of the Fergana Valley

When analyzing the data from Form No. 2 "Information on Infectious and Parasitic Diseases," it was found that the average annual incidence rate of echinococcosis in the population of Andijan region for the years 2010-2020 was 2.8±0.4 per 100,000 population, and there is a trend towards a decrease in the long-term dynamics of the incidence rate (see Table 3.1).

Table 3.1

The number of cases of echinococcosis and morbidity according to forms No. 2 and No. 003/u among the population of Andijan region

Years	Form No. 2		Form No. 003/u	
	Number of cases	Incidence per 100,000 population	Number of cases	Incidence per 100,000 population
2010	109	1,5 ± 0,3	112	1,5 ± 0,3
2011	102	2,3 ± 0,3	108	2,4 ± 0,3
2012	129	2,7 ± 0,3	135	2,8 ± 0,4
2013	131	4,0 ± 0,4	137	4,1 ± 0,4
2014	121	3,6 ± 0,4	127	3,6 ± 0,4
2015	151	4,6 ± 0,4	154	4,7 ± 0,4

2016	128	3,0 ± 0,4	133	3,0 ± 0,4
2017	134	4,2 ± 0,4	138	4,2 ± 0,4
2018	142	3,8 ± 0,4	149	3,8 ± 0,4
2019	105	2,9 ± 0,4	113	3,3 ± 0,4
2020	102	2,4 ± 0,3	108	2,7 ± 0,3

When analyzing the data from form No. 003/u "Inpatient Card," it was found that the average annual incidence rate of echinococcosis in the region's population for the years 2010-2020 was 3.4±0.4 per 100,000 population and exceeded the rate from form No. 2 by 1.2 times ($\chi 2=18.2$; $p<0.05$). A trend of increasing incidence over the years was identified in the data from form No. 003/u. Thus, discrepancies in the incidence of echinococcosis in the region's population were identified between the data from form No. 2 and form No. 003/u.

The discrepancies in the presented results indicate the incompleteness of the data provided by surgical medical organizations to the state statistical observation authorities. The insufficient completeness of the official data is explained by the irregular and incomplete submission of emergency notification cards by doctors when diagnosing "echinococcosis" in surgical medical organizations.

In analyzing the cyclicity (see Table 3.3), we found that over the course of 10 years, there were positive and negative phases: positive phases were observed in 2010-2011 and 2019-2020, while negative phases were observed in 2012-2018. However, the long-term incidence of echinococcosis in the population of Andijan region did not exhibit cyclicity.

Due to the fact that the incidence of the population in the districts exceeded that of the urban population, the study of the factors maintaining the epidemic process of echinococcosis was conducted in relation to the districts. The districts of the Andijan region were divided into two groups based on the average long-term morbidity rate of the population in the region as a whole: 3 districts out of 12, where the incidence of disease was significantly higher than the regional average, were classified into group I (Shakhrikhan, Asaka, and Pakhtaabad). The remaining 9 districts of the region were classified as group II. The average incidence rate in group I was 10.2±0.3 per 100,000 population, in group II it was 3.1±0.3 per 100,000 population, and the differences were statistically significant ($\chi 2=250.1$; $p<0.05$) (see Table 3.2).

Table 3.2

The average incidence of echinococcosis in the Andijan districts in the years 2010-2020

Group of districts	District	Incidence per 100,000
1	2	3
I	Pakhtaabad	13,0 ± 1,6
	Shakhrikhan	19,7 ± 3,1
	Asaka	13,7 ± 3,1

Thus, in areas with different levels of population morbidity, the risk age groups were different.

When analyzing the gender composition of the affected individuals among the adult population in subgroup A, we found that the male population accounted for 43.2±2.0 and 44.3±2.0% (174 and 175 cases), while the female population accounted for 56.7±2.0 and 55.3±2.0% (228 and 217 cases). In subgroup B, the male population constituted 43.7±2.0 and 43.9±2.0% (112 and 101 cases), while the female population constituted 56.2±2.0 and 56±2.0% (144 and 129 cases).

§3.2. Results of the study of survey cards for the early detection of echinococcosis

As in other regions of the Republic of Uzbekistan, in the Fergana region, the dynamics of echinococcosis morbidity among the population can largely be linked to the implementation of the orders of the Ministry of Health of the Republic of Uzbekistan "On strengthening measures for the prevention and control of helminthiases" and "On enhancing the activities of the parasitological service," which led to intensified efforts in the active detection of patients.

Insufficient public awareness about echinococcosis, its causes and clinical manifestations, and the failure to adhere to basic preventive measures contributed to the development of a Questionnaire Map for the examination of patients suffering from echinococcosis (see Appendix 1).

Based on the results of the studies of patient questionnaires suffering from and operated on for echinococcosis, the main causes and conditions for the development of the disease were analyzed, where the condition of the operated patients was assessed (see tables 3.3-3.6).

A survey was conducted among 392 patients suffering from EB, urban and rural residents of subgroup A of the main group, who underwent surgery in the surgical departments of district hospitals and in the surgical clinics of AndGosMI (see Chapter II, §2.1).

We also conducted a survey of 230 EB patients from subgroup B of the main group, who were operated on at the Department of Surgical Clinics of AndGosMI during the period 2018-2020 (see Chapter II, §2.2).

Table 3.3

Results of the study on the conditions for the occurrence of echinococcosis (subgroup A)

Circumstances and conditions of causes	Number of examined individuals (n=392)							
	Absolute number				%			
	village n= 278		city n=114		village n= 278		city n=114	
	yes	no	yes	no	yes	no	yes	no
Do you often go out for agricultural and other work?	250	28	32	82	89,9	10,1	28,1	71,9
Do you often communicate with animals?	230	48	27	87	82,7	17,2	23,6	76,4
Do you often interact with animals: keeping dogs (tied, free, sometimes in the house)?	177	101	38	76	63,6	36,3	33,3	66,7

Do you follow the rules for pet care and prevent fecal contamination of the environment?	98	180	87	27	35,3	64,7	76,3	23,7
What is the degree of contact with animals, close (petting, feeding)?	215	63	27	87	77,4	22,6	23,6	76,4
Do you often take care of animals in a small farm (for example, cows)?	278	0	19	95	100	0	16,7	83,3
Have there been any cases of water supply and sewage system failures at your place of residence?	145	133	32	82	52,1	47,8	28,1	71,9

Having analyzed the incidence of various population groups established by the criterion of contact with sources of invasion (contacts by profession, in daily life, in personal households where agricultural animals and dogs were present, as well as family members of the sick), we found that the highest incidence was observed among rural residents, amounting to 17.4±0.8 per 100,000 population, and their incidence was significantly higher compared to the urban population ($\chi 2=22.9$; $p<0.05$) (see Tables 3.3 and 3.4).

The analysis of the responses showed that the population is poorly informed about the causes of occurrence and poorly aware of possible measures to prevent echinococcosis. Based on the obtained results, it can be asserted that in the studied area, echinococcosis infection predominated in conditions of raising livestock in private households with the presence of an invasion source – dogs.

Table 3.4

Results of the study on the conditions for the occurrence of echinococcosis (subgroup B)

Circumstances and conditions of causes	Number of examined individuals (n=230)							
	Absolute number				%			
	village n= 128		city n=102		village n= 128		city n=102	
	yes	no	yes	no	yes	no	yes	no

Do you often go out for agricultural and other work?	98	30	15	87	76,6	23,4	14,7	85,3
Do you often communicate with animals?	128	0	18	84	100	0	17,7	82,3
Do you often interact with animals: keeping dogs (tied, free, sometimes in the house)?	112	16	28	74	87,5	12,5	27,4	72,6
Do you follow the rules for pet care and prevent fecal contamination of the environment?	58	70	87	15	45,3	54,7	85,3	14,7
What is the degree of contact with animals, close (petting, feeding)?	114	14	18	84	89,1	10,9	17,7	82,3
Do you often take care of animals in a small farm (for example, cows)?	128	0	18	84	100	0	17,7	82,3
Have there been any cases of water supply and sewage system failures at your place of residence?	92	36	22	80	72	28	21,6	78,4

When analyzing the incidence of various population groups distinguished by their contact with sources of invasion, it was found that the incidence of EB among individuals who come into contact with dogs as part of professional activities related to the breeding of agricultural animals (herdsmen, shepherds, professional livestock breeders), as well as family members of the infected, was 10.8±1.0 per 100,000 population. The incidence in private households with agricultural animals, as well as family members of the infected, was 17.4±0.8 per 100,000 population (see Tables 3.5; 3.6).

Table 3.5

Results of the study on the main causes contributing to the development of the disease (subgroup A)

Circumstances and conditions of causes	Number of examined individuals (n=392)							
	Absolute number				%			
	village n= 278		city n=114		village n= 278		city n=114	
	yes	no	yes	no	yes	no	yes	no

Do you have any idea about echinococcosis?	19	259	37	77	6,8	93,2	32,5	67,5
Do you have any pets at home?	278	0	18	96	100	0	15,8	84,2
Are you familiar with the rules for keeping pets at home?	78	200	92	22	28,1	71,9	80,7	19,3
Do you follow the rules for pet care and prevent fecal contamination of the environment?	98	180	87	27	35,3	64,7	76,3	23,7
Do you have any instances of close contact with animals?	215	63	27	87	77,3	22,7	23,7	76,3
Do you follow personal hygiene rules after contact with animals?	98	180	93	21	35,3	64,7	81,6	18,4
Do you maintain personal hygiene when working with soil, as well as after taking care of livestock and handling sheep wool?	88	190	88	26	31,7	68,3	77,2	22,8
Due to the high dust levels during earthworks and when taking care of pets, do you use gauze masks and respirators?	47	231	63	51	16,9	89,1	55,2	44,8

As can be seen from Table 3.5, the incidence of disease among individuals who come into contact with dogs in the context of professional activities related to the breeding of livestock (herdsmen, shepherds, professional livestock breeders), as well as their family members, was higher than the incidence among individuals who do not come into contact with livestock either in their professional activities or in their daily lives ($\chi 2$ =1110.6; $p<0.05$).

Table 3.6

Results of the study on the main causes contributing to the development of the disease (subgroup B)

Circumstances and conditions of causes	Number of examined individuals (n=230)							
	Absolute number				%			
	village n= 128		city n=102		village n= 128		city n=102	
	yes	no	yes	no	yes	no	yes	no
Do you have any idea about echinococcosis?	31	97	22	80	24,3	75,7	21,5	78,4
Do you have any pets at home?	128	0	18	84	100	0	17,7	82,3

Are you familiar with the rules for keeping pets at home?	112	16	82	20	87,5	12,5	80,3	19,6
Do you follow the rules for pet care and prevent fecal contamination of the environment?	58	70	87	15	45,3	54,7	85,3	14,7
Do you have any instances of close contact with animals?	114	14	18	84	89,1	10,9	17,7	82,3
Do you follow personal hygiene rules after contact with animals?	68	60	88	14	53,1	46,9	86,3	13,7
Do you maintain personal hygiene when working with soil, as well as after taking care of livestock and handling sheep wool?	62	66	88	14	48,4	51,6	86,3	13,7
Due to the high dust levels during earthworks and when taking care of pets, do you use gauze masks and respirators?	27	101	69	33	21,1	78,9	67,7	32,3

As can be seen from tables 3.5 and 3.6, during the survey, attention was drawn to the fact that patients suffering from EB have a very poor understanding of the rationality and significance of dietary hygiene. When studying the circumstances and conditions of infection, which are important from the perspective of disease occurrence, it was found that out of 392 (subgroup A) and 230 (subgroup B) examined patients, almost all kept animals in domestic conditions, did not follow personal hygiene rules, and systematically engaged in agricultural work, but did not use gauze masks or respirators.

Based on the obtained results, it can be assumed that echinococcosis infection predominated in the studied area under conditions of raising livestock in private households with the presence of an invasion source—dogs—and non-compliance with hygiene measures and nutrition.

§3.3. Study of the actual nutrition and eating behavior of patients suffering from echinococcosis

The future of dietetics lies in the use of the latest methods and achievements of modern medicine, where the principles of nutrition science developed over centuries are practically implemented in the therapeutic process, both in therapy and surgery; in the development and introduction of products enriched with vitamins and minerals, functional foods, enteral and therapeutic-preventive nutrition mixtures, dietary products, foods for the nutrition of healthy and sick individuals; in the application of new technologies for studying nutritional status and individualized diets based on the study of the human nutrigenome [ ].

With the help of the Questionnaire Map, we assessed the actual nutrition of the patients, which led to the targeted development of a plan for conducting preventive and hygienic measures at all stages of diagnosis and treatment of patients suffering from this pathology (see tables 3.7; 3.8).

When studying the sanitary and hygienic living conditions of patients suffering from ED, it was found that 2.4% of patients systematically used delivered water, 97.6% used tap water, and 4.8% used water from open water bodies (see Tables 3.9 and 3.10).

The low level of public awareness necessitated the urgent need for active sanitary and educational work to prevent the disease. The analysis of responses showed that the population is poorly informed about the causes of the disease and poorly aware of possible preventive measures.

Table 3.7

Results of the study of surveys on hygienic dietary factors in patients with echinococcosis in the main group

Circumstances and conditions of causes	Number of examined individuals (n=392)							
	yes		no		yes		no	
	village n= 278		village n= 278		city n= 114		city n= 114	
	abs	%	abs	%	abs	%	abs	%
Do you practice personal hygiene?	19	6,8	259	93,2	98	86,0	16	14,0
Do you conduct training on personal hygiene rules in the family?	78	28,1	200	71,9	102	89,5	12	10,5
Do you consume safe and high-quality food products?	102	36,7	176	63,3	110	96,5	4	3,5

How often do you consume boiled or unboiled water and raw milk?	92	33,1	186	66,9	112	98,2	2	1,8
Do you consume processed meat products?	112	40,3	166	59,7	114	100,0	0	0,0
Do you consume thoroughly washed vegetables, fruits, greens, wild strawberries, and strawberries?	98	35,3	180	64,7	114	100,0	0	0,0
When preparing hot dishes, do you follow the preparation rules?	189	68,0	89	32,0	113	99,1	1	0,9
Do you drink water from an open water body?	179	64,4	99	35,6	0	0,0	114	100,0
Do you allow the consumption of raw water and vegetables, greens, fruits that have not undergone special processing?	196	64,3	109	35,7	110	96,5	4	3,5
Do you practice personal hygiene before eating, after gathering greens and fruits?	115	41,4	163	58,6	112	98,2	2	1,8

Table 3.8

Results of the study of surveys on hygienic dietary factors in patients with echinococcosis in the main group

Circumstances and conditions of causes	Number of examined individuals (n=230)							
	yes		no		yes		no	
	village n= 128		village n=128		city n= 102		city n=102	
	abs	%	abs	%	abs	%	abs	%
Do you practice personal hygiene?	22	17,2	106	82,8	92	90,2	10	9,8
Do you conduct training on personal hygiene rules in the family?	48	37,5	80	62,5	94	92,2	8	7,8
Do you consume safe and high-quality food products?	52	40,6	76	59,4	92	90,2	10	9,8
How often do you consume boiled or unboiled water and raw milk?	47	36,7	81	63,3	95	93,1	7	6,9

Do you consume processed meat products?	58	45,3	70	54,7	102	100,0	0	0,0
Do you consume thoroughly washed vegetables, fruits, greens, wild strawberries, and strawberries?	45	35,2	83	64,8	100	98,0	2	2,0
When preparing hot dishes, do you follow the preparation rules?	55	43,0	73	57,0	99	97,1	3	2,9
Do you drink water from an open water body?	82	64,1	46	35,9	0	0,0	102	100,0
Do you allow the consumption of raw water and vegetables, greens, fruits that have not undergone special processing?	78	60,9	50	39,1	100	98,0	2	2,0
Do you practice personal hygiene before eating, after gathering greens and fruits?	42	32,8	86	67,2	99	97,1	3	2,9

Table 3.9

Results of the survey card study on identifying the circumstances and conditions of the causes of disease occurrence

Circumstances and conditions of causes		Number of examined individuals (n=392)							
		yes		no		yes		no	
		village n= 278		village n= 278		city n= 114		city n= 114	
		abs	%	abs	%	abs	%	abs	%
How often do you drink water from springs?	Drilling	175	62,9	103	37,1	0	0,0	102	100,0
	Imported	88	31,7	190	68,3	0	0,0	102	100,0
	Open water body	96	34,5	182	65,5	0	0,0	102	100,0
How often do you eat vegetables and fruits?	Vegetables	278	100,0	0	0,0	102	100,0	0	0,0
	Fruits	278	100,0	0	0,0	102	100,0	0	0,0
	Strawberry	203	73,0	75	27,0	75	73,5	27	26,5

Table 3.10

Results of the survey card study on identifying the circumstances and conditions of the causes of disease occurrence

Circumstances and conditions of causes		Number of examined individuals (n=230)							
		yes		no		yes		no	
		village n= 128		village n= 128		city n= 102		city n= 102	
		abs	%	abs	%	abs	%	abs	%
How often do you drink water from springs?	Drilling	98	76,6	30	23,4	0	0,0	102	100,0
	Imported	35	26,3	98	73,7	0	0,0	102	100,0
	Open water body	22	17,2	106	82,8	0	0,0	102	100,0
How often do you eat vegetables and fruits?	Vegetables	128	100,0	0	0,0	102	100,0	0	0,0
	Fruits	128	100,0	0	0,0	102	100,0	0	0,0
	Strawberry	102	79,7	26	20,3	88	86,3	14	13,7
	Raw milk	111	86,7	17	13,3	14	13,7	88	86,3

During the survey, we paid special attention to the fact that patients suffering from ED were very poorly oriented in matters of rationality and the importance of dietary hygiene, and the energy value of their diet did not exceed the permissible norm (2400 kcal) (see Table 3.11).

Table 3.11

Results of the dietary study in patients with echinococcosis upon admission

Nutrients	Hygienic norm, g	Indicators upon admission	
		abs., g	% of the norm
Energy value, kcal	2400	1839,4±32,4	76,6
Total protein, g	80,5	62,3±11,4	77,4
including animal origin	49	29,5±4,9	60,2
fats, g	80	46,7±5,3	58,4
Carbohydrates, g	340	308,9±12,3	90,9
Calcium, mg	1100	729,5±17,1	66,3
Phosphorus, mg	1650	1059,6±18,9	64,2
Magnesium, mg	250	220,1±8,8	88,0
iron, mg	12	10,9±3,2	90,8
Vitamin C, mg	60	58,0±7,7	96,7
Vitamin A, mg	700	162,1±10,4	23,2

Vitamin B_1, mg	1,2	1,06±0,02	88,3
Vitamin B_2, mg	1,4	1,27±0,03	90,7
Vitamin PP, mg	15	13,0±2,5	86,7

We analyzed the dietary protocols of patients with EB in the preoperative period, and as shown in Table 3.11, the diets were found to have insufficient levels of proteins, vitamins, micro- and macroelements, meat, fish, dairy products, raw fruits, and vegetables.

The conducted studies revealed insufficient consumption of primary sources of complete proteins, vitamins, micro- and macroelements: meat, fish, dairy products, raw fruits, and vegetables. These research results were identified during surveys and in the preoperative period. The conducted study indicates that the development of EB in this category of patients was still influenced by sanitary and hygienic living conditions, violations of dietary hygiene, and personal prevention. The risk of developing nutritional deficiencies significantly increased in 50-80% of EB patients.

Thus, when identifying risk factors in EB patients, the leading role should be attributed to socio-hygienic factors, with sanitary-hygienic living conditions, violation of dietary hygiene, and non-compliance with personal hygiene rules being the most frequent risk factors.

§3.4. Study of the actual nutrition and eating behavior of patients with echinococcosis who have undergone surgery

The nutritional status of the patient is one of the factors determining the outcome of the patient's surgery and on which the result of the surgical intervention depends, and malnutrition can be significant in the risk of developing postoperative complications. Among surgical patients, malnutrition has a fairly high prevalence.

When analyzing the actual nutrition of patients with EB, it was found that 80% of unfavorable environmental factors affect the human body through food products and water.

Surveying patients with EB revealed a violation of dietary regimen in 78% of respondents, of which 45% of the surveyed patients ate 3 times a day, 50% 3–4 times, and 5% 5 times a day. Among those examined, 10% of patients consumed hot food once a day, 85% twice a day, and 5% three times a day. There were violations in the preparation of hot dishes and non-compliance with food preparation rules. When consuming vegetables, fruits, greens, strawberries, and wild strawberries, violations in personal hygiene were also observed. Among those surveyed, 36.7% of patients often used unboiled water and consumed raw milk; moreover, personal hygiene was not maintained before meals and after collecting greens and fruits. According to the results of the survey cards, in the main group, 45.3% and 85.3% did not follow the rules for caring for domestic animals and did not timely prevent fecal contamination of the environment.

In this regard, activities and outreach efforts were carried out for the main group of patients to improve the quality of food hygiene in districts and villages, which led to an enhancement of their dietary regimen.

Currently, nutrition is recognized as one of the key components of the WHO's overall strategy, according to which 60% of the causes of human mortality are directly related to nutrition problems (see Table 3.12).

Table 3.12

Results of the dietary study in the main group of patients after correction with the nutritional mixture "NUTRIEN-IMODIUM"

Nutrients	Hygienic norm, g	Main group			
		Before the operation		After the surgery	
		abs., g	% of the norm	abs., g	% of the norm
Energy value, kcal	2400	1839,4±32,4	76,6	1966,6±29,7	81,9
Total protein, g	80,5	62,3±11,4	77,4	67,4±9,7	83,7

including animal origin	49	29,5±4,9	60,2	33,3±4,6	68,0
fats, g	80	46,7±5,3	58,4	55,1±6,2	68,9
Carbohydrates, g	340	308,9±12,3	90,9	317,5±11,1	93,4
Calcium, mg	1100	729,5±17,1	66,3	741,2±15,8	67,4
Phosphorus, mg	1650	1059,6±18,9	64,2	1109,6±20,4	67,2
Magnesium, mg	250	220,1±8,8	88,0	231,3±9,7	92,5
iron, mg	12	10,9±3,2	90,8	9,7±2,1	80,8
Vitamin C, mg	60	58,0±7,7	96,7	49,6±6,7	82,7
Vitamin A, mcg	700	162,1±10,4	23,2	212,6±11,7	30,4
Vitamin B_1, mg	1,2	1,06±0,02	88,3	1,09±0,03	90,8
Vitamin B_2, mg	1,4	1,27±0,03	90,7	1,33±0,04	95,0
Vitamin PP, mg	15	13,0±2,5	86,7	13,2±1,9	88,0

As can be seen from the presented table, in general, the preoperative diets were found to have insufficient levels of proteins, vitamins, micro- and macroelements, meat, fish, dairy products, raw fruits, and vegetables. In this regard, we analyzed the indicators of protein, carbohydrate, and lipid metabolism in EB (see tables 3.13-3.15).

Table 3.13

The results of the study on protein metabolism indicators in the pre- and postoperative periods in patients of the main group (according to V.D. Vankhanen, 2003)

Biological environment	Substance	Content, units of measurement		
		The indicators are normal.	Before the operation	After the surgery
Blood	*Hemoglobin:*			
	among men	130-160 g/L	104 g/l	110 g/l
	among women	120-140 g/l	98 g/l	102 g/l
	Ammonium nitrogen	17,83-35,7 mmol/L	11,7 mmol/L	14,82 mmol/L

	Urea	3,33-8,32 mmol/L	4,53 mmol/L	2,33 mmol/L
Blood serum	Total protein	65-85 g/l		
	Protein fractions (in % of total protein, electrophoresis):			
	albumins	35-50 g/l	25 g/l	30 g/l
	globulins:	23-35 g/l	18 g/l	20 g/l
	α_1	3,6±0,2 g/l	2,6±0,2 g/l	3,2±0,2 g/l
	α_2	5,9±0,2 g/l	3,9±0,2 g/l	4,9±0,2 g/l
	β	5,0-11,0 g/l	3,0-11,0 g/l	4,0-10,0 g/l
	γ	5,0-16,0 g/l	2,0-12,0 g/l	3,0-12,0 g/l
	Ammonium nitrogen	14,3-25 mmol/L	11,3 mmol/L	12,3 mmol/L
Blood	Creatine	10-40 g/l	20 g/l	12 g/l
Blood serum	Creatinine	53-106,1 μmol/L	100,1 μmol/L	98 μmol/L
Serum or blood plasma	*Uric acid:*			
	among men	0,12-0,46 mmol/L	0,36 mmol/L	0,20 mmol/L
	among women	0,12-0,38 mmol/L	0,40 mmol/L	0,10 mmol/L

Analysis of metabolic indicators showed that more than 50% of hospitalized patients exhibited significant nutritional status disorders due to malnutrition. 20% of patients were diagnosed with exhaustion and undernutrition, 50% with lipid metabolism disorders, up to 90% showed signs of hypo- and avitaminosis, and more than 50% had changes in immune status.

Table 3.14

Results of the study on carbohydrate metabolism indicators in the pre- and postoperative periods in patients of the main group (according to V.D. Vankhanen, 2003)

Indicators	Content, units of measurement		
	The indicators are normal.	Before the operation	After the surgery
Plasma glucose	3,89-6,11 mmol/L	4,89 mmol/L	5,0 mmol/L

Whole blood glucose	3,05-5,55 mmol/L	2,05 mmol/L	3,05 mmol/L
Glucose tolerance test (whole blood)	Fasting<5,55 mmol/L	Fasting <3,55 mmol/L	Fasting <4,55 mmol/L
	After 120 minutes <7.8 mmol/L	In 120 minutes <6.8 mmol/L	After 120 minutes <5.8 mmol/L
Sialic acids	2,0-2,33 mmol/L	3,0 mmol/L	2,0 mmol/L
	135-200 y.e.	145 y.e.	135 y.e.
Hexoses bound to proteins	0,72±0,14 g/L	0,62±0,14 g/L	0,52±0,14 g/L
Glycogen (blood)	16,2-38,7 mg/L	18,2 mg/L	16,2 mg/L
Pyruvic acid (blood)	34,06-102,2 µmol/L	38,06 µmol/L	28,06 µmol/L
Lactic acid (blood)	0,9-1,75 mmol/L	1,0 mmol/L	1,4 mmol/L

The conducted studies during the preoperative period survey of EB patients revealed insufficient consumption of the main sources of complete proteins, vitamins, micro- and macroelements: meat, fish, dairy products, raw fruits, and vegetables, and the risk of developing nutritional deficiencies significantly increased to 50-80% of patients.

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Table 3.15

Results of the study on lipid metabolism indicators in the pre- and postoperative periods in patients of the main group (according to V.D. Vankhanen, 2003)

Indicators	Content, units of measurement		
	The indicators are normal.	Before the surgery	After the surgery
Total cholesterol	<52 mmol/L	<62 mmol/L	<52 mmol/L

Cholesterol of α-lipoproteins	>0,9 mmol/L	>0,8 mmol/L	>0,6 mmol/L
Cholesterol of β-lipoproteins	<4,9 mmol/L	<5,9 mmol/L	<4,9 mmol/L
Atherogenic index	Up to 0,3	Up to 0,5	Up to 0,4
Non-esterified fatty acids	400-800 μmol/L	300 μmol/L	280 μmol/L

In the preoperative preparation period for patients in the main group, we implemented a comprehensive set of measures, strictly individualized and aimed at eliminating existing functional disorders of internal organs and systems before the operation, as well as preventing all possible complications during the intra- and postoperative periods.

During the preoperative preparation and postoperative therapy in the main group of patients, to improve liver function as a detoxifying, antioxidant, and hepatoprotective agent in conjunction with other medications and chemotherapy (albendazole).

The success of the operation depended not only on technical surgical skills but also on metabolic interventional therapy, taking into account the patient's ability to withstand metabolic stress, as well as the ability to provide appropriate nutritional support.

We applied special nutrition during the pre- and postoperative periods for the following purposes: integrating nutrition into the overall patient management scheme; avoiding prolonged preoperative fasting; resuming oral nutrition as soon as possible after surgery; initiating diet therapy as soon as a nutritional risk arises; metabolic control, such as blood glucose levels; reducing factors that exacerbate stress-related catabolism or disrupt gastrointestinal function; avoiding fatty, fried, canned, and salty foods.

The patients' diet was composed according to the following scheme: no less than 120 g of pure protein daily; up to 450 g of carbohydrates; 80 g of fats; up to 3,000 kcal of energy value.

Satisfaction of the energy and plastic needs of a surgical patient is ensured by a balanced diet, that is, the intake of a sufficient amount of nutrients in accordance with energy expenditures, which increase in pathological conditions due to an increase in basal metabolism. The optimal ratio is a daily intake of proteins - 13-17%, fats - 30-35%, carbohydrates - 50-55%.

In patients who underwent surgical interventions, the energy metabolism sharply increased in the immediate postoperative period, mainly due to an inadequate increase in the actual basal metabolism. Often, the energy deficit reached such levels that even with the consumption of a regular diet (2500 - 3000 kcal/day), patients still found themselves in conditions of pronounced protein-energy deficiency. These phenomena significantly worsened the course of regeneration processes and prolonged the postoperative wound process [ ].

In the immediate postoperative period, to improve the parenteral nutrition of patients, we administered energy substrates, and the volume and composition of parenteral nutrition were determined individually based on the patient's needs. The duration of complete balanced (in terms of proteins, fats, carbohydrates) parenteral nutrition depended on the volume and complexity of the surgery performed and averaged 3–5 days.

The transition to natural nutrition involved a stage of combined (parenteral-enteral) feeding lasting at least 4–5 days. For enteral feeding, we used the Nutrien-Immune mixture: the energy value of the product was 1.25 kcal/ml. One liter of the prepared product contained 70 g of protein, 45 g of fat, 124 g of carbohydrates, as well as essential nutraceuticals such as L-arginine, L-glutamine, and omega-3 fatty acids. This was due to the fact that as a result of surgical liver trauma, there was a significant suppression of small intestine function, the recovery of which took no less than 7-10 days after the operation. The tube administration of elemental nutritional mixtures into the digestive system in gradually increasing amounts ensured the adaptation of the gastrointestinal tract to the increasing dietary loads in patients after liver surgeries [ ].

The use of the Nutriyen-Immune mixture led to the provision of sharply increasing energy and plastic needs in the immune status, which had a positive impact on the results of surgical treatment, reducing the number of postoperative complications and improving immunobiological indicators.

Thus, the analysis of the sanitary characteristics of dietary factors and the economic activities of the population revealed a certain connection between them and the spread of echinococcosis. The increase in the number of patients is due to the lack of preventive measures and the non-compliance with personal hygiene rules in dietary practices, as well as in animal care and agricultural activities.

§3.5. Development of a model program for comprehensive therapeutic, preventive, and hygienic measures for echinococcosis

Having outlined the main tasks aimed at improving the quality of diagnosis, dynamic monitoring, and treatment in the Fergana Valley, we structured our research in the following directions: to delineate the circle of socio-hygienic aspects, conduct therapeutic and diagnostic, preventive measures, and assess the quality of care provided to patients with EB, analyze the results of surgical treatment, develop a diagnostic and treatment algorithm for patients with EB, and also develop comprehensive therapeutic, diagnostic, and preventive measures at all stages of diagnosis and treatment of EB.

In this regard, we have developed a program model for conducting therapeutic, diagnostic, and preventive measures for patients suffering from EB for the population of the Fergana Valley, which is presented in Figure 3.3.

A significant role in the prevention of echinococcosis is played by sanitary education and hygiene culture. In this regard, the Questionnaire we developed included questions related to sanitary and hygienic living conditions to identify hygienic factors of nutrition and the main causes contributing to the development of echinococcosis, as well as a questionnaire for operated patients; we also took into account the level of public awareness about echinococcosis.

During the survey, we noticed that patients suffering from EB have a very poor understanding of the rationality and importance of dietary hygiene. When studying the circumstances and conditions under which EB infection occurred, it was found that 278 (100%) patients in the subgroup.

And from rural areas, they kept domestic animals at home and did not follow personal hygiene rules, 250 (89.9%) patients from subgroup A and 98 (76.6%) patients from subgroup B systematically engaged in agricultural work, but did not use gauze bandages and respirators.

According to the results of the questionnaire surveys, 180 (64.7%) patients from subgroup A and 70 (54.7%) from subgroup B did not follow the rules for caring for pets and did not timely prevent fecal contamination of the environment. There were also violations of personal hygiene during agricultural work, livestock care, and contact with sheep wool. The survey data revealed insufficient consumption of meat and meat products in the diets.

Based on the developed model of the prevention program for comprehensive medical and preventive measures among the population of the Fergana Valley, we continue scientific research in this direction. The population of the Fergana Valley was informed about the diagnosis and prevention of echinococcosis, as well as other informational messages, through the media, which were aimed at raising awareness about echinococcosis, improving hygiene skills regarding rational and balanced nutrition, and food behavior.

Resume

Thus, the analysis of the sanitary characteristics of actual nutrition revealed a certain correlation with the spread of echinococcosis. The low awareness of the population about the causes of EB development necessitated active sanitary and educational work to prevent and spread EB. In our opinion, the increase in the number of EB cases was also due to violations of nutrition hygiene and personal preventive measures. The nutrition of patients both pre- and post-operatively should be balanced and of high quality, containing sufficient amounts of proteins, lipids, minerals, and vitamins, which can prevent post-operative complications.

CHAPTER IV. IMPROVEMENT OF SURGICAL ASPECTS OF TREATMENT AND PREVENTION OF ECHINOCOCCOSIS

The choice of intraoperative methods for treating echinococcal cysts remains a subject of discussion. Our developments on key issues affecting the outcomes of surgical treatment, the complicated course and its nature in the immediate postoperative period, quality of life, rehabilitation, and work capacity in the long-term period of echinococcosis are described in this chapter [28, 47, 84, 86, 130, 158].

§4.1. Characteristics of Surgical Interventions

All admitted patients with EB underwent various surgical interventions comparable in severity, volume, and duration.

Surgical tactics were determined taking into account the localization, complications, and combination of echinococcosis of the abdominal and thoracic organs with other organs. It was the localization of cysts in the liver and other organs of the abdominal and thoracic cavities that played a decisive role in the choice of surgical access (see Table 4.1).

As can be seen from the table provided, in both groups, the most common localization of echinococcosis (EC) was in the liver in 304 patients, combined liver and thoracic organ involvement in 62 patients, with a significant predominance of combined echinococcal liver and abdominal organ involvement in 80 patients.

Most often, echinococcal cysts were located in the VIII, VII-VIII, and V-VI-VII segments of the right lobe of the liver, and the localization of echinococcal cysts in the lungs was noted in 40 patients.

Table 4.1

Structure of patients by localization of echinococcosis

№	Groups of patients	Echinococcosis, abs.				Total
		Lungs	Lungs and liver	Liver	Liver, spleen, and other organs	
1	Comparison group	22	35	157	42	256
2	Main group	18	27	147	38	230
Total		40	62	304	80	486

At the same time, the volume of the surgical procedure and the elimination of the residual cavity directly depended on the number and diameter of the echinococcal cyst (see Table 4.2; 4.3). Single cysts were found in 147 patients in the comparison group and 137 patients in the main group (57.4% and 59.5%), two cysts in 69 (26.9%) patients in the comparison group and 56 (24.3%) in the main group, three cysts in 23 (8.9%) in the comparison group and 19 (8.2%) in the main group, and more than three cysts in 17 (6.6%) patients in the comparison group and 18 (7.8%) in the main group (see Table 4.2).

Table 4.2

Distribution of patients in the compared groups depending on the number of echinococcal cysts

The number of echinococcal cysts	comparison group (n=256)		main group (n=230)		Total (n=486)	
	abs	%	abs	%	abs	%
Singles	147	57,4	137	59,5	284	58,5

Multiple		109	42,6	93	40,4	202	41,6
	Two cysts	69	26,9	56	24,3	125	25,7
	Three cysts	23	8,9	19	8,2	42	8,7
	More than three	17	6,6	18	7,8	35	7,2
Total		256	100	230	100	486	100

As for the sizes of the cysts, small cysts were present in 22 (8.5%), medium in 144 (56.2%), large in 68 (26.5%), and giant in 22 (8.5%) patients in the comparison group. In the main group, small cysts were present in 13 (5.6%), medium in 137 (59.5%), large in 48 (20.8%), and giant in 32 (13.9%) patients. Additionally, the combination of small and medium cysts and the combination of medium and large cysts were observed in 23 (8.9%) patients in the comparison group and in 33 (14.3%) patients in the main group (see Table 4.3).

Table 4.3

Distribution of patients in the compared groups depending on the sizes of echinococcal cysts

Diameter of echinococcal cysts	comparison group (n=256)		main group (n=230)		Total (n=486)	
	abs	%	abs	%	abs	%
Small up to 5 cm	22	8,5	13	5,6	35	7,2
Medium up to (6-10 cm)	144	56,2	137	59,5	281	57,8
Large (11-20 cm)	68	26,5	48	20,8	116	23,8
Giant (20 cm and more)	22	8,5	32	13,9	54	11,1
Total	256	100	230	100	486	100

It was precisely the diameter and number of cysts that played a decisive role in the surgical tactics. At the same time, the presence of complications from the EC also influenced the volume of the surgical intervention: complications such as EC suppuration were often encountered—22 (8.6%) in the comparison group and 16

(7.0%) in the main group, calcification—14 (5.5%) and 12 (5.2%) respectively in the groups (see Table 4.4).

Biliary fistula was diagnosed in 7 (2.7%) patients in the comparison group and in 9 (3.9%) in the main group, the development of purulent-destructive cholangitis upon rupture into the bile ducts (5 and 7) was observed in 8 (3.1%) of the comparison group and in 7 (3.1%) of the main group. A serious complication was the rupture of the EC into the abdominal (3 and 4 (1.2%; 1.7%)) and pleural cavities (2 and 1 (0.8%; 0.4%)). The presence of certain complications caused specific technical difficulties during the surgical intervention, related to the treatment of the OP and its elimination. The localization of cysts in the liver and other organs of the abdominal cavity played a decisive role in the choice of surgical access (see Table 4.5).

Table 4.4

Distribution of patients depending on complications of echinococcosis in the studied groups

Types of complications	Comparison group (n=256)		Main group (n=230)	
	abs	%	abs	%
No complications	25	9,7	18	7,8
Suppuration of a cyst	22	8,6	16	7,0
Breakthrough in the bile ducts	5	1,9	7	3,1
Breakthrough into the abdominal area	3	1,2	4	1,7
Breakthrough into the pleural area and organs	2	0,8	1	0,4
The deceased cyst	8	3,1	12	5,2
Lime treatment	14	5,5	12	5,2
Compression of the bile ducts with mechanical jaundice	3	1,2	2	0,8
Purulent-destructive cholangitis, pericholangitis	8	3,1	7	3,1
Biliary fistula	7	2,7	9	3,9
Portal hypertension	2	0,8	3	1,3
Total	110	41,8	91	36,9

Table 4.5

Localization of echinococcal cysts in the liver

Liver segments	Comparison group (n=256)		Main group (n=230)	
	In the liver (n=157)		In the liver (n=147)	
	abs.	%	abs.	%
II	3	1,1	2	0,8
III	3	1,1	2	0,8
IV	2	0,7	3	1,3
V	4	1,5	3	1,3
VI	6	2,3	4	1,7
VII	8	3,1	10	4,4
VIII	31	12,1	35	15,2
II-IV	3	1,1	4	1,7
III-VIII	2	0,7	3	1,3
IV-VIII	3	1,1	4	1,7
IV-V	8	3,1	6	2,7
V-VI	13	5,1	11	4,8
V- VI-VII	23	9,0	17	7,4
VII-VIII	27	10,6	22	9,5
VI-VII-VIII	16	6,2	13	5,6
all segments	5	1,9	8	3,5
Total	157	61,3	147	63,9

As seen in Table 4.5, in both groups, a combined lesion of two to three segments was more common, with a significant predominance of echinococcal lesions in the right lobe of the liver. At the same time, the echinococcal cysts were located in the VIII, VII-VIII, and V-VI-VII segments of the right lobe of the liver. Lesion of segment VIII was diagnosed in 31 (12.1%) patients in the comparison group and 35 (15.2%) in the main group, combined lesion of segments VI-VII-VIII in 16 (6.2%) in the comparison group and 13 (5.6%) in the main group, lesion of segments V-VI-VII in 23 (9.0%) and 17 (7.4%), lesion of segments VII-VIII in 27 (10.6%) and 22 (9.5%) patients, respectively.

The localization of EC in the liver and abdominal organs is presented in Table 4.6. The localization of EC in the liver and other abdominal organs was found in 42 (16.4%) and 38 (16.5%) of the patients in the studied groups, respectively.

Table 4.6

Localization of echinococcal cysts in the liver and abdominal organs in the studied groups

Affected organs	Comparison group (n=256)		Main group (n=230)		Total (n=486)	
	Liver and abdominal organs (n=42)		Liver and abdominal organs (n=38)		Total (n=80)	
	abs	%	abs	%	abs	%
Liver + organs of the thoracic cavity.	9	3,5	11	4,7	20	4,1
Liver + greater omentum	15	5,8	13	5,6	28	5,7
Liver + greater omentum + spleen	5	1,9	3	1,3	8	1,6
Liver + retroperitoneal space	6	2,3	3	1,3	9	1,8
Liver + pelvis	4	1,5	4	1,7	8	1,6
Abdominal cavity	3	1,2	4	1,7	7	1,4
Total	42	16,4	38	16,5	80	16,4

As can be seen from the table provided, ECs were more often located in the liver. In 9 (3.5%) and 11 (4.7%) observations, liver ECs were combined with lesions of other abdominal organs, with liver and greater omentum lesions in 15 (5.8%) cases in the comparison group and in 13 (5.6%) cases in the main group.

Table 4.7

Localization of echinococcal cysts in the lungs and liver in the studied groups

Affected organs	Comparison group (n=256)		Main group (n=230)		Total (n=486)	
	Lungs and liver (n=35)		Lungs and liver (n=27)		Total (n=62)	
	abs	%	abs	%	abs	%
Right lung	26	10,1	22	9,6	48	9,8
Lungs upper lobe + liver	4	1,5	3	1,3	7	1,4
Lungs middle lobe	9	3,5	7	3,1	16	3,3
Lung lower lobe + liver	15	5,8	12	5,3	27	5,5
Left lung	9	3,5	5	2,1	14	2,8
Lungs middle lobe	4	1,5	3	1,3	7	1,4

Lung lower lobe + liver	5	1,9	2	0,8	7	1,4
Total	35	13,6	27	11,8	62	12,7

The right lung was affected by EC in 26 (10.1%) cases in the comparison group and in 48 (9.8%) patients in the main group. The left lung was affected in 9 (3.5%) and 5 (2.1%) patients in the studied groups. ECs were more often located in the lower lobe of the lungs - in 15 (5.8%) and 12 (5.7%) cases, respectively, and mainly on the right side. (see Table 4.7).

In determining the method of surgery and residual cavity elimination, the choice of the optimal surgical access was most important (see Table 4.8), where the main principle was the combination of low trauma and maximum accessibility.

Table 4.8.

Summary distribution by access to EC

Nature of surgery	Comparison group (n=256)		Main group (n=230)	
	abs.	%	abs.	%
Thoracotomy	25	9,7	18	7,8
Laparotomy	201	75,8	193	83,9
Thoracoabdominal access	28	10,9	9	3,9
Laparoscopy	2	0,7	10	4,3
Total	256	100	230	100

It was taken into account that the access should not limit the surgeon's manipulations during revision of the organ in order to identify other liver cysts, cyst removal and possible complications, and should not be unnecessarily traumatic.

Upper midline laparotomy was most often used for lesions of the left half and anterior edge of the liver. For the approach to the right half of the liver, oblique subcostal access was used, in case of subdiaphragmatic location of cysts - thoracic or thoracoabdominal access.

In liver lesions laparotomy was performed in 201 (75.8%) patients of the comparison group and 193 (83.9%) patients of the main group. In combined liver and lung lesions thoracoabdominal access was performed in 28 (10.9%) patients of the comparison group and 9 (3.9%) patients of the main group. At the same time in 15 (6.5%) patients of the main group with EC presence in lungs and liver EE was performed from laparotomy access. It should be noted that laparoscopic EE was performed in 2 (0.7%) patients of the comparison group and 10 (4.3%) patients of the main group (see Table 4.9).

Table 4.9.

Summary distribution of surgeries by the method of OP elimination

Nature of surgery	Comparison group (n=256)		Main group (n=230)	
	abs.	%	abs.	%
Closed echinococcectomy	81	31,6	93	40,4
Semi-closed echinococcectomy	95	37,2	88	38,3
Open echinocócectomy	67	26,1	32	13,9
Combined methods	13	5,1	17	7,4
Total	256	100	230	100

The table shows that, according to the method of OP elimination, the patients with closed EE in the main group prevailed in 93 (40.4%) cases, combined EE - in 17 (7.4%), semi-closed EE was performed in 95 (37.2%) in the comparison group and in 88 (38.3%) in the main group of patients. The operation methods depending on the cyst diameter in the studied groups of patients are summarized in Table 4.10.

Table 4.10.

Surgery methods depending on the cyst diameter

Method of surgery	Cyst diameter in (cm)						Total
	5 cm		6-10 cm		11-20 cm		
	abs	%	abs	%	abs	%	
Closed echinococcectomy							
Capitalization	7	2,7	3	1,2	3	1,2	13
	7	3,1	5	2,1	0	0	12
FC invagination	4	1,5	19	7,4	8	3,1	31

		2	0,8	30	13,1	5	2,1	37
Complete excision of FC		3	1,2	17	6,6	2	0,7	22
		2	0,8	22	9,5	1	0,4	25
Perfect echinocolectomy		6	2,3	9	3,5	0	0	15
		1	0,4	17	7,4	1	0,4	19
Total	n=256	20	7,8	48	18,7	13	5,1	81
	n=230	12	5,3	74	32,2	7	3,1	93
Semi-closed								
Capitalization with others		0	0	10	3,9	3	1,2	13
		0	0	7	3,1	2	0,7	9
FC invagination with others.		0	0	16	6,2	6	2,3	22
		0	0	10	4,3	11	4,7	21
Partial exploration. FC		0	0	21	8,2	14	5,5	35
		0	0	12	5,3	21	9,1	33
Tamponade of OP with omentum according to Asperhanov with others		0	0	14	5,5	11	4,3	25
		0	0	10	4,3	15	6,5	25
Total	n=256	0	0	61	23,8	34	13,7	95
	n=230	0	0	39	16,9	49	21,3	88
Open								
Drainage 1 drain		0	0	18	7,0	24	9,4	42
		0	0	7	3,1	1	0,4	10
Drainage of 2 drains.		0	0	9	3,5	16	6,9	25
		0	0	6	2,6	18	7,8	22
Total	n=256	0	0	27	10,5	40	15,6	67
	n=230	0	0	13	5,6	19	8,3	32
Combined methods								
FC+ IEE invagination		2	0,7	5	1,9	2	0,7	9
		1	0,4	7	3,1	2	0,8	10
Invagination + omental tamponade		0	0	1	0,4	3	1,2	4
				4	1,7	3	1,3	7
Total	n=256	2	0,7	8	3,1	3	1,2	13
	n=230	1	0,4	11	4,8	5	2,1	17
Total	n=256	22	8,5	144	56,2	90	31,1	256
	n=230	13	5,6	137	59,5	80	34,7	230

*note: (white box) - comparison group; (grey box) - main group

As can be seen from Table 4.10, in the comparison group, closed EE was performed in 81 (31.6%) patients, more often - with EC diameter of 5 cm - in 20 (7.8%) and 6-10 cm - in 48 (18.7%) patients. In the main group, closed EE was performed and semi-closed EE was performed in 93 (40.4%), mostly with EC diameter of 6-10 cm in 74 (32.2%). Semi-closed EE was mainly performed with EC diameter 6-10 cm in 61 (23.8%) in the comparison group, and in the main group with EC diameter 11-20 cm in 49 (21.3%) patients.

Open EE with OP drainage with one drainage tube in the comparison group was performed in 18 (32,5%) patients with EC diameter of 6-10 cm, and in 24 (9,4) patients with diameter of 11-20 cm and more, which later caused postoperative suppuration and other complications.

In the main group, open EE was mainly performed with drainage with two drainage tubes in 18 (7.8%) patients.

Combined methods of EE in the comparison group were performed in 13 (5.1%) patients in the main group and in 17 (7.4%) patients in the control group. At the same time, practically all the above-mentioned methods of EE depending on the EC size prevailed in the range of cyst size from 6 to 10 cm in diameter.

It should be noted that in the comparison group isolation of the surgical wound and operative space was performed in a standard way (with large napkins), alcoholic iodine solution was used for treatment of the residual cavity, in some cases - furacilin, which caused recurrences of echinococcosis in the postoperative period in 17 (6,6%) patients.

One of the important stages of surgical treatment of EB was the choice of the method of adequate treatment of the residual cavity. Regardless of the planned method of residual cavity elimination, its antiparasitic treatment should be performed.

Intensive therapy in the postoperative period included: antibiotic therapy, infusion and transfusion therapy aimed at correction of anemia, hypoproteinemia, electrolyte balance disorder and maintenance of functions of vital organs and systems, correction of nutrition of coagulation and anti-coagulation system, detoxification using forced diuresis.

§4.2. Development of a comprehensive algorithm for therapeutic and preventive measures in echinococcosis

The choice of the optimal treatment strategy for the patient should be individualized and based on an analysis of the risks and benefits of each method, taking contraindications into account. As experience was gained, we developed an algorithm for echinococcosis, according to which comprehensive diagnostic measures were carried out for patients in all cases, depending on risk groups and the presence of pathology (see Fig. 4.1).

According to the proposed algorithm, risk groups were determined in all cases, followed by a study using the Questionnaire Map. Upon diagnosis clarification, chemotherapy, immunotherapy, and hepatoprotective therapy were administered. Depending on the research results, the decision was made regarding conservative or surgical treatment. Subsequently, patients with EB were registered by epidemiologists and public health surveillance authorities. This method is simple, does not require expensive equipment, and can be performed in any healthcare facility and surgical department. It not only improves treatment outcomes but also reduces treatment costs and leads to a decrease in the frequency of EB complications.

At the current stage of development in EB surgery, this algorithm has allowed for the formulation of indications and contraindications for each surgical treatment method, as well as their combinations, with the aim of further reducing mortality, the frequency of postoperative complications, and disease recurrence.

At the preoperative stage, Albendazole was used for conservative therapy of echinococcosis as a post-surgical recurrence prevention therapy. For the same purpose, after surgical intervention, patients were prescribed at least 3 courses of treatment with Albendazole at a dose of 10 mg per kg of body weight per day in a single dose - morning/evening with a 12-hour interval for 28 days, with a mandatory combination of a hepatoprotector. The drug was recommended to be taken during the consumption of fatty food, which increased its bioavailability. The interval between courses was 15 days, and liver function control and blood cell composition monitoring were conducted before treatment and every 15 days during the first course of therapy. In the absence of significant changes in blood parameters during subsequent courses of the study, control was conducted at least once a month.

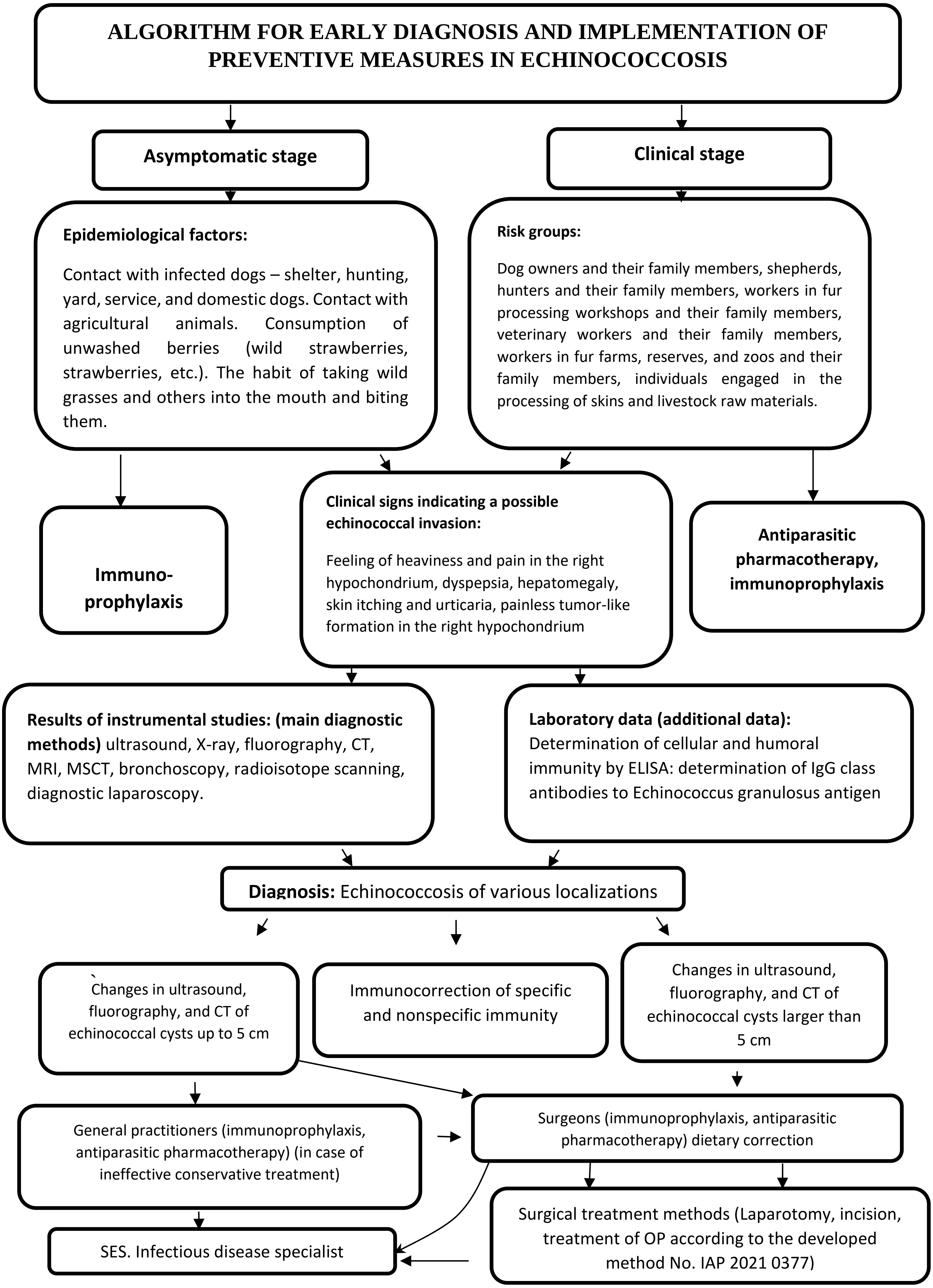

Fig. 4.1. Algorithm for early diagnosis and preventive measures for echinococcosis

Albendazole treatment was carried out against the background of basic therapy (diet and dietary regimen).

Chemotherapy for liver echinococcosis in the pre- and postoperative periods is one of the important aspects, and sometimes the only method, contributing to the prevention of recurrences. The combined use of traditional surgical interventions with antiparasitic chemotherapy is an effective method for preoperative preparation and surgical treatment of this disease.

Summarizing the above, a comprehensive set of diagnostic methods for preoperative examination using ultrasound, radiological, and CT studies, as well as Cart questionnaires, allows for the diagnosis of echinococcosis, determination of localization, assessment of the number and size of cysts, evaluation of the parasite's viability, and selection of a rational surgical treatment strategy.

§4.3. Results of cytological and morphological studies in the examined patient groups

A special section of the research was the cytology of the contents of the cysts for the presence of scolices and the determination of the timing of the death of embryonic elements under the influence of disinfectants.

An important role in the surgical treatment of echinococcosis was played by germicides, which had a lethal effect not only on the fertile elements of the echinococcus but were also non-toxic to the patient's body and prevented the occurrence of recurrent relapses. Taking this into account, one of the main tasks was to conduct cytological and morphological studies to determine the effectiveness of disinfecting the fertile elements of the echinococcus under the influence of antiseptic solutions, hypertonic solution, decasan, and betadine.

4.3.1. Results of cytological and morphological studies in the comparison group of patients with complicated and uncomplicated forms of echinococcosis

At the time of the operation, in patients with echinococcosis in the comparison group, with strict adherence to the principles of anti-parasitism and anti-parasitic treatment, the cyst was punctured, its contents were taken before and after treating the cavity with a furacilin antiseptic solution (1:5000) and a hypertonic solution, and cytological studies were performed to determine the viability of the scolices and their staining brown with a 1% aqueous eosin solution. Cytological studies were conducted using the Papanicolaou method, as it is reliable and allowed for assessing the effectiveness of the disinfection method (see Table 4.11).

The application of a furacilin antiseptic solution in combination with a hypertonic solution for up to 5 minutes did not have a detrimental effect on the scolices, and after 10 minutes of exposure, 90% of the scolices were found to be dead, hooks were absent, and thickening of the internal structure was noted.

Table 4.11

Results of the effect of furacilin antiseptic solution combined with hypertonic solution on the viability of fertile elements of echinococcal cysts in the control group with uncomplicated and complicated forms.

Method of disinfection	Number of patients	Exposure (in minutes), % of dead scolopids		
		3	5	10
Antiseptic solution 0.02% furacilin and 30% hypertonic solution	107	70,0	80,0	90,0

The results of the cytological study are presented in Fig. 4.2-4.5. A live scolex with an intact germinal membrane and intact internal cellular content (see Fig. 4.2).

At the third minute of exposure, changes in the shape of the scolex towards elongation and swelling of the cell membrane were observed (see Fig. 4.3).

At the fifth minute of exposure, the destruction of the germinal membrane was observed, with a thickening of the cellular structure and partial staining in a brown color (see Fig. 4.4). Thus, our cytological studies confirmed the effectiveness of the antiseptic solution of furacilin in combination with a hypertonic solution as a disinfectant during the treatment of the fibrous capsule cavity in echinococcectomy, and after 10 minutes, the percentage of dead scolices was 90% (see Fig. 4.5). Special attention was paid to the morphological state of the fibrous capsule before disinfection and after treatment with a solution of furacilin in combination with a hypertonic solution. These studies were conducted on 12 patients, and for histological examination, material was taken by excising pieces of the fibrous capsule wall with cuts of 1.0x1.0 cm.

Morphological studies of the fibrous capsule before cavity treatment showed productive inflammation and infiltration of the fibrous capsule with signs of hemodynamic disturbance (see Fig. 4.6).

The collagen fibers constituting the connective tissue base of the fibrous capsule were loosened, forming gaps in places. In the excised fibrous capsule, productive inflammation with the development of productive vasculitis was observed.

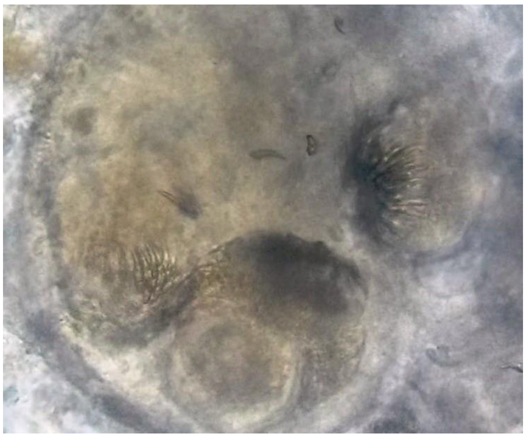

Fig. 4.2 Live scolex before treatment with furacilin and hypertonic solution

Fig. 4.3. Three minutes after exposure to furacilin and hypertonic solution

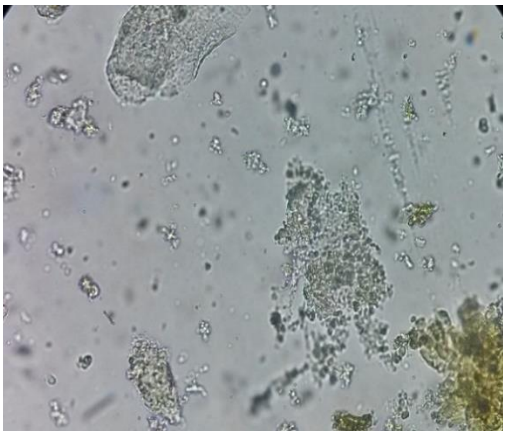

Fig. 4.4. Condition of the scolex 5 minutes after exposure to furacilin and hypertonic solution

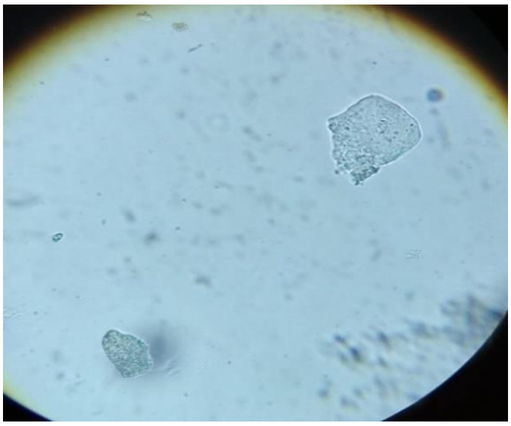

Fig. 4.5. Ten minutes after exposure to furacilin and hypertonic solution

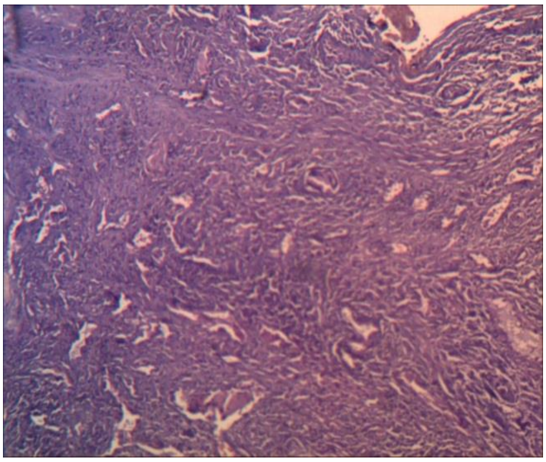

Fig. 4.6. Fibrous capsule before treatment with furacilin and hypertonic solution, stained with hematoxylin-eosin, magnification X64

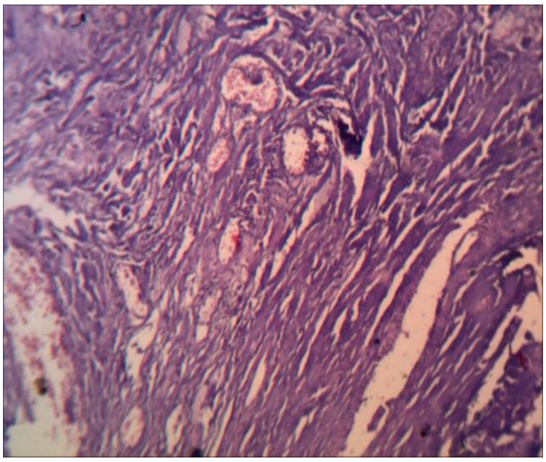

Fig. 4.7. Fibrous capsule after treatment with furacilin and hypertonic solution, stained with hematoxylin-eosin, magnification X64.

After treating the cavity of the fibrous capsule with a 0.02% antiseptic solution of furacilin in combination with a 30% hypertonic solution, disturbances in hemodynamics at the level of the microcirculatory vessels were observed, resembling congestive hyperemia with foci of perivascular hemorrhage. A moderate increase in the process of loosening the collagen matrix of the fibrous capsule with the formation of fissures was also noted (Fig. 4.7).

Thus, morphological studies of the fibrous capsule showed that the use of a furacilin antiseptic solution in combination with a hypertonic solution leads to moderate loosening of collagen fibers, the formation of gaps, and consequently, effective disinfection of the perivascular liver tissue capsule.

4.3.2. Results of cytological and morphological studies in the main group of patients with complicated and uncomplicated forms of echinococcosis

In the main group of patients, we strictly adhered to the principles of non-parasitism during the surgical intervention, aimed at preventing the contact of the cyst contents with the organ being operated on, cavities, and the surgical wound to prevent the intraoperative dissemination of the embryonic elements of the removed cyst.

To ensure anti-parasitic measures, significant importance was given to the surgical access, rules for isolating the surgical field, and anti-parasitic methods for evacuating the contents of the removed cysts. Alongside this, we also adhered to strict anti-parasitic principles, which involved disinfecting the embryonic elements of the parasitic cyst. To this end, we used effective methods and means of anti-parasitic treatment for the contents of the removed cysts, namely, an 80% glycerin solution, a 0.02% decasan solution in combination with a 10% betadine solution, depending on the complications of echinococcosis. In the main group of patients undergoing echinococcectomy, initially, gauze pads soaked in warm decasan solution were placed around the cyst, followed by puncturing, aspirating the cyst contents, after which the cavity was filled with warm 80% glycerin solution, 0.02% decasan, and 10% betadine with an exposure of 3-5-10 minutes. Then, after evacuating the germicide, the fibrous capsule was opened, and the integrity of the chitinous membrane was determined with subsequent removal. The cavity of the fibrous capsule was additionally treated with glycerin, decasan, and betadine depending on the complicated and uncomplicated forms of echinococcosis for 3-5-10 minutes. Before and after disinfecting the cavity of the fibrous capsule with 80% glycerin solution, 0.02% decasan solution, and 10% betadine solution, the cyst contents were taken for cytological examination.

In uncomplicated forms of echinococcosis, we used an 80% glycerin solution for intraoperative antiparasitic treatment of the residual cavity. In cases of complications such as biliary fistula, we applied 80% glycerin in combination with a 0.02% Decasan solution. In cases of suppuration, we used 80% glycerin in combination with a 0.02% Decasan solution and 10% Betadine. In cases of suppuration with a biliary fistula, we applied a combination of 80% glycerin and a 0.02% Decasan solution.

The aim of the cytological study was also directed at determining the viability of the scoli and their staining brown with a 1% aqueous solution of eosin (see Table 4.12).

Table 4.12

Results of the effect of an 80% glycerin solution on the viability of fertile elements of echinococcal cysts in uncomplicated echinococcosis in the main group of patients

Method of disinfection	Number of patients	Exposure (in minutes), % of dead scollexes		
		3	5	10
Glycerin 80%	18	90,0	100,0	100,0

The use of an 80% glycerin solution already showed a lethal effect on the scolex by the third minute, with 90% of the scoleces identified as dead. This was manifested by the secondary elements of the echinococcus being immobile, intensely stained brown, and their internal structure being almost undifferentiated. Studies conducted with exposure from 5 to 10 minutes did not reveal significant differences; all scoleces were dead. It was established that the optimal exposure time was 4-5 minutes (see Figures 4.8-4.11). At the third minute of exposure, a change in the shape of the scolex towards elongation and swelling of the cell membrane was observed (see Figure 4.9).

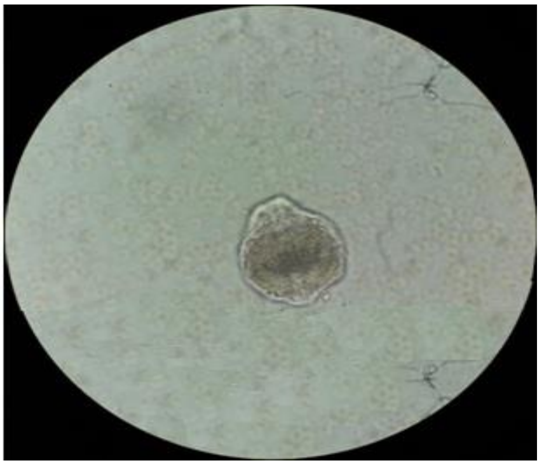

Fig. 4.8. Live scolex before glycerin treatment

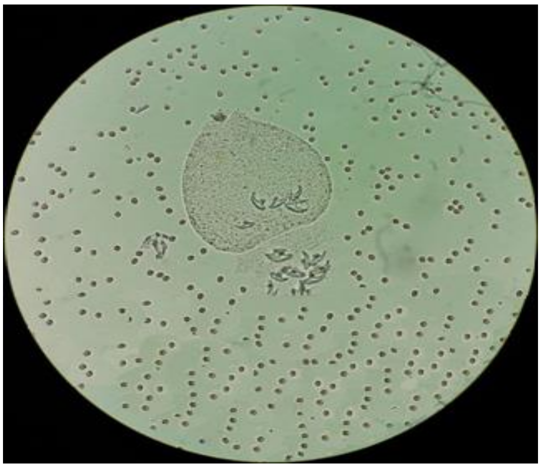

Fig. 4.9. Three minutes after exposure to glycerin

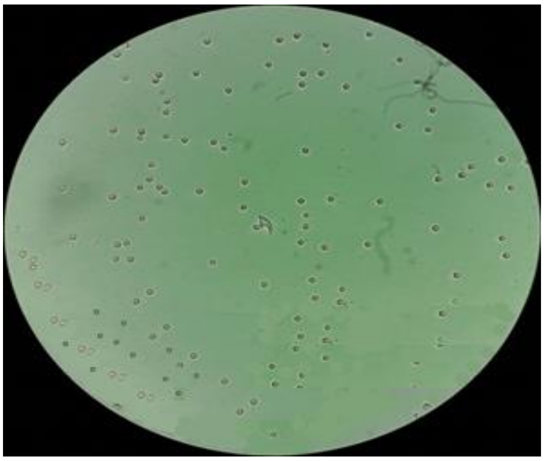

Fig. 4.10. Five minutes after exposure to glycerin.

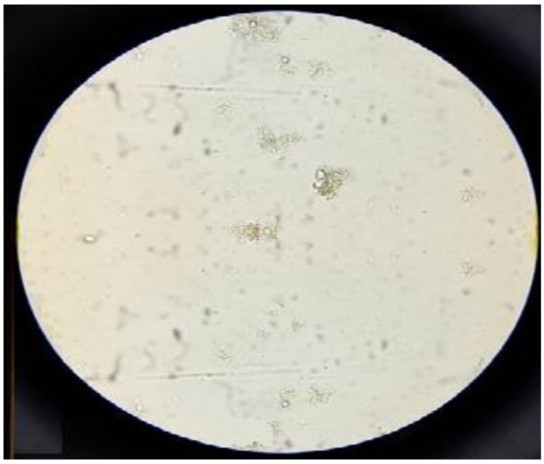

Fig. 4.11. Ten minutes after exposure to glycerin

At the fifth minute, the destruction of the germinative membrane was observed, with a thickening of the cellular structure and partial brown staining (see Fig. 4.10 and 4.11).

Summarizing the results of cytological studies in the main group of patients with uncomplicated echinococcosis, it can be assumed that an 80% glycerin solution is not inferior in its scolexocidal action to a 0.02% antiseptic furacilin solution combined with a 30% hypertonic solution, which served as the basis for using glycerin in the clinic as an effective disinfectant for the residual cavity of the fibrous capsule.

The use of an 80% glycerin solution in combination with a 0.02% decasan solution already had a lethal effect on the scolex by the third minute, with 90% of the scolices observed to be dead (see Table 4.13).

Table 4.13

Results of the effect of the 80% glycerin preparation in combination with a 0.02% decasan solution on the viability of fertile elements of an echinococcal cyst complicated by a biliary fistula in the main group of patients

Method of disinfection	Number of patients	Exposure (in minutes), % of dead scollexes		
		3	5	10
Glycerin 80% Decasan 0.02%	9	90,0	100,0	100,0

This was manifested by the fact that the secondary elements of the echinococcus were immobile, intensely stained brown, and their internal structure was almost undifferentiated. Studies conducted with exposures from the fifth to the tenth minute did not reveal significant differences; all scolices were dead. It was established that the optimal exposure time was 4-5 minutes. The results of the cytological study are presented in Figures 4.12-4.15.

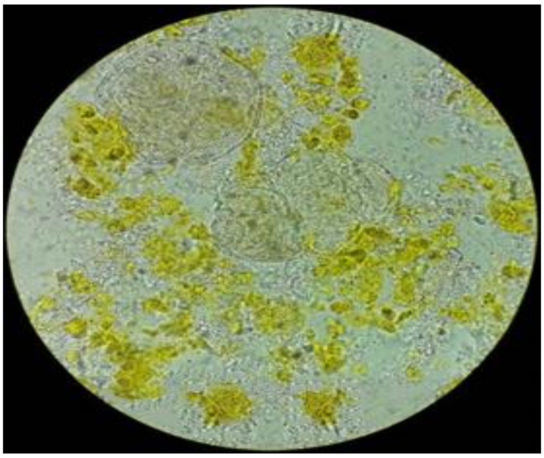

Fig. 4.12. Live scolex before treatment with glycerin and decasan

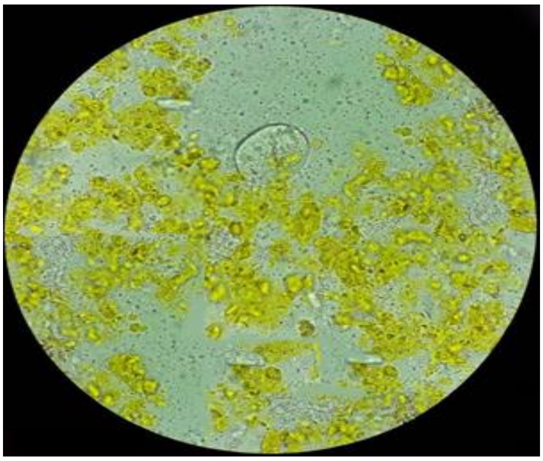

Fig. 4.13. Three minutes after exposure to glycerin and decasan

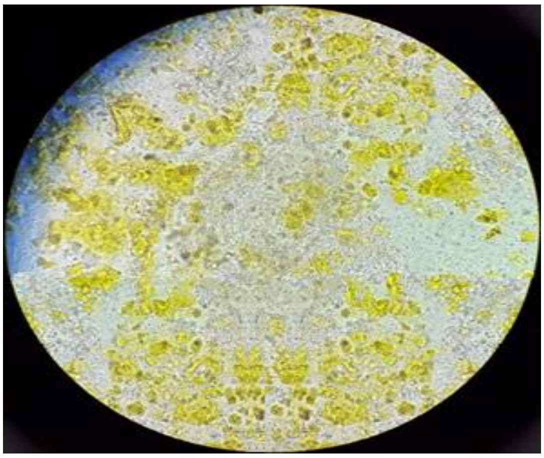
Fig. 4.14. Five minutes after exposure to glycerin and decasan


Fig. 4.15. Ten minutes after exposure to glycerin and decasan

At the third minute of exposure, a change in the shape of the scolex towards elongation and swelling of the cell membrane was observed (see Fig. 4.13). At the fifth minute of exposure, the destruction of the germinal membrane with the thickening of the cell structure and partial brown staining was observed (see Fig. 4.14 and 4.15).

Summarizing the analysis of cytological research results in the main group of patients with complicated echinococcosis, it can be assumed that an 80% glycerin solution combined with a 0.02% decasan solution is not inferior in its scolexocidal action to a 0.02% furacilin antiseptic solution combined with a 30% hypertonic solution. This served as the basis for using the 80% glycerin solution and the 0.02% decasan solution in the clinic as an effective disinfectant for the fibrous capsule cavity in cases of echinococcal cysts complicated by bile fistulas.

The use of an 80% glycerin solution in combination with a 0.02% decasan solution and a 10% betadine solution already had a lethal effect on the scolices by the third minute, with 90% of the scolices being found dead (see Table 4.14).

This manifested in the fact that the secondary elements of echinococcus were immobile, intensely stained brown, and their internal structure was almost undifferentiated. Studies conducted with exposures from the fifth to the tenth minute did not reveal significant differences; all scolices were dead. It was established that the optimal exposure time was 4-5 minutes (see Fig. 4.16-4.19).

Table 4.14

Results of the effect of 80% glycerin combined with 0.02% decasan solution and 10% betadine on the viability of fertile elements during the suppuration of echinococcal cysts in the main group of patients

<table>
<tr><th rowspan="2">Method of disinfection</th><th rowspan="2">Number of patients</th><th colspan="3">Exposure (in minutes),
% of dead scollexes</th></tr>
<tr><th>3</th><th>5</th><th>10</th></tr>
<tr><td>Glycerin 80%
Decasan 0.02%
Betadine 10%</td><td>16</td><td>90,0</td><td>100,0</td><td>100,0</td></tr>
</table>

At the third minute of exposure, a change in the shape of the scolex towards elongation and swelling of the cell membrane was observed (see Fig. 4.17). At the fifth minute of exposure, the destruction of the germinal membrane with thickening of the cell structure and partial brown staining was observed (see Fig. 4.18 and 4.19).

Summarizing the analysis of cytological research results in the main group of patients with complicated echinococcosis in the form of suppuration, it can be assumed that an 80% glycerin solution combined with a 0.02% decasan solution and a 10% betadine solution is not inferior in its scolexocidal action to a 0.02% furacilin antiseptic solution combined with a 30% hypertonic solution. This served as the basis for using the 80% glycerin solution, 0.02% decasan solution, and 10% betadine solution in the clinic as an effective disinfectant for the fibrous capsule cavity in cases of echinococcal cyst suppuration.

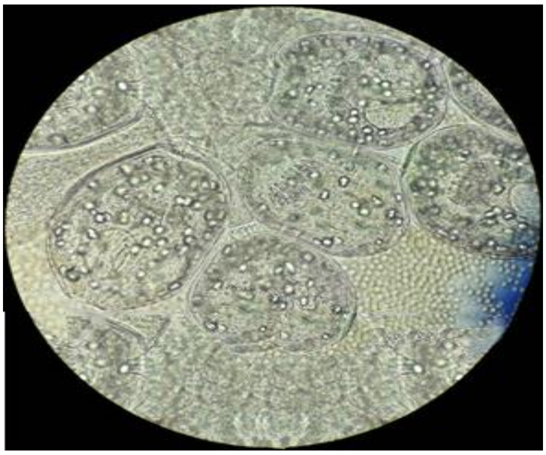

Fig. 4.16. Live scolex before treatment with glycerin, decasan, and betadine

Fig. 4.17. Three minutes after exposure to glycerin, decasan, and betadine

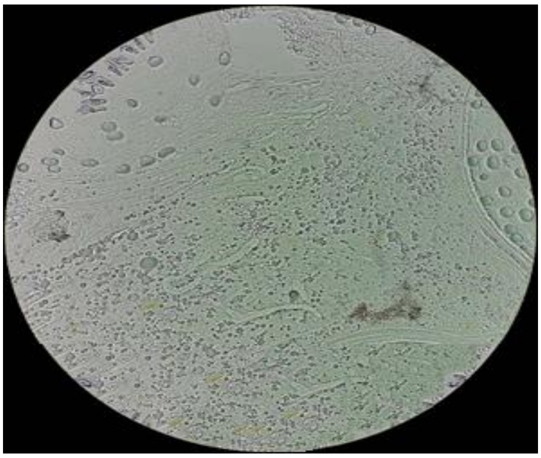

Fig. 4.18. Five minutes after exposure to glycerin, decasan, and betadine

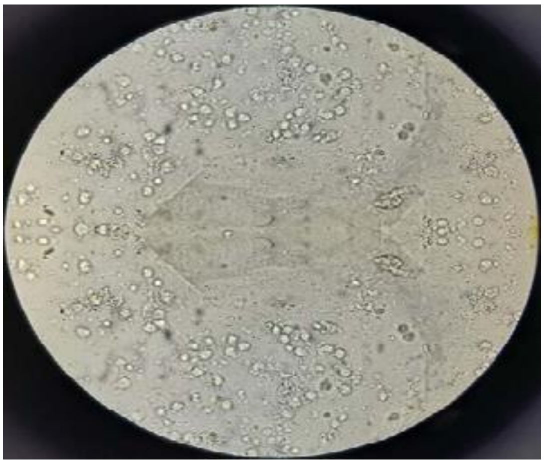

Fig. 4.19. Ten minutes after exposure to glycerin, decasan, and betadine

The use of an 80% glycerin solution in combination with a 0.02% decasan solution already had a lethal effect on the scolex by the third minute, with 90% of the scoleces being found dead (see Table 4.15).

Table 4.15

Results of the impact of the disinfectant, 80% glycerin solution in combination with a 0.02% decasan solution on the viability of fertile elements of echinococcal cysts in the presence of suppuration and biliary fistula in the main group of patients

Method of disinfection	Number of patients	Exposure (in minutes), % of dead scollexes		
		3	5	10
Glycerin 80% Decasan 0.02%	7	90,0	100,0	100,0

This was manifested by the fact that the secondary elements of echinococcus were immobile, intensely stained brown, and their internal structure was almost undifferentiated. Studies conducted with exposures from the 5th to the 10th minute did not reveal significant differences; all scolices were dead. It was established that the optimal exposure time is 4-5 minutes (see Fig. 4.20-4.23).

At the third minute of exposure, a change in the shape of the scolex towards elongation and swelling of the cell membrane was observed (see Fig. 4.21). At the fifth minute of exposure, the destruction of the germinal membrane with thickening of the cell structure and partial brown staining was observed (see Fig. 4.22 and 4.23).

Summarizing the analysis of cytological research results in the main group of patients with complicated echinococcosis, it can be assumed that an 80% glycerin solution combined with a 0.02% decasan solution is not inferior in its scolocidal action to a 0.02% furacilin antiseptic solution combined with a 30% hypertonic solution. This served as the basis for using an 80% glycerin solution with a 0.02% decasan solution in the clinic as an effective disinfectant for the fibrous capsule cavity in cases of suppuration of an echinococcal cyst.

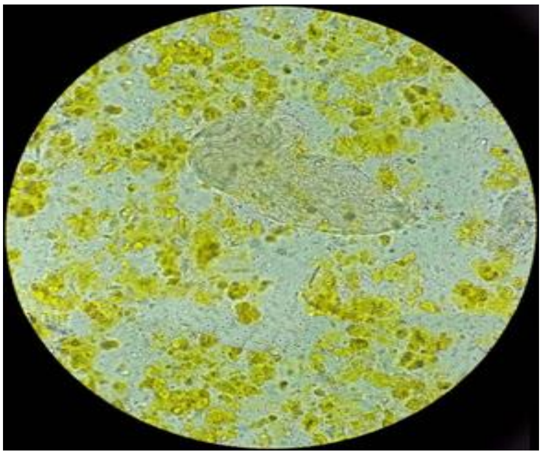

Fig. 4.20. Live scolex before treatment with glycerin and decasan

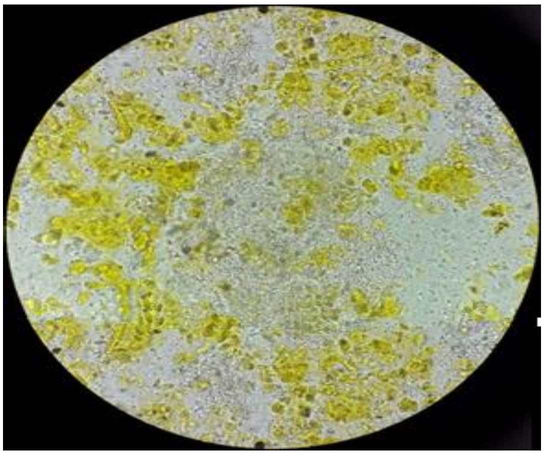

Fig. 4.21. Three minutes after exposure to glycerin and decasan

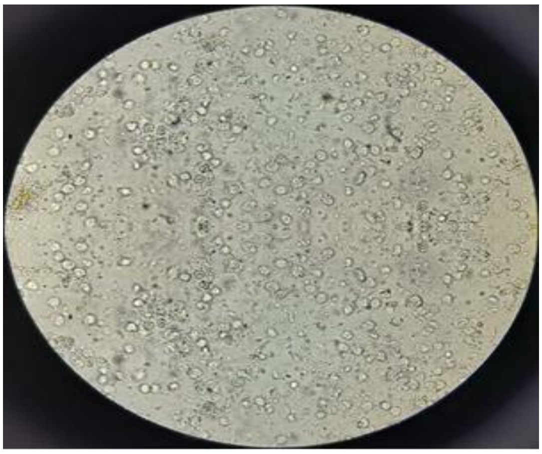

Fig. 4.22. Five minutes after exposure to glycerin and decasan.

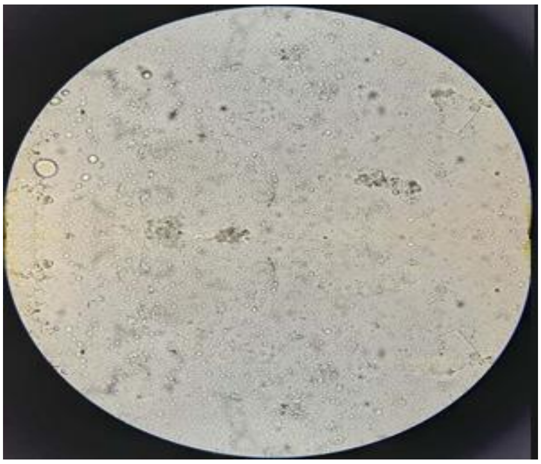

Fig. 4.23. Ten minutes after exposure to glycerin and decasan

And in this studied group of patients, we attached great importance to morphological studies of the fibrous capsule before disinfection and after treatment with an 80% glycerin solution, a 0.02% decasan solution, and a 10% betadine solution. The studies were conducted on 10 patients, and for histological analysis, material was taken by excising pieces of the fibrous capsule wall measuring 1.0 x 1.0 cm before and after cavity treatment.

Morphological studies have shown that after a 3-minute exposure following treatment of the fibrous capsule with an 80% glycerin solution, a 0.02% decasan solution combined with a 10% betadine solution, moderate inflammatory infiltration is observed with signs of impaired hemodynamics, vessel hyperemia, and hemorrhage around the vessels (Figures 4.24 and 4.25).

Collagen fibers, forming the connective tissue basis of the fibrous capsule, were slightly loosened, occasionally forming gaps. Around the vessels, productive inflammation and productive vasculitis were noted.

During the 3-5 minute exposure, disturbances in hemodynamics were observed in the capsule wall, characterized by pronounced hyperemia of the microcirculatory vessels resembling congestive hyperemia with foci of perivascular hemorrhage. An increase in the process of collagen matrix loosening of the fibrous capsule with the formation of fissures was noted (see Fig. 4.25).

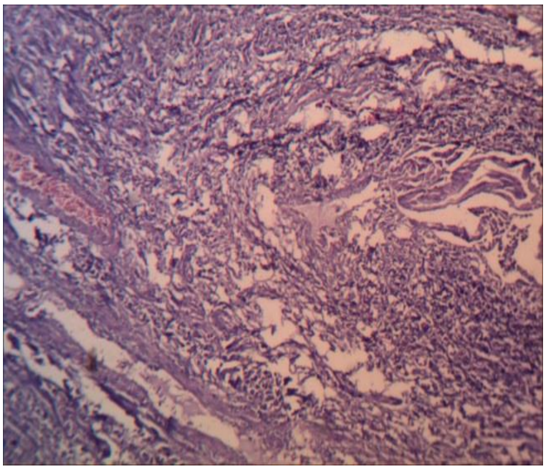

Fig. 4.24. Fibrous capsule before treatment with Decasan and Betadine, stained with hematoxylin-eosin, magnification x64.

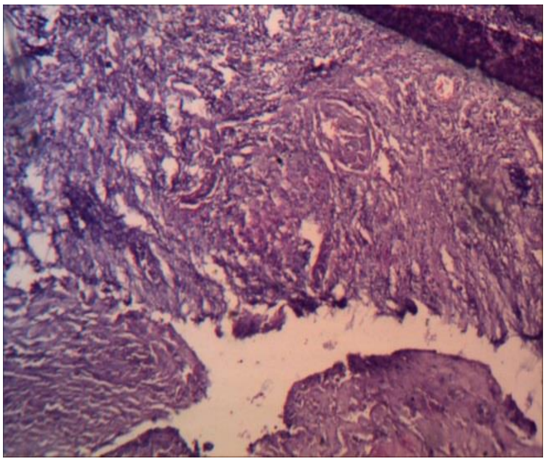

Fig. 4.25. Fibrous capsule after treatment with Decasan and Betadine, stained with hematoxylin-eosin, magnification x64.

So, morphological studies of the fibrous capsule showed that treatment with an 80% glycerin solution, a 0.02% decasan solution, and a 10% betadine solution leads to the loosening of collagen fibers, the formation of gaps, which facilitates the penetration of solutions into the perivascular tissue of the liver and maximizes the disinfection of the capsule.

Moreover, glycerin heated to 60°C has the strongest germicidal effect, and echinococcus acephalocysts are more resistant to the harmful effects of various drugs than the parasite's protoscoleces. The severity of destructive changes in protoscoleces depended on the duration of glycerin exposure, the time of its effect ending, and was not significantly dependent on the concentration of glycerin. Thus, when exposed to 80% glycerin heated to 60°C for 0.5 minutes, destructive changes in protoscoleces, indicating their death, were clearly visible under low magnification of the microscope by the end of the glycerin treatment; for acephalocysts, it was 2–4 minutes.

Resume

Surgical intervention for echinococcosis should be performed after comprehensive, pathogenetically justified preoperative preparation and instrumental diagnostics, and should include the removal of the parasite and resolution of the residual cavity. As our experience shows, the comprehensive use of laboratory and instrumental studies, including ultrasound and MRI, allows for the determination of the localization and size of echinococcal cysts in the liver and abdominal organs, assessment of the state of the fibrous capsule, and identification of the presence and nature of complications. Chemotherapy for echinococcosis in the pre- and postoperative periods is one of the important aspects, and sometimes the only method, contributing to the prevention of recurrent relapses.

Thus, the choice of therapeutic and diagnostic tactics for liver echinococcosis in most cases depends on the nature of the lesion, the number and size of echinococcal cysts, as well as the selection of the most optimal access and methods for isolating the surgical field; antiparasitic treatment of the cyst and rational drainage of residual cavities, based on the principles of apathy and antiparasitism of echinococcectomy, which increase the radicality of operations and significantly reduce the likelihood of disease recurrence.

CHAPTER V. ASSESSMENT OF THE IMMEDIATE AND LONG-TERM RESULTS OF SURGICAL TREATMENT OF ECHINOCOCCOSIS

The study of the results of various surgical interventions for echinococcosis is one of the leading factors in evaluating different surgical methods, determining the feasibility of widely implementing minimally invasive (conservative) surgical treatment methods, and developing a comprehensive set of measures for managing patients before, during, and after the surgical period, monitoring the rehabilitation process of patients' work capacity, and significantly reducing the number of adverse complications.

§5.1. Comparative assessment of the immediate results of surgical treatment

The effectiveness of surgical treatment using advanced techniques and methods, as well as comprehensive measures for preventing recurrence and dissemination of processes, was evaluated by comparing the immediate results in the comparison group and the main group.

For this purpose, patients with postoperative complications were divided into two subgroups, which allowed for an objective analysis of the surgical outcomes (see Table 5.1): 1) postoperative complications of a general nature, which occurred during surgical interventions on other organs and systems of the body: cardiovascular, bronchopulmonary (bronchitis, pneumonia) systems; 2) postoperative complications of a local nature, directly related to the surgery for liver echinococcosis and abdominal organs (fluid accumulation in the residual cavity, formation of external biliary fistulas, blood; liver abscesses, suppuration of the residual cavity, complications of the surgical wound).

As can be seen from the provided data, the main group showed a decrease in the frequency of postoperative complications compared to the control group. The total number of patients with complications also differed between the groups (main group – control group: 12 (5.2%) - 43 (16.4%) respectively). Specific complications were often observed after the removal of the residual cavity using the capitonnage method, followed by omentoplasty, the invagination method, and partial cystopericystectomy combined with the abdominalization of the residual cavity.

Table 5.1

The nature of complications in the early postoperative period depending on the method of closure and treatment of the residual cavity in the comparison group (n=256)

Method		Number of patients	Out of which complications occurred				Total complications
			suppuration of the residual cavity	biliary fistula	pleuro-ritis	wound suppuration	
Closed EE (n=93)							
Capitonage		12	2	1	0	0	3
Invagination		37	0	0	1	0	1
Pericystectomy with end-to-end P-sutures		25	1	0	0	0	1
Perfect echinococcectomy		19	0	0	0	0	0
Semi-closed (n=88)							
Capitonage with drainage		9	1	0	1	0	2
Invagination with drainage		21	0	1	0	1	2
Partial exploration. FC		33	0	0	0	0	0
Omentoplasty according to Askerkhanov		25	0	0	0	0	0
Open echinococcectomy (n=32)							
Drainage of fibrous capsule strip 1dr.		10	1	1	0	0	2
Fibrous capsule strip drainage 2 dr.		22	0	0	0	0	0
Combined methods (n=17)							
FC invagination + IEE		10	0	1	0	0	1
Invagination + tamponade with omentum		7	0	0	0	0	0
Total	abs.number	230	5	4	2	1	12
	%	100,0	2,1	1,7	0,8	0,4	5,2

As seen in Table 5.2, postoperative complications were diagnosed in 12 (5.2%) patients. Suppuration of the residual cavity was identified in 5 (2.1%), with the highest number of complications observed in closed and semi-closed EE.

The causes of purulent infection of the residual cavity after traditional surgical interventions, according to our data, were: non-airtight suturing and unnoticed biliary fistulas, leaving a fairly large volume and inadequate removal of the residual cavity, and in a number of patients - insufficient drainage, the use of catgut and its premature resorption during capitonnage operations, the invagination method, and omentoplasty.

In this regard, in recent years we have completely abandoned catgut and widely adopted precision surgical techniques – absorbable sutures on atraumatic needles from the company "EHTICON" 3.0 and "MONOCOL" 2.0, which turned out to be indifferent; we have practically not observed wound complications after them – wound suppuration, ligature fistulas, and postoperative hernias.

Timely differentiated treatment of the OP with the antiseptics we proposed, and after the elimination of the purulent process – decasan + betadine + glycerin, led to a favorable outcome.

Pleural effusion from the lungs was observed in 2 (0.8%) patients, and pleural effusion from the diaphragmatic surface of the liver in 1 (0.4%) patient. A biliary fistula was diagnosed in 4 (1.7%) patients, most often with closed pleural effusion.

Infiltrate and suppuration of the wound (1) were diagnosed in 1 (0.4%) patient in the main group. Treatment in these cases began with the removal of stitches, spreading the edges of the wound, and then applying active mechanical, chemical, and physical antiseptics.

Thus, the comparative evaluation of the immediate results of surgical treatment showed that after closed echinococcectomy (capitonage), postoperative complications of a local nature in the main group, such as biliary fistulas, suppuration of the residual cavity, and wounds, were observed significantly less frequently—by 11.2%.

Adherence to the principle of nutritional hygiene for patients in the pre- and postoperative periods (measures to improve the quality of nutritional hygiene), consideration of the localization, prevalence, and diameter of echinococcal cysts, the use of advanced techniques and technical methods of surgery, as well as the proposed method of treatment (betadine + decasan + glycerin) of the residual cavity and chemotherapy, have reduced the frequency of early complications from 16.7% to 5.2%.

§5.2. Comparative assessment of long-term results of surgical treatment

In the comparison group after surgery, over a long-term period from 6 months to 5 years, disease recurrences were observed in 12 patients (5.1%): after capitonnage in 2, after the invagination method in 2, and in 1 case each after omentoplasty and partial cystopericystectomy combined with the abdominalization of the residual cavity. In 18 patients who underwent conservative chemotherapy in the long term, suppuration of the EC was noted in 5, and an increase in the EC in 3 patients. Fluid accumulation in the OP with suppuration was observed in 15 (5.8%) patients, a biliary fistula was noted in 7 (2.7%) patients, and prolonged drainage was noted in 23 (8.9%) patients.

In the main group, after surgery, recurrences of the disease were observed only in 2 patients (0.8%) over a long-term period of 6 months to 3 years: after combined EE in 1 and the invagination method in 1. The formation of a residual cavity and the accumulation of fluid with suppuration were observed in 1 (0.4%) patient in the main group, a biliary fistula was noted in 2 (0.8%) patients, and prolonged drainage of the residual cavity was required only in 1 (0.4%) patient. In patients who underwent HT, suppuration of the EC was noted in 1 over the long term, while in the remaining 12, a decrease in the size of the EC was observed over time, leading to its disappearance.

The provided data shows that, for almost all indicators, there are relatively low figures for postoperative complications, with the highest figures observed in the comparison group of patients (see Table 5.3).

Table 5.3

Distribution of complications in the long-term postoperative period

Complication	Comparison group (n=256)		Main group (n=230)	
	abs.	%	abs.	%
Fluid accumulation	15	5,8	1	0,4
Long-term functioning biliary fistula	7	2,7	1	0,4
Recurrence of the disease	12	4,6	2	0,8
Prolonged drainage of residual cavity (more than 6 months)	23	8,9	1	0,4
Reliability of differences (χ^2 test)	13.574; Df=5; P=0.004			

Thus, the optimization of surgical tactics—correct determination of indications and contraindications for surgeries, rational surgical approaches, and improvement of the techniques for their execution—has allowed for a threefold reduction in the number of specific postoperative complications, and has brought the recurrence rate and mortality rate to zero.

Thus, the differentiated tactics of comprehensive surgical treatment of EB proposed by us, with adherence to nutritional hygiene and the use of nutrient and immune mixtures with increased energy value (Nutrilak, Immunogen) in the pre- and postoperative periods, allowed for an increase in the proportion of patients without complications in the early postoperative period from 83.2% to 94.7% (reduction of complications from 16.4% to 5.2%), a decrease in mortality from 1.2% to 0%, and a reduction in the need for repeated traditional interventions in the early postoperative period from 6.6% to 2.1%, and in the long term from 10.4% to 1.2% (P=0.005).

According to the survey data, not all patients in the postoperative period used anthelmintic drugs, or they forgot to take them.

The study of the long-term results of surgical treatment in the main group shows that overall it provided excellent results in 145 (63.1%), good results in 70

(30.5%), satisfactory results in 10 (4.3%), and unsatisfactory results in 5 (2.2%) patients. In the comparison group, excellent long-term results were noted in 98 (38.2%), good results in 35 (13.6%), satisfactory results in 88 (34.3%), and unsatisfactory results in 35 (13.6%) patients (see Table 5.4).

Table 5.4

Long-term results after surgery in the studied groups according to Visik

Results of surgery	comparison group (n=256)		main group (n=230)	
	abs	%	abs	%
Group I - excellent	98	38,3	145	63,0
Group II - good	35	13,7	70	30,4
Group III - satisfactory	88	34,4	10	4,3
IV-A group - bad	35	13,7	5	2,2
TOTAL	256	100	230	100

Therefore, the unsatisfactory results in the comparison group confirmed the opinion of some researchers that the occurrence of various complications has much in common with the tactics of preoperative preparation, the conduct of hygienic measures, and the inadequate adherence to the rules of non-parasitism and anti-parasitism of interventions.

It should be noted that targeted and comprehensive examination of patients before surgery, the selection of the most justified surgical method while adhering to the principles of non-parasitism and anti-parasitism in surgical interventions, and the technically correct execution of the residual cavity elimination, as well as preventive anti-parasitic chemotherapy in the pre- and postoperative periods, allow for a significant reduction in the number of postoperative complications and recurrences of echinococcosis. Consequently, both the long-term and short-term results of surgical intervention for liver echinococcosis can be optimized provided that early diagnosis and surgical interventions, especially in the initial stages, are performed, as well as a differentiated approach to each specific case depending on the localization, diameter, and presence of complications.

Resume

Thus, the long-term results in patients of the main group with optimized access methods and improved techniques for processing and eliminating residual liver cavities were significantly better than those in the comparison group, who underwent standard therapeutic and diagnostic methods, as well as traditional tactical and technical principles of echinococcectomy. Additionally, studying the results based on questionnaire data at various times after different surgeries for outpatient or inpatient examinations is justified and rational.

CONCLUSION

The incidence of echinococcosis among the population in many regions of the world continues to rise. In this regard, the issues of improving the methods of diagnosis and treatment of this disease are currently relevant [7, 9]. The surgical method is the only one for treating echinococcosis, but the recurrence rate of the disease remains high (3.3-54%), which necessitates the development of a set of measures before and after surgeries to significantly reduce this complication [52, 89, 110, 122, 129].

Uzbekistan is one of the regions endemic to echinococcosis. The prevalence of echinococcosis in the republic, determined by the number of medical consultations, is 5.82 per 100,000 population and shows a consistent upward trend [F.G. Nasyrov et al., 2001]. Each year, more than 1,500 cases of echinococcosis are identified in the republic. Data from M. Amidjanov et al. (1999) [ ] indicate that the annual economic damage from echinococcosis in Uzbekistan averages over 5 billion sums (approximately 2 million US dollars).

According to estimates by the WHO Reference Group on Epidemiology and Burden of Disease (FERG), established in 2015, echinococcosis is responsible for approximately 19,300 deaths and around 871,000 disability-adjusted life years (DALYs) lost globally each year. The number of people suffering from echinococcosis worldwide exceeds one million. For cystic echinococcosis, the average postoperative mortality rate for surgical patients is 2.2%, and in 6.5% of cases, recurrences requiring prolonged treatment are observed postoperatively.

The aim of this study was to improve preventive, hygienic measures and surgical treatment of echinococcosis. The tasks we set to achieve this goal included the study and analysis of the results of operated patients with complicated and uncomplicated forms of echinococcosis.

The studied patients were divided into 2 groups. The comparison group consisted of 658 people with echinococcosis from the Andijan region who had undergone echinococcosis; this group was divided into 2 subgroups: subgroup A, in which the incidence of echinococcosis was analyzed with a study of the effectiveness of sanitary and hygienic measures for the prevention of echinococcosis over the period from 2010 to 2017; subgroup B included 256 patients who received inpatient treatment at the Department of Surgical Clinics of Andijan State Medical Institute during the period from 2010 to 2017, where standard therapeutic, diagnostic, and preventive methods were applied.

The main group consisted of 622 patients residing in the Andijan region districts of Asaka, Shahrihan, Pakhtaabad, Izboskan, Oltinkul, and Andijan, where activities for the early detection and prevention of echinococcosis among the population were carried out, studying the actual nutrition and dietary behavior of the population suffering from echinococcosis, as well as applying preventive measures and tactical and technical principles of antiparasitic therapy in combination with advanced treatment methods.

Subgroup A – 392 people with echinococcosis, who underwent activities to improve the quality of medical examinations and prevent echinococcosis among the population, with a study of actual nutrition and dietary behavior during the period from 2018 to 2021.

Subgroup B – 230 patients with echinococcosis who underwent developed hygienic and preventive measures with the individualization of actual nutrition for echinococcosis according to a developed questionnaire and tactical and technical principles of antiparasitic therapy in combination with improved treatment methods at the Department of Surgical Clinics of AndSMI over the period of 2018-2021.

In our observations, there were no elderly patients or centenarians. In the compared groups, women slightly predominated (56.2% and 56%). In the control and main groups, the proportion of patients aged 19-41 years was significantly higher - 71% and 77.7%, respectively. The proportion of patients aged 41-60 years was 21.4% and 15.6%, and in the elderly group, it was 7.7% and 6.5%, respectively.

In both groups of patients, there was a predominance of rural residents compared to the urban population. Thus, in the control group, the incidence of EB among rural residents was 70.8% and 61.8%, while among urban residents it was 29.2% and 38.2%. In the main group, this indicator was 70.9% and 55.6 for rural residents, and 29.1% and 44.4 for urban residents. The analysis also noted a trend towards an increase in incidence among the urban population, which is associated with increased population migration. Nevertheless, rural residents accounted for 2/3, and urban residents for 1/3 of the total number of EB patients.

In the comparison group, only 62 (subgroup A - 15.4%) and 22 (subgroup B - 8.6%) of the studied patients with EB had a disease duration of up to 1 year by the time of surgery. Meanwhile, EB with a duration of 1 to 5 years was observed in 186 (subgroup A - 46.25%) and 139 (subgroup B - 54.2%) patients, and more than 5 years in 154 (subgroup A - 38.3%) and 95 (subgroup B - 37.1%) patients.

In the main group, a similar picture was observed: EB before the operation affected up to 1 year 55 (subgroup A 14.1%) and 31 (subgroup B 13.5%) patients, from 1 to 5 years - 187 (subgroup A 47.7%) and 117 (subgroup B 50.8%) patients, over 5 years - 150 (subgroup A 38.2%) and 82 (subgroup B 35.6%) patients. At the same time, the incidence from 1 to 5 years and older was observed in rural patients: in the comparison group 238 (subgroup A 59.2%) and 146 (subgroup B 57.1%) patients, and in the main group 236 (subgroup A 60.2%) and 114 (subgroup B 49.6%) patients, which was explained by the insufficient awareness of the rural population.

At the same time, the clinical manifestations of the invasion were nonspecific: in most cases, weakness and malaise were noted, diagnosed in 623 (94.6%) patients in the comparison group and 598 (96.1%) patients in the main group. Pain syndrome and a feeling of heaviness in the abdomen, as the only factor that prompted the patient to undergo an ultrasound, were noted in 641 (97.1%) and 615 (98.8%) of the examined patients.

We conducted a retrospective epidemiological analysis of the population's morbidity, which included a comparison of the average echinococcosis morbidity rates among children and adults, as well as urban and rural populations. The calculations were based on data from the state statistics service of the Andijan region regarding the population size in the specified groups, as well as in terms of age.

The key role in the early detection of echinococcosis was played by the development of hygienic and surgical measures aimed at the timely prevention of echinococcosis. Insufficient public awareness about echinococcosis, its causes and clinical manifestations, and the failure to adhere to basic preventive rules contributed to our development of a Questionnaire Map for examining patients suffering from echinococcosis, intended for medical workers, rural doctors, surgeons, and paramedical staff, as well as for family clinic doctors, adolescent and pediatric clinics (see Appendices 1, 2).

Based on the results of the studies of patient questionnaires suffering from and operated on for echinococcosis, we analyzed the main causes and conditions for the development of the disease; as well as assessed the condition of the operated patients. Alongside this, we conducted educational activities aimed at the prevention and control of echinococcosis and its spread.

Due to the fact that the incidence rate in the rural areas exceeded that of the urban population, the study of factors maintaining the epidemic process of echinococcosis was conducted in relation to the rural areas. The most affected territory was the Shakhrikhan district (Zone 1 – with a high incidence rate). The intensity rate varied from 8.37 to 12.09 per 100,000 population, while the average long-term (over 10 years) rate for the region was 2.5. In terms of echinococcus invasion, the second place was taken by the Asaka district, where the average long-term incidence rate ranged from 4.65 to 8.36 per 100,000 population. These districts were classified into Zone 2 (with an average incidence rate).

When analyzing the results of the study on actual nutrition, the following were evaluated: compliance of the energy value of the diet, the ratio between proteins, fats, and carbohydrates, their contribution to the energy value of nutrition, as well as the balance of the amino acid composition and the compliance of micronutrient content and the ratio between individual macroelements. Additionally, the eating regimen was assessed: the frequency of meals, intervals between them, the time of the last meal before sleep, and the distribution of the energy value of the diet across meals. In the evaluation of actual nutrition, the nutritional and energy value of the diet were compared with the recommended values of physiological needs for energy and nutrients both in the preoperative and postoperative periods.

In the diagnosis of echinococcosis, general clinical and instrumental research methods were used: ultrasound examination (US), computed tomography (CT), and magnetic resonance imaging (MRI), as well as hygienic methods, cytology of cyst contents for the presence of scolices and determining the time of death of embryonic elements under the influence of disinfectants. Additionally, morphological examination of the fibrous capsule before and after disinfection was carried out.

The research data were statistically processed using methods of variation parametric and non-parametric statistics with the calculation of the arithmetic mean of the studied indicator (M), the standard deviation (s), the standard error of the mean (m), and relative values (R).

When analyzing the incidence of echinococcosis in the Fergana Valley as a whole and in its subjects, it was found that the average annual incidence rate of echinococcosis in the population of Andijan region for the years 2010-2020 was 2.8±0.1 per 100,000 population, which is 3 times higher than the incidence rate in the Republic of Uzbekistan, which was 0.4±0.1 per 100,000 ($\chi 2=112.3$; $p<0.05$).

After analyzing the data from Form No. 003/u, it was found that the average annual incidence rate of echinococcosis among the residents of the region for the years 2010-2020 was 3.4±0.4 cases per 100,000 population, which exceeded the corresponding rate from Form No. 2 by 1.2 times ($\chi 2=18.2$; $p<0.05$). A significant trend towards an increase in the incidence rate among the population of the region was identified ($\chi 2=4.1$; $p<0.05$). As a result of the comparative analysis of echinococcosis incidence among children and adults, it was found that the average annual incidence rate among the child population for the years 2010-2020 was 3.1±0.3 per 100,000, while among the adult population it was 3.4±0.1 per 100,000. Moreover, there were no differences in the average annual incidence rates between the adult and child populations in the studied territories of the Fergana and Namangan regions ($\chi 2=0.5$; $p>0.05$).

As a result of the analysis of the gender composition of the sick among the adult population, it was established that the male population accounted for 50.7±2.0% (303 cases), and women for 49.3±2.0% (295 cases). The average long-term incidence rate for men was 3.5±0.2 per 100,000, while for women it was 3.2±0.2 per 100,000 ($\chi 2=1.1$; $p>0.05$). The absence of differences in the gender structure was explained by the possible predominance of household transmission of echinococcosis, where contact with the source of invasion occurs with approximately the same frequency in both men and women.

A survey was conducted among 392 patients suffering from ED, from both urban and rural populations of subgroup A of the main group, who underwent surgery in the surgical departments of district hospitals and in the surgical clinics of ASMI.

We also conducted a survey of 230 patients with ED subgroup B from the main group, who were operated on at the Department of Surgical Clinics of ASMI, during the period from 2018 to 2020.

Analysis of the responses showed that the population is poorly informed about the causes of the disease and poorly aware of possible preventive measures. The survey revealed that in most households, the sanitary condition of the population and sheep farms is not organized, and in some cases, the farms do not meet veterinary requirements, and not everywhere are there disposal pits. The population in the regions is poorly informed about the preventive measures and control of echinococcosis and other larval cestodoses of agricultural animals, which contributes to the spread of these diseases.

According to the results of the survey questionnaires in the main group, 45.3% and 85.3% did not follow the rules for caring for pets and did not timely prevent fecal contamination of the environment. There were also violations of personal hygiene during agricultural work, after caring for livestock and contact with sheep wool. The survey data revealed insufficient consumption of meat and meat products in the diets.

When studying the sanitary and hygienic living conditions of patients suffering from ED, it was found that 2.4% of them systematically used delivered water, 97.6% used tap water, and 4.8% used water from open water bodies. The low level of public awareness necessitated the urgent need for active sanitary and educational work to prevent the disease.

The results of the study showed that, overall, the preoperative diet was found to be deficient in proteins, vitamins, micro- and macroelements, meat, fish, dairy products, raw fruits, and vegetables.

In the pre- and postoperative periods, chemotherapy with Albendazole was administered. The success of the operation depended not only on technical surgical skills but also on metabolic interventional therapy, taking into account the patient's ability to tolerate metabolic stress, as well as the ability to provide appropriate nutritional support.

We applied special nutrition in the preoperative and postoperative periods for echinococcosis, including the integration of nutrition into the overall patient management scheme; avoiding prolonged periods of preoperative fasting; resuming oral nutrition as soon as possible after surgery; early initiation of diet therapy as soon as nutritional risk arises; metabolic control.

The transition to natural nutrition included a stage of combined (parenteral-enteral) nutrition lasting at least 4–5 days. For enteral nutrition, we used the Nutrien-Immune mixture with an energy value of 1.25 kcal/ml. One liter of the prepared product contained 70 g of protein, 45 g of fat, and 124 g of carbohydrates.

All admitted patients underwent various surgical interventions comparable in severity, volume, and duration.

Surgical tactics were determined by taking into account the localization, complications, and combinations of echinococcosis of the abdominal and thoracic organs with other organs. It was the localization of cysts in the liver and other organs of the abdominal and thoracic cavities that played a decisive role in choosing the surgical approach.

In both groups, the most common localization of echinococcosis was in the liver, with 304 patients affected, and combined liver and thoracic organ involvement was noted in 62 patients. There was also a significant prevalence of combined echinococcal lesions of the liver and abdominal organs - 80. In this case, the most common locations of echinococcal cysts were in the VIII segment, the combination of VII-VIII, and the V-VI-VII segments of the right lobe of the liver. Localization of echinococcal cysts in the lungs was noted in 40 patients.

At the same time, special attention was paid to the volume of the surgical procedure and the elimination of the residual cavity. Thus, the number and diameter of the echinococcal cyst were given primary importance. Single cysts were found in 147 patients in the control group and 137 patients in the main group (57.4% and 59.5%), two cysts in 69 (26.9%) patients in the control group and 56 (24.3%) in the main group, three cysts in 23 (8.9%) patients in the control group and 19 (8.2%) in the main group, and more than three cysts were identified in 17 (6.6%) patients in the control group and 18 (7.8%) in the main group.

As for the sizes of the cysts, small cysts were present in 22 (8.5%), medium in 144 (56.2%), large in 68 (26.5%), and giant in 22 (8.5%) patients in the control group. In the main group, small cysts were present in 13 (5.6%), medium in 137 (59.5%), large in 48 (20.8%), and giant in 32 (13.9%) patients. Additionally, the combination of small and medium cysts and the combination of medium and large cysts were observed in 23 (8.9%) patients in the control group and in 33 (14.3%) patients in the main group.

At the same time, the volume of surgical assistance was influenced by the presence of complications from the EC. The most common complications were EC suppuration - in 22 (8.6%) of the comparison group and in 16 (7.0%) of the main group, calcification - in 14 (5.5%) and in 12 (5.2%) - respectively in the groups (see Table 4.4).

Biliary fistula was diagnosed in 7 (2.7%) patients in the comparison group and in 9 (3.9%) in the main group; the development of purulent-destructive cholangitis due to rupture into the bile ducts (5 and 7) was observed in 8 (3.1%) of the comparison group and in 7 (3.1%) of the main group. A serious complication was considered the rupture of EC into the abdominal (3 and 4 (1.2%; 1.7%) and pleural cavities (2 and 1 (0.8%; 0.4%).

In cases of combined liver and lung lesions, a thoracoabdominal approach was performed in 28 (10.9%) patients in the comparison group and 9 (3.9%) patients in the main group. Among these, in 15 (6.5%) patients in the main group, when the localization of the EC was in the lungs and liver, the EE was performed through a laparotomy approach. It should be noted that in 2 (0.7%) patients in the comparison group and 10 (4.3%) patients in the main group, laparoscopic EE was performed.

By the method of eliminating OP, patients with closed EE predominated in the main group in 93 (40.4%) cases, combined EEs in 17 (7.4%), and semi-closed EE was performed in 95 (37.2%) in the comparison group and in 88 (38.3%) in the main group of patients.

In the comparison group, closed EE was performed on 81 (31.6%) patients, most frequently with a 5 cm diameter EC in 20 (7.8%) and a 6-10 cm diameter EC in 48 (18.7%) patients. Semi-closed EE was mainly performed with a 6-10 cm diameter EC in 61 (23.8%) in the comparison group, and with an 11-20 cm diameter EC in 49 (21.3%) patients in the main group.

Open EE with drainage of OP using a single drainage tube was performed in the comparison group in 18 (32.5%) patients with a diameter of EC 6-10 cm, and in 24 (9.4%) patients with a diameter of 11-20 cm or more, which subsequently led to the development of postoperative suppurations and other complications.

In the main group, open EE was more often performed with drainage using two drainage tubes in 18 (7.8%) patients.

Combined methods of ECT in the comparison group were performed in 13 (5.1%) patients in the main group and in 17 (7.4%) cases in the control group. Moreover, almost all of the aforementioned ECT methods, depending on the size of the cyst, predominated in the size range of cysts from 6 to 10 cm in diameter.

In the main group of patients undergoing echinococcectomy, initially, gauze pads soaked in warm Decasan solution were placed around the cyst. Then, a puncture was performed, and the cyst contents were aspirated. After that, the cavity was filled with a warm 80% glycerin solution, 0.02% Decasan, and 10% Betadine with an exposure time of 3-5-10 minutes. Following the evacuation of the germicide, the fibrous capsule was opened, and the integrity of the chitinous shell was assessed, leading to its subsequent removal. The fibrous capsule cavity was additionally treated with glycerin, Decasan, and Betadine depending on the complicated and uncomplicated forms of echinococcal disease for 3-5-10 minutes. Before and after disinfecting the fibrous capsule cavity with an 80% glycerin solution, 0.02% Decasan, and 10% Betadine, the cyst contents were taken for cytological examination.

To assess the immediate outcomes of patients with postoperative complications, they were divided into two subgroups, which allowed for an objective analysis of the surgical results: 1) postoperative complications of a general nature, which occurred during surgical interventions on other organs and systems of the body - cardiovascular and bronchopulmonary (bronchitis, pneumonia) systems; 2) postoperative complications of a local nature, directly related to the surgery for liver echinococcosis and abdominal organs (fluid accumulation in the residual cavity, formation of external biliary fistulas, bleeding, liver abscesses, suppuration of the residual cavity, complications of the surgical wound).

Postoperative complications were diagnosed in 42 (16.4%) patients. Suppuration of the residual cavity was identified in 17 (6.6%) patients, with the highest number of complications observed in closed and semi-closed EE.

Pleural effusion from the lungs was observed in 11 (4.2%) patients, and pleural effusion from the diaphragmatic surface of the liver in 2 (0.7%) patients. A biliary fistula was diagnosed in 12 (4.6%) patients, most often with semi-closed biliary fistula.

Retrospective analysis showed that the development of the abscess was due to the onset of a secondary infection and insufficient drainage of the OP contents through the single drain. Infiltrate (1) and wound suppuration (1) in the control group were diagnosed in 3 (1.1%) patients, with 1 having grade 2 obesity. In the postoperative period, patients underwent wound treatment twice daily with a 2% hydrogen peroxide solution, furacilin diluted 1:5000, and a 20% hypertonic sodium chloride solution.

A comparative evaluation of the immediate results of surgical treatment showed that after closed echinococcectomy and combined methods of eliminating the residual cavity of the echinococcal cyst, postoperative complications of a local nature in the comparison group, such as biliary fistulas, suppuration of the residual cavity, and wounds, were observed significantly more often – at 12.3%.

Often, specific complications were observed after the elimination of the residual cavity using the capitonnage method, followed by omentoplasty, the invagination method, and partial cystopericystectomy combined with the abdominization of the residual cavity. Postoperative complications were diagnosed in 12 (5.2%) patients. Suppuration of the residual cavity was identified in 5 (2.1%) patients, with the highest number of complications observed in closed and semi-closed EE.

Timely differentiated treatment of the OP with the antiseptics we proposed, and after the elimination of the purulent process – decasan + betadine + glycerin, led to a favorable outcome.

Compliance with the principle of nutritional hygiene for patients in the pre- and postoperative periods (measures to improve the quality of nutritional hygiene), consideration of the localization, prevalence, and diameter of echinococcal cysts, the use of advanced techniques and technical methods of operations, as well as the proposed method of treatment (betadine+decasan+glycerin) of the residual cavity and chemotherapy, allowed for a reduction in the frequency of early complications from 16.4% to 5.2%.

In the comparison group, in the long term after surgery, from 6 months to 5 years, disease recurrences were observed in 12 patients (5.1%): after capitonnage (in 2), the invagination method (in 2), and one case each after omentoplasty and partial cystopericystectomy combined with the abdominization of the residual cavity. In 18 patients who underwent conservative chemotherapy in the long term, the suppuration of the EC was noted in 5, and the increase of the EC in 3 patients. The accumulation of fluid in the OP with suppuration was observed in 15 (5.8%) patients, a biliary fistula was noted in 7 (2.7%) patients, and prolonged drainage was noted in 23 (8.9%) patients.

In the main group, over a long-term period after surgery ranging from 6 months to 10 years, recurrences of the disease were observed in only 2 patients (0.8%): after combined EE (in 1) and the invagination method (in 1). The formation of a residual cavity and the accumulation of fluid with suppuration were observed in 1 (0.4%) patient in the main group, a biliary fistula was noted in 2 (0.8%) patients, and prolonged drainage of the residual cavity was required in only 1 (0.4%) patient. Among the patients who underwent HT, in the long term, suppuration of the EC was noted in 1, while in the other 12, a decrease in the size of the EC was observed over time, up to its disappearance.

The study of long-term results of surgical treatment in the main group showed that overall it provided excellent results in 145 (63.1%), good results in 70 (30.5%), satisfactory results in 10 (4.3%), and unsatisfactory results in 5 (2.2%) patients.

In the comparison group, excellent long-term results were noted in 98 (38.2%), good in 35 (13.6%), satisfactory in 88 (34.3%), and unsatisfactory in 35 (13.6%) patients.

Therefore, the unsatisfactory results in the comparison group confirmed the opinion of some researchers that the occurrence of various complications is closely related to the tactics of preoperative preparation, the implementation of hygienic measures, and the inadequate adherence to the rules of non-parasitism and anti-parasitism during interventions.

Thus, the proposed differentiated tactics of comprehensive surgical treatment of EB, with adherence to nutritional hygiene and the use of nutritional and immune mixtures in the pre- and postoperative periods depending on the nature of the lesion, allowed for an increase in the proportion of patients without complications in the early postoperative period from 16.4% to 5.2% and a reduction in mortality from 1.5% to 0%, as well as a decrease in the need for repeated traditional interventions from 10.4% to 4.2% (P=0.005).

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