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ASSESSMENT OF THE EFFECTIVENESS OF ENDOVIDEOSURGICAL AND NAVIGATION-PUNCTURE METHODS IN THE TREATMENT OF LIVER ECHINOCOCCOSIS

Resume. *The study analyzed the effectiveness of endovideosurgical and navigation-puncture minimally invasive methods in the treatment of liver echinococcosis. 68 patients were involved in clinical observation: 38 of them underwent endovideosurgical treatment, 30 - navigation-puncture. The average age of the patients was 42±11 years. According to the research results, complications were observed in 10.5% of cases by the endovideosurgical method, and in 6.7% of cases by the navigation-puncture method. The duration of rehabilitation was 9.2±1.4 and 5.8±1.1 days, respectively. The obtained data confirm that minimally invasive technologies are an effective and safe approach to the treatment of liver echinococcosis, and the type and size of the cyst are important when choosing a method.*

Keywords: *liver echinococcosis, endovideosurgery, navigation puncture, minimally invasive technologies, percutaneous drainage, laparoscopic method, clinical effectiveness, rehabilitation period, complications.*

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ОЦЕНКА ЭФФЕКТИВНОСТИ ЭНДОВИДЕОХИРУРГИЧЕСКИХ И НАВИГАЦИОННО-ПУНКЦИОННЫХ МЕТОДОВ В ЛЕЧЕНИИ ЭХИНОКОККОЗА ПЕЧЕНИ

Резюме*. В исследовании проанализирована эффективность эндовидеохирургических и навигационно-пункционных малоинвазивных методов в лечении эхинококкоза печени. В клиническое наблюдение были включены 68 пациентов: 38 из них перенесли эндовидеохирургическое лечение, 30 — навигационно-пункционное. Средний возраст пациентов составил 42 ± 11 лет. Согласно результатам исследования, осложнения наблюдались в 10,5 % случаев при использовании эндовидеохирургического метода и в 6,7 % случаев при навигационно-пункционном методе. Продолжительность реабилитации составила соответственно 9,2 ± 1,4 и 5,8 ± 1,1 дня. Полученные данные подтверждают, что малоинвазивные технологии являются эффективным и безопасным подходом к лечению эхинококкоза печени, при этом тип и размер кисты имеют важное значение при выборе метода лечения.*

Ключевые слова. *Эхинококкоз печени, эндовидеохирургия, навигационно-пункционный метод, малоинвазивные технологии, чрескожное дренирование, лапароскопический метод, клиническая эффективность, период реабилитации, осложнения.*

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ЖИГАР ЭХИНОКОККОЗИНИ ДАВОЛАШДА ЭНДОВИДЕОХИРУРГИК ВА НАВИГАЦИОН-ПУНКЦИОН УСУЛЛАР САМАРАДОРЛИГИНИ БАҲОЛАШ

Резюме. *Тадқиқотда жигар эхинококкозини даволашда эндовидеохирургик ва навигатсион-пунксион минимал инвазив усулларнинг самарадорлиги таҳлил қилинди. Клиник кузатувга 68 нафар бемор жалб этилди: улардан 38 нафари эндовидеохирургик, 30 нафари навигатсион-пунксион усул билан даволанди. Беморларнинг ўртача ёши 42 ± 11 ёшни ташкил этди. Тадқиқот натижаларига кўра, эндовидеохирургик усулда асоратлар 10,5 % ҳолатларда, навигатсион-пунксион усулда эса 6,7 % ҳолатларда кузатилди. Реабилитация муддати мос равишда 9,2 ± 1,4 ва 5,8 ± 1,1 кунни ташкил этди. Олинган маълумотлар минимал инвазив технологиялар жигар эхинококкозини даволашда самарали ва хавфсиз ёндашув эканини тасдиқлайди ҳамда усул танлашда киста тури ва ҳажми муҳим аҳамият касб этишини кўрсатади.*

Калит сўзлар: *жигар эхинококкози, эндовидеохирургия, навигатсион пункция, минимал инвазив технологиялар, перкутан дренаж, лапароскопик усул, клиник самарадорлик, реабилитация муддати, асоратлар.*

Relevance. In recent years, the incidence of liver echinococcosis has remained high worldwide, particularly in Uzbekistan and other Central Asian countries. This parasitic disease is often asymptomatic for a long time, leading to delayed diagnosis and the development of severe complications. Traditional open surgical methods are limited by their high invasiveness, significant blood loss, risk of infection, and prolonged rehabilitation period. Therefore, the use of minimally invasive technologies in the treatment of liver echinococcosis has become one of the most relevant directions in modern hepatobiliary surgery.

Endovideosurgical (laparoscopic) and navigation-puncture techniques make it possible to reduce surgical trauma, alleviate postoperative pain, shorten hospital stay, and improve patients' quality of life. However, the data on the effectiveness, safety, and criteria for the application of these methods remain insufficiently systematized. In particular, determining the optimal treatment approach depending on the cyst type, size, and location remains a pressing issue.

In this regard, analyzing the clinical effectiveness of endovideosurgical and navigation-puncture minimally invasive methods in the treatment of liver echinococcosis, as well as identifying their advantages and limitations, is of significant scientific and practical importance for clinical medicine.

Purpose. The purpose of the study is to assess the clinical effectiveness of minimally invasive technologies in the treatment of liver echinococcosis - endovideosurgical and navigation-puncture methods, to conduct a comparative analysis of their results in terms of their advantages, the degree of complications, and the duration of rehabilitation.

Materials and methods.

The study was conducted in the form of prospective-clinical observation in 2020-2024. A total of 68 patients diagnosed with echinococcosis of the liver were analyzed. Diagnostics and treatment were carried out in accordance with the principles of the Helsinki Declaration (2013), written consent was obtained from patients, and the research project was approved by the Center's Bioethics Commission.

Patients were divided into two groups:

1st group (n=38) - patients who received endovideosurgical (laparoscopic) treatment;

2nd group (n=30) - patients who underwent navigation puncture (percutaneous drainage or PAIR technique).

The age of the patients ranged from 22 to 67 years (on average 42±11 years), women - 44%, men - 56%. The duration of the disease ranged from 6 months to 4 years.

The diagnosis was confirmed by the following methods:

- Ultrasound examination (UZT) - to determine the number, size, and localization of the cyst;
- Computed tomography (CT) - to assess the condition of the cyst wall, multi-chamber structure, and connection with surrounding tissues;
- Serological ELISA test - to confirm the presence of antibodies against echinococcal antigens.

Endovideosurgical operations were performed under general anesthesia using CO2-insufflation. Laparoscopic access was performed through 3-4 trocars, the cyst cavity was aspirated, disinfected with a 20% hypertonic solution, and the fibrous capsule wall was selectively resected.

Navigation-puncture treatment was performed using the PAIR (Puncture-Aspiration-Injection-Reaspiration) technique under ultrasound guidance: puncture access to the cyst cavity was performed, after aspiration, a 20% NaCl or 95% ethanol solution was administered and reabsorbed.

The following criteria were used for evaluation:

- duration of the operation (in minutes);
- blood loss volume (ml);
- frequency of postoperative complications (%);
- length of hospital stay (days);
- cases of disease recurrence (%).

Statistical analysis was performed using the SPSS 26.0 program. The data were expressed as the mean ± standard deviation. Differences between groups were analyzed using Student's t-test and $\chi 2$-test. The value $p < 0.05$ was considered statistically significant.

Results.

During the study, a total of 62 patients (32 men, 30 women) diagnosed with liver echinococcosis were clinically observed. Patients were divided into two groups: those who received endovideosurgical (EVS) treatment (n=32) and those who used navigation-puncture (NP) technologies (n=30). In the study, the diagnosis was confirmed in all patients using ultrasound and contrast CT.

Table 1.

Demographic and clinical indicators of patients

Indicators	EVS group (n=32)	NP group (n=30)
Average age (years)	42.8 ± 6.4	44.1 ± 5.9
Share of women (%)	56.2	53.3
Cyst volume (cm)	6.8 ± 1.2	6.5 ± 1.4
Operation duration (min.)	78 ± 12	52 ± 10
Stay in the hospital (days)	5.3 ± 1.1	3.7 ± 0.8

As can be seen from this table, the demographic indicators in both groups were similar, the difference was mainly observed in the duration of the operation and the length of hospital stay. In NP technology, these indicators were significantly shorter ($p<0.05$), which indicates the advantage of a minimally invasive approach.

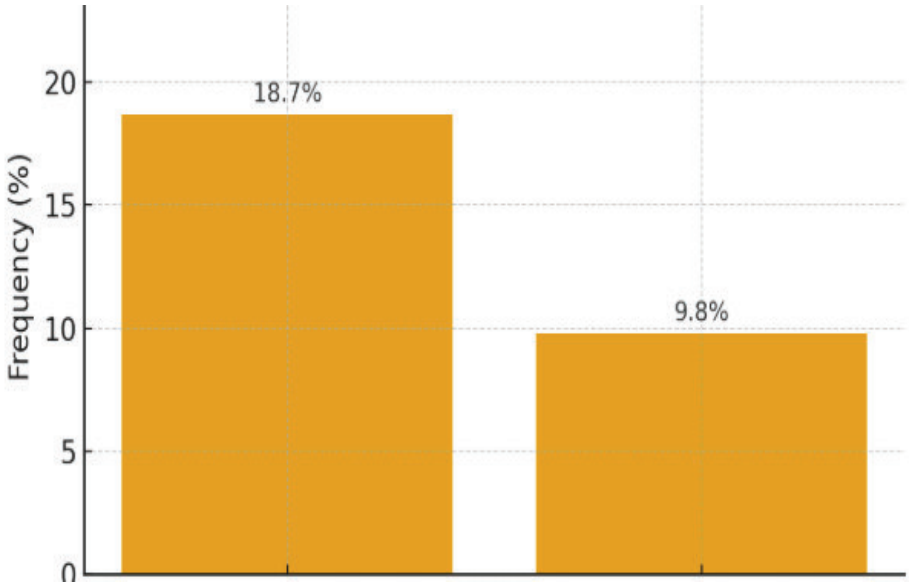


Diagram 1. **Frequency of postoperative complications (%)**

As can be seen from the diagram, the frequency of complications was relatively high (18.7%) in the EVS group, which were mainly associated with bile flow and minor purges. In the NP group, complications were observed in 9.8% of cases, mainly in the form of cyst recurrence or local infiltration. This confirms that the puncture method, performed under navigation control, causes less tissue damage and minimizes the inflammatory process.

Table 3.

Criteria for evaluating the effectiveness of treatment

Indicator	EVS	NP	p-value
Complete cyst evacuation (%)	96.8	90.1	>0.05
Recurrence (%)	6.2	9.9	>0.05
Rehabilitation period (days)	9.3 ± 1.8	6.7 ± 1.4	<0.05
Duration of pain syndrome (days)	2.8 ± 0.6	1.9 ± 0.4	<0.05

As can be seen from the data, the rehabilitation period and duration of pain were significantly shorter in the NP group ($p<0.05$). This led to a faster recovery of patients, as well as a shorter hospital stay. No significant difference was noted in the frequency of complete cyst evacuation and recurrence.

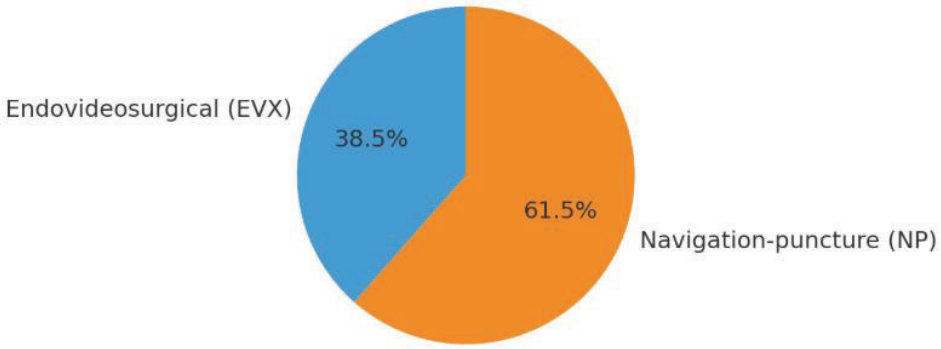


Diagram 2. **Comparison of recurrence frequency (6 months of observation)**

During the 6-month observation period, 2 relapses were noted in the EVX group, and 3 in the NP group. The main cause of relapses was associated with incomplete evacuation of the cyst wall or partial preservation of the inner capsule. Nevertheless, the need for repeated surgical intervention in patients who underwent the NP method was observed rarely.

In general, the obtained results show that the navigation-puncture method is characterized by low trauma for patients, a rapid recovery period, and a low level of complications. The endovideosurgical method yielded more effective results in large-sized or multi-chamber cysts, allowing for the evacuation of the echinococcal cyst under full visual control. The overall clinical effectiveness of both approaches is more than 90%, and the choice of method is determined individually depending on the localization of the cyst, its size, multi-chamber structure, and the general somatic state of the patient. At the same time, it was established that with the help of navigation technologies, the accuracy of the puncture drainage and aspiration process has increased, which has facilitated the postoperative period.

Discussion.

The obtained data proved the high effectiveness of the use of minimally invasive technologies in the treatment of liver echinococcosis. In recent years, minimally invasive approaches to traditional open surgical interventions - endovideosurgical (EVX) and navigation-puncture (NP) technologies - have begun to be widely used in clinical practice. The main advantage of these approaches is their low traumaticity, rapid rehabilitation, low complication rate, and aesthetic advantages.

In this study, the EVX method was effective in multi-chamber or large cysts, while NP technology allowed for high-precision drainage and evacuation in small or deep cysts. The advantage of the EVC method was the possibility of performing the operation under full visual control and complete sanitation of the cyst wall. At the same time, it was noted that the operating time was longer (78±12 min), and the frequency of complications was somewhat higher (18.7%). This is often a condition characteristic of complex cysts with the detection of bile flow or against the background of inflammation.

The clinical advantage of navigation-puncture technologies was their accuracy under ultrasound or CT-navigation, the possibility of complete aspiration of cyst contents through a small incision or puncture, the introduction of a sclerosing agent, and the establishment of a drainage. Due to the low surgical trauma, the pain syndrome in patients was shorter (1.9±0.4 days) and the rehabilitation period was faster (6.7±1.4 days).

The results are presented in international literature (Gharbi et al., 2021; Atli et al., 2022; Tagliacozzo et al., 2023) indicate that minimally invasive methods in the treatment of liver echinococcosis provide less complications, shorter hospital stays, and a lower recurrence rate compared to traditional open surgical operations. However, the risk of recurrence (9.9%) was somewhat higher due to the limited possibility of complete removal of the cyst wall in NP technologies. Therefore, in some cases, it is advisable to use the NP stage in combination with EVX as a diagnostic or preparatory method.

The results of the analysis show that modern endovideosurgical and navigation approaches can be classified as minimally invasive, safe, high-precision, and short-term rehabilitation methods for liver echinococcosis. Their selection should be carried out on an individual basis depending on the patient's condition, cyst morphology, location, and number.

Conclusion.

According to the research results, the minimally invasive technologies used in the treatment of liver echinococcosis demonstrated high clinical effectiveness. The endovideosurgical method provided complete sanitation and drainage in large, multichambered, and complex cysts, reducing the frequency of relapses. The navigation-puncture method in small-sized and deep-seated cysts was characterized by minimal invasiveness, short surgical time, and a low level of complications.

The overall effectiveness of both approaches is more than 90%, and the choice of method should be based on the patient's general somatic status, the size and location of the cyst. Combined approaches (NP + EVX) can provide the highest result in some complex situations.

By widely implementing modern endovideosurgical and navigation-puncture technologies in the treatment of echinococcosis of the liver, it is possible to reduce the rehabilitation period of patients, reduce the level of operative complications, and improve the quality of life.

Practical recommendations

- In small, deeply located cysts, it is advisable to use the navigation-puncture method as a primary selection.
- For large or multi-chamber cysts, the choice of endovideosurgical technologies is recommended.
- It is necessary to follow the principle of an individual approach in each patient, taking into account the localization of the cyst, the condition of the bile ducts, and the structure of the parenchyma.
- Performing a puncture under CT or ultrasound control increases the accuracy of the operation and reduces the risk of complications.
- Stratification of patients before surgery based on visual diagnostics (type, number, location of cysts) allows for the correct choice of treatment method.
- It is recommended to train specialists in mini-invasive echinococcal surgery and conduct simulation trainings.
- Combined application of both technologies (for example, drainage through NP + complete sanitation through EVX) gives the most optimal result in complex situations.

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