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# Transcatheter Hepatic Artery Embolization Versus Hepatic Artery Perfusion Chemoembolization in the Interventional Treatment of Primary Hepatocellular Carcinoma: Clinical Effect Observation

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**Abstract:** *Objective*: To investigate the clinical effect of transcatheter hepatic artery embolization and hepatic artery perfusion chemoembolization on the interventional treatment of primary liver cancer. *Methods*: Eighty-two primary hepatocellular carcinoma patients who came to the outpatient clinic for treatment from August 2020 to November 2023 were selected as the study subjects. Based on the retrospective analysis, they were divided into 45 cases in the embolization group and 37 cases in the chemoembolization group according to the difference of treatment methods. The embolization group was treated with transcatheter hepatic artery embolization, and the chemoembolization group was treated with hepatic artery perfusion chemoembolization. The clinical efficacy, survival rate, survival quality score, serum tumor markers, and incidence of adverse reactions were observed in the two groups. *Results*: The clinical efficacy, survival quality score, and serum tumor markers of the chemoembolization group were higher than that of the embolization group, and the incidence of adverse reactions was lower than that of the embolization group, with statistically significant differences ($P < 0.05$). The survival rate of the chemoembolization group was not statistically significant when compared with that of the embolization group ($P > 0.05$). *Conclusion*: In the treatment of primary hepatocellular carcinoma, hepatic artery perfusion chemoembolization is better than transcatheter hepatic artery embolization, which can effectively improve the quality of patients' survival and reduce the incidence of adverse reactions, and it is worth further popularized in the clinic.

**Keywords:** Catheter; Hepatic artery embolization; Hepatic artery perfusion chemoembolization; Primary liver cancer; Clinical effect

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## 1. Introduction

As one of the malignant tumors with high incidence worldwide, primary liver cancer poses a great challenge to clinical treatment and patients' lives. As early symptoms of liver cancer are not obvious, it is often diagnosed at an

intermediate to advanced stage so the best time for surgical treatment is missed [1–3]. For those liver cancer patients who cannot undergo surgical resection, liver transplantation, or have other contraindications, interventional therapy has become one of the effective treatment options due to its advantages of less trauma and faster recovery [3–4]. In recent years, two interventional techniques, which are transcatheter arterial embolization (TAE) and transcatheter arterial chemoembolization (TACE), have been widely applied clinically [5–6]. The principle of TAE treatment is to block the blood-supplying arteries of the tumor so that the tumor will be necrotic due to ischemia. TACE, on the other hand, adds a local concentrated infusion of chemotherapeutic drugs to the tumor based on TAE, to achieve better anti-tumor effects and reduce systemic side effects [7]. Despite the clinical success of these two approaches, there are still many controversies about the effectiveness and safety of TAE and TACE in the treatment of primary liver cancer. Therefore, this paper provides a comparative analysis of the survival rate, clinical efficacy, tumor remission, quality of life, and the occurrence of adverse effects of the two treatment modalities, to provide clinicians with a scientific basis for decision-making, thus bringing more hope to patients.

## 2. Information and methods

### 2.1. General information

Eighty-two patients with primary liver cancer who came to the outpatient clinic for treatment from August 2020 to November 2023 were selected as the study subjects. Based on the retrospective analysis, they were divided into 45 cases in the embolization group and 37 cases in the chemoembolization group according to the different treatment methods. Among them, 36 patients in the embolization group were male and 9 were female. The age ranged from 33 to 82 years, with a mean age of 55.18 ± 9.68 years. The maximum diameter of the tumor ranged from 5 cm to 11 cm, with an average of 7.31 ± 1.52 cm. 30 patients in the chemoembolization group were male and 7 were female. The age ranged from 31 to 80 years, with a mean age of 54.67 ± 10.07 years. The maximum diameter of the tumor ranged from 4.6 cm to 11 cm, with an average of 7.27 ± 1.61 cm. The baseline data of the patients in the two groups were compared, and the difference was not statistically significant ($P > 0.05$).

Inclusion criteria: Patients diagnosed with primary liver cancer based on clinical manifestations, imaging, and pathological findings; patients over 20 years of age, regardless of gender; patients with Child-Pugh class A or B liver function and normal liver function; patients who have not received other anti-tumor treatments or who have received other treatments but with stable condition and no recurrence; patients who have signed an informed consent form and are willing accept this clinical trial treatment.

Exclusion criteria: The presence of contraindications to interventional therapy; the presence of serious cardiac, hepatic, and renal insufficiency, unable to tolerate interventional therapy; the combination of other serious diseases, such as serious infections, respiratory diseases, neurological disorders, and so on; patients with mental disorders.

### 2.2. Methodology

In the embolization group, TAE was performed, a 5F-RH catheter was inserted into the tumor-supplying artery, and the embolic agent was iodinated oil; embolization was performed under fluoroscopy, and the embolization effect was enhanced with shredded absorbent gelatin sponge.

The chemoembolization group was treated with TACE. Platinum + 5-Fu (5-fluorouracil) + calcium folinate + adriamycin were infused for more than 30 min, and at the end of the infusion, a 5F-RH catheter was inserted into the blood-supplying artery of the tumor, and the embolizing agent used was an emulsion made from a mixture of chemotherapeutic agents, and embolization was performed under fluoroscopy, and the effect of embolization was strengthened by crushed absorptive gelatin sponge.

## 2.3. Observation indicators

The observation indicators are shown in **Table 1**.

**Table 1.** Observed indicators

| Observation indicators | Specific indicators | Special note |
|---|---|---|
| Clinical efficacy | 1) Lesion progression: after treatment, the lesion increases in size by more than 25%.<br>2) Stabilization of the lesion: after treatment, the lesion grows less than 25% in volume, shrinks less than 50%, and is maintained for at least 1 month.<br>3) Partial remission of the lesion: after treatment, the volume of the lesion is reduced by more than 50% and maintained for at least 1 month.<br>4) Complete remission of the lesion: total disappearance of the lesion, maintained for at least 1 month. | Objective remission rate = (partial remission of lesion + complete remission of lesion)/total number of cases * 100% |
| Survival rate (med.) | 1) 1-year survival rate<br>2) 2-year survival rate<br>3) 3-year survival rate | - |
| Quality of survival score | Scored on a cardinal scale with a total of 100 points | Higher scores indicate a higher quality of survival. |
| Serum tumor marker | 1) Carcinoembryonic antigen (CEA)<br>2) Neuron-specific enolase (NSE)<br>3) Glycoantigen 125 (CA125)<br>4) Glycoantigen 19-9 (CA19-9) | - |
| Incidence of adverse reactions | 1) Fever<br>2) Vomiting<br>3) Dizziness | Incidence rate of adverse reactions = (number of cases of fever + number of cases of vomiting + number of cases of dizziness)/ total number of cases * 100% |

## 2.4. Statistical analysis

SPSS 20.0 statistical software was used for data processing, and the measurement information was expressed as rate (%). Measurement information that conformed to normal distribution was expressed as (Mean ± SD) using independent samples *t*-test. A comparison of rates between groups for count data was performed using the $\chi^2$ test. $P < 0.05$ was considered statistically significant.

# 3 Results

## 3.1. Comparison of the efficacy of the two groups of patients

The comparison revealed that the clinical efficacy of the chemoembolization group (27/72.97%) was higher than that of the embolization group (21/46.67%), with a statistically significant difference ($P < 0.05$) as shown in **Table 2**.

**Table 2.** Comparison of clinical outcomes between the two groups of patients

| Efficacy indicators | Embolization group ($n = 45$) | Chemoembolization group ($n = 37$) | $\chi^2$ | *P* |
|---|---|---|---|---|
| Lesion progression | 4 | 1 | | |
| Lesion stabilization | 20 | 9 | | |
| Partial remission of lesions | 18 | 10 | | |
| Complete remission of lesions | 3 | 17 | | |
| Objective mitigation rate | 21 (46.67%) | 27 (72.97%) | 5.789 | 0.016 |

## 3.2. Comparison of survival rates between the two groups

Comparison revealed that the 2-year survival rate (13/35.14%) and 3-year survival rate (10/27.03%) in the chemoembolization group were higher than the 2-year survival rate (10/22.22%) and 3-year survival rate (8/17.78%) in the embolization group, respectively. However, the difference between the groups was not statistically significant when compared ($P > 0.05$) as shown in Table 3.

**Table 3.** Comparison of survival rates between the two groups

| Survival rate indicators | Embolization group (n = 45) | Chemoembolization group ($n = 37$) | $\chi^2$ | *P* |
|---|---|---|---|---|
| 1-year survival rate | 27 (60%) | 14 (37.84%) | 3.989 | 0.045 |
| 2-year survival rate | 10 (22.22%) | 13 (35.14%) | 0.363 | 0.547 |
| 3-year survival rate | 8 (17.78%) | 10 (27.03%) | 1.014 | 0.314 |

## 3.3. Comparison of quality of survival scores between the two groups of patients

The quality of survival scores after treatment was significantly higher in the chemoembolization group than in the embolization group, and the difference was statistically significant ($P < 0.01$) as shown in **Table 4**.

**Table 4.** Comparison of quality of survival scores of the two groups of patients

| Norm | Timing | Embolization group ($n = 45$) | Chemoembolization group ($n = 37$) | *t* | *P* |
|---|---|---|---|---|---|
| Quality of survival score | Pre-treatment | 62.75 ± 0.35 | 62.81 ± 0.31 | 0.861 | 0.392 |
| | Post-treatment | 65.35 ± 1.56 | 71.29 ± 2.04 | 15.516 | 0.000 |

## 3.4. Comparison of serum tumor markers between the two groups of patients

The comparison revealed that the serum tumor markers CEA, NSE, CA125, and CA19-9 were lower in the chemoembolization group than in the embolization group, and the difference was statistically significant ($P < 0.01$) as shown in **Table 5**.

**Table 5.** Comparison of serum tumor markers between the two groups of patients

| Serum tumor marker indicators | Embolization group ($n = 45$) | Chemoembolization group ($n = 37$) | *t* | *P* |
|---|---|---|---|---|
| CEA | 16.08 ± 5.21 | 11.95 ± 1.35 | 5.148 | 0.000 |
| NSE | 18.26 ± 4.81 | 12.97 ± 3.21 | 6.137 | 0.000 |
| CA125 | 46.38 ± 7.34 | 33.61 ± 8.09 | 7.842 | 0.000 |
| CA19-9 | 48.38 ± 13.56 | 33.65 ± 10.37 | 5.788 | 0.000 |

## 3.5. Incidence of adverse reactions in two groups of patients

The comparison revealed that the incidence of adverse reactions in patients in the chemoembolization group (4/10.81%) was significantly lower than that in the embolization group (14/10.81%), and the difference was statistically significant ($P < 0.05$) as shown in **Table 6**.

**Table 6.** Incidence of adverse reactions in two groups of patients

| Adverse reaction | Embolization group ($n$ = 45) | Chemoembolization group ($n$ = 37) | $\chi^2$ | $P$ |
|---|---|---|---|---|
| Cannot think calmly | 6 | 2 | | |
| Vomiting | 5 | 1 | | |
| Dizziness | 3 | 1 | | |
| Incidence of adverse reactions | 14 (31.11%) | 4 (10.81%) | 4.428 | 0.035 |

## 4. Discussion

Primary liver cancer is a malignant tumor that originates directly in the liver, of which the most common type is hepatocellular carcinoma, which accounts for the majority of all liver cancer cases. Other less common types of primary liver cancer include intrahepatic cholangiocarcinoma and hepatic angiosarcoma. Liver cancer is a major part of the global health problem, especially in Asia and sub-Saharan Africa, where its incidence and mortality are relatively high. Major risk factors for liver cancer include chronic infection with hepatitis B and C viruses, alcoholic liver disease, nonalcoholic fatty liver disease, nonalcoholic steatohepatitis, and chronic exposure to aflatoxins [8–9]. For early primary liver cancer, surgical resection is usually possible, while for tumors that cannot be directly surgically resected, interventional procedures need to be used, and common interventional procedures include TAE and TACE.

TAE is a method of inserting a catheter into the blood-supplying artery of hepatocellular carcinoma through an interventional technique and then injecting embolic substances to block the blood supply of the tumor and make the tumor ischemic and necrotic. Its advantages are simple operation, rapid efficacy, and high safety. Embolic substances usually include absorbent gelatin sponges, iodized oil, and so on. These substances can effectively block the blood supply to the tumor, causing it to lose nutrition and gradually undergo necrosis. However, TAE also has certain limitations. Due to the complexity of the blood supply arteries of liver cancer, it is sometimes difficult to completely block the blood supply of the tumor, resulting in limited efficacy. In addition, TAE cannot kill cancer cells, but only control tumor growth by blocking blood supply. Therefore, for some larger or multiple tumors, TAE may not be able to completely control the disease.

TACE is an interventional therapy developed based on TAE. In addition to injecting embolic substances, TACE also injects chemotherapeutic drugs into the blood-supplying arteries of hepatocellular carcinoma through a catheter, to achieve the purpose of killing tumor cells and controlling tumor growth. In comparison, TACE can reduce the damage to liver tissue, with higher efficacy and lower recurrence rate [10–12]. Many studies have also confirmed this. For example, Zhang Yanfeng et al. concluded that in the treatment of primary liver cancer, hepatic artery perfusion chemoembolization can significantly improve the condition of patients and reduce the incidence of complications [13]. Zhang Wei et al. compared the efficacy of TACE and TAE in the treatment of primary hepatocellular carcinoma and found that TACE was more effective than TAE in relieving patients' clinical symptoms, increasing clinical efficiency, and improving liver function [14]. Jiang Yongji et al. showed that compared with TAE, TACE for primary liver cancer can achieve better efficacy and can better improve the quality of survival scores of liver cancer patients [15]. These studies are consistent with the study of this paper, which concluded that hepatic artery perfusion chemoembolization is better than transcatheter hepatic artery embolization in the treatment of primary liver cancer, which can effectively improve the survival treatment of patients and reduce the incidence of adverse reactions, which is worthy of further promotion in the clinic.

In conclusion, both TAE and TACE can achieve good therapeutic effects in the treatment of primary liver cancer, but in comparison, TACE is more advantageous and deserves to be further promoted and applied.

## Disclosure statement

The author declares no conflict of interest.

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