

Effects of radiofrequency ablation assisted partial hepatectomy in the treatment of primary liver cancer

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ABSTRACT

Objective: To investigate the effects of radiofrequency ablation assisted partial hepatectomy in the treatment of primary liver cancer. **Methods:** A total of 60 patients with primary liver cancer treated in our hospital from March 2013 to October 2015 were selected as study subjects and were divided into the control group and the study group by the random number table method, 30 cases in each group. The control group were treated with partial hepatectomy. On the basis, the study group were treated with radiofrequency ablation. The operation associated indexes (operation time, the average wound bleeding volume, postoperative length of hospital stay), preoperative and postoperative liver function indexes [alanine aminotransferase (ALT), total bilirubin (TBIL), aspartate aminotransferase (AST)], the incidence of complications and recurrence rates in the two groups were observed. **Results:** The operation time and postoperative length of hospital stay of the study group were significantly shorter than those of the control group, and the average bleeding volume was significantly less than that of the control group ($P < 0.05$). There was no significant difference in ALT, TBiL and AST between the two groups before operation ($P > 0.05$). After operation, ALT, TBiL and AST in the two groups were significantly lower than those before operation, and the changes in the study group were greater than those in the control group ($P < 0.05$). The incidence of postoperative complications and the recurrence rate in 1 year after operation were significantly

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lower than those in the control group ($P < 0.05$).

Conclusion:

Radiofrequency ablation

has obvious positive effect in patients with primary liver cancer undergoing partial hepatectomy. It has advantages of little bleeding, short rehabilitation time, protecting liver function, few postoperative complications and low recurrence rate.

0 Introduction

Liver cancer is one of the malignant tumors with high mortality rate in the world, and our country belongs to the high incidence area of liver cancer, which accounts for more than 45% of the world^[1]. Because of the lack of donor liver, the immaturity of social medical system and the influence of low personal economic level, surgical hepatectomy is an important position in the treatment of primary liver cancer at present^[2]. The related studies showed that there was a higher recurrence rate in the marginal part area after resection of liver cancer, which caused serious effect on long-term survival rate of patients with liver cancer after operation and local recurrence is closely related to the micrometastases around liver cancer. How to select to effectively eradicate the micrometastases around the living tumor has become a hot and difficult research in hepatobiliary surgery^[3]. The relevant research shows that radiofrequency ablation can better damage the lesion of liver cancer, and it has obvious application value in patients with primary liver cancer^[4]. However, at present, the study are less involved in the effects and follow-up recurrence rate of radiofrequency ablation assisted partial hepatectomy in the treatment of primary liver cancer. In this paper, the author conducted the clinical control study and the results were as follows.

1 Information and methods

1.1 Cases data

A total of 60 patients with primary liver cancer treated in our hospital from March 2013 to October 2015 were selected as study subjects and were divided into the control group and the study group by the random number table method, 30 cases in each group. In the control group, male and female respective were 18 and

12 cases, average age was (49.35 ± 7.25) years old, average diameter of tumor was (5.99 ± 3.81) cm. Tumor type: single tumor, multiple tumor each 27 and 3 cases. In the study group, male and female respective were 14 and 16 cases, average age was (50.05 ± 7.19) years old, average diameter of tumor was (6.01 ± 3.85) cm. Tumor type: single tumor, multiple tumor each 27 and 3 cases. There was no significant difference in above baseline data between the 2 groups ($P > 0.05$). It was comparable.

1.2 Case inclusion criteria

① The pathological section of the surgical resection specimen was confirmed as primary liver cancer. ② no history of abdominal surgery and the history of hepatobiliary system in the past. ③ Before the study, there were no important organ dysfunction such as heart, brain, lung and kidney. ④ No distant organ metastasis was found before operation. ⑤ Patients and their families had informed and voluntarily signed the study and had obtained approval from the ethics committee of our hospital.

1.3 Research methods

The control group was treated with partial hepatectomy, and the patients were in horizontal position. After the patient underwent successful general anesthesia, the lower oblique incision of normal right costal margin was inserted into the abdomen. Patients with gallbladder stones could be treated with cholecystectomy. Dissecting hepatic portal free hepatic duct and portal vein and hepatic artery branch, and dissociating the ligaments around the liver. Partial hepatectomy was carried out at the edge of the liver tumor at 2cm after hepatic blood flow was blocked in liver portal. The satellite lesions around the main lesion were also removed and the blood vessels of the

hepatic section or the bile duct end were also normally ligated or sewed. In the intraoperative treatment of patients with the portal venous branch cancer suppository, the tumor thrombus was removed from the hepatic section portal vein broken end and the hepatic blood flow was repeatedly opened and scoured. The portal vein was rinsed with fluorouracil injection.

② The study group was assisted by radiofrequency ablation on the basis of the control group. RF ablation was used in a predetermined resection plane. The surgical electrode needle of the radiofrequency coagulator was implanted on the side of the tumor in the plane, gradually advancing, overlapping multiple times, covering the entire excision plane. Then conventional hepatectomy was done. Liver door preset blocking belt which was generally not used. Using the equipment model provided by Mianyang Lide Electronics Co., Ltd.: ldrf-120s RF Therapy Instrument. In the treatment of radiofrequency host, power mode was adopted and power 80w was set. Each time the ablation depth was 2-3cm and for the isolation belt with width 1cm and length 1.5cm, the time of ablation was 15-30 seconds. Start radiofrequency output and when coagulation necrosis of the liver tissue, the equipment automatically stops output. The insertion of an electrode needle into a liver tissue by a radiofrequency coagulator should avoid larger bile duct or blood flow.

1.4 Observation indexes

① Comparison of operation associated indexes between two groups [operation time, the average wound bleeding volume and postoperative length of hospital stay]. Compare the operation time, the average wound bleeding volume and postoperative length of hospital stay between two groups. ② Compare liver function indexes between two groups before and after the operation [alanine aminotransferase (ALT), total

bilirubin (TBIL), aspartate aminotransferase (AST)]. The expression level of ALT, TBiL and AST in two groups was determined by using the AU5800 Automatic Biochemical Analyzer provided by American Beckman Company before and after operation 7d. ③ Comparison of the incidence of complications between two groups after operation. Compare the incidence of complications between two groups after operation. ④ Comparison of recurrence rates between two groups after operation. Two groups of patients were followed up through the form of revisits for 1 year after surgery. Compare recurrence between two groups.

1.5 Statistical methods

Statistical software SPSS19.0 was used to analyze and process the research data. The rate (%) was used to express the counting data and ($\bar{x} \pm s$) was used to express the measurement data. χ^2 test and T-value test were used for contrast between groups. The difference was statistically significant when $P < 0.05$.

2 Results

Comparison of operation associated indexes between two groups The operation time and postoperative length of hospital stay of the study group were significantly shorter than those of the control group, and the average bleeding volume was significantly less than that of the control group ($P < 0.05$). See table 1.

Comparison of liver function between 2 groups before and after operation. There was no significant difference in ALT, TBiL and AST between the two groups before operation ($P > 0.05$). After operation, ALT, TBiL and AST in the two groups were significantly lower than those before operation and the changes of liver function indexes in the study group were more obvious than those in the control group. The difference was statistically significant ($P < 0.05$). See table 2.

Table 1 Comparison of operation associated indexes between two groups ($\bar{x} \pm s$, n=30)

Groups	operation time(min)	the average wound bleeding volume (mL)	postoperative length of hospital stay (d)
study group	103.32 ± 23.05	254.49 ± 30.15	9.16 ± 2.45
control group	99.08 ± 22.01	372.58 ± 41.91	13.32 ± 4.19
<i>T value</i>	0.729	12.528	4.694
<i>P value</i>	>0.05	<0.05	<0.05

Table 2 Comparison of liver function between two groups before and after operation($\bar{x} \pm s$, n=30)

Groups	time	ALT (U/L)	TBiL (μmol/L)	AST (U/L)
Study group (n=30)	preoperative	40.12±5.51	19.87±2.46	43.12±2.75
	postoperative 7d	12.25±2.26 ^{①②}	6.39±1.58 ^{①②}	28.41±1.66 ^{①②}
Control group (n=30)	preoperative	39.89±5.58	19.89±2.57	43.01±2.59
	postoperative 7d	18.72±3.37 ^①	8.88±1.97 ^①	35.42±1.98 ^①

Note: compared with the same group before operation, all^① P<0.05; compared with control group after operation, all^②P<0.05.

Comparison of the incidence of complications between two groups after operation. The incidence of postoperative complications in the study group were significantly lower than those in the control group (P < 0.05). The difference was statistically significant (P < 0.05). See table 3.

Table 3 Comparison of the incidence of complications between two groups [Number of cases (%)]

Groups	Number of cases	Bile leakage	Incision infection	Pulmonary infection	Ascites	Incidence
Study group	30	1 (3.33)	2 (6.67)	0 (0.00)	0 (0.00)	3 (10.00)
Control group	30	4 (13.33)	3 (10.00)	3 (10.00)	1 (3.33)	11 (36.67)

Comparison of follow-up recurrence situations between two groups after the operation. Spiral CT enhanced scanning was performed in two groups in 1 year after the operation, and two groups of patients were followed-up effectively. The recurrence rate in 1

year after the operation in the study group was 6.67%, which was significantly lower than that in control group 33.33%. The difference was statistically significant. ($P < 0.05$). See table 4.

Table 4 Comparison of follow-up recurrence situations between two groups after the operation [Number of cases (%)]

Groups	number of cases	tumor resection margin recurrence	new lesions in the liver	lung metastasis	lumbar spine metastasis	total recurrence rate
Study group	30	1 (3.33)	1 (3.33)	0 (0.00)	0 (0.00)	2 (6.67)
Control group	30	3 (10.00)	2 (6.67)	2 (6.67)	1 (3.33)	8 (33.33)

3 Discussion

Surgical operation is the first choice for patients with primary liver cancer. Traditional hepatectomy is a great trauma to patients, and it has a serious effect on the prognosis recovery of patients. In recent years, partial hepatectomy has become an important treatment method for patients with primary liver cancer. However, there is a high risk of recurrence rate after hepatectomy, which affects the prognosis of patients. Early studies have indicated that radiofrequency ablation has a significant assisted application value in hepatectomy for liver cancer patients^[5, 6]. However, the study are less involved in the clinical effects and follow-up recurrence rate of radiofrequency ablation assisted partial hepatectomy in the treatment of primary liver cancer. So in this paper, the author conducted a clinical comparative study.

The results of this study show that the operation time and postoperative length of hospital stay of the study group were significantly shorter than those of the

control group, and the average wound bleeding volume was significantly less than that of the control group. After operation, ALT, Tbil and AST in the study group was significantly lower than that in the control group. The incidence of postoperative complications and the recurrence rate in 1 year after operation in the study group were significantly lower than those in the control group. It is proved that clinical application value of radiofrequency ablation assisted partial hepatectomy in patients with primary liver cancer has obvious advantages compared with single surgical treatment. In routine partial hepatectomy, hepatic portal occlusion should be performed several times to effectively control intraoperative bleeding. However, due to the restriction of blocking time, it further leads to liver ischemia and heat perfusion injury and especially has greater impact on patients with cirrhosis, which is easy to increase the risk of postoperative liver function atrophy and even failure^[7]. But the study group was treated with radiofrequency ablation on the basis of routine surgical resection. Radiofrequency

ablation places RF needle into the target area, and generates RF current through the RF generator, resulting molecules and ions in the tissue to produce shock and friction. The heat is then produced and the heat energy is gradually transferred to the peripheral tissue of the liver, thereby causing irreversible solidification degeneration and necrosis of the local tissue cell protein. It can not only effectively kill the cancer cells at the cutting edge, but also play an obvious role in hemostasis, which is an important way to promote the hepatectomy without blood for hepatological surgery department^[8]. During partial hepatectomy with radiofrequency catheter ablation, the cutting edge can be treated with the RF needle in advance to promote the formation of coagulation ischemic necrosis zone, coagulating the vascular that diameter is <5mm to reduce the amount of bleeding in the operation and effectively avoiding the blocking of the hepatic door, so that the effect on the residual liver tissue is less and the probability of postoperative liver failure is effectively reduced. At the same time, radiofrequency ablation can promote coagulation of small blood vessel, effective reducing the wound bleeding volume, so the wound bleeding volume after the operation in the study group is significantly lower than that in the control group^[9]. The local recurrence rate of patients with primary liver cancer after hepatectomy is higher and local recurrence is closely related to the presence of micrometastasis surrounding the tumor. However, most of the micrometastasis are located around the tumor. It is often difficult to achieve radical resection in surgical treatment for patients with micrometastasis lesions around the tumor. In the early study, the hepatic cross was treated by electrocoagulation and argon beam solidification, and the hepatic arterial infusion chemotherapy was carried out for patients after operation. The main objective is to eliminate the potential micrometastasis around the tumor, but the effect is very little^[10]. Radiofrequency ablation is a new technique developed in recent years. Through the input of RF energy, it can make the local

tissue to achieve high temperature inactivation and solidification, and will carry out inactivation for metastatic cancer cells with the help of their own thermal radiation, effectively reducing postoperative local recurrence and distant metastasis in patients^[11]. Therefore, the postoperative recurrence rate of the study group is significantly lower than that in the control group.

To sum up, the clinical positive role of radiofrequency ablation-assisted partial hepatectomy in patients with primary liver cancer is obvious, not only can effectively protect the liver function, but also a treatment program with a clear curative effect, few postoperative complications and low recurrence rate. So it has the popularization and application value.

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