ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

# Surgical Management of Colorectal Cancer Liver Metastases.

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**ABSTRACT**

The article outlines 2 principal methods of surgical management for the patients with colorectal cancer liver metastases: hepatectomy and radio-frequency ablation (RFA). The criteria for resectability of metastases which did not exceed 20% were defined based on examination and treatment materials for 104 patients with colorectal cancer liver metastases. Postoperative complications incidence was evaluated as making 3.8%. A 1-, 3- and 5-year cumulative survival rate after radio-frequency ablation was determined as 88.6%, 35.3% and 19.5%.

**Keywords:** Hepatectomy, radio-frequency ablation, colorectal cancer metastasis.

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ISSN: 0975-8585

## INTRODUCTION

Colorectal cancer incidence in Russia for the period from 1999 to 2009 increased by more than 30% and made 57363 new cases in 2009 [1, 2]. Liver is a principal target for colorectal cancer metastases. 15-25% of patients have liver metastases by the moment of confirming the diagnosis, in 50-75% of patients metastases are found at different periods after removal of a primary neoplasm. Given absence of treatment a 1-year survival rate for such patients does not exceed 7%, in cases when intensive treatment (polychemotherapy) is used the patients' survival ability does not exceed 24 months. For the moment a complete surgical resection of all of the secondary neoplasms is a unique method giving chance for recovery. Liver resection increases lifetime of 35—60% of the patients by 5 years and of 28% of the patients – by 10 years [3, 4]. Nevertheless only 15% of the patients are found to be resectable. At the present time radio-frequency ablation is regarded as the principal method of liver metastases local destruction due to relative equipment availability, low treatment cost and insignificant number of complications (not exceeding 10%) [5, 6]. According to some of the investigations [4] local recurrence frequency or continuing growth after RFA made less then 10%, while other investigations [7, 8] reported of local recurrence in 47% of cases. At that RFA shows the median survival rate of 30-35 months and a 3-year survival rate of 20-36% [5]. However main task of oncology lies in prolongation of life of a patient [9].

## METHODOLOGY

Radio-frequency ablation was performed by means of RADIONICS Cool-tip RF device and a peristaltic pump for internal cooling of electrodes. Cool-tip electrodes with the diameter of 1.8 mm and the effective section from 1 to 3 cm with internal cooling circuit were used. Depending on a tumor dimension during one procedure there were used from 1 to 3 bipolar applicators in the mode of resistance control with exposition from 12 to 15 minutes per each application. The operation was carried out both by an "open' method and with use of ultrasonic navigation and under laparoscopic control. RFA was considered to be successful if a transient hyperechogenic area as confirmed by intraoperative echographia wholly overlaps a neoplastic focus [10]. Hepatectomy was performed by means of CUSA unltrasonic aspirator-destructor.

## MAIN BODY

The investigation is based on the results of surgical management of 104 patients (56 men and 48 women aged between 25 and 77) with colorectal cancer liver metastases that were treated in the Interregional Coloproctology Center of the Bishop Ioasaf Belgorod Regional Clinical Hospital in the period from 2004 to 2013. All of the patients were diagnosed with primary neoplasm and metastatic liver injury which were confirmed by a morphologic examination. 40 patients (38.5%) had the primary neoplasm located in the straight intestine, 27 patients (26%) in the sigmoid colon, 7 patients (6.7%) in the descending colon, 6 patients (5.8%) in the colon splenic flexture, 5 patients (4.8%) in the transverse colon, 5 patients (4.8%) in the colon hepatic flexture, 8 patients (7.7%) in the ascending colon and 6 patients (5.8%) in the blindgut.

**Patients distribution by primary neoplasm location.**

| A neoplasm location in the large intestine | Number of patients (%) |
|---|---|
| Straight intestine | 40 (38.5) |
| Sigmoid colon | 27 (26%) |
| Descending colon | 7 (6.7%) |
| Colon splenic flexture | 6 (5.8%) |
| Transverse colon | 5 (4.8%) |
| Colon hepatic flexture | 5 (4.8%) |
| Ascending colon | 8 (7.7%) |
| Blindgut | 6 (5.8%) |

The majority of patients (74%) had moderately differentiated cancer types, 18% of the patients had well differentiated adenocarcinoma and 8% of the patients had poorly differentiated cancer.

51 patients were subjected to liver surgery along with resection of the injured intestine. The rest of patients were subjected to hepatectomy or radio-frequrncy ablation within various terms after the primary neoplasm removal in case of absence of the disease local recurrence. Solitary liver metastases were diagnosed in 61 patients, multiple liver metastases were detected in 41 patients. Diameter of liver foci varied from 1 to 20 cm.

According to classification of L. Gennari metastatic liver injury in 62 patients was consistent with the I stage, in 40 patients – with the II stage and in 2 patients – with the III stage. The investigation included the patients with the stage of functional hepatic impairment at least of A class under Child-Phue score, somatic state of the postoperative patients corresponded to 80-100% under Karnofsky scale and less then 2 under the classification of the American Society of Anesthesiologists.

21 patients (6 men and 12 women) aged between 25 and 73 years underwent hepatectomy. Solitary or multiple unilobar metastases were regarded as indications for hepatectomy. Solitary metastases were detected in 18 cases, multiple ones in 3 cases. Surgical interference extent was distributed as follows: left hemihepatectomy — 4, extended left hemihepatectomy — 2, right hemihepatectomy — 8, extended right hemihepatectomy — 6, resection of the II, III and VI liver segments — 1. 6 patients with multiple liver metastases underwent hepatectomy accompanied by radio-frequency ablation.

**Characteristic of operations depending on hepatectomy extent**

| Surgical interference extent | Number of operations |
|---|---|
| Left hemihepatectomy | 4 |
| Extended left hemihepatectomy | 2 |
| Right hemihepatectomy | 8 |
| Extended right hemihepatectomy | 6 |
| Resection of separate segments | 1 |

RFA was performed by means of RADIONICS Cool-tip RF device and a peristaltic pump for internal cooling of electrodes. Cool-tip electrodes with the diameter of 1.8 mm and the effective section from 1 to 3 cm with internal cooling circuit were used. Depending on a tumor extent during one procedure there were made from 1 to 3 applications in the mode of resistance control and with exposition from 12 to 15 minutes per each application. Solitary or multiple metastases but not exceeding 5 and with the diameter not exceeding 5 cm were regarded as an indication for RFA. Totally 83 patients were subjected to treatment and ablation of 166 liver nodes was carried out. Electrodes positioning was performed by three different ways: by means of percutaneous transparietal liver metastases puncture under sonographic control with sequential ablation of each separate metastasis (16 patients); during laparotomy (62 patients, inclusive of 50 patients for which ablation was accompanied by primary neoplasm removal) and under laparoscopic control (5 patients).

**Characteristic of RFA operations depending on the used access route**

| Used access route | Number of patients |
|---|---|
| Laparotomic | 62 |
| Under ultrasonographic control | 16 |
| Under laparoscopic control | 5 |

After radio-frequency ablation control of recurrence neoplastic proliferation was performed by means of ultrasonography, helical computed tomography and morphologic confirmation of recurrence by puncture. During the methods efficiency evaluation both long-term and short-term treatment results were taken into consideration. Total life duration was subject to examination.

ISSN: 0975-8585

## CONCLUSION

All of the patients were discharged within the term from 2 to 16 days after operation depending on the surgical interference extent and the used access route. No fatal cases were reported. Complications were detected in 4 patients (3.8%) in the early postoperative period. Hepatic abscess after radio-frequency ablation which was drained under ultrasonographic control was reported in 1 case. 2 patients after right hemihepatectomy underwent drainage of dexter subphrenic space bilomas and 1 patient experienced interloop abscess which was also drained under ultrasonographic control.

During the first year after RFA there were reported 4 (4.5%) recurrences of liver metastases which required hepatectomy in 2 cases and repeated RFA procedure in the other 2 cases. The long-term treatment results were analyzed for 88 patients. Total life duration was calculated as a time period from the moment of the patient inclusion into the investigation and up to his/her death due to any reason. A cumulative 1-, 3- and 5-year survival rate reached 88.6%, 35.3% and 19.5%. After analysis of the patients' mortality in the group up to 1 year it was revealed that the majority of them had the II–III stages under Gennari classification.

## FINDINGS

Hepatectomy is an optimal surgical management method for the patients with colorectal cancer liver metastases, but only 15-20% of them can be subject to it. Radio-frequency ablation is an effective way of local metastases destruction due to low rate of recurrences, few postoperative complications, availability of equipment, low cost of treatment and short medical rehabilitation period. It can be used as an addition to hepatectomy in case of multiple metastases and allows achieving the long-term results comparable to surgical management.

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