



# Successful Combined Treatment of a Patient with Borderline Resectable Liver Metastasis of Colorectal Cancer

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**Aim:** to present the value of interventional radiology techniques in the treatment of a patient with liver metastasis of colorectal cancer.

**Key points.** In 2013, a 60-year-old patient with stage IIIB sigmoid colon cancer, pT3N2M0 underwent resection of the sigmoid colon with the formation of hardware rectosigmoid anastomosis, 6 courses of adjuvant chemotherapy were performed. In 2015, a control examination revealed metastatic liver damage. Liver resection could not be performed due to the small future residual volume, and systemic chemotherapy was not effective. The patient underwent 3 cycles of regional chemotherapy. Taking into account the pronounced positive dynamics, in the form of a decrease in tumor size and a decrease in cancer markers, the patient managed to perform an extended right-sided hemihepatectomy. No progression of the tumor process was detected during the follow-up.

**Conclusion.** Modern possibilities of X-ray endovascular methods allow to achieve results in the treatment of patients with colorectal cancer metastases in the liver such as a decrease in metastases in size, that make liver resection possible.

**Key words:** colorectal cancer, liver metastases

**Conflict of Interest:** The authors declare no conflicts of interest.

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## Успешное комбинированное лечение пациента с погранично-резектабельным метастазом колоректального рака в печени

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**Цель исследования:** представить значение методов интервенционной радиологии в лечении пациента с метастазом колоректального рака в печени.

**Основные положения.** Пациенту 60 лет в 2013 г. по поводу рака сигмовидной кишки IIIB стадии, pT3N2M0 выполнена резекция сигмовидной кишки с формированием аппаратного ректосигмоанастомоза, проведено 6 курсов адъювантной химиотерапии. В 2015 году при контрольном обследовании выявлено метастатическое поражение печени. Выполнить резекцию печени не удалось в связи с маленьким остаточным объемом, а проведение системной химиотерапии оказалось неэффективным. Пациенту проведено 3 цикла регионарной химиотерапии. Учитывая положительную динамику в виде уменьшения размеров опухоли и снижения показателя онкомаркеров, пациенту удалось выполнить расширенную правостороннюю гемигепатэктомию. Прогрессирование опухолевого процесса за время наблюдения выявлено не было.

**Заключение.** Современные возможности рентгенэндоваскулярных методов лечения позволяют добиться результатов в лечении пациентов с метастазами колоректального рака в печени в виде уменьшения метастазов в размерах с последующей возможностью выполнения резекции печени.

**Ключевые слова:** колоректальный рак, метастазы печени

**Конфликт интересов:** авторы заявляют об отсутствии конфликтов интересов

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## Introduction

In the structure of the incidence of malignant tumors for a number of years, colorectal cancer occupies one of the leading places with a steady upward trend [1, 2]. Despite significant progress in the diagnosis of this disease using modern methods and the introduction of national screening programs in a number of countries, patients with metastatic liver damage account for about a third of the total cohort [3–6]. The method of choice for the treatment of patients with liver metastases today remains liver resection [7, 8]. Performing liver resections with metastatic lesions in colorectal cancer allows achieving 5-year survival in 35–50 % of patients [9–11]. Despite the fact that most patients are subsequently diagnosed with the progression of the tumor process, 20 % of patients achieve long-term remission [12]. However, it is possible to perform radical surgery R0 on the liver due to the prevalence of the tumor process or severe concomitant diseases only in 5–25 % of patients [8, 11, 13]. This determines the need to direct the efforts of doctors to expand the cohort of patients with initially unresectable liver metastases to potentially resectable ones.

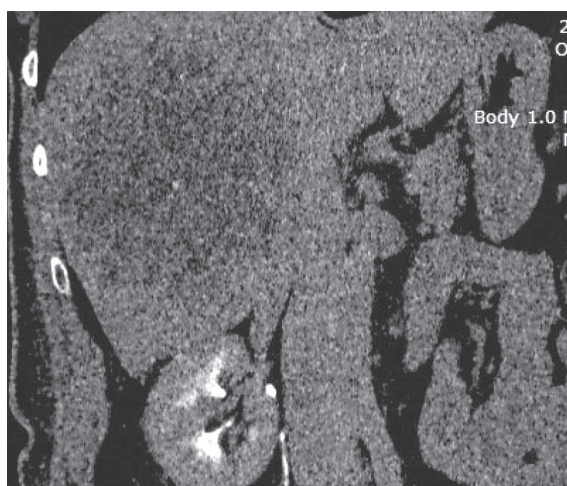
Modern schemes of systemic chemotherapy (SCT) and a personalized approach based on the biology of the primary tumor and metastases allow achieving an average survival rate of patients of 18–22 months [14–16]. The use of SCT according to a number of studies makes it possible to achieve

resectability of liver metastases and achieve survival comparable to the survival of patients with initially resectable metastases [17–20]. SCT with fluorouracil, leucovorin, irinotecan or oxaliplatin makes it possible to convert metastases into resectable ones in 7–40 % of cases [21, 22]. SCT extremely rarely leads to the recovery of patients with initially unresectable metastases, but allows for a relapse-free survival of up to 10 months. There may be complications of chemotherapy or the development of chemoresistance, which causes oncologists to interrupt specific antitumor treatment [23–25].

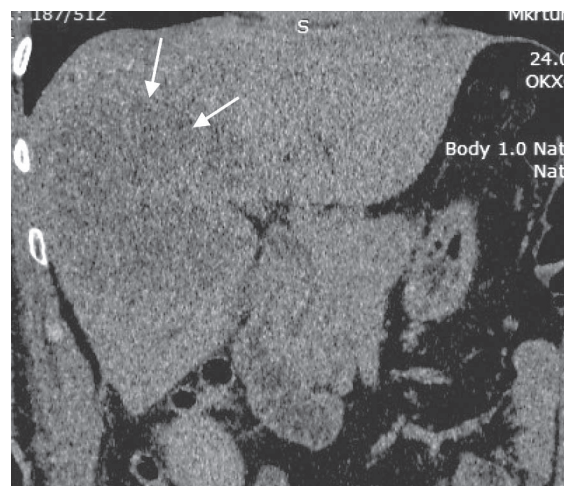
The above makes it necessary to introduce into clinical practice methods of regional chemotherapy (RCT) in the treatment of patients with liver metastases: chemoembolization of the hepatic artery (TACE), chemoinfusion of the hepatic artery (TACI) and embolization of the portal vein (EVV). The use of chemoembolization of the hepatic artery in the treatment of patients with unresectable or resistant to systemic chemotherapy metastases of colorectal cancer in the liver allows for an answer in 65–88 % of cases [26–28], which makes it possible to perform curable liver resection.

## Clinical observation

A 60-year-old patient was diagnosed with sigmoid colon cancer stage IIIB, rT3N2M0 in 2013. A standard clinical and morphological study was conducted. The diagnosis was verified histologically.



A



B

Fig. 1. Abdominal CT with contrast enhancement (August 2015): A – tumor occupies almost the entire right lobe of the liver; B – transition to the fourth segment of the liver (arrows)

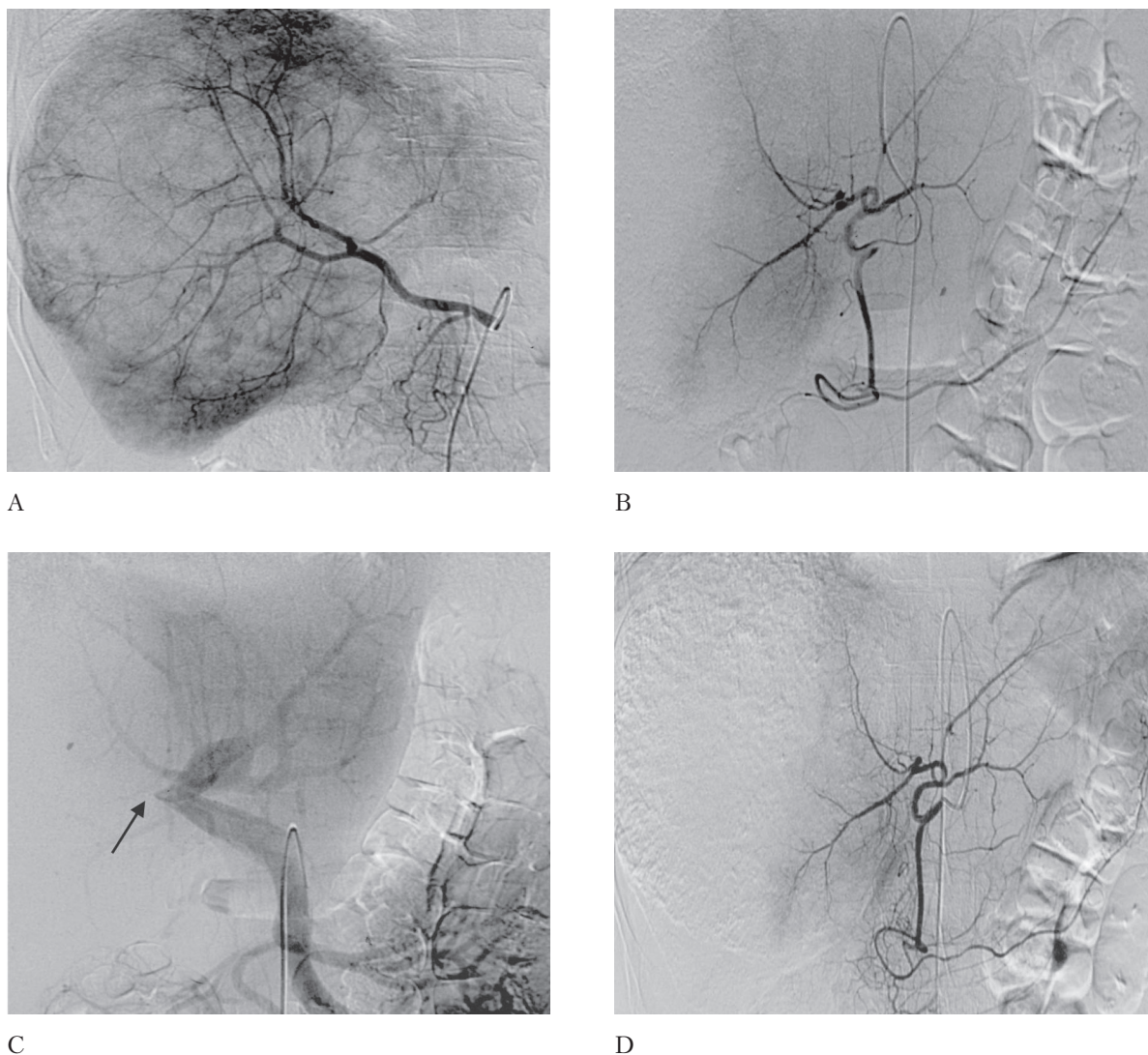


Fig. 2. Angiograms of patient M.: A is a variant of the vascular anatomy of the gastropancreatobiliary zone: a replacement right hepatic artery from the superior mesenteric. In the projection of the entire right lobe of the liver, a hypervascular pathological formation with a spread to SIV is determined; B — left hepatic artery from the common hepatic artery. In the projection of the left lobe of the liver, pathological formations are not clearly visualized; C — the superior mesenteric, trunk and left branch of the portal vein are passable. Occlusion of the right branch of the portal vein (arrow) is noted. The blood flow is hepatopetal; D— after chemoembolization of 150 mg Carboplatin + 8 ml Lipiodol of the right hepatic artery, the control image shows a compact accumulation of chemoembolizate in the tumor, the catheter is left in the common hepatic artery for chemoinfusion

It was moderately differentiated adenocarcinoma (G2). In March 2013, sigmoid colon resection was performed with the formation of hardware rectosigmoidoanastomosis. The postoperative period proceeded smoothly. Subsequently, the patient underwent 6 courses of adjuvant systemic chemotherapy according to the FOLFOX scheme. The patient was observed by an oncologist at the place of residence, regularly underwent control examinations. In May 2015, he noted the appearance of periodic dull pains in the right hypochondrium. According to CT data

from 05/22/2015, multiple metastases were detected in the right lobe of the liver with spread to the SIV of the liver (Fig. 1). A biopsy was performed. Morphological confirmation of colorectal cancer metastasis was obtained.

CA was 19.9 425 IU/ml, REA was 6.22 ng/ml. FOLFIRRI was started, which was found ineffective after 2 cycles due to an increase in the size of the tumor. The patient was offered a hemihepatectomy. After laparotomy and revision, taking into account the volume of metastatic lesion and the



interest of the fourth segment, it was technically not possible to perform liver resection. Mobilization of the liver gate and ligation of the right branch of the portal vein was carried out. At the time of surgery, the remaining liver volume was 30 %.

The patient was referred to the FSBI "Russian Scientific Center of Radiology and Surgical Technologies named after academician A.M. Granov", where on 26.10.2015 an oil TACE of 150 mg carboplatin + 8 ml of Lipiodol was performed, followed by a daily HIPA of 300 mg carboplatin and 3000 5 FU with intravenous administration of 450 mg leucovorin (Fig. 2). The procedure was without complications. In the postembolization period, the appearance of cytolytic syndrome was noted — a moderate increase in transaminases: AST to 83 U/L, ALT to 83 U/L. During the control examination after 4 weeks, a decrease in the cancer marker CA 19-9 to 155.5 IU/ml was noted, stabilization of the tumor process in the liver was diagnosed according to the mRECIST criteria. In November and December 2015, two more RCT cycles were performed according to the same scheme in the same dosages.

A control examination in January 2016 revealed a partial response of metastatic nodes according to the mRECIST criteria and a decrease in the value of the cancer marker CA 19-9 to 95.5 IU/ml, an increase in the remnant by 25 % of the initial volume. The patient was consulted by a hepatologist: taking into account the positive dynamics against the background of regional treatment, the patient underwent an extended right-sided hemihepatectomy on 04.02.2016. The operation was complicated by an external biliary fistula along the resection plane. Percutaneous transhepatic cholangiodrenation was performed on the left to separate the gallbladder and fistula. After three months on an outpatient basis, the fistula closed, the drains were removed.

Subsequently, a month after the operation, 5 cycles of adjuvant daily chemoinfusion of 300 mg Carboplatin + 3000 5 FU were performed against the background of intravenous administration of leucovorin 300 mg at intervals of 4-6 weeks between cycles.

During control examinations in 2019–2021, the progression of the tumor process was not revealed (Fig. 3). The patient died in August 2021 from acute myocardial infarction, there was no relapse of the disease.

## Discussion

Over the past few decades, X-ray endovascular interventions have established themselves as one of the main methods of treating unresectable liver metastases along with surgical and chemotherapeutic methods [22, 28]. Currently, the technique of preoperative EVV is widely used, which allows to increase FRL to "safe" 30–40 % of the liver, but the results of preoperative TACE and HAI are

contradictory [29]. Thus, according to various data, the frequency of reduction of colorectal cancer metastases in the liver to resectable sizes after HAI was from 25 to 35 % [5, 30]. Our preliminary results obtained in patients with a large, critical for resection volume of liver damage by colorectal cancer metastases indicate that treatment may need to start with a combination of CT and RCT, and then, after evaluating its effectiveness, continue in the form of EVV followed by curable resection [29]. According to the literature, the use of chemoembolization and HIP in patients with colorectal cancer metastases in the liver can increase overall survival, minimizing systemic and hepatic toxicity. It is advisable to use RCT as early as possible, not only with the development of chemoresistance, but as a second-line therapy [28].

## Conclusion

The described clinical observation shows the modern possibilities of X-ray endovascular surgery in the treatment of patients with unresectable metastases of colorectal cancer in the liver. The patient underwent a multi-stage complex treatment, which included removal of the primary tumor and CT. Despite this, the patient revealed the progression of the tumor process — the appearance of unresectable metastases in the liver. An attempt to surgically remove the tumor at the place of residence was unsuccessful: X-ray endovascular techniques were not available, therefore, ligation of the right lobe of the liver was performed in the hope of hypertrophy of the contralateral lobe. In the future, with the help of HEPA + HIP in our center, it was possible

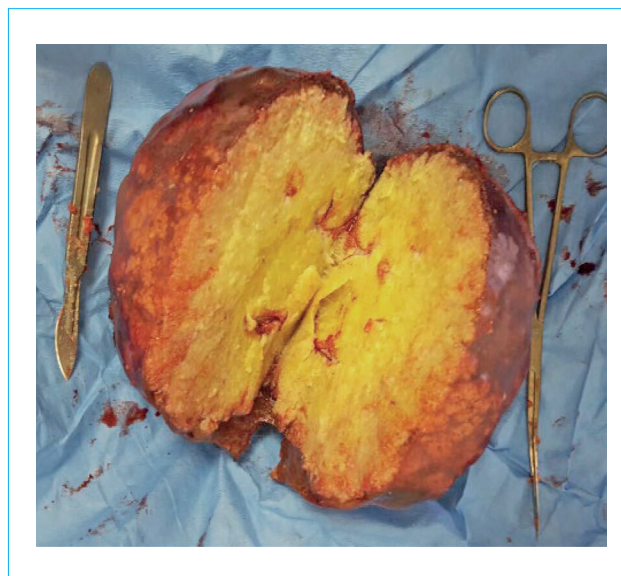


Fig. 3. Macropreparation of the removed tumor. The central part of the tumor is totally necrotized after TACE

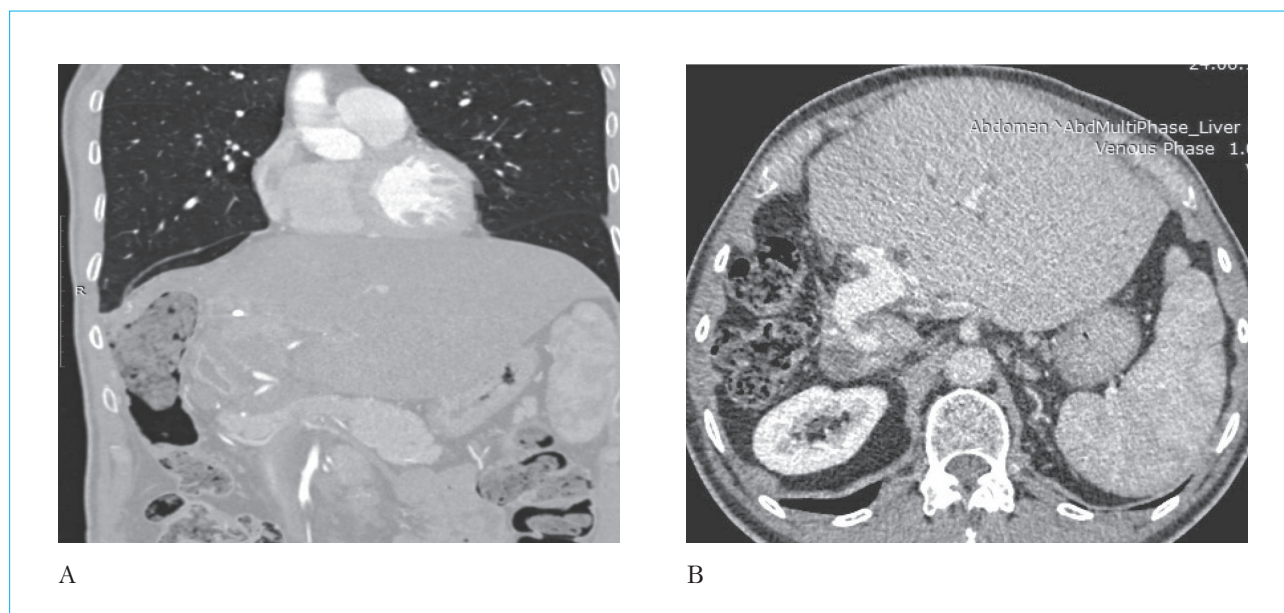


Fig. 4. Control CT with intravenous contrast. Absence of relapse of the disease: A — a year after the operation; B — two years after the operation

to achieve a reduction in the size of metastatic foci (partial response according to mRECIST) and a decrease in the biological activity of the tumor (lowering the cancer marker CA 19-9 from 425 to 95.5 IU/ml). Ligation of the right portal vein combination with caused hypertrophy of the remaining left lobe of the liver and minimized the

risk of postoperative liver failure. The use of endovascular methods of treatment in our patient made it possible to perform curable liver resection, and his life expectancy was 75 months from the moment of diagnosis of liver metastases without relapse of the disease.

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