



## Case report

## Laparoscopic synchronous resection of rectal cancer and liver metastases: A case report and review of the literature

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## ARTICLE INFO

## Keywords:

Synchronous laparoscopic liver resection  
 Colorectal cancer  
 Synchronous liver metastasis

## ABSTRACT

**Introduction and importance:** During the past decade, there are several studies which showed the advantages of the laparoscopic approach for treating colorectal cancer (CRC) or colorectal cancer liver metastasis (CRCLM). However, in contrast, there are only a few reports of combined one stage synchronous laparoscopic colorectal and liver metastasis resection, cold one stage minimally invasive approach (MIA).

**Case presentation:** Our patient was 51 years old woman.

Rectal adenocarcinoma was verified three centimeters from the anal verge. Magnetic resonance imaging (MRI) with rectal protocol modification indicated T1N0M0 stage. We decided to do transanal local excision and achieved R0 resection. Half a year after the operation on the control MRI, lymphadenopathy was found along the rectum and possible recurrence of cancer. Also on the MRI was shown solitary, 4.7 × 2.7 × 3.8 cm big metastasis in the IVa/VIII segment of the liver. The patient was shown on a multidisciplinary team and it was decided to do laparoscopic synchronous resection of rectum and liver metastases.

**Clinical discussion:** During the last decades many articles with different strategies for treating CRC and liver metastasis were published. Some of them preferred two-stage surgical treatment, like liver first approach which allows initial control of liver metastases, and delivery of preoperative radiotherapy for rectal cancer without the fear that liver metastases will meanwhile progress beyond the possibility of cure. Alternatively, the colon first approach is where the adjuvant chemotherapy is combined with the resection of the primary colorectal tumour with liver resection being undertaken (if at all) as a subsequent operation. By developing surgery, anaesthesia and critical care, the one stage approach for patients with CRC and liver metastasis started to be a reasonable option.

**Conclusion:** Totally laparoscopic synchronous resection of the colorectal cancer and synchronous colorectal liver metastasis is technically feasible and safe in the hands of the experienced abdominal surgeon. This type of approach offers all the benefits of the laparoscopic minimally invasiveness associated with good oncological outcomes, and it is indicated in well-selected patients. However, the real scientific answer to this question can be given just with randomised control trial which will be a real challenge for endoscopic surgeons in the future.

## 1. Introduction

CRC is the third most common cancer in the world, regardless of sex, with nearly 1.4 million cases diagnosed in 2012 [1]; and it is the fourth most common cancer regarding mortality [2], immediately behind lung, liver, and stomach cancer [3]. The 5-year survival rates depend on the tumour stage; with a survival of 90.3% for Stage I and only 12.5% for stage IV [4].

The liver is the most common site of metastasis in patients with CRC [5]. About 70% of patients with CRC will develop metastasis in the liver

during their disease [6]. At the time of first medical consultation, 14 to 18% of these patients have liver metastasis, and a further 10 to 25% are diagnosed at the time of primary tumour resection [7].

A curative R0 resection for these patients with CRC and liver metastasis is the only treatment that offers the possibility of a cure, and it has proven to contribute to long-term patient survival [8]. The optimal oncological and surgical treatment strategy for patients with CRC and liver metastasis are still items being discussed. Some reports have shown the benefit of one-stage synchronous open resection of CRC and CRCLM compared with two-stage (liver first or colon first) approach [9,10].

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Received 10 January 2022; Received in revised form 23 February 2022; Accepted 27 February 2022

Available online 3 March 2022

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During the past decade, there are several studies which showed the advantages of the laparoscopic approach for treating CRC [11,12] or CRCLM [13,14]. However, in contrast, there are only a few reports of combined one stage synchronous laparoscopic colorectal and liver metastasis resection, cold one stage MIA [15,16].

This review aims to analyse and evaluate currently published experiences in totally laparoscopic synchronous resection of the colorectal cancer (TLRSR) of cancer CRC and SCRLM and to compare it with our first experience in this complicated procedure.

This work was written in accordance with the SCARE criteria [39].

## 2. Case report

Our patient was 51 years old woman. She was without other comorbidities, according to the American Society of Anesthesiologists classification (ASA) she was classified like ASA I.

Rectal adenocarcinoma was verified three centimeters from the anal verge. Magnetic resonance imaging (MRI) with rectal protocol modification indicated T1N0M0 stage. We decided to do transanal local excision and achieved R0 resection. Half a year after the operation on the control MRI, lymphadenopathy was found along the rectum and possible recurrence of cancer. Also on the MRI was shown solitary,  $4.7 \times 2.7 \times 3.8$  cm big metastasis in the IVa/VIII segment of the liver (Fig. 1). There were no visible metastases on the computer tomography of the thorax.

The patient was shown on a multidisciplinary team and due to liver metastases, lymphadenopathy along the rectum and possible recurrence in the area of the scar, it was decided to do laparoscopic synchronous resection of rectum and liver metastases.

For the first stage of surgery, three troacars were placed: supra-umbilical, epigastric and the left hypochondriac troacar. Patient was placed in the left side reverse Trendelenburg position. After liver mobilisation, intraoperative ultrasonography was made to verify the position of the metastasis and liver vascular structures. The metastasectomy was made by a “clamp crushing” dissection technique with Ligasure- Maryland device (Fig. 2).

In the second phase of the operation, a patient was moved to the Trendelenburg position and another suprapubic troacar was added. Abdominoperineal rectal resection was done, and both specimens were extracted through the transperineal incision (Fig. 3).

The total operative time was 283 min with estimated blood loss of 0.35 L and without using of Pringle manoeuvre. Our patient did not have

any morbidity and left hospital on the sixth postoperative day. One team of surgeons operated.

Pathohistological finding of the resected part of the liver corresponds to the metastasis of moderately differentiated adenocarcinoma, while focal intramucosal recurrence in the form of tubular formations lined with dysplastic epithelium was found in the rectum (Fig. 4).

## 3. Discussion

Comprehensive research and analysis of up to now published literature on Medline was performed for TLRSR of CRC and SCRLM. The analysis takes literature published on Medline until March 2021.

We excluded reports which contain combined laparoscopy/laparotomy technique or hand-assisted procedure. Also, we excluded all reports without clearly distinguished results of MIA from the conventional open approach.

This published results we compare with our experience of TLRSR of rectal cancer (Miles procedure) and metastasectomy of the SCRLM in the eight liver segment.

Using these searching criteria we found 46 publications. After matching with exclusion criteria, we include 25 published studies in our review, which includes 360 patients who were exposed to TLRSR of the CRC and SCRLM. There were no randomised control trials found.

Demographic and clinical characteristics are shown in Table 1.

The median age of our patients was 63 years (31–88), there were 191 males (53.1%) and 169 (46.9%) females [15,16,23,24,26,32,38]. According to ASA classification, most of the patients were classified as ASA I (194/53.8%) and just 11 patients (3.1%) as ASA IV. The most common site of primary CRC was rectum, in 152 (42.2%) of patients, and after left colon 110 (30.6%), and right colon 98 (27.2%). SCRLM were single in 192 (53.4%) and multiple in 168 (46.6%) number of the patients. Unilobar SCRLM were in the 279 (77.5%) patients, with a size less than 2 cm in the 201 (56%) patients.

Operative outcomes are shown in Table 2. According to primary CRC location, there were 137 (38.1%) anterior rectal resections, 110 (30.6%) left colectomies, 98 (27.2%) right colectomies and 15 (4.1%) rectal amputations. Most usually the type of liver resection was minor resection which takes less than three segments of the liver, in 316 (87.8%) of patients. Because of intraoperative complication (bleeding, ureter injury, unclear liver margin, difficult progression) in 9 (2.5%) patients, the operation was converted into the open. Pringle manoeuvre was used in 30 (8.3%) patients. The median operative time was 328 min

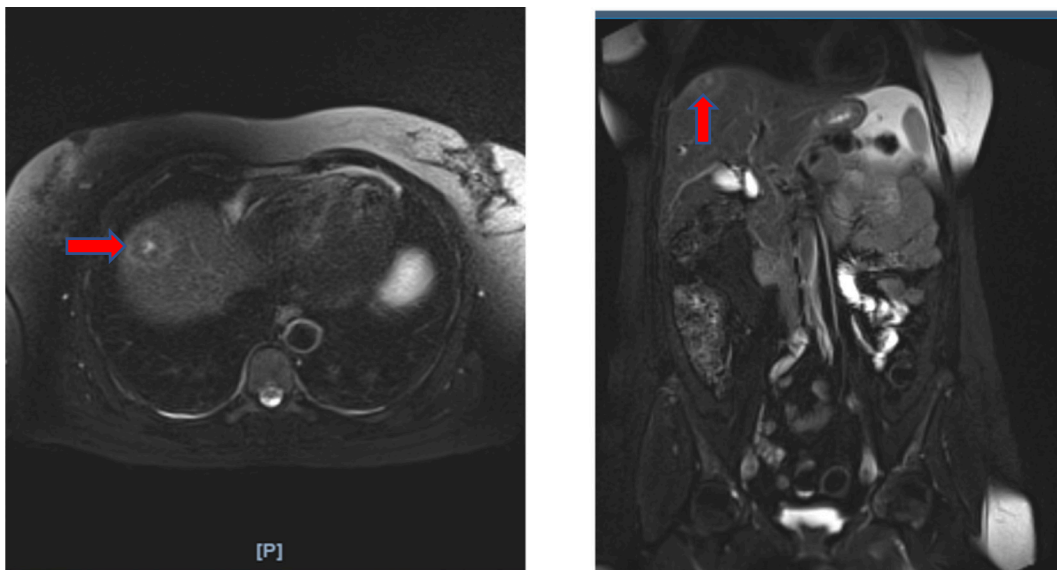


Fig. 1. Synchronous rectal liver metastasis in IVa/VIII liver segment shown on MR images.

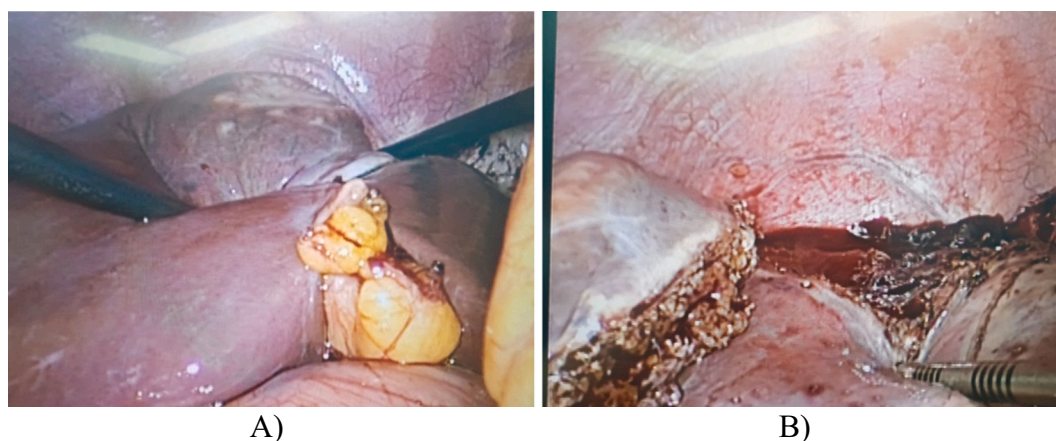


Fig. 2. Intraoperative presentation of metastasis in IVa/VIII liver segment before (A) and after (B) resection.

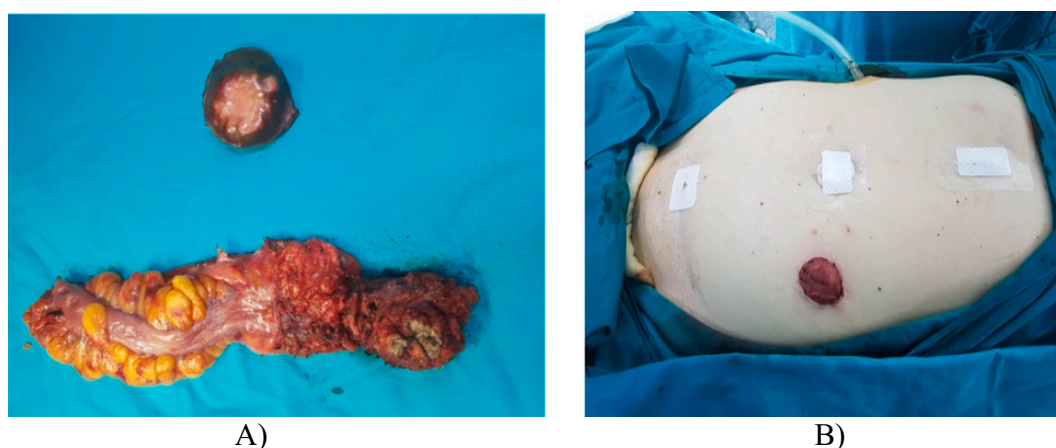


Fig. 3. Rectal and liver specimens (A) and abdominal wall (B) after laparoscopic abdominoperineal rectal resection.

(95–1005 min), with median estimated blood loss was 240 mL (10–1800 mL) [15,16,23,24,26,32,38].

Postoperative outcomes are shown in Table 3. The overall morbidity rate was 24.2% (n:87), with a surgical morbidity rate of 11.2% (n:40). The most common type of surgical morbidity was anastomotic leakage with 4.4% (n:16) of overall morbidity, followed with bile leakage 3.3% (n:12), liver abscess 1.6% (n:6), Ileus 1.1% (n:4), and bleeding 0.6% [2]. Mortality rate during the first 30 postoperative days was 1.7% (n:6). The median length of hospital stay was 8.7 days (3–84). In most of these studies, operations were provided by two teams (hepatobiliary and colorectal) of surgeons.

TLSR of the CRC and liver metastasis is technically feasible and safe in the hands of the experienced abdominal surgeon. This type of approach offers all the benefits of the laparoscopic minimally invasiveness associated with good oncological outcomes, and it is indicated in well-selected patients. Our first experience correlates with these results.

During the last decades many articles with different strategies for treating CRC and liver metastasis were published. Some of them preferred two-stage surgical treatment, like liver first approach which allows initial control of liver metastases, and delivery of preoperative radiotherapy for rectal cancer without the fear that liver metastases will meanwhile progress beyond the possibility of cure [19,20]. Alternatively, the colon first approach is where the adjuvant chemotherapy is combined with the resection of the primary colorectal tumour with liver resection being undertaken (if at all) as a subsequent operation [21–23]. By developing surgery, anaesthesia and critical care, the one stage

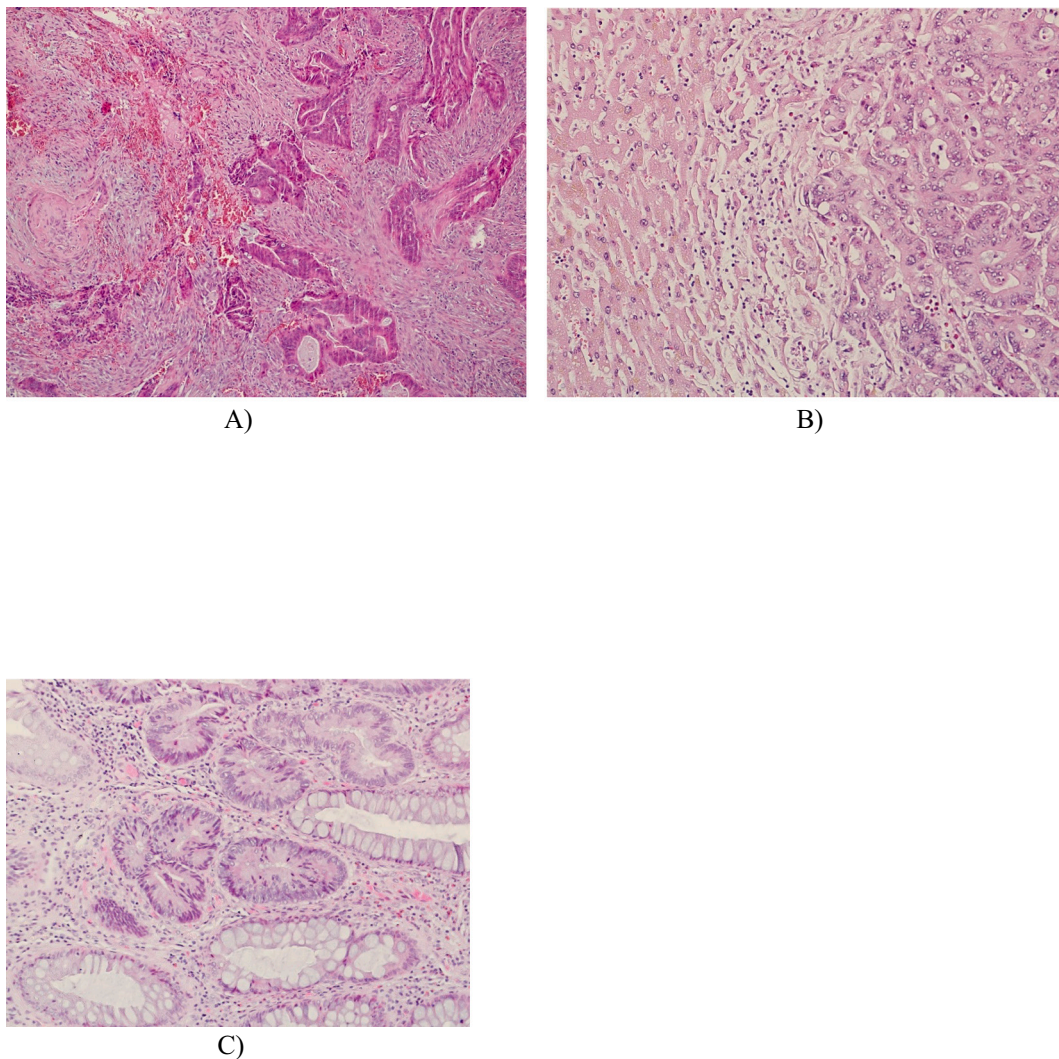
approach for patients with CRC and SCRLM started to be a reasonable option [9,10,24–26].

Benefits of the laparoscopic resection for CRC are well known for a long time [11,12,18,27], but the development of open liver surgery with the technical development of laparoscopic surgery has brought to feasibility to perform even major laparoscopic liver resections only in the last decade [13,14,28,29]. After the adoption of these two techniques by the abdominal surgeons, the logical way of developing the strategy for CRC with SCRLM was to perform a synchronous laparoscopic resection of CRC and liver metastasis [15,16,30].

In highly selected patients, a totally laparoscopic approach is a feasible and safe option to treat primary colorectal neoplasm with synchronous liver metastasis requiring major hepatectomies, performed in a one stage operation [31,32], with respecting all oncologic requirements. For selecting the patients for TLSR of CRC and SCRLM, we need to follow indications for laparoscopic resection of liver metastasis [33] and indications for laparoscopic colorectal resections [27].

There is some debate about margins of R0 liver resection. Some authors recommend that the margin must be 1 cm or more [34], but in the other studies, there is no significant difference in long-term prognosis with margins less than 1 cm, as long as it is an R0 resection [35]. In all published studies of TLSR for CRC and liver metastasis R0 resection was accomplished.

In most of these studies of TLSR for CRC and SCRLM Pringle manoeuvre was avoided during liver resection because it can cause transient congestion in mesenteric outflow with oedema of the intestinal mucosa which can lead to an anastomotic failure [36–38].



**Fig. 4.** Pathohistological findings: Adenocarcinoma after transanal local excision (A), metastasis of adenocarcinoma in the liver (B), focal intramucosal recurrence in the form of tubular formations lined with dysplastic epithelium (C).

**Table 1**  
Demographic and clinical characteristics.

Variable	Patients n. 360 (%)
Age (years)	63 (31–88)
Gender (male/female)	191 (53.1)/169 (46.9)
ASA 1	194 (53.8)
ASA 2	81 (22.5)
ASA 3	74 (20.6)
ASA 4	11 (3.1)
Location of the primary tumour	
Right colon	98 (27.2)
Left colon	110 (30.6)
Rectum	152 (42.2)
Number of liver metastases	
Single	192 (53.4)
Multiple	168 (46.6)
Location of liver metastases	
Unilobar	279 (77.5)
Bilobar	81 (22.5)
Size of liver metastases	
<2 cm	201 (56)
>2 cm	159 (44)

**Table 2**  
Operative outcomes.

Type of colorectal surgical procedure (n.)	
Right colectomy	98 (27.2)
Left colectomy	110 (30.6)
Anterior rectal resection	137 (38.1)
Miles procedure	15 (4.1)
Type of liver surgical procedure (n.)	
Major resection (≥3 segments)	44 (12.2)
Minor resection (<3 segments)	316 (87.8)
Conversion to laparotomy (n.)	
Pringle's manoeuvre (n.)	9 (2.5)
Operative time (min)	328 (95–1005)
Blood loss (mL)	240 (10–1800)

There are several limitations to our study. First of all, this is a non-comparative study. Another limit of this retrospective overview study was the heterogeneity of the sample which makes difficult in making a common conclusion.

Our review concluded that in highly selected patients, a totally laparoscopic approach is a feasible and safe option to treat primary colorectal neoplasm with synchronous liver metastasis in a one stage operation even when requiring major hepatectomies which correlate with previously published literature [31,38]. Our first experience

**Table 3**  
Postoperative outcomes.

Overall morbidity (n.)	87 (24.2%)
Surgical morbidity (n.)	40 (11.2%)
Anastomotic leakage	16 (4.4%)
Bile leakage	12 (3.3%)
Liver abscess	6 (1.6%)
Ileus	4 (1.1%)
Bleeding	2 (0.6%)
30-day mortality (n.)	6 (1.7%)
Hospital stay (days)	8.7 (3–84)

correlates with these results. An appropriate selection of patients and adequate experience of the surgeon plays a key role in the successful operation. These results need to be validated by larger, prospective, randomised control trials which will be a real challenge for endoscopic surgeons in the future.

#### 4. Conclusion

TLRS of the CRC and SCRLM is technically feasible and safe in the hands of the experienced abdominal surgeon. This type of approach offers all the benefits of the laparoscopic minimally invasiveness associated with good oncological outcomes, and it is indicated in well-selected patients. For selecting the patients for TLRS, we need to follow indications for laparoscopic resection of liver metastasis and indications for laparoscopic colorectal resections. Our first experience correlates with these results. However, the real scientific answer to this question can be given just with randomised control trial which will be a real challenge for endoscopic surgeons in the future.

#### Provenance and peer review

Not commissioned, externally peer-reviewed.

#### Sources of funding

None.

#### Ethical approval

No approval is required for this case report.

#### Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

#### Credit authorship contribution statement

Mislav Rakić – Surgeon performing the operation, writing of original manuscript.

Ante Šabić – Data collection, revision of the manuscript.

Robert Kliček – Data collection, revision of the manuscript.

Fedor Amić – Revision of the manuscript.

Antonija Đuzel – Revision of the manuscript.

Marijan Kolovrat – revision and final revision of the manuscript.

#### Research registration

Not applicable.

#### Guarantor

Mislav Rakić, MD, PhD.

#### Declaration of competing interest

None.

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