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The "Short-Cut" Laparoscopic Reverse Approach: A Novel Strategy for Synchronous Colorectal Cancer and Liver Metastases Requiring Major or Complex Procedures?

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Abstract

Aim To report on the feasibility and the safety of a novel strategy in patients with colorectal cancer and synchronous liver metastases (SLM) requiring major or complex procedures for both the primary and liver deposits.

Patients and Methods The strategy consisted in performing the two major procedures (liver first and colorectal) by laparoscopy within a short interval in order to keep both oncological advantages and short-terms outcome benefits.

Results Two patients were treated with this strategy: one with a laparoscopic resection of segment VIII extended to the segment IVb followed by the laparosopic rectal resection; the second with a laparoscopic left hepatectomy with a microwave ablation of the lesion located in the segment VII followed by the laparoscopic resection of the sigmoid colon. Postoperative courses were uneventful.

Conclusion The "short-cut" laparoscopic reverse approach may represent an attractive option for patients requiring major liver and colorectal resections for SLM provided expertise in laparoscopic surgery in both fields is ensured.

The decision-making process of patients with colorectal cancer (CRC) and synchronous liver metastases (SLM) is tailored on tumor statuses of both the primary and liver metastases. Up-front chemotherapy +/− targeted agent is now the standard of care of patients with CRC and resectable or potentially resectable SLM with the aim of controlling both the primary and the metastatic disease, downsizing metastases, improving resectability and survival rates [1, 2]. When both the primary tumor and the metastases are resectable and require limited surgical procedures, combined resection can be performed safely [1]. Nevertheless, even in case of minor procedures, whether the liver resection should be performed first or not during the combined procedure remains unknown since portal triad clamping during liver resection may induce edema of the intestinal anastomosis and opening the gut before hepatectomy may lead to bacterial contamination of the liver transectional surface.

Although oncologically relevant, associating major or complex hepatectomy and colorectal resections may increase postoperative morbidity, especially infectious complications and related postoperative liver failure. Hence, most authors recommend a sequential approach in this setting [1, 3]. Last, considering that prognosis is mainly brought by the metastatic disease, the liver-first approach has become the preferred sequential strategy for patients with significant liver tumor burden to minimize the

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risk of metastatic progression during the treatment of the primary [4]. However, the liver-first approach may be associated with a risk of primary tumor progression (symptoms or complications) if the treatment of the primary is postponed or precluded in case of early metastatic recurrence. For these reasons, a relevant strategy in this setting would be to safely perform the two major procedures (liver first and colorectal) within a short interval in order to keep both oncological advantages and short-terms outcome benefits.

The laparoscopic approach has been shown to reduce complications rates, improve postoperative rehabilitation and shorten hospitalization time compared with the open approach without compromising the oncological outcomes in both CRC and liver metastases [5, 6]. It also shortens the delay to postoperative chemotherapy administration and reduces intra-abdominal heavy adhesions [7]. For patients with CRC and SLM, simultaneous laparoscopic resection has been shown to be safe and feasible provided associated procedures are limited [8]. Assuming that combined laparoscopic major resections increase operative time and having in mind the previously described strategy for patients with significant synchronous liver tumor burden, we investigated the concept that laparoscopy may allow two major resections (liver first) within a short delay of less than a week owing to a quick recovery and absence of adhesions. We also assumed that, if postoperative complications occur after the first procedure, the strategy would be "switched" to the conventional sequential liver-first strategy including interval chemotherapy and the treatment of the primary in a second stage. This "short-cut" laparoscopic reverse approach was performed in two patients;

- First, in a 65-year-old man with a high rectal cancer (12 cm from the anal verge). At initial CT scan, a 10-cm segment VIII SLM encroaching the proximal portion of the middle hepatic vein and surrounded by two satellite nodules was found (Fig. 1a). After six cycles of FOLFIRINOX chemotherapy, a major response was observed (Fig. 1b). The patient then underwent a laparoscopic resection of segment VIII extended to a part of the segment IVb. Following ultrasound-guided injection of blue dye in segment VIII portal vein, liver transection was performed using CUSA and bipolar devices. Intermittent inflow occlusion was applied for 83 min. The total operative time was 4 h. The postoperative course was uneventful, and the patient was discharged on postoperative day 3. Abdominal CT performed on postoperative day 5 was showed no complication (Fig. 1c). The patient was therefore readmitted and underwent laparoscopic rectal resection on postoperative day 6 using five trocars including two previous ports used for the liver resection (Fig. 1d). The inferior mesenteric vein was divided, the splenic flexure was taken down, and the inferior mesenteric artery was divided at 1 cm from the aorta. Extrafascial partial mesorectal excision was performed with division of the mesorectum 5 cm below the tumor

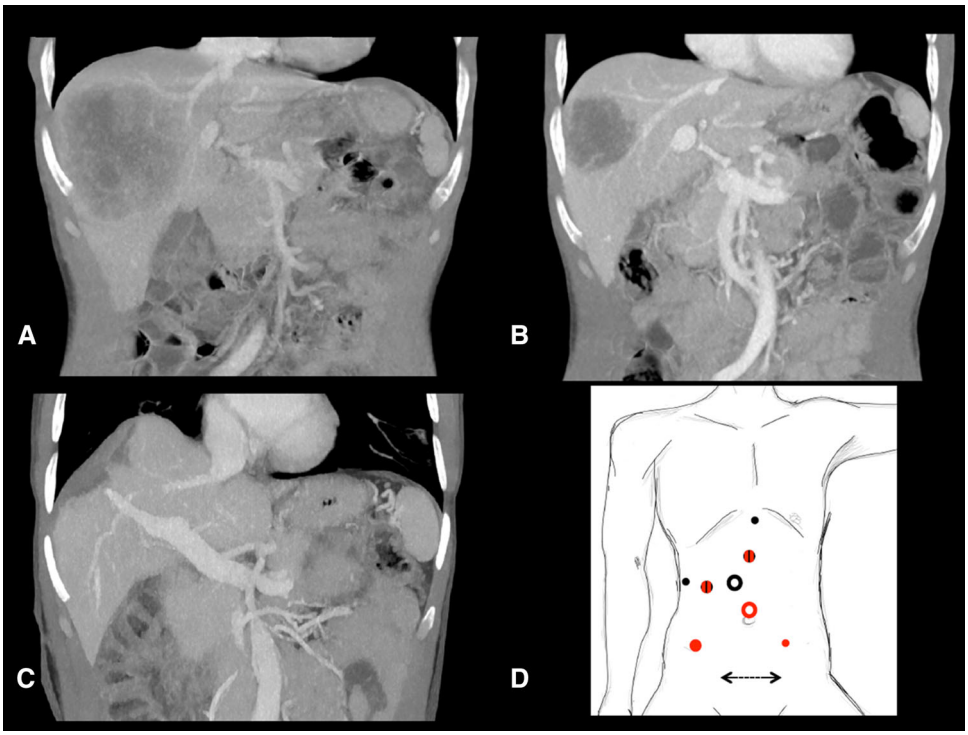

Fig. 1 **a** Liver metastasis on the first workup computed tomography (CT) scan realized. **b** Chemotherapy response on the assessment CT scan. **c** Postoperative day 4 control CT scan after laparoscopic liver resection and before the laparoscopic rectal resection. **d** Trocar placement: black for liver resection, red for rectal resection and red–black-banded points for both. The hollow circles represent the scope placement and the dotted line the suprapubic incision for specimen removal

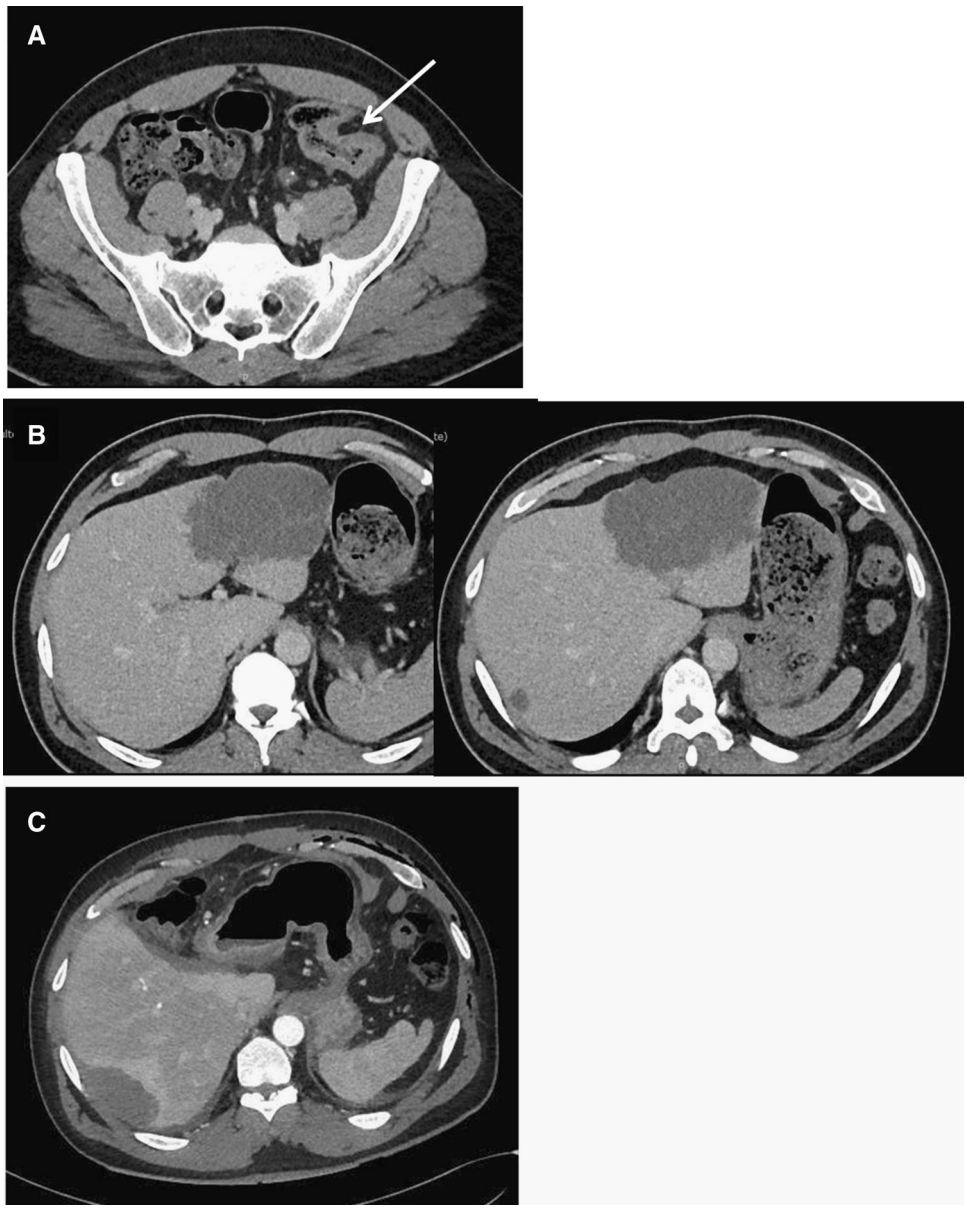

Fig. 2 **a**, **b** Sigmoid colon adenocarcinoma (white arrow) and synchronous liver metastases on CT scan after FOLFIRINOX chemotherapy. **c** Postoperative day 6 control CT scan after laparoscopic liver resection and ablation of the segment VII lesion, and before the laparoscopic sigmoid resection

followed by end-to-end stapled colorectal anastomosis without defunctioning ileostomy. No postoperative complications occurred, and the patient was discharged on postoperative day 3 (postoperative day 9 from the liver surgery). Pathological examination showed an 8-cm metastasis with two 0.7-cm satellite nodules, without invasion of the middle hepatic vein. The minimal resection margin was 2 mm and the TRG was 2. The rectal cancer was classified ypT2N1a (1N+/16), TRG2 with negative distal and circumferential margins. Adjuvant FOLFOX chemotherapy (MDT recommendations) was started 15 days after the second surgical procedure.

- The second case was performed in a 50-year-old man diagnosed with a sigmoid adenocarcinoma and two synchronous liver metastases: one of 10 cm diameter in the left liver and a second one of 2 cm in the segment VII. Six cycles of FOLFIRINOX chemotherapy were administrated (Fig. 2a, b). The patient then underwent a laparoscopic left hepatectomy using five trocars, associated with a microwave ablation of the lesion located in the segment VII. Two 15-min intermittent clamping associated with veinous exclusion of the middle and left hepatic vein were required for liver resection. He developed no postoperative complication. The abdominal CT scan on postoperative day 6 was normal (Fig. 2c). A laparoscopic left colectomy was performed on postoperative day 7 using five trocars including three previous ports used for the liver resection. The colorectal technique was the same as the one described

above. Postoperative course was uneventful, and the patient was discharged on postoperative day 10. Pathological examination showed a 10-cm metastasis with a minimal resection margin of 1 cm and a TRG of 2. The sigmoid cancer was classified ypT3N2b (8N+/18) with negative longitudinal margins. Adjuvant FOLFOX chemotherapy for 3 months (MDT recommendations) was started 12 days after the second surgical procedure.

Given the priority to the metastatic disease, the present "short-cut" laparoscopic reverse approach offers the oncological advantages of the classic reverse approach for patients with large synchronous liver tumor burden. This approach is enhanced by the initial laparoscopic approach due to its faster recovery period and offers advantages over both the classical one-stage and delayed two-stage approaches. On one hand, resection of the primary is performed only if no complication occurs after the liver resection. On the other hand, it allows to treat both tumor sites within a short period of time limiting the risk of progression, complications or symptoms related to the primary during the interval period. Finally, the fact that both surgeries are performed using a laparoscopic approach may allow early administration of adjuvant chemotherapy. One should emphasize that a strict selection of optimal candidates with immediately favorable postoperative course after the first surgery should be performed before the second stage. Taken together, the "short-cut" laparoscopic reverse approach may represent an attractive option for patients requiring major liver (right or left hepatectomy, resection of segment VIII or bisegmentectomy VI–VII) and colorectal resections for SLM provided expertise in laparoscopic surgery in both fields is ensured. For those with rectal cancer requiring short-course neoadjuvant radiotherapy, this strategy may also be applicable. It is to our knowledge that such a strategy raises several questions: (1) the potential feasibility of all procedures in a single step, (2) the tolerance and quality of life of the patient after these two procedures, (3) the feasibility of this complete strategy including the two steps (i.e., rate of dropout), (4) the potential benefit of this strategy compared to the conventional one. A multicenter study including a higher number of patients is now needed to bring answers.

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