



Should we do laparoscopic resection for synchronous stage IV colorectal cancer?

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Colorectal cancer (CRC) is one of the most common cancers ranking third in the USA in cancer related deaths. Approximately 25–50% of patients with CRC have liver metastases upon initial presentation (1). Surgical resection provides the best chance for long-term survival for colorectal liver metastasis (CRLM) including laparoscopic and open hepatectomy. Over the last decade, laparoscopic liver resection (LLR) has greatly expanded including resection of CRLM as well as major hepatectomy (2-4). Open liver resection has been the gold standard for CRLM; however, with the publication of the Second International Consensus Guidelines on Laparoscopic Liver Resection, the use of LLR for CRLM has become more widely accepted (5).

The OSLO-COMET Randomized clinical trial showed that patients undergoing parenchymal-sparing LLR for CRLM had less operative complications and a shorter hospital stay compared to open liver resection. No differences were noted regarding blood loss, OR time, or resection margins between the groups (6). Another prospective randomized clinical trial was performed by Robles-Campos *et al.* showing that LLR had similar oncologic outcomes compared to open surgery with no difference in 5-year disease-free survival (DFS) or overall survival (OS) between the groups (7).

Another potential advantage of LLR for CRLM is the earlier initiation of adjuvant systemic chemotherapy compared to open surgery. Patients undergoing laparoscopic surgery had a shorter interval to postoperative chemotherapy compared to open procedure (median 42 *vs.* 63 days, $P < 0.001$) (8). While there is no consensus as

to the number for CRLM that can (or should) be resected laparoscopically, a meta-analysis of rigorously matched patients comparing LLR to open liver resection (OLR) for CRLM in 610 patients showed that the vast majority of patients had 1 or 2 liver metastases (9).

For synchronous stage IV CRC with CRLM, there are several surgical strategies including synchronous *vs.* staged resections. Some groups advocate for a colorectal-first staged approach, followed by adjuvant chemotherapy and subsequent liver resection if no progression of disease is noted. This strategy is thought to minimize patients' stress to undergo a combined extensive surgery, thereby decreasing morbidity and mortality. More importantly, it allows for monitoring of patients on chemotherapy for disease progression and thereby spare an unnecessary second surgical intervention.

In contrast is a liver first-approach, which is comprised of a liver resection, followed by a staged resection of the primary tumor. This method can potentially avoid the progression of liver metastases between two major surgeries. With the improvement of surgical technique and perioperative care, more patients are managed with a combined open resection for synchronous disease. A multi-center study compared simultaneous *vs.* staged open resections for synchronous stage IV CRLM (10). They concluded that simultaneous colectomy and minor hepatectomy is safe, but that caution should be used when major hepatectomy is needed.

Some authors have reported on laparoscopic synchronous resection of CRC primary tumor and CRLM. In a multi-

center study in 142 patients, the median number of liver metastases resected was one, median liver tumor size 2.8 cm, and 5-year OS was 72% (11). The same group provided a propensity score match (PSM) of laparoscopic simultaneous resection of colorectal primary tumor and CRLM in 89 patients and matched to 89 patients that underwent simultaneous open resection (12). Selection criteria for this study were CRLM amenable to wedge resection or LLS. There was no difference in OR time, estimated blood loss (EBL), or transfusion between groups. Open conversion was required in 7% of the minimally invasive procedures. Morbidity and 3-year OS were similar between the groups. In another PSM analysis of synchronous CRC and CRLM, the laparoscopic group had less blood loss (350 *vs.* 600 mL), shorter LOS (9 *vs.* 12 days), lower postop morbidity index (0.14 *vs.* 0.20) compared to the open group (13).

Recently, Moris and colleagues provided a systematic review of laparoscopic synchronous resection of CRC and liver metastases (14). They identified 12 studies; 4 were non-comparative and 8 were comparative (lap *vs.* open). In the comparative studies, they analyzed postoperative outcomes of 136 patients who underwent laparoscopic synchronous resection *vs.* 171 patients who underwent open synchronous resection. In total, 199 patients from 12 studies underwent laparoscopic synchronous resection. Colon was the primary tumor site in 58% of patients and rectum in 42% of patients. For the hepatectomy, most patients underwent minor LLR (84%). Neoadjuvant chemotherapy was administered in 28% of patients. In the comparative studies, laparoscopic synchronous resection was associated with comparable OR time and postoperative morbidity, while the laparoscopic group had a shorter hospital length of stay (LOS) compared with open resection. Long-term oncologic outcomes were comparable between the groups. They conclude that laparoscopic synchronous resection is safe and feasible in well-selected patients.

The extent of hepatic resection and whether patients that require anatomic major hepatectomy to clear the CLRM should be done as a synchronous case remains controversial. While some studies have reported laparoscopic synchronous resection that includes a major hepatectomy, others have cautioned against this approach. An Expert Group on OncoSurgery management of Liver Metastases (EGOSLIM) consensus recommended that simultaneous resection should be reserved to patients undergoing limited hepatectomy (15). Another important factor in the decision-making between synchronous *vs.* staged resection is the degree of difficulty of the colorectal primary, especially for low rectal cancers

that might require coloanal anastomosis. Likewise, whether two surgical teams (colorectal and liver) are preferred *vs.* one team with appropriate skills remains unanswered. In summary, laparoscopic synchronous resection of CRC and CRLM should be considered in well-selected patients and performed by experienced surgeons.

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