

## **Abstract Title**

### **Coordinated Minimally-Invasive Multi-stage Surgery For Stage IV Colorectal Cancer**

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#### Background

Minimally-invasive surgery (MIS) is increasingly performed for colorectal cancer (CRC) and liver metastases (LM). Perioperative benefits and oncologic adequacy have been separately demonstrated for each. However, coordinated minimally-invasive multi-stage surgery for CRC with resectable LM has not been investigated. We evaluated the perioperative and oncologic safety of the coordinated MIS approach.

#### Methods

Thirty-one consecutive patients who underwent MIS resections for both CRC and for synchronous (n=23) or metachronous (n=8) LM between 2011-2015 were retrospectively reviewed for clinicopathologic characteristics and multimodality treatments. Outcome measures included perioperative morbidity, pathologic assessment, and return to intended oncologic therapy (RIOT).

#### Results

The median age at CRC diagnosis was 55 years and 16 (52%) were female. Most (80%) primary tumors arose from the sigmoid (n=14) and rectum (n=11, median 8cm from the anal verge). For patients with synchronous LM, 17(74%) received preoperative chemotherapy and 4(17%), pelvic radiation. Resection sequence was reverse (liver-first, n=5, 22%; 0 conversion during CRC resection), combined (n=9, 39%), or classic (CRC-first, n=9, 39%; 1 conversion during LM resection). Overall, CRCs required 2-stage resection with temporary diversion in 8 (26%) patients, while hepatectomy was 2-stage with portal vein embolization (PVE) in 5 (22%) patients (with post-PVE procedure performed open). Perioperative outcomes highlighted low morbidity and short hospital stay (Table). All were rendered disease-free, with R0 resection in 94% for CRC (2 with 1mm radial margin) and 94% for LM (2 with R1 resection; median free margin: 4mm). A median of 24 [interquartile range, IQR: 17, 34] nodes were resected with CRCs. All patients returned to their intended oncological therapy at a median of 6.5 [IQR: 5.1, 7.6] weeks after all resections.

#### Conclusion

Coordinated curative-intent MIS for CRC with resectable LM affords favorable peri-operative morbidity rates, excellent pathologic outcomes, and timely RIOT. Advanced planning of multi-stage resections, including port and ostomy site placements, is required. Long-term oncologic results will await future studies.

**Table: Summary of peri-operative outcomes of coordinated minimally-invasive**

### surgery for CRC with resectable liver metastases

	Primary CRC (N=31)	Liver metastases (N=31)
Surgical approach	Laparoscopic (n=24, 45%) Robotic (n=12, 36%) Laparoscopic hand-assisted (n=6, 16%)	Laparoscopic (n=24, 45%) Laparoscopic hand-assisted (n=5, 16%) Robotic (n=1, 3%) Trans-diaphragmatic (n=1, 3%)
Surgical procedure	Low anterior resection (n=18, 58%) Segmental colectomy (n=10, 32%) Abdominal perineal resection (n=2, 7%) Total proctocolectomy (n=1, 3%)	Major hepatectomy (n=8, 26%) Minor hepatectomy (n=23, 74%)
Estimated blood loss, cc (median, IQR)	100 [50, 200]	100 [50, 200]
Transfusion	1 (3%)	0
Length of hospital stay, days (Median, IQR)	4.5 [3, 5.3]	3.3 [4, 5.8]
In-hospital/30-day morbidity, Any	4 (12.9%)	6 (19%)
In-hospital/30-day morbidity, Grade 3 or higher**	1 (3%)	3 (9.7%)

\* Major hepatectomy included: wedge resection of 3 or more segments, anatomic resection of 2 or more segments, left/right hepatectomy, extended left/right hepatectomy. Minor hepatectomy included: wedge resection of fewer than 3 segments; anatomic segment resection.

\*\* Grade 3 defined as a complication requiring surgical, endoscopic or interventional radiology intervention