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EDITORIAL – HEPATOBILIARY TUMORS

# A Colon Resection and Pump Implantation in the Same Surgical Procedure: Is it Safe?

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Patients with synchronous colorectal liver metastases (CRLM) require management by a multidisciplinary team (MDT) right from initial presentation. Treatment modalities for these patients include systemic chemotherapy, radiotherapy, resection of the primary colorectal cancer, and resection or ablation of liver metastases. The challenge of the MDT is to determine the benefit and optimal sequence of these treatments for each individual patient. A patient with a solitary CRLM may undergo a single-stage resection without systemic chemotherapy. A patient with widespread metastatic disease in the liver, lungs, and peritoneum may receive only systemic chemotherapy without any locoregional treatment. Stage IV colorectal cancer (CRC) is a heterogeneous disease.

Hepatic arterial infusion pump (HAIP) chemotherapy is another treatment in the armamentarium for stage IV CRC, in particular in patients without metastatic disease beyond the liver.[1] HAIP chemotherapy requires a surgical procedure to position a catheter in the gastroduodenal artery at its origin from the hepatic artery. The catheter is connected to a subcutaneous pump for continuous intra-arterial infusion of floxuridine. The pump can be refilled percutaneously. HAIP chemotherapy is increasingly offered in cancer centers across the United States and in clinical trials in Europe.[2]

A randomized, controlled trial (RCT) demonstrated the efficacy of adjuvant HAIP chemotherapy for progression-free survival (31.3 vs. 17.2 months, $p$ =0.02) and overall survival (68.4 vs. 58.8 months, $p = 0.10$).[3] A propensity score analysis of more than 2000 patients also found promising survival after adjuvant HAIP with a hazard ratio of 0.67 (95% confidence interval [CI]: 0.59–0.76, $p < 0.001$).[1] An ongoing RCT in the Netherlands compares complete resection of CRLM with and without HAIP chemotherapy.[2] Adjuvant HAIP chemotherapy is of increasing interest, now that two RCTs found overlapping OS curves for adjuvant systemic chemotherapy.[4,5] HAIP chemotherapy is also promising for unresectable CRLM as induction treatment. In a phase II trial of patients with a median of 14 CRLM, the rate of conversion to resection was 49%. The response rate of HAIP chemotherapy was 70% as second-line treatment, which is much higher than after systemic second-line chemotherapy.[6]

Verheij et al. investigated in this journal whether colon resection (with or without additional partial liver resection) and subcutaneous pump implantation can be safely combined in the same surgical procedure.[7] A potential drawback of a combined procedure is the risk of infecting the pump with a clean-contaminated colon resection. Moreover, infectious complications of the colon resection (i.e., wound infection and anastomotic break down) could subsequently lead to pump pocket infection. Infection of the pump pocket can frequently be managed with antibiotics but may require surgical placement of a new pump away from the initial site.

In a retrospective cohort, the authors investigated 374 patients with CRC and synchronous liver metastases who all underwent pump implantation for HAIP chemotherapy. Patients with rectal cancer were excluded. HAIP chemotherapy was planned as induction treatment (i.e., without partial liver resection) or as adjuvant treatment with resection of CRLM. The authors compared patients who underwent simultaneous HAIP implantation with colectomy versus patients who underwent HAIP



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implantation alone. Unfortunately, no data were reported on the proportion of patients with a symptomatic CRC. The oncological benefit or harm of the combination of colectomy and pump placement in the induction setting was not investigated. Two recent RCTs found that primary tumor resection in asymptomatic CRC patients with unresectable metastases increases short-term mortality and provides no long-term survival benefit.[8,9]

The authors compared 258 patients who underwent simultaneous colon resection and pump placement with 116 patients who underwent pump placement alone after previous partial colectomy. No 30-day mortality was observed. The percentage of postoperative grade 1 or 2 complications was higher in the simultaneous group (36.8%) compared with the pump alone group (12.9%; $p < 0.001$). This difference was mainly explained by an increase in both cardiovascular complications and surgical site infections in the combined group. The percentage of postoperative grade 3 or 4 complications, however, was similar in both groups (12.9% vs. 14.3%; $p = 0.82$). Pump pocket infections delaying chemotherapy occurred more frequently in the simultaneous group ($n = 5$) than in the pump-only group ($n = 1$), but this difference was not statistically significant ($p = 0.67$). The median time to start the first HAIP cycle also was similar between both groups (27 vs. 30 days; $p = 0.92$). In a small, separate cohort, the authors investigated the combination of stoma reversal and pump implantation. They found a high rate of grade 3–4 and infectious complications and recommend against combining these procedures.

All patients in the pump alone group had a previous colectomy, for which the complications were not accounted for in the comparison with the simultaneous procedure. Therefore, the combined complication rate of the two separate procedures would certainly exceed that of the simultaneous approach. Finally, an important aspect of the favorable results of the combined procedure is that the pump placement is completed before the colectomy. The incision for the subcutaneous pump should be away from the laparotomy incision or trocar sites, and the skin should be closed and sealed off before the bowel is transected. In conclusion, colon resection and pump implantation in the same surgical procedure appears safe and should be considered in patients with CRLM in the adjuvant setting or as induction treatment in patients with symptomatic colon cancer.

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