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Feeding tube placement during cytoreductive surgery and heated intraperitoneal chemotherapy does not improve postoperative nutrition and is associated with longer length of stay and higher readmission rates

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ABSTRACT

Background: Patients with colorectal cancer and peritoneal carcinomatosis (CRC/PC) may benefit from cytoreductive surgery and heated intraperitoneal chemotherapy (CRS/HIPEC). Nutritional support is frequently required for patients after CRS/HIPEC. It remains unclear if placement of feeding access is of benefit in regard to improving postoperative nutrition in this patient population.

Materials and methods: Patients with CRC/PC who underwent complete cytoreduction were evaluated. Preoperative and postoperative nutritional data and discharge outcomes were retrospectively recorded. The presence of a feeding tube and PCI scores were recorded by review of operative notes. Readmission rates were calculated for patients at 30 d and 60 d after discharge from hospital.

Results: Forty-one patients underwent CRS/HIPEC, 25 had feeding tube placement at the time of surgery. Weight loss was common after HIPEC as 38 of 41 patients demonstrated weight loss. The mean weight loss was 7.6%. total parenteral nutrition was required at discharge in four patients (7.9%); three of these patients had feeding access placed. There was no difference in the degree of weight loss between groups ($7.1 \pm 3.7\%$ no tube versus $7.9 \pm 5.8\%$ patients with tube; $P = 0.608$). The mean decrease in albumin was 12.7% but was not significantly different in patients with feeding access and those without (10.0% versus 14.75% ; $P = 0.773$). Sixty-day readmission rates were higher in patients with feeding tubes (36% compared with 0%, $P < 0.01$).

Conclusions: Significant nutritional loss is common after CRS/HIPEC for patients with CRC/PC. Feeding tube placement does not prevent this and appears to be related to higher readmission rates and longer length of stay.

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1. Introduction

Peritoneal carcinomatosis (PC) will develop in approximately 10%–15% of patients with colorectal cancer (CRC) [1–3]. In patients that develop metastatic disease, isolated peritoneal disease will occur in approximately 25% of those patients and is typically associated with poor prognosis [2]. Median survival for this cohort of patients treated with systemic chemotherapy is generally considered to be approximately ≤ 24 mo [4–6]. Complete cytoreduction (removal of all visible disease) with administration of heated intraperitoneal chemotherapy (CRS/HIPEC) has been demonstrated to improve survival in selected patients with colorectal cancer and peritoneal carcinomatosis (CRC/PC) [1,4,6,7]. However, CRS/HIPEC is associated with a severe morbidity rate of close to 50%; therefore, patient selection is critical [8,9]. Additionally, owing to a high incidence of prolonged postoperative ileus, including delayed gastric emptying, patients will typically remain without oral intake for 6–8 d after CRS/HIPEC, and many patients will need longer before they are fully tolerating an oral diet [10,11]. Postoperative ileus is of particular concern as it is associated with longer hospital stays and increased rates of readmission [12,13]. Early enteral nutrition has been demonstrated to decrease the incidence of postoperative ileus in this population and decrease length of stay (LOS) [14].

For these reasons, we have frequently used feeding tubes in patients undergoing CRS/HIPEC, with the hope of mitigating the effects of prolonged ileus so common in this population [15,16]. Additionally, postoperative nutritional parameters could be positively affected by the early use of enteral feeding. There has been little focus in the literature documenting the effects of CRS/HIPEC on postoperative nutrition. We performed a retrospective study of our experience in a homogeneous group of colorectal cancer patients with peritoneal metastasis to determine if the use of feeding tubes was associated with improved postoperative nutrition, decreased LOS, and reduced readmission rates after CRS/HIPEC.

2. Materials and methods

2.1. Study population

We performed a retrospective evaluation of patients treated in the Peritoneal Surface Malignancy Center at our institution from January 1, 2008 to April 1, 2014. Patients were identified if they were evaluated for treatment of peritoneal carcinomatosis from a colorectal cancer primary. Patients with appendiceal or other primary neoplasms were not included in this database. The institutional review board of the UT MD Anderson Cancer Center approved the research protocol.

Data were extracted from review of the medical record. Peritoneal carcinomatosis index (PCI) and completeness of cytoreduction (CCR) scores were obtained from review of operative notes. Resection was considered complete if CCR0 or CCR1 resection was achieved. Degree of weight loss was calculated using the weight from the preoperative anesthesia assessment compared to the weight at the time of postoperative visit. Degree of change for serum albumin was

calculated by comparing the value at the preoperative visit to the first postoperative visit, which occurs 7–14 d after discharge. Information regarding discharge on total parenteral nutrition, tube feeds, or oral diet was obtained from review of electronic medical records.

2.2. Cytoreduction and heated intraperitoneal chemotherapy

The operative procedure for CRS/HIPEC has been previously described [17]. Patients were taken to the operating room and explored via a generous midline incision from xiphoid to pubis. The entirety of gross disease was resected involving peritonectomy and visceral resection as needed. Intraperitoneal chemotherapy was administered after complete cytoreduction. Mitomycin C was administered at a dose of 20–25 mg/m² depending on the prior exposure to systemic chemotherapy. Oxaliplatin was administered at a dose of 200 mg/m². Intraperitoneal chemotherapy was delivered using a closed technique. Outflow temperatures are kept at 41°C. The placement of feeding tubes was at the discretion of the attending physician. There was no randomized process but feeding tubes were placed based on the degree of suspicion for a prolonged ileus. One surgeon (K.F.F.) performed most cases included in this study (35 cases, 85%) and placed feeding tubes in 46% of patients compared with 56% without feeding tubes. The distribution of cases precluded analysis by surgeon.

2.3. Statistical analysis

Quantitative and qualitative variables were expressed as mean values \pm standard deviation, median (range), and frequency. LOS was calculated from date of operation until date of discharge. Mean values were compared with t-tests. Categorical variables were compared with that of chi-squared or Fisher exact test. Survival was calculated with the Kaplan–Meier method and log rank test [18]. Multivariate analysis using Cox Regression analysis was performed to identify factors related to LOS [19]. Statistical analysis was performed using SPSS version 21 (IBM Corporation, Armonk, NY).

3. Results

We identified 51 patients who underwent cytoreduction for peritoneal carcinomatosis for a colorectal primary at MDACC between January 1, 2008 and April 1, 2014. Ten patients with disease burden too significant for complete cytoreduction did not undergo perfusion with heated intraperitoneal chemotherapy. Therefore, 41 patients underwent CCR0/1 resection, and this was the cohort used for analysis. Clinical and pathologic data are shown in Table 1. Sixteen patients were treated without a feeding tube, and 25 patients had feeding tubes placed. There were no significant differences in the pathologic features of the primary tumor. American Society of Anesthesiologist score was not different between groups, with most of patients graded an American Society of Anesthesiologist 3.

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