

Case Report: Role of Low-Carbohydrate, High-Protein (LCHP) Diet in Pre-Operative Weight Loss for Obese Patient with Partially Obstructed Colon Cancer

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Received:-25 September 2025/ Revised:- 06 October 2025/ Accepted: 12 October 2025/ Published: 31-10-2025

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Abstract— This report describes the case of a 64-year-old female with morbid obesity (BMI 70) diagnosed with a partially obstructing adenocarcinoma of the transverse colon in August 2023 following episode of PR (per rectal) bleeding. The patient's high BMI makes her a significant anaesthetic risk, requiring preoperative weight loss through a low-carbohydrate, high-protein (LCHP) diet. She achieved a remarkable weight loss before undergoing a successful robotic-assisted right hemicolectomy in February 2024. A repeat CT scan performed prior to surgery showed no evidence of metastatic disease despite the delayed treatment. This case emphasises the importance of tailored, multidisciplinary care in managing colorectal cancer in obese patients with comorbidities and highlights the role of dietary interventions in weight management and cancer care.

Keywords— Colorectal cancer, Low-Carbohydrate High-Protein (LCHP) Diet, Peri-operative Weight Loss, Obesity.

I. INTRODUCTION

Colorectal cancer (CRC) is a leading cause of cancer-related morbidity and mortality worldwide (1, 2). Obesity is a known risk factor for CRC (3) and have significant challenges for treatment, including increased surgical and anaesthetic risks (4). Furthermore, dietary patterns play a crucial role in weight management and cancer prevention (5). This report highlights the case of a morbidly obese patient who successfully underwent delayed surgical treatment for partially obstructed transverse colon adenocarcinoma after significant preoperative weight loss through a structured dietary intervention.

II. CASE PRESENTATION

A 64-year-old female presented in August 2023 with melaena, anaemia and intermittent constipation. She denied significant changes in bowel habits or weight loss. Her medical history included atrial fibrillation, hypertension, hypothyroidism and chronic back pain. She is on regular rivaroxaban, levothyroxine, pregabalin and amiodarone. She had history of abdominal surgeries or family history of CRC. Clinical examination revealed soft abdomen with discomfort on the right upper quadrant and blood on glove during per rectal examination. Her BMI was 70, classifying her as morbidly obese.

III. INVESTIGATIONS

Initial laboratory results demonstrated:

Hb 56 g/L

eGFR 89 mL/min

CEA 4.6 ug/L

Glucose 5.0 mmol/L

Fe 9 umol/L ,Transferrin 2.3 g/L, Ferritin 397 ug/L

CT imaging revealed thickening of the transverse colon with partial luminal obstruction and proximal bowel dilation, suggestive of malignancy. Colonoscopy confirmed a circumferential adenocarcinoma in the transverse colon. Biopsies showed a high-grade mismatch repair deficient carcinoma, consistent with medullary carcinoma. There was no evidence of metastatic disease on staging scan.

The patient was deemed a high anaesthetic risk due to her obesity and comorbidities. Multidisciplinary planning involved a weight loss physician, colorectal surgeon and anaesthetist. A decision was made to delay surgery to facilitate preoperative weight loss. She was placed on a structured LCHP diet by local surgeon with interest in weight loss management, which has been shown to promote weight loss by reducing caloric intake while preserving lean body mass. A study suggest that such diets may also slow cancer progression by reducing glucose availability, which is essential for tumour growth (6).

The patient achieved significant weight loss of 44 kg over six months, improving her overall fitness for surgery. Repeat imaging in February 2024 confirmed no evidence of metastasis despite the treatment delay. The patient underwent robotic-assisted right hemicolectomy with primary anastomosis. The surgical approach was chosen to minimise the impact of her obesity on operative outcomes. Intraoperatively, a bulky mass in the transverse colon was identified and resected. There was no evidence of peritoneal disease or lymphadenopathy.

Postoperatively patient had an uneventful recovery and was discharged on postoperative day 5. The histopathology examination confirmed a transverse colon medullary carcinoma; mismatch repair protein deficient (pT4N0M0). She was discussed in multidisciplinary team meeting and decision made for active surveillance under surgical team given localised disease.

IV. DISCUSSION

Obesity is a well-established risk factor for CRC and is associated with worse prognosis (3). Excess adiposity contributes to carcinogenesis through mechanisms such as chronic inflammation, insulin resistance, and altered adipokine levels, creating a pro-tumorigenic environment (7, 8). A systematic review published in 2022 highlighted that higher BMI at diagnosis correlates with poorer overall survival and increased cancer-specific mortality, particularly in colorectal cancer (9). Low-carbohydrate, high-protein (LCHP) diets are increasingly recognised for their role in weight management and potential benefits in cancer care. These diets limit glucose availability, which is crucial for tumour growth, and may have a role in slowing cancer progression (6). However, human studies present conflicting results, with some suggesting risks associated with high intake and long-term adherence to such diets (10).

LCHP diets can alter tumour metabolism by reducing glucose availability, theoretically slowing tumour growth since cancer cells often rely on glycolysis (Warburg effect) for energy production, even in oxygen-rich conditions (11). By lowering carbohydrate intake, LCHP diets may reduce insulin and insulin-like growth factor 1 (IGF-1) levels, which are implicated in promoting tumour growth (12). Additionally, increased protein intake can support muscle maintenance, which is particularly beneficial for patients experiencing cancer-related cachexia (13).

Despite potential metabolic benefits, LCHP diets can negatively affect bowel cancer patients due to reduced fibre intake, which is essential for maintaining gut microbiota diversity and bowel function (14). Fibre deficiency may also compromise gut barrier integrity and increase systemic inflammation, potentially worsening outcomes (15). **High intake of animal-based proteins, particularly red and processed meats, is link with increased CRC risk due to the formation of carcinogenic N-nitroso compounds** (16). Furthermore, LCHP diets may lead to nutrient deficiencies, dehydration, and increased cardiovascular risk if not carefully managed (17).

Personalised dietary recommendations are essential for bowel cancer patients thus, LCHP diet is recommended for these patients. Emphasis should be placed on selecting high-quality protein sources such as fish, poultry, legumes, and plant-based proteins to mitigate potential carcinogenic effects associated with red meat (18). Further, incorporating vegetables with low-carbohydrate and high fibre in diet can help maintain good gut health. In this case, the patient's remarkable preoperative weight loss was achieved through a tailored LCHP diet, which improves her surgical outcomes and potentially reducing her cancer progression. Despite 6 months treatment delay, the absence of metastatic disease highlights the importance of personalised dietary and medical strategies in cancer management. This case shows the value of a multidisciplinary approach that integrates dietary counselling, surgical planning, and oncological care for obese cancer patients

V. CONCLUSION

LCHP diets must be approached cautiously in CRC patients due to potential negative impacts on gut health and long-term cancer outcomes although, it look promising in altering cancer metabolism and supporting muscle mass preservation. This case

highlights the interplay between obesity, dietary interventions, and CRC outcomes. The patient's surgical fitness improvement and favourable prognosis were potentially contributed by preoperative weight loss through LCHP diet. Yet, continuous research are needed to better understand the role of diet in cancer prevention and treatment, emphasising the importance of personalised, evidence-based care.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

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