

## Surgical interventions of colon cancer

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### ABSTRACT

Colon cancer is most common type of malignancies all over the world. Various risk factors including genetic mutations, old age, family history, smoking, drinking excessively, poor diet and several others are associated with increasing cases of colorectal carcinoma (CRC). Diagnosis is usually made by colonoscopy and confirmed by tissue biopsy. After diagnosis delay to treatment can worsen the disease progression and long-term outcome. Treatment options for CRC include surgical resection either open or laparoscopic both with their merits and demerits. Laparoscopic resection have been well accepted for treatment and is known to result in less hospitalisation and blood loss while open surgery still has same overall survival rate, morbidity and mortality. Surgical treatment is associated with postoperative complications including port site metastases, surgical site infections (SSIs), Adhesions, intestinal obstruction, venous thromboembolic events, colonic ischemia, these complications can be decreased by preoperative assessment, intraoperative care and postoperative interventions. Controlling nutritional status (COUNT) score is prognostic factor of postoperative complications and mortality of patients with CRC. 5-years survival rate has increased upto 70% due to improved treatment modalities.

**Keywords:** Colon cancer, colorectal cancer, surgical treatment, complications

### INTRODUCTION

Colorectal cancer is third most common amongst all malignancies worldwide. Estimated global cases in 2014 were approximately 1360602<sup>(1)</sup>. With an increasing elderly population, the number of cancer patients is simultaneously rising<sup>(2)</sup>. Despite different treatment strategies 50630 deaths were recorded in the United States in 2018<sup>(3)</sup>. Colon cancer at the left colonic corner, the distal third of colon cancer, or the proximal descending colon within 10cm of the flexure is known as splenic flexure cancer (SFC)<sup>(4)</sup>. It is exceedingly uncommon, accounting

for just 1-8% of all cases of colon cancer.<sup>(4)</sup>

### Risk factors:

Several risk factors other than genetic mutations including old age, male sex, sedentary lifestyle, inflammatory bowel disease, family history or personal history of colorectal cancer are of significant importance in increasing cases of colorectal cancer.<sup>(5)</sup> Aging, smoking, drinking excessively, a poor diet, an elevated BMI, diabetes mellitus, and conditions like helicobacter pylori infection and Lynch syndrome (familial) all have a substantial role

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role in the development of colorectal carcinoma (CRC).<sup>(6)</sup>

### Diagnosis and screening:

Nowadays different recommended screening methods for age of 50 years who are at high risk include colonoscopy (every 10 years), or flexible sigmoidoscopy (every 5 years), or fecal occult blood test (FOBT, every one year), CT colonography (every 5 years), FIT-fecal DNA test (every 3 years)<sup>(7)</sup>. CRC is usually diagnosed by colonoscopy and then confirmed by tissue biopsy and TNM staging system contribute to choice of best therapeutic approach.<sup>(7)</sup> After diagnosis prolonged delays to surgery in cancer patients increases risk of disease progression and worse long term outcomes.<sup>(3)</sup>

### Treatment Modalities:

The most established curative treatment option of colorectal cancer is surgical resection improving quality of life and prognosis<sup>(2)</sup>. Open and laparoscopic resection being possible surgical treatment options are applicable both with their merits and demerits<sup>(8)</sup>. Laparoscopic colon resection has been well accepted for treatment of left and transverse colon cancer while for right colon cancer greater laparoscopic experience required due to complexity of right colon laparoscopic anatomy and variable vascular peduncles<sup>(8)</sup>. However laparoscopic procedures including total laparoscopic right colectomy, single incision laparoscopic surgery for right colon, laparoscopic assisted right colectomy, hand assisted right colectomy with laparoscopic mobilization of colon by hand to right side, have facilitated surgical approaches for right colonic cancer<sup>(8)</sup>. While various extents of resections, from extensive colectomy to segmental resection, with or without neighbouring organ resections, have been recommended a conventional surgical strategy to splenic flexure cancer has not been identified<sup>(4)</sup>. Although laparoscopic procedures are known to result in less hospitalisation and blood loss, open surgery still has the same overall survival rate, morbidity, and mortality<sup>(9)</sup>. Additionally, it is risk-free and practical for elderly patients and those who have had previous abdominal procedures<sup>(9)</sup>. However, older patients' fragility can result in a

poor surgical prognosis<sup>(9)</sup>.

### Surgical complications:

Numerous postoperative issues have been documented, and they have a substantial impact on morbidities, extended hospital stays, and even fatalities<sup>(6)</sup>. Depending on the patient's health, the disease, and the surgeon's surgical prowess, the prevalence of these complications has exhibited variations<sup>(6)</sup>. A typical side effect of minimally invasive colorectal surgery is port site metastases<sup>(9)</sup>. Patients undergoing elective colorectal surgery are prone to highest risk of surgical site infections (SSIs) resulting in prolonged hospital stay, mortality and morbidity<sup>(10)</sup>.

The 2018 WHO recommendations advocate the routine use of mechanical bowel preparation (MBP) and oral antibiotic prophylaxis (OAP) in adult patients undergoing elective colorectal surgery in an effort to reduce the frequency of SSI rates linked to colorectal surgery<sup>(10)</sup>. SSI risk for colorectal surgery increased from 7.7% to 9.9% in 2020-2021 in the United Kingdom alone, according to statistics published by the U.K. Health security agency that reviewed the incidence of SSIs across NHS Hospitals in England<sup>(10)</sup>. But the use of MBP and OAP together in elective colorectal surgery therefore poses a number of issues that needed to be addressed, such as the problem of antimicrobial resistance, the right choice of antibiotics and ideal OAP course duration, and the cost-effectiveness of the MBP and OAP combination<sup>(10)</sup>. Adhesions, which affect nearly 95% of cases and are the main reason for small intestinal obstruction, are the most often reported laparoscopic complication<sup>(6)</sup>.

Male sex, urgent surgery, prolonged recovery, open colorectal surgery, and dysfunctional ileostomy placement are additional risk factors for SBO<sup>(6)</sup>. In about 10% of cases involving colorectal surgery, SBO and peritoneal adhesions develop postoperatively<sup>(6)</sup>. Laparoscopic and open surgery are both related to the emergence of SBO, according to a study<sup>(6)</sup>. A lower survival rate is a hallmark of adhesive SBO recurrence. As

a result, prompt surgical therapy is necessary to prevent its recurrence<sup>(6)</sup>. Following resection, the bowel's anatomy changes, which might interfere with regular digestion and result in symptoms<sup>(11)</sup>. Because of this, many people who survive colon cancer must live with gastrointestinal dysfunction<sup>(11)</sup>. After colon cancer surgery, diarrhoea is most likely a common long-term consequence<sup>(11)</sup>. The targeted treatment of patients who have this problem will be made easier with awareness of it and a precise diagnosis<sup>(11)</sup>.

Nearly 2.5% of patients undergoing colorectal surgery experience venous thromboembolic events (VTE)<sup>(9)</sup>. Some of the often cited risk factors include age, an elevated body mass index, anaemia, surgical infection, sepsis, prolonged ventilation, irritable bowel syndrome, and sepsis<sup>(9)</sup>. Greater risk of venous thromboembolic events is concurrently associated with use of steroids, a history of preoperative infections and weight loss, longer surgical time, and postoperative chemotherapy<sup>(9)</sup>. Ileus is a condition when intestinal peristalsis malfunctions as a result of abdominal surgery and anaesthesia<sup>(9)</sup>. It is a typical side effect after colorectal surgery and may result in pain, nausea/vomiting, and difficulty swallowing<sup>(9)</sup>.

Colonic ischemia (CI), sometimes referred to as ischemic colitis, is a rare but significant side effect following colon surgery<sup>(6)</sup>. The increased prevalence of colonic ischemia (CI) in patients undergoing colorectal cancer surgery is related to advanced age, male gender, and previous cardiovascular diseases<sup>(6)</sup>. The incidence of these problems can be decreased with preoperative assessment, intraoperative care, and postoperative interventions<sup>(6)</sup>.

### **Mortality and Prognosis:**

The mortality rate from colorectal cancer has increased up to 10 times during the past 50 years<sup>(6)</sup>. New research has linked sarcopenia, which is measured by a low skeletal muscle

index (SMI) from computer tomography (CT) scans, to a worse prognosis in a number of cancer types<sup>(12)</sup>. Contemporary systemic reviews and meta-analyses of cancer patients found that sarcopenia patients had a 1.2 fold higher probability of experiencing any problems or significant complications following an oncologic surgery<sup>(12)</sup>. Compared to individuals without sarcopenia, there is a 2-fold increased risk of death within 30 days of surgery as well as a shorter survival time. Skeletal muscle radiodensity, which is inversely linked with intramuscular lipid deposition and hence represents fat<sup>(12)</sup>. It has been suggested that malnutrition and the prognosis of cancer are related<sup>(9)</sup>.

The Geriatric Nutritional Risk Index (GNRI), which is a straightforward screening tool to determine the likelihood of nutrition-related morbidity and death in elderly people, is based on blood albumin levels, current body weight, and optimum body weight<sup>(9)</sup>. Elderly people frequently develop malnutrition and have concomitant conditions like cardiovascular disease and respiratory dysfunction<sup>(9)</sup>. Disease-related malnutrition in senior people is linked to increased morbidity and mortality as well as longer hospital stays because of a decline in their quality of life, performance status, and immune system<sup>(9)</sup>. To evaluate the nutrition-related risk of morbidity and death for senior hospital patients, the Geriatric Nutritional Risk Index (GNRI) has been proposed<sup>(9)</sup>. Patients with moderate-to-severe malnutrition had longer hospital stays (LOS), more adverse events (including medical and surgical problems), more surgical wound infections, more blood transfusions needed, and more packed red blood cells transfused<sup>(13)</sup>. The percentage of patients without nutritional risk fell from 46 to 9% while they were hospitalised, and there was an increase in mild, moderate, and severe risk<sup>(13)</sup>. Controlling nutritional status (CONUT) score is an index that allows for assessment of nutritional condition<sup>(13)</sup>.

CONUT score is calculated from serum albumin, total cholesterol concentration, and peripheral lymphocyte counts <sup>(13)</sup>. CONUT score is a prognostic factor of postoperative complications and mortality in patients with CRC that useful for estimation of preoperative risk <sup>(13)</sup>. Despite all complications, due to improved treatment strategies of colon cancer , 5 years survival rate have mounted upto 70% <sup>(3)</sup>. But for metastatic disease 5 year survival rate is still 13% despite all advances in treatment options <sup>(5)</sup>.

### **Barrier to treatment modalities:**

Although disparities in colon cancer care have been well studied, much of the work has assessed systemic barriers to care <sup>(14)</sup>. Less is known about differences in patterns of refusal of potentially life-prolonging treatment, which may represent important disparities in care <sup>(14)</sup>. Within efforts to preserve patient autonomy in shared decision-making, motives that lead patients with cancer to select or refuse potentially life-prolonging treatment are multifactorial <sup>(14)</sup>. These decisions may be influenced by health literacy and understanding, perceived risk of financial burden of treatment (financial toxicity), and other sociodemographic and cultural factors, which may in turn inform patient-provider discussions and provide avenues through which disparities in care could be addressed and mitigated <sup>(14)</sup>. It is concerning how quickly financial toxicity is rising, especially for young CRC patients <sup>(15)</sup>.

Financial toxicity was found to be connected with reduced insurance satisfaction, higher symptoms of despair and anxiety, and lower coping with patients with cancer among young cancer patients and survivors (age 40) <sup>(15)</sup>. In multivariable modelling, financial toxicity also result in treatment omission or postponement <sup>(15)</sup>. Patient in the lowest income quartile, those who have emergency surgery, those are black or Hispanic, and those who have surgery for oesophageal and colon cancer are at greatest risk for financial toxicity <sup>(15)</sup>.

Clinical problems specific to early-onset colorectal cancer (EO-CRC) patients exist. Low levels of suspicion from primary care providers, financial toxicity for patients who are at the height of their earning ability, sexual and fertility considerations, and long-term survivorship issues all contribute to diagnostic delays <sup>(15)</sup>.

### **Conclusion:**

Colorectal carcinoma is most common amongst all malignancies worldwide and associated with increasing death all over the world. Surgical resection (open and laparoscopic) are well established treatment options for CRC with risk of complications including port site metastases, SSIs, Adhesions, venous thromboembolic events (VTE). Despite all complications, improved treatment options have mounted survival rate of patients. Laproscopic resection is widely accepted and is known to result in less hospitalisation while open surgery has same overall survival rate, morbidity, mortality.

Mojaver et al conducted a randomized controlled study with division of patients in four groups, they used bupivacaine alone 1 Omg, pethidine 1mg/kg, bupivacaine 10mg plus magnesium sulfate 100mg and pethidine 1mg/kg plus magnesium sulfate 100mg respectively. Contrary to our results and results of other studies mentioned above in the discussion they found no significant differences in the hemodynamic profiles of the patients. They also concluded that magnesium sulfate decreased the duration of motor blockage in bupivacaine group but it increased this duration in the pethidine group<sup>[18]</sup>.

**Limitations:** Focused support for EO-CRC patients is required throughout their treatment and survivorship, as well as education for primary care physicians and oncologists on diagnosis and long-term care for survivors <sup>(15)</sup>.

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