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Safety and Efficacy of Laparoscopic Resections in Stage IV Colorectal Cancer: Ensuring a Smooth Postoperative Course and Optimal Pharmacotherapy Outcomes

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ABSTRACT

In patients with stage IV colorectal cancer, removing the primary tumor may prevent future tumor-related complications, enhance quality of life, and reduce the likelihood of emergency colostomies. Laparoscopic surgery offers a minimally invasive alternative that can potentially lower perioperative risks in this high-risk patient group. This study evaluates short-term surgical outcomes in 17 patients with stage IV colorectal cancer who had unresectable liver metastases and/or pulmonary or peritoneal metastases. Delays in chemotherapy due to postoperative complications remain a significant concern affecting survival. A retrospective review was conducted on 17 patients who underwent laparoscopic palliative colorectal surgery. Data were collected on perioperative complications, hospital stay duration, intraoperative blood loss, transfusion needs, operative time, and type of procedure performed.

Laparoscopic surgery included 10 sigmoid resections, five left colectomies, and two right colectomies. Fourteen patients also underwent liver biopsies during the same procedure. No deaths or perioperative complications were reported, yielding a 0% mortality and morbidity rate. The median hospital stay was 5.3 days, the median blood loss was 47.9 mL, and a total of three units of blood were transfused (median 0.17 units per patient). The median operative time was 130.2 minutes. Laparoscopic palliative resection in stage IV colorectal cancer is associated with excellent early outcomes, minimal surgical trauma, and rapid recovery, allowing timely initiation of postoperative chemotherapy.

Keywords: Stage IV, Colorectal cancer, Palliative, Laparoscopic resection

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Introduction

Colorectal cancer ranks among the top causes of cancer-related deaths worldwide [1]. Despite advances in detection, approximately one in five patients is still diagnosed at stage IV, primarily due to late recognition and inadequate preventive measures. In this population, nearly 80% present with metastases that cannot be surgically removed [2]. Palliative strategies are therefore essential, aiming not only to extend survival but also to maintain quality of life [3]. Advances in precision medicine, including biologic and targeted therapies informed by genetic profiles, are increasingly being used to improve survival outcomes [4]. Early implementation of palliative care has become a recommended approach in advanced cancers [5], often involving a combination of treatments [6].

For patients with symptomatic primary tumors, surgical resection following oncologic principles is advised when feasible, even though chemotherapy may alleviate some symptoms [7, 8]. Evidence indicates that laparoscopic surgery is particularly suitable in these cases, offering faster recovery, reduced hospital stays, lower complication rates, and earlier initiation of systemic chemotherapy compared to conventional open procedures [9].

The optimal management of asymptomatic primary tumors in stage IV disease remains controversial. Some authors recommend initial systemic chemotherapy without surgical intervention [10, 11], although a subset of patients may develop symptoms during therapy and require urgent surgery. Open surgery in such cases is

associated with high perioperative risk [12], whereas palliative resection has been linked to longer median survival [13]. Since its introduction in 1991, laparoscopic colorectal surgery has accumulated evidence demonstrating improved perioperative outcomes and comparable oncological results relative to open surgery [14–19]. These advantages are particularly relevant for patients with stage IV disease and unresectable metastases.

Materials and Methods

This study retrospectively examined 17 patients with stage IV colorectal cancer and unresectable metastases. Sixteen patients had multiple liver metastases, four had pulmonary metastases, and two had peritoneal involvement. The current analysis is part of a broader 11-year retrospective study comparing laparoscopic and open colorectal resections, encompassing 285 cases, with laparoscopic procedures performed 1.8 times more frequently than open operations.

Eligibility criteria included mild to moderate symptoms or absence of symptoms from the primary tumor. Patients with acute bowel obstruction, perforation, peritonitis, abscesses, fistulas, or acute bleeding were excluded. Patient demographic and clinical characteristics are summarized in **Table 1**.

Table 1. Patient demographic data.

Parameter	Result	Range
Age (yrs, mean and range)	64.7	(39–81)
Sex (male/female)	9/8	
BMI index (mean and range)	25.68	(18.07–38.64)
Procedure	-5570,76	
Right colectomy	2	
Left colectomy	5	
Sigmoid and High rectal resection	9	
Low anterior rectal resection	1	
ASA	-626,504	
ASA I	2	
ASA II	4	
ASA III	9	
ASA IV	2	
Incurable metastases	-5683,43	
Liver	16	
Lung	4	
Peritoneum	2	
Macroscopic local tumor status cT		
cT3	13	
cT4	4	
Nodal stage pN		
Positive	14	
Negative	3	

Patients with mid- and low-rectal cancers were excluded from this study due to their elevated risk of perioperative complications. Surgical management of these tumors often requires the creation of a temporary or permanent ileostomy or colostomy, which can negatively affect postoperative quality of life.

The median age of the study cohort was 64.7 years, with an equal distribution between male and female patients. Tumors located on the left side of the colon and in the upper rectum were the most common. Eleven patients had significant comorbid conditions classified as ASA III or IV, and histopathology revealed lymph node involvement in 14 cases.

All procedures were performed using conventional multiport laparoscopy, adhering to oncologic principles, including primary tumor resection with regional lymphadenectomy. Perioperative parameters evaluated included

age, sex, comorbidities according to the American Society of Anesthesiologists (ASA) classification, presenting symptoms, preoperative hemoglobin levels, type of surgery, operative duration, intraoperative blood loss, transfusion requirements, local T stage, and perioperative complications.

Results and Discussion

Preoperative evaluation consisted of lower endoscopy with biopsy and contrast-enhanced CT scans. Standard preoperative preparation involved mechanical bowel cleansing combined with intravenous antibiotics and carbohydrate and protein loading. Cardiology consultation was mandatory for all patients, while additional specialist consultations were obtained as indicated for patients with ASA grade III or higher.

Patients were included in the Enhanced Recovery After Surgery (ERAS) program, emphasizing early mobilization, initiation of oral intake, and multimodal pain management. All laparoscopic procedures employed conventional multiport techniques. Pneumoperitoneum was established via a Veress needle at either the supraumbilical or left subcostal (Palmer's) point, with intraperitoneal CO_2 pressure maintained at 12–14 mmHg.

For left and right colectomies, a medial-to-lateral dissection approach was utilized with regional D2 lymphadenectomy, whereas tumors of the transverse colon and left colic flexure were managed with a lateral approach, beginning with transection of the gastrocolic ligament and mobilization of the left colic flexure.

During the laparoscopic resections, 15 patients also underwent liver biopsies, which could usually be performed without additional trocar placement in the setting of multiple liver metastases. Intraoperative findings included tumor adherence to the parietal peritoneum (cT4a) in four patients, with local excision of the involved site, and peritoneal metastases in two patients, confirmed via excisional biopsy.

Demographic and clinical characteristics of the study population are summarized in **Table 1**, which includes age, sex, median BMI, type of surgical procedure, ASA grade, presence of distant metastases, local tumor stage, and nodal involvement.

Postoperative recovery followed ERAS principles, including avoidance of nasogastric tubes, immediate mobilization, early feeding, and multimodal analgesia without routine opioid use. Perioperative outcomes are presented in **Table 2**.

Table 2. Perioperative Outcomes

Parameter	Result	Range
Duration of surgery (mean)	130.2 min	70–255 min
Intraoperative blood loss (mean)	47.9 mL	10–200 mL
Blood transfusions (mean per patient)	0.17 units	Total 3 units
ICU admission	0	–
Conversion to open surgery	0	–
Time to first flatus	2.41 days	1–3 days
Time to first bowel movement	2.94 days	2–4 days
Length of hospital stay (mean)	5.35 days	5–7 days
Perioperative mortality	0	–
Perioperative morbidity	0	–
Anastomotic leak	0	–
Intra-abdominal abscess	0	–
Surgical site infection	0	–
Postoperative ileus	0	–
Other complications	0	–
Postoperative day 1 leukocyte count (mean)	11.1	7.2- 16.2

Perioperative data are summarized in **Table 2**, including median operative duration, intraoperative blood loss, transfusion requirements, ICU stay, conversion rate, time to first flatus and bowel movement, hospital stay, mortality, complications, and first-day postoperative leukocyte counts.

No access-related or pneumoperitoneum-associated complications were observed. All laparoscopic procedures were successfully completed without conversion to open surgery. Liver biopsies performed during the procedures were uneventful, with no bleeding or bile leakage reported. Gastrointestinal function resumed rapidly, with median times to first flatus and defecation of 2.41 and 2.94 days, respectively. Primary anastomosis was achieved in all cases, and no anastomotic leaks, intra-abdominal abscesses, or postoperative ileus were recorded. Only three patients required blood transfusions due to tumor-related anemia. The median hospital stay was 5.35 days, with 76.4% of patients discharged on postoperative day 5.

Despite improvements in colorectal cancer screening, approximately 20% of patients present with metastatic disease at diagnosis [1]. Five-year overall survival remains low in developed countries, ranging from 13% to 18.8% [20, 21]. For these patients, the primary goals are symptom control, quality of life improvement, and extension of survival. Systemic chemotherapy has been shown to enhance overall survival [22, 23], and modern multidrug regimens—including targeted and biologic agents—further improve outcomes in patients with unresectable metastatic disease [4, 24].

Resection of symptomatic primary tumors remains a recommended strategy when clinically feasible [7], due to the risk of tumor-related complications. The role of palliative resection for asymptomatic tumors within multimodal therapy continues to be debated. Evidence suggests that removal of the primary tumor can improve long-term survival; for instance, Leone *et al*. reported a 14-month survival advantage in patients undergoing primary tumor resection compared to those receiving chemotherapy alone [25]. Similarly, Rijken *et al*. demonstrated significant survival benefits for patients with peritoneal metastases who underwent primary tumor resection versus chemotherapy alone [26]. Primary tumor resection may also enhance the efficacy of subsequent polychemotherapy in patients with unresectable metastases [27].

Perioperative complications are strongly associated with reduced overall survival in patients undergoing primary tumor resection for incurable stage IV colorectal cancer [28]. Emergency surgery carries particularly high morbidity and mortality; Smothers *et al*. reported rates of 64% and 35%, respectively, in emergency resections compared to substantially lower rates in elective procedures [29]. Furthermore, some initially asymptomatic primary tumors may become symptomatic during chemotherapy, necessitating urgent surgical intervention.

Laparoscopic surgery has consistently demonstrated superior perioperative outcomes compared to open procedures for stage I–III colorectal cancer, including faster return of bowel function, earlier oral intake, quicker mobilization, and shorter hospitalization [27, 30, 31]. Our study supports these findings in stage IV disease: despite advanced cancer, perioperative morbidity and mortality were 0%, and no conversions occurred. In larger series, laparoscopic colorectal resections typically show a complication rate around 21% and a conversion rate up to 29% [14, 27, 30, 31]. Even with the limited sample size in this retrospective analysis, our outcomes are encouraging. The minimal surgical trauma and early postoperative recovery observed with laparoscopic surgery facilitate the timely initiation of polychemotherapy.

Conclusion

Laparoscopic resection of the primary tumor in patients with unresectable stage IV colorectal cancer is both safe and effective. The approach offers rapid recovery, short hospital stay, low perioperative complication rates, and avoids conversion to open surgery, supporting its use as a standard palliative treatment option.

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