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Original Article

A Comparative Study of Obstructed Colon Tumor Resection with and Without Prophylactic Diversion

Mohamed fathalla eljali*, Yamen Mohamed Bobaker
Department of General Surgery,Tobruk Medical Center
corresponding auther Mohamed fathalla eljali: Email: **m.eljali8989@gmail.com**.

Abstract

Background: Cancer is a severe non-infectious disease that significantly affects quality of life. Technological advancements and daily exposure to toxins contribute to its rise by disrupting cellular mechanisms and causing genetic damage.
Aim: To compare a one-stage operation versus a two-stage operation in the therapy of blocked non-perforated colon cancer conducted on 24 patients divided equally into one-stage and two-stage groups. **Methods:** This prospective randomized research has been performed at Tobruk Medical Center over the past four years, including 24 patients diagnosed with obstructed nonperforated colon cancer. Participants were randomly separated into two groups: 12 cases underwent a one-stage procedure, while the remaining 12 underwent a two-stage approach. **Results:** A statistically insignificant variance has been observed among the studied groups in terms of duration of obstruction, previous abdominal surgeries, weight loss, preoperative blood transfusion, surgeon experience, liver condition, locally advanced disease, blood loss, operative time, intraoperative blood transfusion, mass size, anastomotic configuration, anastomotic technique, postoperative pathology, intraoperative complications, lymph vascular (LV) invasion, free safety margin, white blood cells (WBCs), Ryle amount per day, postoperative ileus, wound infection, fever, leakage, electrolyte imbalance, and mortality($P > 0.05$). However, significant differences were observed in Ryle removal time, oral intake initiation, hospital stay, and stoma complications. ($P < 0.05$)
Conclusion: This study found no significant differences in postoperative complications, except for higher stoma complications in one group, possibly due to surgical technique.
Key words: Cancer Colon; Stages; Obstructed; Mortality.

Introduction

Cancer is one of the most dreadful non-infectious illnesses that can significantly impair an individual's quality of life. The quick infusion of technological advances has led to a rise in life-threatening genetic disorders such as cancer. Daily exposure to harmful toxicants may alter the cellular system's standard processes and ultimately result in genetic damage [1,2].

Colorectal cancer (CRC), characterized as cancer of the rectum or colon, has been observed as an increasing problem in developed nations for more than forty years, being among the most prevalent neoplastic locations [3,4]. CRC ranks as the 3rd most prevalent cancer globally, with surgical intervention serving as the primary therapeutic approach to obtain a cure [5,6].

A poor diet lacking in vegetables and fruits, together with lifestyle variables like alcohol and smoking consumption, can elevate the probability of developing cancer. Cancer cells can quickly
transfer to other tissues via metastasis. Early recognition and management can only extend overall survival rates or assist with treatment rather than provide a complete cure [1,7].

Obstructive colorectal cancer (OCRC) is reported to occur in seven to sixteen percent of CRC cases and is the primary cause for emergent operation in colorectal cancer cases [8]. Perforation transpires at the tumor location in around seventy percent of cases and proximal to the tumor site in approximately thirty percent of cases. When perforation occurs at the tumor site, peritoneal contamination is typically localized; conversely, when perforation is proximal to the tumor location, fecal propagation leads to diffuse peritonitis and septic shock [9].

The current study aimed to compare a one-stage operation versus a two-stage operation in the therapy of blocked non-perforated colon cancer, conducted on 24 patients divided equally into one-stage and two-stage groups.

Patients and methods

Study Design : This is a prospective randomized comparative study conducted to evaluate one-stage versus two-stage surgical management in obstructed non-perforated colon cancer.

Setting : The study was conducted at Tobruk Medical Center.

Study Period : The study was carried out over a period of four years.

Patient: A total of 24 patients (n = 24) diagnosed with obstructed non-perforated colon cancer were included. Patients were randomly allocated into: one-stage group (n = 12), two-stage group (n = 12)

Sample size

The sample size was calculated using G* power software version and based on previous study done by [10]. So, with test family (Exact), statistical test (Inequality, two independent groups (Fisher's Exact test), type of power analysis (inequality: two independent groups), input

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parameters (Postoperative pathology signet ring) were (8%) in one stage and (4%) in two stage, α error= 0.05, power (1- β) = 0.80 and Allocation ratio N2/N1=1 resulting output parameter was total sample size of 24 each group 12.

Inclusion Criteria: Cases diagnosed with blocked non-perforated colon cancer, categorized as ASA (American Society of Anesthesiologists) Class I or II, with no proof of organ failure.

Exclusion Criteria: Presence of perforation in colon with peritonitis, American Society of Anesthesiologists classification > II, patients requiring colostomy or palliative ileostomy for nonresectable tumors, disseminated illness, critical disease, or septic shock, and patients with colonic stents, rectal cancer, pregnancy, or metastatic tumors.

Handling of suspected cases: Only confirmed cases of obstructed non-perforated colon cancer were included in the statistical analysis. Suspected or unconfirmed cases were excluded.

Preoperative Assessment: All patients underwent a thorough medical history evaluation, physical assessment, laboratory tests, and radiological imaging to confirm the evaluation and diagnosis of the tumor's extent. Prior to surgery, patients received conservative management for 24 hours, including nasogastric decompression, intravenous fluids, urinary catheterization, and antibiotic administration.

Surgical Procedure:

All operations have been carried out by the same surgical team following standard protocols. A lower midline incision was used for abdominal exploration, and tumor resection was conducted with meticulous surgical techniques to ensure clear proximal and distal margins. Intestinal content evacuation was performed to reduce distension and anastomotic tension. The preferred anastomotic technique was a hand-sewn single-layer interrupted suture method, though some cases involved double-layer or stapled anastomosis. In the two-stage group, a protective loop ileostomy has been created approximately twenty-five to thirty centimeters proximal to the ileocec11al valve.

Postoperative Care: Cases have been monitored in the ICU throughout the immediate postoperative interval before being transferred to the internal ward. Vital signs, complete blood counts, and serum electrolytes were closely monitored. Oral intake was permitted after confirmation of bowel function, and in the two-stage group, stoma output was assessed before resuming oral feeding.

Follow-up and Outcome Assessment: Patients were scheduled for monitoring visits for two weeks, one month, three months, six months, and twelve months post-surgery. Clinical assessments were conducted in all cases, with laboratory and imaging studies performed as needed. In the two-stage group, a distal loop gram using a gastro graphic enema was performed before ileostomy closure.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board of Tobruk Medical Center. Written informed consent was obtained from all participants prior to inclusion in the study

Statistical Analysis

Data has been evaluated utilizing SPSS version 22. Qualitative variables have been reported as frequencies and percentages, whilst quantitative data has been expressed as mean ± standard deviation. The Fisher's exact test, chi-square test, independent t-test, and Mann-Whitney U test have been utilized when applicable. Statistical significance was set at a p-value below 0.05.

Results

Table (1): Distribution of preoperative in both examined groups.

	One stage n =12	**Two stages n =12**	**Test**	**P-value**
Duration of Obstruction	1.5 (1–3)	1.5 (1–4)	z = 0.82	0.41
Previous abdominal surgeries				
Upper Abdomen	1 (8.3%)	1 (8.3%)	x^2=0.147	0.92
Lower Abdomen	3 (25%)	4 (33.3%)		
Both	1 (8.3%)	2 (16.7%)		
Weight Loss	4 (33.3%)	5 (44.7 %)	x^2 = 0.178	0.67
Preoperative Blood Transfusion	2 (16.7%)	2 (16.7%)	x^2= 0	1
Surgeon experience				
A	2 (16.7%)	4 (33.3%)		

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B	2 (16.7%)	3 (25%)	x^2= 2.152	0.5
C	5 (41.7%)	2 (16.7%)		
D	3 (25%)	3 (25%)		
Liver Condition				
Normal	10 (83.3%)	10 (83.3%)	x^2= 2	0.5
Cirrhotic	1 (8.3%)	0 (0%)		
Fatty	1 (8.3%)	1 (8.3%)		
Fibrotic	0 (0%)	1 (8.3%)		
Locally Advanced Disease	2 (16.7%)	2 (16.7%)	x^2=0	1

P value >0.05: Not significant, P value <0.05 is statistically significant, p<0.001 is highly significant.
Table 1 illustrates that a statistically insignificant variance has been observed among the examined groups according to duration of obstruction, previous abdominal surgeries, weight loss, preoperative blood transfusion, surgeon experience, liver condition, and locally advanced disease.

Table 2: Distribution of data during surgery in both examined groups.

	One stage N=12	Two stages N=12	Test	P-value
Operative time (minutes)	162.4 ±16.3	173.2 ±18.3	T=1.5266	0.14
Blood loss (ml)	152 (80-600)	153 (105-500)	Z=-0.321	0.73
Mass size (cm3)	8 (4-12)	7 (4-15)	Z=-0.790	0.51
Intraoperative blood transfusion	2 (16.7%)	1 (8.3%)	X^2=0.381	0.53
Anastomotic technique				
Stapler	12(100%)	12 (100%)	X^2=0	1
Anastomotic configuration				
End to end	11 (91.7%)	10 (83.3%)	X^2=0.381	0.53
Side to end	1 (8.3%)	2 (16.7%)		
Intraoperative complications				
Bladder injury	1 (8.3%)	0 (0%)	X^2=1.043	0.3

Table 2 illustrates that a statistically insignificant variance has been observed among examined groups according to blood loss, intraoperative complications, intraoperative blood transfusion, mass size, anastomotic configuration, anastomotic technique, and time of operation.

Table (3): Distribution of data following surgery in both examined groups.

	One stage n =12	**Two stages n =12**	**Test**	**P-value**
Postoperative pathology				
Adenocarcinoma	10 (83.3%)	9 (75%)	X^2=0.386	0.82
Mucinous	1 (8.3%)	2 (16.7%)		
Signet ring	1 (8.3%)	1 (8.3%)		
LV invasion	1 (8.3%)	1 (8.3%)	X^2=0	1
Free safety margin	12 (100%)	12 (100%)	X^2=0	1

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WBCs (103/ml)	15 (7.1-34.2)	15.9 (8.9-22.5)	Z=-1.632	0.25
Ryle amount/day (ml)	405 (55-1260)	345 (35-1055)	Z=-1.356	0.32
Day or Ryle removal	6 (5-7)	3 (3-4)	Z=-6.256	**≤0.001**
Day or oral intake	4.83 ±0.71	2.92 ±0.69	T=6.6829	**≤0.001**
Hospital stays (Days)	5.63 ±0.79	3.23 ±0.72	T=7.7781	**≤0.001**

Table 3 illustrations that, A statistically insignificant variance has been observed among examined groups regarding postoperative pathology, Lv invasion, free safety margin, WBCs, and Ryle amount day, while a statistically significant variance has been observed among examined groups regarding Day or Ryle removal, Day or oral intake, and Hospital stays

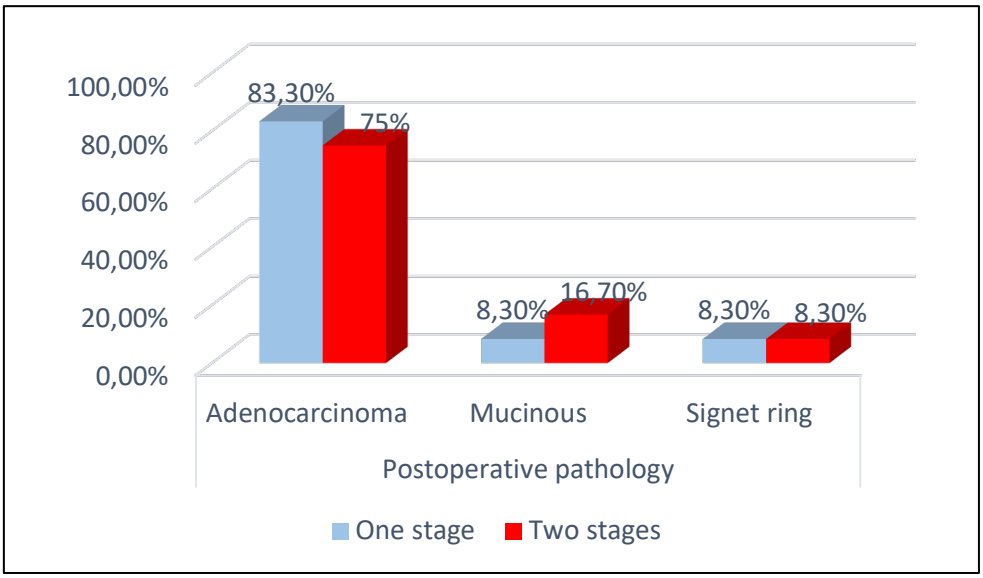

Figure 1: Distribution of postoperative data in both examined groups.

Table 4: Distribution of complications following surgery in both examined groups.

	One stage n =12	**Two stages n =12**	**Test**	**P-value**
Postoperative ileus	1 (8.3%)	1 (8.3%)	0	1
Wound infection	2 (16.6%)	3 (25%)	0.253	0.61
Fever	3 (25%)	2 (16.6%)	0.253	0.61
Leakage	0 (0%)	0 (0%)	0	1
Electrolyte imbalance	0 (0%)	1 (8.3%)	1.043	0.30
Mortality	1 (8.3%)	0 (0%)	1.043	0.30
Stomal complications				
No complications	12 (100%)	7 (58.3%)		

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Retraction	0 (0%)	0 (0%)	6.316	**0.04***
Skin erosions	0 (0%)	5 (41.7%)		

Table 4 illustrates that a statistically insignificant difference has been observed among the examined groups regarding postoperative ileus, wound infection, fever, leakage, electrolyte imbalance, and Mortality while a statistically significant difference has been observed among the examined groups regarding stomal complications.

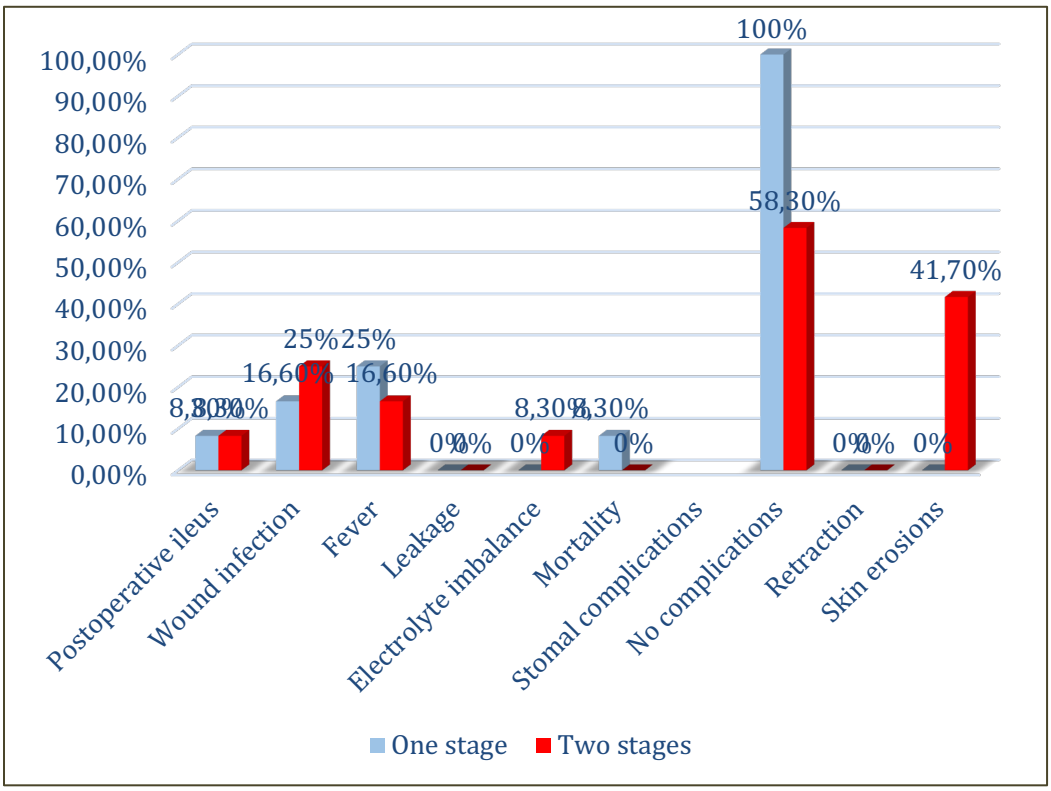

Figure (2): Distribution of Postoperative complications in the two studied groups.

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Discussion

The present research demonstrates that a statistically insignificant difference has been observed among the one-stage and two-stage groups regarding duration of obstruction, previous abdominal surgeries, weight loss, preoperative blood transfusion, surgeon experience, liver condition, and locally advanced disease.

Similarly, the current study aligned with[10] ,who aimed to assess the efficacy of a one-stage operation compared to a two-stage operation in patients with blocked non-perforated colon cancer, according to operating duration, length of hospitalization, complications following surgery, death during surgery, and quality of life. They stated a statistically insignificant variance has been observed among the examined groups regarding duration of obstruction, previous abdominal surgeries, weight loss as it was reported in one-stage and two-stage groups, respectively, preoperative blood transfusion as it was needed in both groups, surgeon experience, liver condition, and locally advanced disease, as locally advanced tumors were detected in both groups.

Regarding the study conducted by [11], who performed a prospective analysis of the technical difficulties they encountered throughout laparoscopic colorectal cancer operations. They revealed that preoperative blood transfusion was required in some cases, and a percentage of patients experienced technical difficulties during the procedure.The results indicated statistically insignificant variations among the one-stage and two-stage groups concerning blood loss, operation duration, intraoperative blood transfusion, mass size, anastomotic configuration, anastomotic technique, and intraoperative complications.

In accordance with [10]**.** Who carried out a prospective randomized investigation involving fifty cases of diagnosed obstructed no perforated colon cancer, participants were randomly assigned to two groups: the first group comprised cases that had a one-stage approach, while the second group had a two-stage approach. They stated that while the two-stage method required a lengthier operating duration than the one-stage method, the distinction was statistically insignificant. Insignificant distinction has been observed among both groups for mass size, loss of blood during surgery, anastomotic method, transfusion of blood, anastomotic configuration, or intraoperative complications, which occurred in only one case in the one-stage group.

The present results demonstrated that a statistically insignificant variance has been observed among one-stage and two-stage groups regarding pathology following operation, LV invasion, free safety margin, WBCs, and Ryle amount day, while there was a statistically significant difference between studied groups regarding day or Ryle removal, day or oral intake, and hospital stays. As well, [10]. concluded that the one-stage procedure did not significantly increase perioperative morbidity or mortality rates compared to the staged approach in obstructed colon cancer patients. They found a statistically insignificant distinction has been observed among the examined groups regarding postoperative pathology, LV invasion, free safety margin, WBC count, and Ryle amount per day. However, a statistically significant variation has been detected in the duration of Ryle removal, the timing of oral intake, and hospital stay, with the single-stage group showing a longer hospital stay compared to the two-stage group.

Laparoscopic resection has become known as the most common therapy for colorectal cancers. Laparoscopic operation demonstrates advantages over open operations, including diminished pain following the operation, shorter recovery duration, and reduced hospitalization. [11].

The present research demonstrated that an insignificant variance has been observed among the one-stage and two-stage groups regarding postoperative ileus, wound infection, fever, leakage, electrolyte imbalance, and Mortality while a significant variance has been observed among the examined groups regarding stoma complications.

Similarly, the present findings agreed with [10]**,** an insignificant distinction has been observed among the examined groups according to postoperative ileus, wound infection, fever, leakage, electrolyte imbalance, or mortality, which occurred in only one case in the single stage group. However, a significant variance was observed between the groups regarding stoma complications.

In contrast, [12], who aimed to assess the surgical outcomes of one-stage vs. multiple stage operation in cases with left colorectal crises. They reported a significant difference between the one-stage and multiple-stage groups regarding wound infection, prolonged ileus, and anastomotic leakage. However, their study did not statistically analyze each complication separately, which may explain the difference between their findings and the current study.

Conclusion

The present research demonstrated that statistically insignificant distinctions have been observed among the examined groups in terms of postoperative ileus, wound infection, fever, leakage, electrolyte imbalance, and mortality. However, a significant difference was observed regarding stoma complications, with the incidence of these complications being notably higher in one of the groups. These results suggest that while the overall postoperative recovery and complications were similar between the two

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approaches, stoma complications were a notable exception, indicating that this factor may be influenced by the surgical technique.

Conflict of interest:

The authors declare that there is no conflict of interest regarding the publication of this paper.

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