

Primary Anastomosis After Left Colectomy in Emergency Cases: Clinical Trial.

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ABSTRACT

Background: Colorectal cancer ranks as the third most prevalent cancer globally and the second leading cause of cancer-related deaths. Obstruction, a common complication in advanced cases, often necessitates emergency surgical intervention. Traditional multi-stage procedures such as Hartmann's operation are widely used but carry significant morbidity and impact on quality of life.

Objective: to assess the results of primary anastomosis after left colectomy for obstructing mass in emergency cases regarding early post operative complications like surgical site infection, ileus, incidence of leakage, restoration of bowel movement, hospital stay and rate of readmission within one month from the time of intervention.

Patients and Methods: This one-arm clinical trial was conducted at Ain Shams University Hospitals over 12 months, involving 37 patients with obstructing left colon masses. All underwent left colectomy with primary hand-sewn anastomosis. Patients were carefully selected based on intraoperative findings (good vascularity, absence of sepsis or perforation). Data were collected on postoperative recovery, complications, and hospital stay.

Results: Anastomotic leakage occurred in 3 patients (8.1%), surgical site infections in 7 patients (18.9%), ileus in 5 patients (13.5%), and readmissions in 3 patients (8.1%). Bowel movement was restored in 86.5% of patients within three days. Mean hospital stay was 7.2 ± 1.2 days. No perioperative mortality was recorded.

Conclusion: Primary anastomosis after emergency left colectomy is a safe and viable option in selected patients. When performed by experienced surgeons and guided by strict intraoperative criteria, it offers favorable short-term outcomes and avoids the need for stoma formation.

KEYWORDS: Acute abdomen; Colectomy; Colon carcinoma; Emergency surgery; Left-sided large bowel obstruction; Primary anastomosis.

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INTRODUCTION

Colon cancer is prevalent, with rising incidence in young patients and left-sided obstructing colon being the commonest form [1-2]. It ranks as the third common carcinoma, following lung and breast or prostate carcinomas, and is the second leading cause of cancer-related deaths after lung carcinoma in the United States and Western Europe. It causes more than 50,000 deaths annually in the United States [3-5]. In 20% to 30 % of patients, primarily the old patients, obstruction and ileus may be the initial clinical manifestations of advanced carcinoma (stage II, III, or even IV) [4,6-7]. Obstruction is the most common reason for emergency department visits among patients with colorectal carcinoma, accounting for 75%-80% of such presentations[8].

Various guidelines have outlined strategies for the emergency management of left-sided obstruction in colorectal cancer patients. However, the optimal approach regarding short-term surgical or interventional outcomes and long-term oncological results remains uncertain. Early decompression is essential to prevent further bowel distention, ischemia, and perforation, which can lead to fecal peritonitis and septic shock. [9,10,11] The management of obstructing left-sided colon mass traditionally involves multiple-staged operative intervention to reduce the risk of leakage due to lack of bowel preparation [12,13]. Recently, a single-stage resection of the diseased part of colon with primary anastomosis, with or without intraoperative colon preparation, has become more common. In selected patients, tumor resection with primary anastomosis can yield accepted results when using intraoperative colon preparation [14]. The two-stage operation is complex and may affect the patient quality of life, diverting stoma is another operative management for damage control in acute left colon emergency [12,13]. The formation of a diverting stoma is followed by the second-stage operation of primary tumor resection with or without colostomy closure. Stoma closure can take place at a third stage [12].

Various techniques are available for performing colonic and rectal anastomosis, including handsewn, stapled, and compression methods. Among these, handsewn and stapled techniques are the most used, though concerns exist regarding the potential for foreign materials to damage intestinal tissue and induce an inflammatory response. While handsewn anastomosis is a traditional approach, stapled anastomosis has gained popularity due to its ease of implementation. In contrast, compression anastomosis utilizes devices such as clips and rings to achieve a sutureless, end-to-end connection. [15]. The aim of this study is to know the outcome of primary anastomosis after left colectomy in emergency cases regarding early post operative complication like surgical site infection, ileus, incidence of leakage, restoration of bowel movement and hospital stay and rate of readmission within one month from the time of intervention.

PATIENTS AND METHODS

Study Design

This was a single-arm clinical trial conducted in accordance with SPIRIT (Standard Protocol Items: Recommendations for Interventional Trials) guidelines. The objective was to evaluate the safety and outcomes of primary anastomosis following emergency left colectomy in patients presenting with obstructing left-sided colonic lesions. The trial was performed at Ain Shams University Hospitals.

Setting and Duration

The study was carried out over a 12-month period. All surgical procedures were performed by the same dedicated surgical team to ensure consistency in technique and minimize procedural variability.

Ethical Considerations and Trial Registration

Prior to initiation, the study received ethical clearance from the Institutional Review Board (IRB) at Ain Shams University (IRB No. 00006373). All procedures were carried out in accordance with ethical standards outlined in the Declaration of Helsinki. Written informed consent was obtained from each participant before enrollment.

The clinical trial was registered at ClinicalTrials.gov under the identifier NCT07026201. Ethical and regulatory approvals were in place prior to patient recruitment and data collection.

This clinical study was carried out on a cohort of 37 patients who presented to the emergency department with obstructive left-sided colonic masses.

Inclusion Criteria

Eligible participants were adults aged 18 to 80 years diagnosed with obstructing left colon lesions who required emergency laparotomy. Intraoperative assessment guided the decision to proceed with left colectomy and primary anastomosis. Criteria for proceeding included: stable general condition, good bowel perfusion, absence of peritoneal contamination or sepsis, lack of significant bowel wall edema or peritoneal thickening, no colonic perforation, and minimal caliber discrepancy of the bowel. All patients provided informed consent prior to inclusion.

Exclusion Criteria

Patients were excluded if they presented in poor general condition, exhibited delayed presentation following obstruction, or had evidence of colonic perforation with diffuse peritonitis, including severe tissue edema, thickened bowel walls, pyogenic membranes, or diminished bowel vascularity due to prolonged distension. Irresectable tumors or refusal to participate also constituted exclusion criteria.

Preoperative Assessment

All patients underwent preoperative optimization, including nasogastric (Ryle) tube insertion, intravenous fluid resuscitation, correction of metabolic or laboratory abnormalities, and urinary catheter placement. Oral intake was withheld.

Laboratory tests included:

Complete blood count (CBC)

International normalized ratio (INR)

Liver and renal function tests

Virology screening

Arterial blood gases (ABG)

Electrolyte panel

C-reactive protein (CRP)

Radiological evaluation involved:

Erect abdominal X-ray (revealing air-fluid levels and distension)

Pelvi-abdominal ultrasound (to assess for dilated loops, obstructing mass, and free fluid)

Contrast-enhanced CT of the abdomen and pelvis (to localize the transition point and evaluate bowel dilation, if contrast was not contraindicated)

Intraoperative Procedure

Following general anesthesia, a midline laparotomy was performed to inspect the bowel and confirm the obstruction site. The bowel was assessed for viability and absence of perforation or ischemia before proceeding with resection.

A standard left hemicolectomy or sigmoidectomy was then performed, involving mobilization of the colon, ligation of the inferior mesenteric vessels at their origin, and identification of the left ureter. The proximal bowel was decompressed through a controlled enterotomy using a sterile containment bag to prevent fecal contamination.

A hand-sewn end-to-end anastomosis was carried out using 3-0 Vicryl in a single-layer continuous fashion. Six stay sutures using the near-far, far-near technique were initially placed for alignment and inversion. Sutures were spaced approximately 7 mm apart and tied loosely due to the large bite size. After completion, the stay sutures were removed.

The anastomosis was tested intraoperatively for leakage. A pelvic drain was placed, peritoneal lavage performed, and hemostasis ensured. The abdominal wall was closed with large-bite PDS loop sutures, and skin was approximated using interrupted polypropylene sutures.

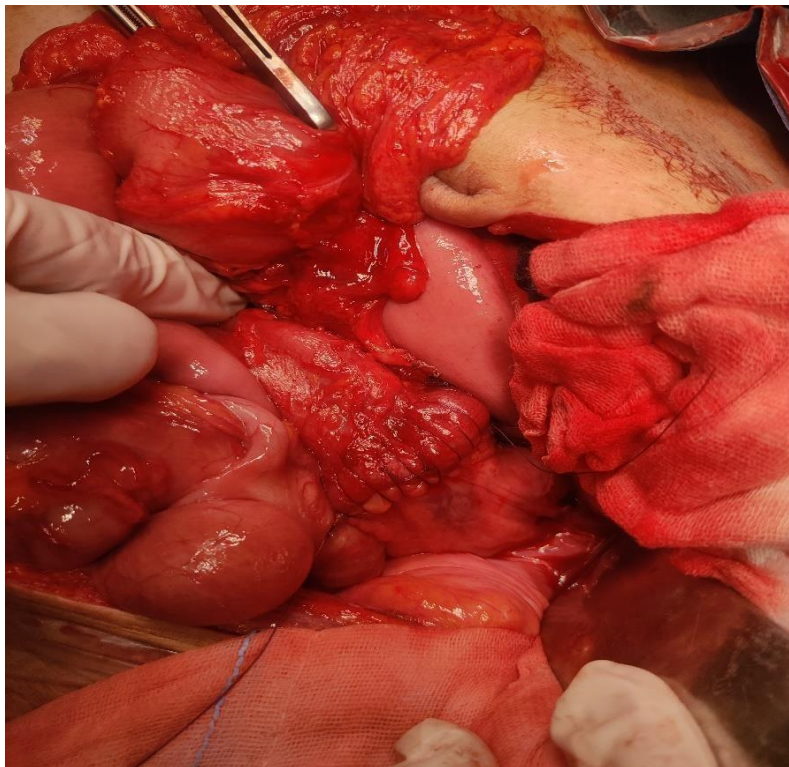


Figure (1) Colorectal anastomosis single layer continuous sutures

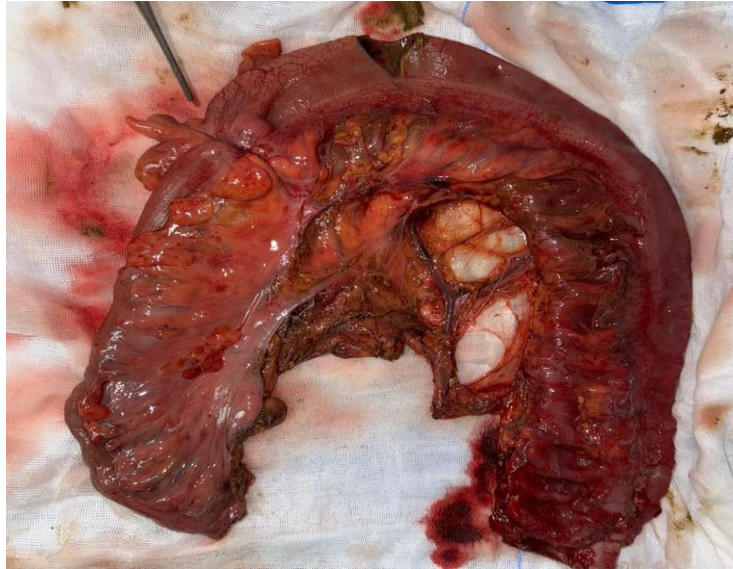


Figure (2) The left colon mass after resection

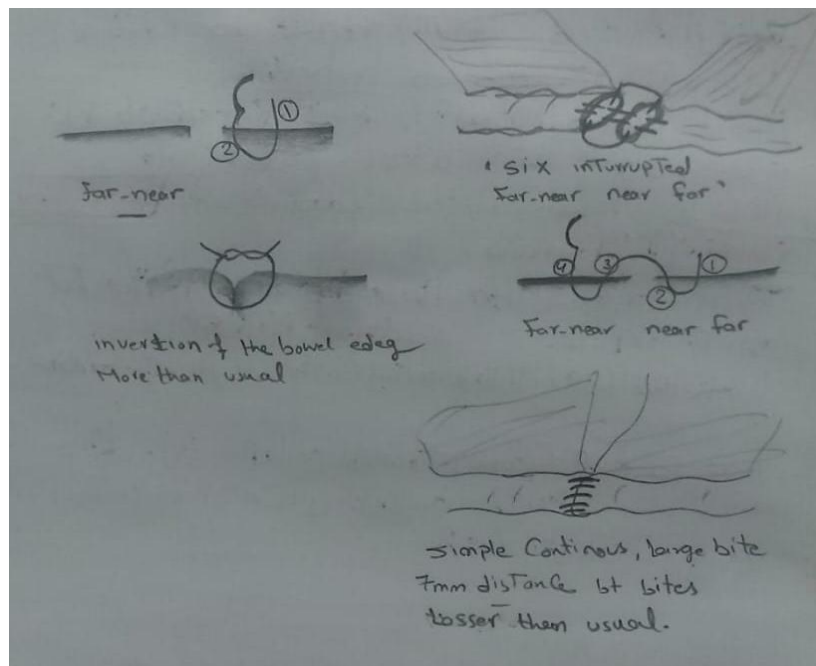


Diagram (1) showing how to take the stitches _

Postoperative Care and Monitoring

Postoperatively, patients were closely monitored to assess overall clinical status and detect any early signs of complications. Routine evaluation included:

Vital Signs and General Assessment: Continuous monitoring of hemodynamic stability and general condition.

Laboratory Investigations: Regular testing included complete blood count (CBC), international normalized ratio (INR), arterial blood gases (ABG), C-reactive protein (CRP), liver and kidney function tests, and serum electrolytes to identify any deviations from baseline.

Gastrointestinal Function: Bowel activity was monitored through assessment of bowel sounds, passage of flatus, presence of vomiting, and output from the Ryle (nasogastric) tube.

Pelvic Drain Monitoring: The color, consistency, and volume of fluid from the pelvic drain were observed daily to detect any evidence of anastomotic leakage or intra-abdominal collection.

Wound Inspection: The surgical incision was examined for signs of surgical site infection, including redness, swelling, warmth, discharge, or dehiscence.

Pain Assessment: Patients were queried regularly about pelvic or abdominal pain that could signal underlying complications, particularly anastomotic failure or abscess formation.

Diet Advancement Protocol

A stepwise dietary regimen was followed:

Day 3 Post-op: Oral fluids were initiated after confirmation of returning bowel function.

Day 4 Post-op: Patients progressed to a soft diet as tolerated.

Day 5 Post-op: Boiled or easily digestible solid food was introduced.

This structured postoperative care aimed to promote recovery, facilitate early detection of complications, and support gradual return to normal gastrointestinal function.

Statistical Analysis:

Data were analyzed using Statistics Package for Social Sciences (SPSS) version 25. Qualitative data were expressed as frequency and percentage. Continuous quantitative data were expressed as mean ± standard deviation (Mean ±SD).

Mean (average): The central value of a discrete set of numbers is the mean, calculated by dividing the sum of all values by the total number of values.

Standard deviation (SD): measures the dispersion of a set of values. A low SD signifies that the values are closely clustered around the mean, whereas a high SD indicates a broader spread across a wider range.

Results:

This table shows, as regard age, The mean age of patients was 51.3 ± 12.8 years (Table 1)

Table (1): description of age in all patients.

		<u>All patients (N = 37)</u>
<u>Age</u>	<u>mean ± SD</u>	<u>51.3 ± 12.8</u>
	<u>Min–Max</u>	<u>– 77</u>

"Comorbidities among the study population included hypertension in 8 patients (21.6%), diabetes mellitus in 12 patients (32.4%), and ischemic heart disease in 2 patients (5.4%). Table 2 presents a detailed summary of these comorbid conditions.

Table (2): description of comorbidities in all patients

<u>Comorbidities</u>		<u>All patients (N= 37)</u>	
<u>HTN</u>	<u>No</u>	<u>29</u>	<u>78.4%</u>
	<u>Yes</u>	<u>8</u>	<u>21.6%</u>
<u>DM</u>	<u>No</u>	<u>25</u>	<u>67.6%</u>
	<u>Yes</u>	<u>12</u>	<u>32.4%</u>
<u>IHD</u>	<u>No</u>	<u>35</u>	<u>94.6%</u>
	<u>Yes</u>	<u>2</u>	<u>5.4%</u>

"Postoperative complications were observed in 7 patients (18.9%), while 30 patients (81.1%) experienced no complications.

Table 3 outlines the overall rate of postoperative complications"

Table (3): Description of Complications in all patients

		<u>All patients</u> (N= 37)	
<u>Complications</u>	<u>No</u>	30	81.1%
	<u>Yes</u>	7	18.9%

"Anastomotic leakage occurred in 3 patients (8.1%) of the study population.

Table 4 provides detailed information on these occurrences."

Table (4): Description of anastomotic leakage in all patients

		<u>All patients</u> (N= 37)	
<u>Anastomotic leakage</u>	<u>No</u>	34	91.9%
	<u>Yes</u>	3	8.1%

"Surgical site infections were observed in 7 patients (18.9%) among the study population. Table 5 presents the incidence of surgical site infections.

Table (5): Description of surgical site infection in all patients

		<u>All patients</u> (N= 37)	
<u>Surgical Site Infection</u>	<u>No</u>	30	81.1%
	<u>Yes</u>	7	18.9%

"Postoperative ileus was reported in 5 patients (13.5%) of the study population. Table 6 presents the detailed description of ileus."

Table (6): Description of ileus in all studied patients

		<u>All Patients</u> (N= 37)	
<u>Ileus</u>	<u>No</u>	32	86.5%
	<u>Yes</u>	5	13.5%

"Readmission was reported in 3 patients (8.1%) of the study population. Table 7 provides a detailed description of readmission events"

Table (7): Description of readmission in all patients

<u>All patients</u> (n= 37)			
<u>Readmission</u>	<u>No</u>	34	91.9%
	<u>Yes</u>	3	8.1%

"The mean duration for restoration of bowel movement was 3.1 ± 1.2 days, with a range of 3 to 7 days among the study population. Table 8 provides detailed data on this duration"

Table (8): Clarification of duration of restoration bowel movement in all patients

<u>All patients</u> (N= 37)		
<u>Duration Of Restoration Bowel Movement</u>	<u>Mean ± SD</u>	3.1 ± 1.2
	<u>Min – max</u>	– 7

"The length of hospital stay ranged from 5 to 14 days among the study population. Table 9 provides detailed information on hospital stay duration"

Table (9): clarification of length of staying at hospital in all patients

<u>All patients</u> (N= 37)		
<u>Length of staying at hospital</u>	<u>Mean ± SD</u>	7.2 ± 1.2
	<u>Min – max</u>	5 – 10

DISCUSSION

According to the World Society of Emergency Surgery guidelines, Single stage resection with primary anastomosis is favored over Hartmann's two-stage procedure for appropriately selected patients and the surgery is performed by experienced surgeons [19, 20].

In our study, 37 patients underwent open resection with primary anastomosis for obstructing left colon masses, with no reported deaths within six months of follow-up. This is consistent with findings by Son et al., who also observed no perioperative mortality among 55 patients undergoing primary anastomosis for obstructing left colon cancer [16]. Hsu et al. similarly reported a low operative mortality rate of 1.5% (2 out of 134 patients), attributing both deaths to metastatic colorectal cancer following surgery [21]. In contrast, Rohr et al. observed a higher mortality rate of 8.3% (2 out of 24 patients) in cases managed with immediate primary anastomosis, including one death resulting from anastomotic leakage [20].

Regarding morbidity, our study demonstrated an overall complication rate of 18.9% (7 out of 37 patients). Anastomotic leakage occurred in three patients (8.1%). One patient developed generalized peritonitis on the second postoperative day, requiring reoperation and conversion to Hartmann's procedure. The other two patients experienced minor leaks: one developed a pelvic abscess on postoperative day 10, diagnosed via pelvic-abdominal CT and managed successfully with interventional radiology-guided drainage, antibiotics, and close monitoring; the other exhibited fecal discharge from the pelvic drain on postoperative day five. Despite the absence of radiologically confirmed collections, conservative management with antibiotics and ongoing drainage led to resolution. All three cases had favorable outcomes.

Comparable findings were reported by Nyam et al., who retrospectively reviewed 59 cases of obstructing left colon cancer and identified only one case of anastomotic leakage, specifically in the group managed with colonic irrigation [25].

Similarly, Naraynsingh et al. documented a single instance of leakage among 58 patients treated with segmental resection and manual decompression for left-sided colorectal obstruction [28].

Lim et al. retrospectively analyzed 49 patients with obstructing left-sided colorectal cancer, of whom 24 underwent intraoperative colonic irrigation and 25 had manual decompression only. The study found two cases of anastomotic leakage in the manual decompression group, while no leaks were observed among those who underwent colonic irrigation [23]. Similarly, Ciga et al. conducted a comparative study involving 68 emergency surgeries and 146 elective procedures for descending colon masses, all treated with primary colorectal anastomosis without bowel preparation. Their findings showed no statistically significant differences in mortality (0% in the emergency group vs. 2% in the elective group) or symptomatic anastomotic dehiscence (1.4% vs. 2.7%, respectively) [22].

Awotar et al. reported one case of anastomotic leakage (5.56%) among 18 patients undergoing resection with primary anastomosis for obstructing left colon masses [18]. In contrast, Son et al. studied 55 patients (45.5% with descending colon cancer and 54.5% with sigmoid colon cancer) and found neither anastomotic leakage nor perioperative mortality, underscoring the safety of primary anastomosis in carefully selected patients [16]. Patrity et al. contributed further evidence by examining one-stage resections without colonic preparation in emergency settings. Their study revealed an anastomotic leak rate of 4.5% and a mortality rate of 2.3%, with the only death attributed to postoperative myocardial infarction [14].

These findings align with broader literature that places anastomotic leakage rates in emergency colorectal surgeries for left-sided obstruction between 3% and 10% [29]. Importantly, studies comparing intraoperative colonic lavage versus no lavage report similar leak and mortality rates. Leak rates range from 0% to 13% with lavage [26,27], and from 0% to 10% without it, with associated mortality rates spanning 0% to 9.6% [24,25].

In our study, the length of hospital stay ranged from 5 to 14 days, depending on patient condition. Surgical site infections (SSIs) were observed in 18.9% of cases (7 out of 37 patients), presenting with typical signs such as erythema, swelling, warmth, tenderness, and purulent discharge. Management protocols included twice-daily wound dressings, removal of sutures where necessary, microbiological wound cultures, and intravenous antibiotic therapy.

Comparable findings have been reported in the literature. Munir et al. treated 28 patients with obstructing left colon masses (18 males and 10 females, aged 23–69 years) and reported a mean hospital stay of 8 days. SSIs occurred in 10.7% of patients (3 cases), all managed with standard care. One patient (3.6%) developed an anastomotic leak, which required reoperation, and no mortality was reported [17]. Chiappa et al. also observed SSIs in 3 out of 50 patients undergoing surgery for obstructing left colon tumors, with one patient developing an intraabdominal abscess [30]. Rohr et al., in a five-year series, documented one superficial wound infection (4%) among 24 patients undergoing emergency resection with immediate anastomosis, and the median hospital stay was notably longer at 19.5 days [20].

Fabiani et al. performed 13 emergency large bowel resections with primary anastomosis and reported no mortality, with both the anastomotic leak and wound infection rates at 7.6%. The average hospital stay was 15 days [31]. Similarly, Aguilar-Nascimento et al. observed a 28.6% complication rate among 14 patients undergoing one-stage resection, with no deaths and a median hospital stay of 8 days [32]. Naraynsingh et al. reported an average hospital stay of 9.8 days in 58 patients managed with decompression, resection, and primary colocolic anastomosis [28]. Zorcolo et al. found wound sepsis in 4.5% of 176 patients, with a 30-day mortality of 5.7% and a median hospital stay of 13 days [33].

The complication rates in our study align with these findings, reflecting the inherent challenges of infection control in emergency surgical settings. These results highlight the importance of timely intervention and robust postoperative management to mitigate morbidity risks.

Additionally, postoperative ileus occurred in 13.5% of our patients (5 out of 37), defined as the absence of bowel sounds for more than 48 hours after surgery. Management included withholding oral intake, correcting electrolyte imbalances, inserting a Ryle tube, addressing underlying causes (e.g., pelvic collections), and monitoring for return of bowel function. The average time to bowel movement restoration was three days postoperatively.

Son et al. corroborate these findings in their analysis of 55 patients with obstructive left colon cancer. Among 12 patients who experienced postoperative complications, ileus was the most frequent, occurring in 10 cases [16]. Our study supports the growing body of evidence that, in selected patients, emergency left colectomy with intraoperative preparation and primary anastomosis can be performed safely and effectively.

Clinical Implications

The findings of this study support the safety and feasibility of primary anastomosis following emergency left colectomy in selected patients presenting with obstructing left colon masses. Traditionally, Hartmann's procedure has been preferred due

to concerns about anastomotic leakage and infection in unprepared bowel. However, this study shows that with careful intraoperative patient selection — including favorable bowel vascularity, absence of perforation, and no severe peritoneal contamination — primary anastomosis can achieve low rates of complications, comparable to elective surgeries. This approach avoids the need for temporary or permanent stomas, thereby enhancing patient quality of life and reducing the psychological and physiological burden of subsequent reversal procedures.

Strength Points

One of the key strengths of this study lies in its focused design: all operations were performed by the same experienced surgical team using standardized intraoperative techniques, including manual decompression and hand-sewn anastomosis. This consistency minimizes technical variability and strengthens the internal validity of the findings. Additionally, the study captured a comprehensive set of outcome measures — including anastomotic leak, surgical site infection, ileus, hospital stay, and readmission — providing a robust assessment of early postoperative recovery. The strict inclusion criteria ensured that only patients with favorable intraoperative conditions were selected, reflecting real-world surgical decision-making and enhancing applicability in clinical practice.

Limitations

Despite its valuable insights, the study is limited by its relatively small sample size ($n = 37$), which may reduce statistical power and limit generalizability. The absence of a control or comparison group (e.g., patients undergoing Hartmann's procedure) prevents direct evaluation of the relative advantages of primary anastomosis. Additionally, the follow-up period was short and focused on early postoperative outcomes, thereby limiting conclusions about long-term oncologic and functional results, recurrence rates, or stoma reversal success. A multicenter design with larger sample size and longer follow-up would strengthen future findings.

CONCLUSION

Primary anastomosis after emergency left colectomy for obstructing colon masses is a safe and effective strategy in appropriately selected patients. The observed low rates of anastomotic leakage (8.1%), surgical site infections (18.9%), and readmissions (8.1%) suggest favorable short-term outcomes. No perioperative mortality was observed. These findings align with international studies that endorse single-stage surgical approaches in emergency colorectal cancer management. When performed by experienced surgeons and guided by strict intraoperative criteria, this approach can reduce morbidity associated with multi-stage procedures and improve patient recovery and satisfaction.

It is recommended that primary anastomosis be considered as a first-line surgical option in emergency left colectomy for obstruction, particularly in centers with experienced colorectal surgeons. Intraoperative assessment remains critical to minimize risks, and a checklist-based selection protocol may enhance safety.

List of abbreviation

CBC: complete blood count

INR: international normalized ratio

ABG: arterial blood gases

CRP: c-reactive protein

PDS LOOP: polydioxanone loop

SPSS: Statistics package for social science

HTN: hypertension

DM: diabetes

IHD: ischemic heart disease

SSI: surgical site infection

AL: anastomotic leakage

PA_CT scan: Computed tomography scan of abdomen and pelvis

Declarations

Ethics approval and consent to participate:

Informed written consent was obtained from all participants prior to inclusion in the study, the study was approved by the ethical committee of the faculty of medicine, Ain shams university , Egypt., (Approval NO ,IRB protocol number:00006373). Clinical trial ID NCT07026201

Human ethics and consent to participate declaration: available

Consent for publication:

All patients provided signed written informed consent for publication.

Availability of data and materials:

The datasets used and analyzed during this study are available from the corresponding author on reasonable request.

Competing interests: there is no competing interest.

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Authors' contributions:

“AA drafted the manuscript. AA participated in the sequence alignment. TY participated in the design of the study. AA and IM performed the statistical analysis. IM conceived the study. AA participated in its design, coordination. IM helped to draft the manuscript. All authors read and approved the final manuscript”

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