

Original Research Article

RETROSPECTIVE COMPARATIVE STUDY OF LAPAROSCOPIC AND OPEN APPROACH OF FECAL DIVERSION IN LOCALLY ADVANCED CARCINOMA RECTUM

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ABSTRACT

Background: Locally advanced rectal cancer is commonly managed with neoadjuvant chemoradiotherapy to downstage the disease, often necessitating diversion procedures for obstruction, incontinence, or fistula. This study aimed to compare the laparoscopic and open methods for faecal diversion performed before the initiation of NACRT or Curative surgery.

Materials and Methods: This retrospective study included 52 patients diagnosed with biopsy-proven locally advanced rectal carcinoma (> T3N1) at Tirunelveli Medical College between January 2022 and April 2025. All included patients were treated with curative intent and were divided into two groups: laparoscopic faecal diversion (n=38) and open faecal diversion (n=14). Depending on the future surgery plan, those planned for LAR underwent transverse loop colostomy and those planned for APR underwent sigmoid loop colostomy.

Results: The mean patient age was 56 and 54 years in the laparoscopic and open groups, respectively (p=0.5). Obstruction was the primary indication for diversion in both groups, with similar rates (82.4% vs. 82%, p=0.56). In the laparoscopic group, 24 patients underwent transverse loop colostomy and 14 underwent sigmoid loop colostomy, compared to eight and six patients in the open group respectively. The laparoscopic group showed significantly faster initiation of NACRT (7.43 vs. 20.43 days, p=0.001), earlier oral intake (1.08 vs. 2.8 days, p=0.02), and shorter hospital stay (2.5 vs. 6 days, p=0.001). Stage migration was more frequent in the laparoscopic surgery group (32% vs. 18%, p=0.003).

Conclusion: Laparoscopic diversion enables early NACRT initiation, faster recovery, and fewer complications while improving stoma creation and disease assessment with better anatomical visualisation.

Keywords: Locally advanced rectal carcinoma, Transverse loop colostomy, Sigmoid loop colostomy, Disease downstaging, Stoma creation.

INTRODUCTION

Colorectal cancer (CRC) represents a significant global health burden, ranking as the third most commonly diagnosed malignancy and the fourth leading cause of cancer-related mortality worldwide.^[1] Within this spectrum, locally advanced rectal cancers constitute a particularly challenging subset, typically defined as T3 or T4 primary tumours

or those presenting with regional nodal metastases. These encompass Stage II disease (cT3-4 N0) and Stage III disease (cT1-4, N1-3), both of which present formidable therapeutic challenges and require sophisticated management strategies to achieve optimal oncological outcomes.

The contemporary management of locally advanced rectal cancer has evolved into a highly coordinated endeavour requiring seamless integration of multiple

medical disciplines. The current standard of care paradigm typically involves a sequential treatment approach: neoadjuvant chemoradiotherapy aimed at downstaging the disease and improving resectability, followed by definitive surgical intervention incorporating total mesorectal excision (TME), with selective administration of adjuvant chemotherapy based on pathological findings and individual patient factors.^[2] This multimodal treatment strategy has been refined over decades and represents the culmination of numerous clinical trials and collaborative research efforts aimed at improving both survival and functional outcomes.

In the Indian subcontinent, epidemiological data indicate a concerning trend of increasing incidence of rectal carcinoma, reflecting both changing demographic patterns and evolving lifestyle factors.^[3] This rising prevalence necessitates enhanced awareness and optimization of treatment protocols tailored to the local population characteristics and healthcare infrastructure. The burden of advanced-stage presentation remains particularly high in resource-limited settings, where delayed diagnosis and limited access to screening programs result in a substantial proportion of patients presenting with locally advanced disease.

A significant proportion of patients with locally advanced rectal cancer present with obstructive symptoms, ranging from partial intestinal obstruction to complete bowel blockage. These presentations pose immediate management dilemmas and require urgent intervention to prevent life-threatening complications such as bowel perforation, peritonitis, and sepsis.^[4] Additionally, the presence of obstruction precludes the safe administration of standard neoadjuvant therapy, thereby compromising the established treatment pathway and potentially affecting long-term oncological outcomes.

The creation of a temporary faecal diversion stoma has emerged as a crucial component in the management algorithm for such complex cases. This intervention serves multiple critical functions: it provides symptomatic relief from obstructive symptoms, enables the safe delivery of full-dose neoadjuvant chemoradiotherapy without the risk of treatment-related complications, and allows adequate time for patient optimization and comprehensive preoperative planning for definitive surgical resection.^[5] By effectively decompressing the distal colon and diverting the faecal stream, this procedure creates a therapeutic window during which optimal multimodal therapy can be administered without the constraints imposed by an obstructed bowel.

Beyond obstruction, several other clinical scenarios warrant consideration of prophylactic or therapeutic faecal diversion. These include severe faecal incontinence that significantly impairs quality of life, the development of pelvic sepsis manifesting as perirectal abscesses or complex fistulous tracts, and impending perforation in the setting of bulky tumours. Furthermore, it is well-established in the oncological literature that the initiation of

neoadjuvant chemoradiotherapy can induce localized inflammatory changes and oedema of the bowel wall, which may precipitate acute obstruction in patients with borderline luminal patency or exacerbate pre-existing partial obstructions.^[6] This phenomenon underscores the importance of careful patient selection and consideration of prophylactic diversion in high-risk individuals.

The surgical landscape for faecal diversion has undergone remarkable transformation over the past several decades, paralleling the broader evolution of minimally invasive surgery. Traditionally, faecal diversion procedures were performed exclusively through open laparotomy, which, while effective in achieving the primary therapeutic goal, carried inherent morbidity related to the surgical access itself. Open surgery is associated with larger incisions, increased postoperative pain, prolonged ileus, extended hospital stay, delayed return to functional status, and potentially higher rates of wound-related complications including infection and incisional hernias.

The advent and subsequent refinement of laparoscopic surgical techniques have revolutionized various aspects of colorectal surgery, including stoma creation procedures. Laparoscopic faecal diversion offers several theoretical and demonstrated advantages over the conventional open approach. These include reduced surgical trauma through smaller incisions, decreased postoperative pain requiring less analgesic medication, earlier restoration of bowel function, shorter hospitalization duration, faster return to baseline functional status, and improved cosmetic outcomes. In the context of locally advanced rectal cancer, these benefits assume particular significance, as they may facilitate earlier initiation of crucial neoadjuvant therapy, reduce the interval between diagnosis and definitive treatment, and minimize treatment-related delays that could potentially impact oncological outcomes.^[7]

However, the adoption of laparoscopic techniques for diversion procedures in the setting of locally advanced rectal cancer has not been universal, and several factors influence the choice between open and laparoscopic approaches. These include surgeon expertise and institutional experience with minimally invasive techniques, patient-specific anatomical considerations, the urgency of the clinical situation, available resources and infrastructure, and the presence of complicating factors such as previous abdominal surgery or significant tumour bulk. Additionally, concerns regarding the adequacy of tumour assessment, operative time considerations in the emergency setting, and the learning curve associated with laparoscopic surgery have tempered the enthusiasm for universal adoption of the minimally invasive approach.

Despite the increasing utilization of laparoscopic techniques in colorectal surgery broadly, there remains a paucity of robust comparative data specifically examining the outcomes of laparoscopic versus open faecal diversion in the context of locally

advanced rectal cancer. Most existing literature focuses on stoma creation in general colorectal surgery or addresses laparoscopic colorectal resection, but dedicated analyses comparing the two approaches for diversion procedures in this specific patient population are limited. This knowledge gap is particularly relevant given the unique characteristics of these patients, including their compromised nutritional status, potential immunosuppression, need for timely oncological therapy, and the complexity of their disease process.

The importance of optimizing perioperative outcomes in this population cannot be overstated. Any intervention that can reduce treatment-related morbidity, accelerate recovery, and facilitate timely progression through the multimodal treatment pathway has the potential to improve not only short-term quality of life but also long-term oncological outcomes. Furthermore, in resource-constrained healthcare systems, interventions that reduce hospital length of stay and healthcare costs while maintaining or improving patient outcomes are particularly valuable.

Pre-emptive faecal diversion, when appropriately indicated, can substantially reduce the morbidity associated with recurrent hospital admissions for acute episodes of intestinal obstruction or subobstructive ileus, prevent the catastrophic complications of bowel perforation and peritonitis, and obviate the need for emergency surgical interventions that may be performed under suboptimal conditions and preclude the possibility of curative resection with adequate margins.^[7] By creating a controlled clinical environment in which comprehensive staging, patient optimization, and planned therapeutic interventions can occur sequentially, prophylactic or early diversion may ultimately improve the proportion of patients who successfully complete their intended treatment protocol and undergo definitive surgical resection.

Given these considerations, a systematic comparative evaluation of laparoscopic versus open approaches to faecal diversion in patients with locally advanced rectal cancer is warranted. Such an analysis can provide evidence-based guidance regarding the optimal surgical approach, identify patient subgroups most likely to benefit from each technique, and inform clinical decision-making in this complex patient population. This study aims to address this knowledge gap by retrospectively comparing the perioperative outcomes, complication profiles, recovery parameters, and impact on subsequent oncological therapy between laparoscopic and open faecal diversion procedures in patients with locally advanced carcinoma rectum, thereby contributing to the optimization of care pathways for this challenging clinical entity. Based on this aim of our study is to compare the laparoscopic and open methods for faecal diversion performed before the initiation of NACRT or curative surgery.

MATERIALS AND METHODS

This retrospective comparative study was conducted at the Department of Surgical Gastroenterology, Tirunelveli Medical College, encompassing a study period from January 2022 to April 2025. The study received approval from the Institutional Ethics Committee prior to its initiation, and informed consent was obtained from all participating patients in accordance with institutional guidelines and ethical standards for clinical research. A total of 52 patients with biopsy-proven locally advanced rectal carcinoma were included in the final analysis.

The study population comprised adult patients diagnosed with histologically confirmed carcinoma rectum classified as locally advanced disease (>T3 or N1 disease based on preoperative staging investigations). All included patients were planned for treatment with curative intent, following a multimodal approach that included neoadjuvant therapy and subsequent definitive surgical resection. Patients who underwent palliative procedures without curative intent were systematically excluded from the study to maintain homogeneity of the study population and ensure comparability between groups. This exclusion criterion was applied to focus the analysis on patients who would potentially benefit from the complete treatment protocol and allow meaningful comparison of perioperative outcomes in the context of curative management.

The study cohort was divided into two groups based on the surgical approach employed for faecal diversion: the laparoscopic faecal diversion group comprised 48 patients, while the open faecal diversion group included 14 patients. The type of diversion stoma created was tailored to the anticipated definitive surgical procedure planned for each patient following completion of neoadjuvant chemoradiotherapy. Specifically, patients who were candidates for low anterior resection (LAR) based on tumour location and anticipated sphincter preservation underwent creation of a transverse loop colostomy, which would facilitate subsequent reversal and anastomosis. Conversely, patients designated for abdominoperineal resection (APR) due to distal tumour location precluding sphincter preservation underwent sigmoid loop colostomy, recognizing that these patients would ultimately have a permanent end colostomy following definitive surgery.

Surgical Technique: Laparoscopic Faecal Diversion: The laparoscopic approach utilized a standardized two-port technique designed to minimize surgical trauma while allowing adequate visualization and manipulation of the colon. Initial access was established through a 5 mm supraumbilical port for camera insertion, providing panoramic visualization of the abdominal cavity. A second 5 mm working port was positioned based on the intended stoma location: for transverse loop colostomy, this port was placed in the right upper

quadrant along the right midclavicular line, while for sigmoid loop colostomy, it was positioned in the left iliac fossa along the left midclavicular line. Under laparoscopic guidance, the appropriate segment of colon was identified and mobilized as necessary. At the predetermined ostomy site, a circular skin incision was made and deepened sequentially through the subcutaneous tissue to expose the anterior rectus sheath. The rectus muscle fibers were then divided longitudinally, and the posterior rectus sheath along with the peritoneum were incised to create an adequate aperture. A 5 mm trocar was then inserted through this opening to facilitate exteriorization of the bowel. The selected colonic segment was carefully exteriorized through the ostomy site, ensuring proper orientation without rotation or tension. The stoma was then matured using standard technique, with the bowel opened and mucosa sutured to the skin edge to create a functional diverting stoma.



Figure 1: A to E: Laparoscopic faecal diversion



Figure 2: Open Colostomy

Surgical Technique: Open Faecal Diversion: The open surgical approach involved a small midline laparotomy incision, which provided direct access to the abdominal cavity and allowed for comprehensive assessment of the peritoneal cavity and potential metastatic disease. This access also facilitated

evaluation of the bowel for synchronous lesions or unexpected pathology. Based on the planned definitive procedure, either a sigmoid colostomy was fashioned in the left iliac fossa for patients designated for APR, or a transverse loop colostomy was created in the right upper quadrant for those planned for LAR. The stoma site was prepared by creating a circular skin incision followed by sequential division of subcutaneous tissue, anterior rectus sheath, rectus muscle, and posterior rectus sheath with peritoneum. The appropriate colonic segment was then delivered through this opening and matured in standard fashion. It is noteworthy that the technique of trephine colostomy, which involves stoma creation through a small localized incision without formal laparotomy, was deliberately avoided in this series. This decision was made because trephine colostomy does not permit adequate staging assessment for peritoneal or hepatic metastases, nor does it allow comprehensive evaluation of the remaining bowel for synchronous lesions, both of which are important components of the initial surgical assessment in patients being treated with curative intent.

Statistical analysis: Data are presented as mean, standard deviation, frequency, and percentage. Continuous variables were compared using an independent-sample t-test. Categorical variables were compared using Pearson's chi-squared test. Significance was defined as $p < 0.05$ using a two-tailed test. Data analysis was performed using IBM-SPSS version 21.0 (IBM-SPSS Corp., Armonk, NY, USA).

RESULTS

The mean ages of the participants were 56 and 54 years in the laparoscopic and open surgery groups, respectively ($p=0.5$). 23 (63%) and 9 (64%) patients in the laparoscopic and open surgery groups, respectively, were male. The main indication for diversion was obstruction in both groups: 25 patients (82.4%) in the laparoscopic group and 9 patients (82%) in the open group. ($p=0.56$). The other indications were incontinence and fistula (3 patients each in the laparoscopic and 1 each in the open group, respectively). In the laparoscopic group, 24 patients underwent transverse loop colostomy and 14 underwent sigmoid loop colostomy. In the open group, 8 and 6 patients underwent transverse and sigmoid colostomies, respectively. Diagnoses of carcinoma were evenly distributed, with upper-third carcinoma in 32% vs. 27%, middle-third in 45% vs. 55%, and lower-third in 23% vs. 18% ($p=0.866$) [Table 1].

The primary endpoint, the mean time to initiation of NACRT, was significantly shorter in the laparoscopic group at 7.43 days (range: 5-12 days) compared to 20.43 days (range: 15-25 days) in the open group ($p=0.001$). The secondary endpoint also demonstrated significant advantages for the laparoscopic group, with 12 patients (32%)

experienced stage migration compared to only 2 patients (18%) with downstaging in the open group (p=0.003). The mean time to start oral intake was significantly shorter in the laparoscopic group at 1.08 days compared to 2.8 days in the open group (p=0.02). The duration of hospital stay was significantly reduced in the laparoscopic group, with

a mean stay of 2.5 days compared to 6 days in the open group (p=0.001). There was no significant difference in the duration of surgery (34 minutes vs. 45 minutes, p=0.32). The rate of stoma-related complications was similar between the two groups (41% in the laparoscopic group vs. 45% in the open group, p=0.4) [Table 2].

Table 1: Demographic data

		Laparoscopic diversion	Open diversion	P value
Age in years (mean)		56	54	0.5
Gender	Male	23 (63%)	9 (64%)	0.32
Indication for diversion	Obstruction	25 (82.4%)	9 (82%)	0.56
	Incontinence	3 (9.3%)	1 (8.9%)	0.54
	Fistula	3 (9.3%)	1 (8.9%)	0.435
Stoma	Transverse loop colostomy	24 (74%)	8 (73%)	0.860
	Sigmoid loop colostomy	14 (23%)	6 (27%)	
	Loop ileostomy	1 (3%)	0 (0%)	
Diagnosis	Carcinoma upper third	10 (32%)	3 (27%)	0.866
	Carcinoma middle third	14 (45%)	6 (55%)	
	Carcinoma lower	7 (23%)	2 (18%)	

Table 2: Primary endpoints and secondary endpoints

		Laparoscopic diversion	Open diversion	P value
Primary endpoint	Time to initiate (days)	7.43 (5-12)	20.43 (15-25)	0.001
Secondary endpoints	Stage migration	12 (32%)	2 (18%)	0.003
	Time to start orals (days)	1.08 (1-3)	2.8 (2-6)	0.02
	Hospital stays (days)	2.5 (2-4)	6 (3-8)	0.001
Duration of surgery (min)		34 (25-45)	45 (30-70)	0.32
Stoma related complication		13 (41%)	5 (45%)	0.4

DISCUSSION

The application of laparoscopic techniques to faecal diversion procedures represents a significant milestone in the evolution of minimally invasive colorectal surgery. The pioneering work of Khoo et al. in 1993 first demonstrated the feasibility and safety of laparoscopic faecal diversion, opening new avenues for reducing surgical morbidity in patients requiring temporary or permanent stomas.⁸ Over the subsequent three decades, laparoscopic surgery has become increasingly recognized for its inherent advantages over conventional open approaches, including enhanced postoperative recovery kinetics, reduced formation of intra-abdominal adhesions, decreased wound-related complications, and overall diminished perioperative morbidity. These benefits have been consistently demonstrated across various abdominal surgical procedures and have gradually extended to the realm of stoma creation in both benign and malignant colorectal diseases.

In the specific context of colorectal cancer management, particularly in cases presenting with obstructive symptoms, faecal diversion has emerged as an essential temporizing intervention that effectively addresses the acute clinical crisis while preserving oncological treatment options. The creation of a diverting stoma allows patients to overcome the immediate threat of complete bowel obstruction and its associated complications, thereby creating a therapeutic window during which comprehensive staging, patient optimization, and importantly, the safe administration of neoadjuvant

chemoradiotherapy can be accomplished.⁹ This approach has become widely accepted as a bridge to definitive surgical intervention, allowing patients who would otherwise require emergency surgery under suboptimal conditions to receive the full spectrum of multimodal therapy with curative intent. While alternative strategies such as self-expanding metallic stent (SEMS) placement have been explored as potential options for palliation of malignant colorectal obstruction, this modality has demonstrated several limitations that have tempered enthusiasm for its widespread adoption. Endoscopic stenting is associated with specific technical challenges, including a substantial risk of procedural failure, potential for stent migration, perforation risk, tumour ingrowth or overgrowth necessitating reintervention, and uncertain long-term patency rates. Additionally, the procedure is associated with considerable costs, requires specialized expertise with an extended learning curve, and may not be suitable for all patients depending on tumour location, configuration, and degree of obstruction.¹⁰ Consequently, surgical faecal diversion has remained the more universally accepted and reliable intervention for managing obstructive colorectal malignancies, particularly in patients being considered for curative treatment protocols. The predictability, durability, and definitiveness of surgical diversion make it the preferred option in most clinical scenarios, especially when patient and institutional factors favor a surgical approach.

Comparative Analysis of Study Findings: The present study undertook a systematic comparison of

laparoscopic versus open surgical approaches for faecal diversion in patients with locally advanced rectal carcinoma. Our analysis revealed several noteworthy findings that contribute to the growing body of evidence supporting the preferential use of minimally invasive techniques in this patient population. The two groups demonstrated excellent baseline comparability, with no statistically significant differences in fundamental demographic characteristics. The mean age of participants was remarkably similar between the laparoscopic and open surgery cohorts (56 years versus 54 years, $p=0.5$), indicating that age-related selection bias was not a confounding factor in our analysis. Similarly, gender distribution was essentially identical across both groups (63% versus 64% male predominance, $p=0.32$), further validating the comparability of the study populations.

The clinical indication for performing faecal diversion was predominantly intestinal obstruction in both groups, affecting 82.4% of laparoscopic patients and 82% of open surgery patients ($p=0.56$). This high concordance in clinical presentation underscores that the choice of surgical approach was not driven by differences in disease severity or urgency of presentation, but rather by evolving institutional practice patterns and surgeon preference. The distribution of stoma types was also remarkably similar between groups, with transverse loop colostomy performed in 74% of laparoscopic cases and 73% of open cases, while sigmoid loop colostomy was created in 23% and 27% of cases respectively. This similarity reflects consistent surgical planning based on tumour location and anticipated definitive procedure, irrespective of the approach chosen for the initial diversion. Furthermore, the anatomical distribution of primary tumours showed no significant differences between groups, with upper-third rectal tumours accounting for 32% versus 27%, middle-third lesions comprising 45% versus 55%, and lower-third carcinomas representing 23% versus 18% of cases ($p=0.866$). This comparable disease distribution eliminates tumour location as a potential confounding variable when interpreting outcome differences.

The most clinically significant finding of our study was the substantial difference in time to initiation of neoadjuvant chemoradiotherapy (NACRT) between the two surgical approaches. Patients undergoing laparoscopic faecal diversion demonstrated a markedly shorter interval to commence NACRT compared to those treated with open surgery (7.43 days versus 20.43 days, $p=0.001$). This difference of nearly two weeks represents a critical advantage in oncological management, as delays in initiating definitive cancer therapy can potentially impact disease progression, patient anxiety, and overall treatment outcomes. The accelerated recovery trajectory following laparoscopic surgery, characterized by reduced tissue trauma, decreased postoperative pain, and earlier return of physiological function, directly translated into enhanced readiness

for subsequent oncological therapy. This finding has profound implications for clinical practice, as it suggests that the choice of surgical approach for diversion can significantly influence the overall treatment timeline and potentially affect oncological outcomes.

Another striking observation was the significantly higher rate of pathological stage migration observed in the laparoscopic group (32% versus 18%, $p=0.003$). Stage migration, defined as downstaging of the tumour following neoadjuvant therapy, serves as a surrogate marker for treatment response and is associated with improved long-term outcomes including reduced local recurrence rates and enhanced overall survival. The superior stage migration observed in the laparoscopic cohort may reflect the combined effects of earlier treatment initiation, better patient tolerance of chemoradiotherapy due to reduced surgical stress, improved nutritional status secondary to faster recovery, and potentially better compliance with the complete treatment protocol. This finding suggests that the benefits of laparoscopic diversion extend beyond immediate perioperative advantages to potentially influence fundamental oncological outcomes.

Consistent with the well-established benefits of minimally invasive surgery, the laparoscopic group demonstrated significantly earlier resumption of oral intake (1.08 days versus 2.8 days, $p=0.02$), reflecting faster return of gastrointestinal function and reduced postoperative ileus. This earlier restoration of enteral feeding has important implications for nutritional status, which is a critical factor in patients preparing for demanding chemoradiotherapy protocols. Furthermore, the overall hospital length of stay was dramatically reduced in the laparoscopic cohort (2.5 days versus 6 days, $p=0.001$), representing a reduction of more than 50% in hospitalization duration. This difference not only reflects faster physiological recovery but also has significant implications for healthcare resource utilization, patient satisfaction, and reduction in hospital-acquired complications such as nosocomial infections and venous thromboembolism.

Interestingly, operative duration showed no statistically significant difference between the two approaches (34 minutes versus 45 minutes, $p=0.32$), suggesting that concerns about prolonged operative times with laparoscopic techniques may be unfounded in experienced hands. This finding is particularly relevant in the emergency or semi-urgent setting, where surgical efficiency is paramount. The comparable operative times indicate that laparoscopic faecal diversion can be performed expeditiously without compromising the efficiency advantages traditionally associated with open surgery. Additionally, the rate of stoma-related complications was similar between groups (41% versus 45%, $p=0.4$), demonstrating that the laparoscopic approach does not compromise the technical adequacy of stoma creation or increase

procedure-specific morbidity. These complications, which typically include issues such as stoma retraction, parastomal hernia, skin excoriation, and high output, appear to be related more to patient factors and stoma management rather than the surgical approach employed for creation.

Concordance with Existing Literature

Our findings align closely with and expand upon previous investigations examining laparoscopic versus open faecal diversion in colorectal cancer patients. Varghese et al. conducted a similar retrospective comparative study spanning two years with 55 enrolled patients, focusing on the same primary outcome of interest: time to initiation of neoadjuvant chemoradiotherapy.¹¹ Their results demonstrated a significantly shorter interval to NACRT commencement in the laparoscopic cohort compared to the open surgery group (16 days versus 20.5 days, $p=0.31$), corroborating our central finding albeit with a somewhat smaller magnitude of difference. The consistency between our study and theirs, despite being conducted in different institutional settings with potentially different patient populations and perioperative protocols, strengthens the validity of this observation and suggests that it represents a reproducible advantage of the laparoscopic approach. The slightly longer intervals observed in the Varghese study compared to ours may reflect differences in institutional protocols, patient acuity, or the era during which the study was conducted, but the directional finding remains consistent and clinically meaningful.

Singh et al. provided additional valuable insights through their single-centre comparative study following 62 patients undergoing faecal diversion.¹² Their detailed analysis revealed multiple perioperative advantages favouring the laparoscopic approach across several clinically relevant parameters. Patients in the laparoscopic group experienced significantly reduced intraoperative blood loss (20.69 ± 17.71 ml versus 121.97 ± 35.29 ml, $p=0.0005$), a finding that reflects the enhanced precision and hemostasis achievable with laparoscopic techniques and the reduced tissue trauma associated with smaller incisions. This reduction in blood loss has important implications for postoperative recovery, risk of transfusion, and overall surgical stress response. Furthermore, they documented a significantly reduced requirement for postoperative analgesic medications (4.28 ± 1.76 days versus 6.88 ± 2.75 days), providing objective evidence of the decreased pain burden associated with minimally invasive surgery. This finding is particularly relevant as reduced pain facilitates earlier mobilization, improved respiratory function, and decreased risk of pain-related complications such as pneumonia and venous thromboembolism.

The Singh study also demonstrated a significantly shortened hospital length of stay in the laparoscopic cohort (8.79 ± 5.57 days versus 11.73 ± 6.61 days, $p=0.001$), consistent with our findings and further validating this as a reproducible advantage of the

minimally invasive approach. Additionally, they reported superior tolerance to oral diet and earlier return of bowel function in laparoscopic patients, both of which are critical factors in postoperative recovery and preparation for subsequent oncological therapy. Perhaps most importantly from a patient safety perspective, their analysis revealed lower rates of both postoperative complications and hospital readmissions in the laparoscopic group, suggesting that the benefits of this approach extend beyond enhanced recovery to potentially improved overall safety profile. These findings collectively paint a picture of laparoscopic faecal diversion as a technique that offers comprehensive advantages across the spectrum of perioperative care metrics.

The potential long-term implications of surgical approach choice extend beyond the immediate perioperative period, as demonstrated by the work of Yellinek et al., who conducted an extensive retrospective analysis of 795 patients undergoing closure of diverting loop ileostomy.^[13] Their study revealed that patients who had undergone their initial stoma creation via laparoscopic technique experienced significantly lower complication rates during the subsequent stoma reversal procedure compared to those whose initial stoma had been created through open surgery. This finding suggests that the reduced adhesion formation and preserved tissue planes associated with laparoscopic surgery confer lasting benefits that facilitate subsequent abdominal operations. Given that most diverting stomas in rectal cancer patients are eventually reversed following completion of definitive treatment, this observation has important implications for the entire treatment trajectory. The reduced complexity of stoma reversal in patients initially treated laparoscopically may translate into shorter operative times, fewer perioperative complications, shorter hospitalization for the reversal procedure, and potentially earlier restoration of intestinal continuity, all of which contribute to improved quality of life and treatment satisfaction.

Clinical Implications and Future Directions

The primary therapeutic objective of faecal diversion in the management of locally advanced rectal cancer is to effectively palliate obstructive symptoms and prevent potential emergency complications during the critical interval between initial presentation and definitive surgical resection, thereby enabling patients to receive the full benefit of curative-intent neoadjuvant chemoradiotherapy.^[14] By creating a controlled decompression of the obstructed intestinal segment, diversion eliminates the risk of progression to complete obstruction, bowel perforation, or systemic sepsis, all of which could compromise or preclude subsequent curative treatment. The ability to safely administer full-dose chemoradiotherapy without concern for treatment-related exacerbation of obstruction represents a critical advantage that directly influences oncological outcomes.

The evidence supporting laparoscopic faecal diversion has accumulated progressively through

numerous studies in the surgical literature, and the findings of our present investigation provide strong corroboration of this growing consensus. Beyond the immediate perioperative advantages discussed previously, laparoscopic surgery offers additional technical benefits that warrant consideration. The magnified visualization afforded by laparoscopic optics allows superior identification of anatomical structures, assessment of bowel quality, and evaluation of the peritoneal cavity for unexpected pathology or metastatic disease. This enhanced visualization becomes particularly valuable in patients with previous abdominal surgery or inflammatory processes where tissue planes may be distorted. The laparoscopic approach provides the surgeon with improved access for careful adhesiolysis when necessary, potentially reducing the risk of inadvertent enterotomy and enabling more precise dissection in challenging anatomical scenarios.^[15]

Furthermore, the minimally invasive nature of laparoscopic surgery preserves the integrity of the abdominal wall to a much greater degree than open techniques, an advantage that assumes particular importance when considering subsequent major oncological resection. The reduced disruption of the rectus muscles and fascia, combined with the smaller incisions, results in a stronger abdominal wall with fewer potential sites for future incisional hernias. This is especially relevant in patients with rectal cancer who will undergo extensive pelvic dissection and potentially receive pelvic radiation, both of which can compromise wound healing and increase hernia risk. The preservation of abdominal wall integrity following laparoscopic diversion may facilitate subsequent laparoscopic definitive resection and reduce the technical challenges associated with re-entering the abdomen.

Based on the cumulative evidence from our study and supporting literature, we advocate that laparoscopic faecal diversion should be considered the preferred approach whenever feasible, taking into account patient factors, institutional resources, and surgeon expertise. The multiple advantages spanning reduced recovery time, earlier oncological treatment, potentially improved tumour response, decreased morbidity, and facilitation of subsequent surgery collectively support this recommendation. However, it is important to acknowledge that successful implementation of laparoscopic techniques requires appropriate training, experience, and institutional infrastructure. In settings where these prerequisites are met, and in the absence of specific contraindications such as prohibitive adhesions, hemodynamic instability, or other factors precluding pneumoperitoneum, laparoscopic faecal diversion should be offered to patients as the standard of care. Continued investigation into long-term oncological outcomes, quality of life measures, and cost-effectiveness analyses will further refine our understanding of the optimal approach to faecal diversion in this complex patient population.

Limitations

The study's retrospective nature may introduce selection bias and limit the ability to establish causal relationships. The relatively small number of patients in the open diversion group (n=14) may reduce the statistical power and generalizability of the findings.

CONCLUSION

Laparoscopic diversion, being easily available and feasible, has proven to be advantageous in terms of early initiation of NACRT, improved prognosis, short duration of surgery, short hospital stays, faster recovery, stage migration, and fewer postoperative complications. In addition, it allows for a better anatomical view of the stoma, better appreciation for disseminated disease, and better management of technical difficulties for stoma exteriorisation. In addition, it allows the mobilisation of the lateral peritoneal fold and splenic flexure.

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