# Role of Exploratory Laparoscopy in the Management of Locally Advanced Colorectal Cancer: Experience of Ibn Rochd University Hospital in Casablanca

## Abstract

Colorectal cancer (CRC) is the third most common malignancy and the second leading cause of cancer-related mortality worldwide. In Morocco, its incidence is rising, with late-stage presentations being frequent due to limited access to advanced imaging and weak screening systems. Exploratory laparoscopy offers a minimally invasive staging alternative, particularly useful in resource-constrained settings. This study aimed to evaluate the role of exploratory laparoscopy in the diagnostic and therapeutic management of locally advanced CRC in a Moroccan university hospital. We conducted a retrospective descriptive study of 24 patients with histologically confirmed, locally advanced CRC who underwent exploratory laparoscopy between January 2018 and December 2023 at Ibn Rochd University Hospital, Casablanca. Clinical, radiological, laparoscopic, and histological data were analyzed, along with intraoperative findings, postoperative outcomes, and follow-up. The median age was 53 years, with a male-to-female ratio of 1.4. The most common symptoms were altered bowel habits (79.2%), rectal bleeding (58.3%), and weight loss (29.1%). Tumors were most frequently located in the rectum (31%) and rectosigmoid junction (28%). Preoperative CT suggested metastases in 33% of cases, whereas laparoscopy revealed peritoneal carcinomatosis in 54.4% and ascites in 63.6%. Therapeutic intent was altered in 41% of patients, shifting from curative to palliative management. Conversion to laparotomy occurred in 45.8%, and postoperative complications were reported in 8.3%, including two deaths. The overall mortality rate at follow-up was 41.6%. Exploratory laparoscopy significantly improved the accuracy of staging and decision-making in locally advanced CRC, particularly by detecting occult peritoneal metastases missed on imaging. It enabled rational therapeutic adaptation, avoidance of unnecessary laparotomies, and optimized resource use. Laparoscopy should be considered a standard staging tool in CRC management protocols in low- and middle-income countries.

## Introduction

Colorectal cancer (CRC) is a major global public health issue. It is defined by the World Health Organization (WHO) as a malignant tumor arising from the epithelium of the colon or rectum, most often in the form of an adenocarcinoma. In terms of incidence, it is the third most common cancer worldwide and the second leading cause of cancer-related death in both men and women. In 2020, nearly 1.9 million new cases were recorded, with approximately 935,000 deaths, according to GLOBOCAN data.

In Morocco, CRC is also a growing concern. Long underestimated due to a lack of structured data, it now ranks third among the most frequent cancers in several regions of the country, particularly in the Casablanca region according to the Greater Casablanca Cancer Registry (GCCR). Between 2008 and 2012, CRC accounted for 6.7% of all recorded cancer cases, with a crude incidence estimated at 8.1 per 100,000 inhabitants. This increase in incidence is attributed to various factors: urbanization, changes in dietary habits (increased consumption of fats and red meat, low fiber intake), sedentary lifestyle, smoking, and an aging population.

Locally advanced forms of CRC, defined by invasion of adjacent structures or the presence of locoregional metastases (notably peritoneal), present a major therapeutic challenge. Initial tumor staging is a crucial step in deciding on the appropriate treatment, whether curative or palliative. However, conventional imaging examinations such as computed tomography (CT) or magnetic resonance imaging (MRI) have limitations in detecting certain metastatic locations, especially small peritoneal or hepatic lesions.

It is in this context that exploratory laparoscopy becomes highly relevant. As a minimally invasive tool, it allows direct visualization of the abdominal cavity, offering a more accurate assessment of tumor spread. It enables detection of subclinical peritoneal carcinomatosis, targeted biopsies, and, if necessary, the placement of a diverting colostomy. Thus, it helps avoid unnecessary laparotomies, adjust the therapeutic plan, and reduce postoperative complications.

The objective of this study is to evaluate the contribution of exploratory laparoscopy in the management of locally advanced colorectal cancers in a Moroccan university hospital center. Based on a case series managed in the digestive cancer and liver transplantation surgery department at Ibn Rochd University Hospital in Casablanca, we aim to clarify the diagnostic and decision-making role of laparoscopy, highlighting its value in resource-limited settings.

## Materials and Methods

We conducted a retrospective descriptive study within the Department of Digestive Cancers and Liver Transplantation Surgery (Wing III) of the Ibn Rochd University Hospital in Casablanca. This study covered a six-year period, from January 2018 to December 2023. It included a series of 24 patients with locally advanced colorectal cancer who underwent exploratory laparoscopy as part of their diagnostic and therapeutic management.

The inclusion criteria were as follows: adult patients of any sex, with histologically confirmed colorectal cancer classified as locally advanced based on clinical and radiological data, and who underwent exploratory laparoscopy in the department. Patients with incomplete medical records or those who were not operated on were excluded from the study.

Data were collected from hospital medical records, operative reports, hospitalization registries, and pathology reports. A standardized data collection form was developed to homogenize data collection. The variables studied included demographic data (age, sex), medical and surgical history, clinical symptoms, radiological data (CT, MRI), results of exploratory laparoscopy, intraoperative procedures performed, and postoperative outcomes.

Exploratory laparoscopy was performed under general anesthesia using a standardized technique, in accordance with the recommendations of the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES, 2022). The patient was placed in the supine position with Trendelenburg inclination depending on tumor location. A CO₂ pneumoperitoneum was created using a Veress needle, followed by the introduction of trocars in a triangulated layout. A systematic exploration of the abdominal cavity was performed, from the diaphragm to the pelvis. Any suspicious lesion was biopsied, and peritoneal cytology was performed in the presence of ascites. If necessary, conversion to laparotomy was decided.

Ethical aspects were rigorously respected. Patient anonymity was guaranteed, and data processing was carried out in strict compliance with confidentiality standards. The study was approved by the institutional ethics committee.

## Results

This retrospective study included 24 patients diagnosed with locally advanced colorectal cancer (CRC) who underwent exploratory laparoscopy at Ibn Rochd University Hospital in Casablanca between January 2018 and December 2023. The mean age of patients was 53 years (range: 35–79), with a male predominance (58.3%), yielding a male-to-female ratio of 1.4.

\*\*Clinical and Demographic Characteristics\*\*

The most common clinical presentation included altered bowel habits (79.2%), rectal bleeding (58.3%), abdominal pain (33.3%), and unintentional weight loss (29.1%). General signs such as fatigue and anorexia were also frequently reported. On physical examination, 25% of patients had abdominal tenderness, and 29.1% had a palpable rectal mass on digital rectal examination. A family history of colorectal cancer was present in 37.5% of patients, and comorbidities such as hypertension, diabetes, and smoking history were reported in a minority of cases.

\*\*Tumor Location and Histology\*\*

The primary tumor was most frequently located in the rectum (31%), followed by the rectosigmoid junction (28%), sigmoid colon (18%), descending colon (15%), and transverse colon (8%). Histologically, the most common subtype was Lieberkühn adenocarcinoma (44%), followed by mucinous adenocarcinoma (25%) and signet-ring cell carcinoma (8%). Notably, mucinous and signet-ring variants were associated with a higher risk of peritoneal dissemination.

\*\*Imaging and Laparoscopic Findings\*\*

Preoperative imaging with CT suggested potential metastatic disease in 33% of patients. However, exploratory laparoscopy identified peritoneal carcinomatosis in 54.4% and ascites in 63.6%, highlighting the added sensitivity of laparoscopy in detecting small-volume or occult disease. Micro-nodular peritoneal deposits were commonly located along the paracolic gutters, pelvis, and omental surfaces—areas often underappreciated by imaging alone. In one case, diffuse omental caking was noted, consistent with extensive peritoneal metastasis.

Laparoscopy findings led to a change in therapeutic intent in 41% of patients, primarily from curative to palliative management. This reclassification rate is notably higher than those reported in other studies, including 22% in Egypt and 12% in the Netherlands (Hassan et al., 2019). These results underscore the pivotal role of laparoscopy in refining staging and guiding treatment strategies, particularly in resource-constrained settings where advanced imaging modalities like PET scans are not readily available.

Table 1 : Comparing the Change in Therapeutic Intent Based on Laparoscopy Findings across studies

|  |  |
| --- | --- |
| Studies | Percentage |
| Egypt | 22% |
| Netherlands | 12% |
| Our study | 41% |

\*\*Surgical Interventions and Intraoperative Outcomes\*\*

While all procedures began laparoscopically, conversion to open laparotomy was necessary in 45.8% of patients. The most frequent reasons for conversion included dense intra-abdominal adhesions (4 patients), visceral obesity (3 patients), and extensive tumor invasion precluding safe laparoscopic dissection (5 patients). Despite these challenges, no intraoperative injuries or iatrogenic complications occurred.

The most commonly performed surgical procedure was diverting colostomy (25%), particularly in patients presenting with obstruction or inoperable disease. Other procedures included tumor biopsies, palliative resections, and diagnostic sampling of peritoneal or ascitic lesions. Photographic and written records of all intraoperative findings were systematically maintained.

\*\*Postoperative Course and Complications\*\*

The average postoperative hospital stay was 3.5 days (range: 2–7 days). Bowel function resumed within a mean of 1.45 days, and early mobilization was implemented in all patients. Postoperative complications occurred in 8.3% of patients. Two severe complications were reported: one case of pulmonary embolism and one case of postoperative peritonitis due to suture dehiscence. Both resulted in patient death despite resuscitative efforts, corresponding to a postoperative mortality rate of 8.3%.

These outcomes were compared to international series, which reported hospital stays ranging from 2.8 to 4.7 days, and complication rates between 3.7% and 6%. The higher morbidity in our study may reflect the more advanced disease stage at presentation.

Table 2 : Comparing the average postoperative hospital stay across studies

|  |  |  |  |
| --- | --- | --- | --- |
| Study / Country | Hospital Stay (days) | Bowel Function Recovery (days) | Complication Rate % |
| Our Study | 3.5 | 1.45 | 8.3 |
| Canada | 2.8 | 3.6 | 6.0 |
| China | 3.0 | 3.0 | 6.0 |
| Italy | 4.7 | 4.7 | 3.7 |

At follow-up, overall mortality reached 41.6%, reflecting the advanced stage of disease in this patient cohort. Only 8.3% of patients demonstrated favorable short-term outcomes. One patient remains under regular follow-up, while the others were lost to follow-up.

## Discussion

This study highlights the essential role that exploratory laparoscopy can play in accurate staging and therapeutic planning of locally advanced colorectal cancer, particularly in low-resource settings such as Morocco. In our cohort of 24 patients, laparoscopic evaluation led to a change in treatment plan in 41% of cases, mainly due to the detection of peritoneal disease not identified on preoperative imaging.

In several patients, micro-nodular peritoneal involvement was identified along the paracolic gutters or the omentum, allowing for rapid biopsy, cytology, and appropriate therapeutic reclassification. These results confirm the usefulness of laparoscopy in the early detection of subclinical peritoneal carcinomatosis, particularly in high-risk patients. This approach is consistent with the conclusions of Elias et al. (2011), who demonstrated the benefits of systematic second-look surgery followed by HIPEC in asymptomatic patients at high risk of carcinomatosis, improving early detection and therapeutic strategy adaptation.

The added diagnostic yield of exploratory laparoscopy lies in its ability to directly visualize peritoneal surfaces, diaphragmatic domes, omental folds, and pelvic recesses—anatomic areas commonly missed or underestimated by CT. In several patients, micro-nodular disease along the paracolic gutters or omentum was identified laparoscopically, leading to prompt biopsy, cytological analysis, and appropriate reclassification. This high sensitivity supports existing literature affirming the value of laparoscopy in staging gastrointestinal cancers, including gastric, pancreatic, and colorectal malignancies (Muntean et al., 2008; Jayakrishnan et al., 2014).

Our data also reveal that laparoscopic assessment enables early adaptation of therapeutic strategies, sparing patients the morbidity of unnecessary laparotomies. Several patients in our cohort initially planned for curative resection were spared open surgery after laparoscopy revealed unresectable or disseminated disease. Instead, minimally invasive colostomies or biopsies were performed, streamlining care and facilitating the early initiation of systemic treatment.

In low- and middle-income countries (LMICs), where PET-CT and high-resolution MRI may not be available due to cost or technical limitations, exploratory laparoscopy offers an affordable and effective staging alternative. This is particularly relevant in Morocco, where cancer diagnosis often occurs at a late stage due to weak screening programs and poor public awareness. Integrating laparoscopy into CRC management protocols may help mitigate the diagnostic gap created by limited imaging resources.

The surgical safety profile observed in this study was acceptable. Despite the need to convert to open laparotomy in 45.8% of patients—primarily due to adhesions, obesity, or advanced tumor invasion—there were no intraoperative complications such as bowel perforation or major vascular injury. This conversion rate is in line with other series of laparoscopic surgery for advanced colorectal cancer, which typically report rates ranging from 30% to 50% (Lacy et al., 1995; Noblett & Horgan, 2007). Our postoperative complication rate was 8.3%, with two deaths related to severe complications (pulmonary embolism and peritonitis). These rates are higher than those reported in high-income countries but likely reflect the advanced disease stages and limited perioperative resources available in our setting.

Moreover, laparoscopy appears to confer benefits in terms of recovery metrics. The mean hospital stay was 3.5 days, and bowel function resumed within 1.45 days—comparable to or better than values reported in other international studies. These findings further support the safety and efficiency of laparoscopy even in a high-risk surgical population. They also echo studies indicating that minimally invasive approaches are associated with shorter hospitalization, reduced postoperative pain, faster recovery, and earlier initiation of adjuvant therapy (Greene & Heniford, 2010).

In addition to clinical advantages, laparoscopy offers economic benefits. By reducing unnecessary laparotomies and their associated costs—operative time, hospitalization, complications—laparoscopy contributes to more efficient resource utilization. In LMICs with constrained health budgets, this aspect is particularly valuable. The World Health Organization and regional policy-makers should consider supporting the expansion of laparoscopic surgery as part of comprehensive cancer control strategies.

Nevertheless, this study has limitations. First, the retrospective design limits the control over data collection and introduces potential selection bias. Second, the small sample size, though reflective of real-world practice in a single tertiary center, limits the statistical power and generalizability of our findings. Third, we were unable to systematically evaluate long-term survival or quality of life, outcomes that would be crucial in assessing the full impact of staging laparoscopy.

To overcome these limitations, future research should focus on prospective, multicenter studies comparing laparoscopic staging with imaging-based strategies in advanced CRC. These studies should also assess outcomes such as survival, disease progression, time to treatment initiation, quality of life, and cost-effectiveness. Randomized controlled trials could further validate the utility of laparoscopy as a standard component of CRC staging algorithms.

Moreover, institutional and national-level initiatives should focus on building laparoscopic capacity by investing in equipment, surgeon training, and infrastructure. Many hospitals in Morocco and similar settings still lack dedicated laparoscopic towers or instruments. Introducing laparoscopy as a routine component of oncology pathways would require not only technical preparation but also changes in policy and clinical culture.

Ethically, laparoscopy aligns with the principles of personalized and patient-centered care. It minimizes unnecessary interventions, tailors treatment plans to actual disease burden, and facilitates shared decision-making based on real-time findings. As Rau and Hünerbein (2005) assert, diagnostic laparoscopy is not merely a technical adjunct but a moral imperative in the modern management of abdominal cancers.

### Conclusion

Exploratory laparoscopy represents a powerful adjunct to conventional imaging in the management of locally advanced CRC. Its capacity to visualize occult metastatic disease and permit intraoperative adaptation of the therapeutic strategy results in better patient selection, optimal allocation of resources, and avoidance of unnecessary surgical trauma. In the present study, the 41% tumor reclassification rate reflects its high diagnostic yield in a population with limited access to PET scans or advanced MRI.

From a public health standpoint, the integration of laparoscopy into colorectal cancer care pathways in Morocco and similar contexts can contribute to reducing delays in treatment, improving survival outcomes, and enhancing the efficiency of oncology services. Training surgical teams in laparoscopy, securing adequate equipment, and incorporating this approach into national cancer strategies are necessary steps toward equitable cancer care.

Future prospective studies, ideally multicentric and randomized, are needed to confirm the prognostic value of laparoscopy-guided staging and its long-term impact on survival and quality of life. Until then, our findings support its inclusion in routine evaluation of patients with advanced CRC. Given its feasibility, safety, and diagnostic value, exploratory laparoscopy should be strongly considered a standard of care in the preoperative management of these patients.

## Consent and Ethics

All patients provided written informed consent prior to the procedure. The study protocol was reviewed and approved by the Ethics Committee of Ibn Rochd University Hospital.

## Disclaimer

The authors affirm that no generative artificial intelligence tools were used in the writing or editing of this manuscript.

### Références

1. El Housse H, Ajbara W, Amsaguine S, et al. Profils épidémiologiques et anatomoclinique d'une population marocaine atteinte de cancer colorectal. J Afr Cancer. 2015;7(2):95–9.
2. Arnold M, Sierra MS, Laversanne M, et al. Global patterns and trends in colorectal cancer incidence and mortality. Gut. 2017;66(4):683–91.
3. Society of American Gastrointestinal and Endoscopic Surgeons (SAGES). Guidelines for Diagnostic Laparoscopy. 2022.
4. Muntean V, Oniu T, Lungoci C, et al. Staging laparoscopy in digestive cancers. J Gastrointestin Liver Dis. 2008;17(4):425–9.
5. Hassan A, Elkerkary M, Gamal M, et al. Evaluation of staging laparoscopy in colorectal cancer assessment. Suez Canal Univ Med J. 2019;22(2):164–9.
6. Iyer RB, Silverman PM, DuBrow RA, Charnsangavej C. Imaging in the diagnosis, staging, and follow-up of colorectal cancer. AJR Am J Roentgenol. 2002;179(1):3–13.
7. Jayakrishnan TT, Zacharias AJ, Sharma A, et al. Role of laparoscopy in patients with peritoneal metastases considered for cytoreductive surgery and HIPEC. World J Surg Oncol. 2014;12:270.
8. Elias D, Honoré C, Dumont F, et al. Results of systematic second-look surgery plus HIPEC in asymptomatic patients presenting a high risk of developing colorectal peritoneal carcinomatosis. Ann Surg. 2011;254(2):289–93.
9. Lacy AM, García-Valdecasas JC, Piqué JM, et al. Short-term outcome analysis of a randomized study comparing laparoscopic vs open colectomy for colon cancer. Surg Endosc. 1995;9(10):1101–5.
10. Noblett SE, Horgan AF. A prospective case-matched comparison of clinical and financial outcomes of open versus laparoscopic colorectal resection. Surg Endosc. 2007;21(3):404–8.
11. Greene FL, Heniford BT, editors. Minimally Invasive Cancer Management. New York: Springer; 2010.
12. Rau B, Hünerbein M. Diagnostic laparoscopy: indications and benefits. Langenbecks Arch Surg. 2005;390(3):187–96.