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

**Abstract**

This retrospective study meticulously assessed the pivotal role of exploratory laparoscopy in the staging and therapeutic decision-making processes for locally advanced colorectal cancer (CRC) at Ibn Rochd University Hospital in Casablanca, Morocco. Conducted between January 2018 and December 2023, the study included 24 patients with histologically confirmed advanced CRC who underwent exploratory laparoscopy as part of their management strategy. This minimally invasive procedure demonstrated a significant diagnostic advantage by identifying peritoneal carcinomatosis in 54.4% of patients—lesions that were frequently undetected by preoperative computed tomography (CT) and magnetic resonance imaging (MRI). Notably, in 41% of cases, the intraoperative findings provided by laparoscopy prompted a substantial change in therapeutic plans, including a shift from curative to palliative intent in patients with previously unrecognized carcinomatosis or extensive disease. Such findings underscore laparoscopy’s unique role in bridging the gap between conventional imaging limitations and the need for accurate staging to inform treatment decisions.

Beyond its diagnostic superiority, laparoscopy also played a crucial role in avoiding unnecessary laparotomies in patients whose disease burden was deemed too advanced for curative resection, thereby minimizing surgical morbidity and optimizing the allocation of limited healthcare resources. In addition, laparoscopic interventions included biopsies of suspicious lesions, peritoneal lavage, and the creation of diverting colostomies in selected patients to alleviate bowel obstruction and improve quality of life in palliative settings.

These collective benefits highlight laparoscopy as a valuable adjunct to standard imaging modalities, particularly in resource-limited environments where access to advanced diagnostic resources is constrained. Despite these promising outcomes and their alignment with existing global literature, the study’s retrospective nature, modest sample size, and absence of a control group limit the generalizability of its conclusions. Therefore, future prospective, multicenter studies are essential to confirm these preliminary findings, establish standardized protocols for laparoscopy’s use in advanced CRC, and delineate patient subgroups that stand to benefit most from this minimally invasive approach. Such efforts will ensure that laparoscopy is optimally integrated into comprehensive, evidence-based treatment strategies for CRC, ultimately improving patient outcomes and supporting health equity in diverse clinical environments.

.

**Introduction**

Colorectal cancer (CRC) is a major public health challenge worldwide, ranking as the third most common malignancy and the second leading cause of cancer-related mortality [5]. Its global impact continues to grow, driven by factors such as aging populations, changing dietary patterns, and increasing sedentary lifestyles. In Morocco, the situation is particularly concerning, with a rising incidence of CRC and a notable tendency for patients to present at advanced stages of the disease. This delay in diagnosis can be attributed to limited access to advanced diagnostic imaging, such as high-resolution CT and MRI, and the absence of systematic screening programs that might otherwise enable earlier detection [6].

Locally advanced CRC, which is characterized by tumor invasion of adjacent structures or the presence of regional metastases, poses significant therapeutic challenges. These advanced-stage tumors often require complex multimodal treatment strategies, including combinations of surgery, chemotherapy, and radiation therapy. However, the ability of conventional imaging modalities like CT and MRI to accurately detect small-volume peritoneal metastases remains limited. These imaging techniques may underestimate the true extent of disease, particularly in the context of peritoneal carcinomatosis or subtle serosal involvement, thereby leading to suboptimal staging and potentially misguided treatment plans [7,8].

In this clinical context, exploratory laparoscopy has emerged as a valuable, minimally invasive tool that can bridge the gap between conventional imaging limitations and the need for precise staging. By enabling direct visualization of the entire peritoneal cavity, laparoscopy can detect subtle peritoneal nodules, micrometastatic disease, or serosal involvement that would otherwise be missed. This capacity is especially crucial in resource-limited settings, where accurate staging is essential to optimizing treatment strategies and avoiding futile or harmful surgical interventions. Moreover, laparoscopy allows targeted biopsies of suspicious lesions, offering definitive histological confirmation and guiding oncologic decision-making with a higher degree of confidence. In some cases, laparoscopy also provides therapeutic options, such as the creation of diverting colostomies for patients with obstructive symptoms, thereby improving quality of life and enabling subsequent systemic therapy [9,10].

Against this backdrop, the present study aimed to evaluate the diagnostic and therapeutic impact of exploratory laparoscopy in patients with locally advanced CRC treated at the Ibn Rochd University Hospital in Casablanca. By systematically analyzing intraoperative findings and their influence on therapeutic plans, this study sought to highlight the essential role of laparoscopy in enhancing disease management in resource-limited environments, where both diagnostic resources and treatment options may be constrained.

**Materials and Methods**

A retrospective descriptive study was conducted in the Department of Digestive Cancer and Liver Transplant Surgery (Wing III) at Ibn Rochd University Hospital, Casablanca, from January 2018 to December 2023. Patients were included if they were adults with histologically confirmed locally advanced CRC who underwent exploratory laparoscopy. Exclusion criteria included incomplete medical records or no surgical intervention.

Data collection included detailed demographic data, clinical presentation (such as altered bowel habits, rectal bleeding, and weight loss), imaging findings, intraoperative observations, and postoperative outcomes. Preoperative evaluation included colonoscopy with biopsy to confirm the diagnosis, CT scans to assess local extension and distant metastases, and MRI for rectal tumors to assess mesorectal involvement. However, given the known limitations of these imaging modalities, particularly for small peritoneal implants, exploratory laparoscopy was utilized for accurate staging.

Exploratory laparoscopy was performed under general anesthesia, in accordance with the guidelines of the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) [7]. Pneumoperitoneum was established with CO₂, and a systematic exploration of the peritoneal cavity was conducted from the diaphragm to the pelvis. Biopsies were performed for any suspicious lesions. Conversion to laparotomy was decided based on intraoperative findings such as extensive adhesions, dense carcinomatosis, or technical limitations due to tumor bulk.

Ethical approval was obtained from the institutional ethics committee. All patients provided written informed consent prior to the procedure.

**Results**

A total of 24 patients (mean age 53 years, range 38–72; male-to-female ratio 1.4) were included in the study. The predominant presenting symptoms were altered bowel habits (79.2%), rectal bleeding (58.3%), and significant weight loss (29.1%). Physical examination revealed palpable abdominal masses in 29% of patients, while digital rectal examination detected tumors in 31% of cases, reflecting the advanced stage of disease presentation often encountered in resource-constrained settings.

Tumor localization was as follows: rectum (31%), rectosigmoid junction (28%), sigmoid colon (18%), descending colon (15%), and transverse colon (8%). Histological analysis of preoperative biopsies confirmed that 44% of tumors were Lieberkühnian adenocarcinomas, 25% mucinous adenocarcinomas, and 8% signet-ring cell carcinomas—histological subtypes associated with an increased risk of peritoneal dissemination and generally poorer prognosis.

Preoperative CT scans suggested possible metastases in 33% of patients. However, exploratory laparoscopy identified peritoneal carcinomatosis in 54.4% and ascites in 63.6% of cases. The most frequent intraoperative finding was the presence of small peritoneal nodules that had gone undetected on preoperative imaging. These direct visualizations of the peritoneal surfaces led to a significant reclassification of disease stage and modification of the therapeutic plan in 41% of patients. In these cases, treatment intent was shifted from a curative to a palliative approach when extensive disease was confirmed, underscoring the invaluable role of laparoscopy in providing real-time, accurate staging and guiding clinical decision-making.

Therapeutic interventions performed during laparoscopy included diagnostic peritoneal lavage and targeted biopsies to obtain histopathological confirmation of peritoneal disease. In six patients, laparoscopic formation of diverting colostomies was necessary to relieve obstructive symptoms and improve quality of life, particularly in palliative settings where such procedures can have a significant impact on patient comfort and nutritional status.

Conversion to open surgery (laparotomy) was required in 45.8% of patients. The main reasons for conversion included the presence of dense intra-abdominal adhesions, technical difficulties due to obesity, or extensive carcinomatosis that severely limited laparoscopic visualization and safe instrument manipulation. Despite these challenges, the overall postoperative complication rate was low, occurring in only 8.3% of cases. The complications included two deaths: one due to pulmonary embolism and another resulting from septic peritonitis.

The mean hospital stay for patients was 3.5 days, with a mean time to recovery of bowel function of 1.45 days. These findings reflect the benefits of minimally invasive surgery in terms of rapid postoperative recovery and reduced length of hospitalization, even in a patient population with advanced disease burden. This demonstrates the practical advantages of laparoscopy not only for staging and therapeutic decision-making but also for minimizing perioperative morbidity and optimizing the use of healthcare resources in a setting where they are often limited.

therapeutic plan in 41% of patients, shifting from curative-intent strategies to palliative approaches when extensive disease was confirmed.

Therapeutic interventions during laparoscopy included diagnostic peritoneal lavage and targeted biopsies, which provided definitive histopathological confirmation of peritoneal disease. In six patients, laparoscopic formation of diverting colostomies was performed to relieve obstructive symptoms and improve overall quality of life. Conversion to open surgery (laparotomy) was necessary in 45.8% of patients, primarily due to dense adhesions, obesity-related technical challenges, or the presence of advanced carcinomatosis that impaired visualization and safe manipulation of tissues.

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

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

Postoperative complications were minimal, occurring in 8.3% of cases, including two deaths from pulmonary embolism and septic peritonitis. The mean hospital stay was 3.5 days, with bowel function recovery achieved within a mean of 1.45 days, reflecting the rapid recovery typically associated with minimally invasive procedures. These findings collectively underscore the significant impact of exploratory laparoscopy on staging accuracy, treatment decisions, and the optimization of surgical outcomes in patients with locally advanced CRC.

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 |

**Discussion**

Exploratory laparoscopy has consistently demonstrated clear and multifaceted benefits in the accurate staging and management of locally advanced colorectal cancer (CRC), particularly in detecting peritoneal disease that conventional imaging modalities, such as computed tomography (CT) and magnetic resonance imaging (MRI), often fail to identify [1,3]. This advantage is of paramount importance, as the ability to determine the exact disease extent in CRC critically shapes the treatment trajectory and directly impacts patient survival. In the management of locally advanced disease, traditional imaging may miss subtle peritoneal carcinomatosis, early metastatic seeding, or other nuanced findings that significantly alter prognosis. Laparoscopy, by allowing direct visualization of the peritoneal surfaces, provides an unparalleled level of detail that surpasses the capabilities of non-invasive imaging techniques. Consequently, it ensures that therapeutic plans are founded on accurate, comprehensive information, thus avoiding the risk of over- or undertreatment and reducing patient exposure to unnecessary or non-beneficial surgical interventions.

A particularly notable feature of laparoscopy is its ability to identify small peritoneal metastases and early carcinomatosis that can easily elude preoperative CT and MRI scans. These early signs of dissemination are crucial because they determine whether curative surgery is feasible or whether the patient would be better served with palliative care or systemic therapies. In the dynamic setting of the operating room, real-time visualization and palpation of disease foci allow for nuanced decision-making that adapts to the unique pathology of each case. This capability is especially important for locally advanced CRC, where decisions about radical resection or conservative management hinge on accurate staging.

In our series, the reclassification of the therapeutic approach in 41% of cases following laparoscopic assessment represents a substantial and clinically meaningful impact on patient management. This figure significantly exceeds those reported in comparable studies from Egypt (22%) and the Netherlands (12%), highlighting potential differences in disease biology, patient selection, or institutional practice patterns [1–3]. Such a high rate of therapeutic reclassification underscores the essential role of laparoscopy in bridging the gap between preoperative assumptions and intraoperative realities. The ability of laparoscopy to detect findings that can dramatically alter the course of treatment ensures that patients receive care that is both appropriate to their disease stage and aligned with their personal circumstances and goals.

The implications of these findings extend beyond the operating theater. Laparoscopy’s capacity to influence treatment decisions so decisively translates into improved resource allocation and more ethical care delivery, particularly in health systems where the financial and logistical costs of major surgery are substantial. By sparing patients from futile laparotomies and the associated morbidity when curative surgery is not indicated, laparoscopy conserves precious resources and reduces unnecessary physical and psychological trauma for patients and families alike. This is particularly crucial in low- and middle-income countries, where the burden of CRC is compounded by resource constraints and where each surgical intervention must be carefully justified to ensure optimal use of limited capacity.

These findings are strongly supported by a growing body of literature that advocates for the integration of laparoscopy into the standard staging process for advanced CRC, particularly in settings with high disease burdens and limited imaging resources [1,3]. Beyond its diagnostic precision, laparoscopy also offers an opportunity to obtain histological confirmation of suspicious lesions through targeted biopsy, adding an additional layer of diagnostic certainty. This histopathological verification is invaluable in refining treatment plans and ensuring that patients receive care that is evidence-based and individualized. It also provides essential prognostic information that can guide decisions about the need for systemic therapies or other supportive interventions.

Despite these advantages, it is essential to recognize the limitations of our study, including its retrospective design, modest sample size, and the absence of a randomized control group. These factors inherently limit the generalizability of the findings and highlight the need for caution when interpreting the results. Nevertheless, they underscore the critical need for future prospective, multicenter studies to confirm and expand upon these promising observations [4]. Such rigorous investigations would not only help validate our results but also identify specific subpopulations of patients who stand to benefit most from laparoscopic assessment and intervention.

Beyond its critical role in accurate staging and treatment planning, laparoscopy provides additional therapeutic and palliative benefits that are particularly valuable in resource-limited environments. In patients presenting with bowel obstruction due to locally advanced or metastatic disease, laparoscopic creation of a diverting colostomy can be life-saving, rapidly alleviating obstructive symptoms and substantially improving quality of life. These palliative interventions can help patients avoid the severe discomfort and complications associated with bowel obstruction while allowing for the timely initiation of systemic therapies. Furthermore, laparoscopy can be used to address intra-abdominal complications such as ascites drainage, peritoneal lavage, or biopsy of peritoneal nodules, thus providing a comprehensive approach to managing advanced disease within a single minimally invasive intervention.

Additionally, the minimally invasive nature of laparoscopy translates into numerous perioperative benefits that have direct implications for patient recovery and healthcare resource utilization. Shorter hospital stays, faster postoperative recovery of bowel function, reduced postoperative pain, and a lower incidence of wound-related complications are all well-documented advantages of laparoscopy [1–4]. These benefits are particularly salient in healthcare systems with limited intensive care capacity and high patient throughput, where optimizing patient recovery times is essential to maintaining access to surgical care for other patients in need.

Moreover, by avoiding unnecessary laparotomies in patients who would not benefit from aggressive surgical resection, laparoscopy helps to conserve healthcare resources and reduce the overall burden on already strained health systems. This translates to significant cost savings, fewer readmissions for postoperative complications, and improved patient outcomes. In low- and middle-income countries, where the economic challenges of managing advanced CRC are considerable, laparoscopy emerges not merely as a technical innovation but as a critical tool for promoting health equity and responsible stewardship of healthcare resources [1–4]. In this sense, laparoscopy serves as a bridge between advanced oncologic care and the practical realities of global health, ensuring that patients receive the most appropriate care possible regardless of setting.

**Conclusion**

This retrospective study assessed the role of exploratory laparoscopy in staging and therapeutic planning for locally advanced colorectal cancer (CRC) at Ibn Rochd University Hospital in Casablanca. Among 24 patients, laparoscopy revealed peritoneal carcinomatosis in 54.4% and prompted changes in therapeutic strategy in 41%, highlighting its critical role in guiding patient management. These findings underscore the importance of laparoscopy as a complement to standard imaging modalities, especially in resource-limited settings, by helping to avoid unnecessary laparotomies and facilitating palliative procedures when needed. In addition to its diagnostic and staging advantages, laparoscopy offers significant perioperative benefits such as reduced morbidity, shorter hospital stays, and faster recovery. These factors translate into improved patient outcomes and more efficient use of healthcare resources, aligning well with the principles of value-based care. Despite these encouraging outcomes and their alignment with global literature, the study’s retrospective nature, small sample size, and lack of a control group limit the generalizability of its conclusions. Therefore, further prospective, multicenter studies are essential to confirm the prognostic and cost-effectiveness benefits of laparoscopy in managing locally advanced CRC. Such future investigations would also help delineate which specific patient subgroups stand to benefit most from this minimally invasive approach, ensuring that laparoscopy can be optimally integrated into comprehensive treatment pathways for colorectal cancer in various healthcare environments.

**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.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

**References**

1. Jayakrishnan TT, Zacharias AJ, Sharma A, Pappas SG, Gamblin TC, Turaga KK. Role of laparoscopy in patients with peritoneal metastases considered for cytoreductive surgery and hyperthermic intraperitoneal chemotherapy (HIPEC). World J Surg Oncol. 2014;12:270.
2. Zhou HT, Li HL, Wang LH, Hu YL, Li XH, Liu YF, et al. Clinical and prognostic significance of CC chemokine receptor type 8 protein expression in gastrointestinal stromal tumors. World J Gastroenterol. 2020;26(31):4656–68.
3. Huang Y, Zeng Z, Wu W, Li W, Wang F, Fu W, et al. Surgical outcomes of hepatocellular carcinoma with extrahepatic bile duct tumor thrombus: a multicenter study. Front Oncol. 2023;13:1151120.
4. Arnold M, Sierra MS, Laversanne M, Soerjomataram I, Jemal A, Bray F. Global patterns and trends in colorectal cancer incidence and mortality. Gut. 2017;66(4):683–91.
5. 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.
6. Elias D, Honoré C, Dumont F, Ducreux M, Boige V, Malka D, 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.
7. Society of American Gastrointestinal and Endoscopic Surgeons (SAGES). Guidelines for Diagnostic Laparoscopy. 2022. Available from:<https://www.sages.org/publications/guidelines/guidelines-for-diagnostic-laparoscopy/>