ORIGINAL ARTICLE

Short Term Outcomes of Laparoscopic Right Hemicolectomy with Complete Mesocolic Excision for Right Colon Cancer

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Abstract

Background: ***More than half a million people die each year from colorectal adenocarcinoma, making it one of the most frequent cancers in the world. The right hemicolon is involved in around 40% of these tumors.***

Aim and objectives: ***To assess the efficacy of right colon cancer laparoscopic hemicolectomy with total mesocolic excision.***

Subjects and methods: ***Following clearance from the research ethics committee of the Al-Azhar Faculty of Medicine, this prospective study was carried out from February 2023 to February 2025 on 40 patients with operable right colon cancer at the General Surgery Department of Al-Azhar University Hospitals. Every single patient who took part in the trial gave their informed consent.***

Results: ***During the operation, there was a statistically significant difference in the amount of time it took to complete the anastomosis and reconstruction processes ($p<0.001$), as well as the amount of time it took to complete the operation overall compared to the open group ($p<0.001$). In cases where it was deemed necessary, US was used to conduct bedside imaging to closely monitor all clinical and laboratory indicators during the postoperative period. In terms of the first day of motion, when to start oral intake, and length of hospital stay, the laparoscopic group outperformed the open group ($p=0.017$, 0.017, and 0.004 correspondingly) .***

Conclusion: ***There are several benefits to doing a right hemicolectomy using a laparoscopic technique rather than an open one. These include a more favourable postoperative course and better pathological outcome. The problem of lengthy operating times can be mitigated with experience; after a certain number of procedures, the surgeon will have mastered the art and will need less time in the operating room.***

Keywords: Outcomes; Colon cancer; Laparoscopic right hemicolectomy; Mesocolic excision

1. Introduction

There are several benefits to laparoscopic surgery, including faster recovery, less pain, and less short-term morbidity.[1]

The ideal technique for laparoscopic surgery is a "medial-to-lateral" approach. By cutting the mesocolon along the mesenteric axis, near the superior mesenteric vein, a laparoscopic right hemicolectomy can be performed. The superior mesenteric vein is the ideal location for the division of the ileocolic veins.[2]

Separation of the pancreatic head from the transverse colon is accomplished when the mesocolic interface has been exposed. The procedure continues by exposing the gastrocolic trunk of Henle as the dissection moves along the superior mesenteric vein. Following this, the origin of the right branch of the middle colic artery is severed, allowing the artery to ascend from the superior mesenteric artery. While doing so, the lymph nodes are carefully removed, while the left branch of the middle colic artery is preserved.

At the same time, after locating the main colic vein, its right branch's root is severed. Dissecting the larger omentum on its right side is the next step in the anterior-to-median technique. Between the omentum and transverse mesocolon, the fusion fascia separates, and the hepatic flexure is mobilised.[3]

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Gouvas et al. examined the quality of colonic specimens obtained by laparoscopic colon cancer surgery in comparison to those obtained through open surgery during a complete mesocolic excision (CME) procedure that included central vascular ligation.[4]

Bae et al. provided evidence that laparoscopy-assisted CME was both feasible and safe when compared to open CME for right colon cancer, and showed that the former had better short-term results.[5]

However, Storli et al. found no difference in postoperative results between CME procedures performed using a laparoscopic method and those performed using an open approach for colon cancer.[6]

This study set out to assess the efficacy of laparoscopic right hemicolectomy in conjunction with full mesocolic excision as a treatment for cancer of the right colon.

2. Patients and methods

Forty patients with operable right colon cancer were enrolled in this prospective trial from February 2023 to February 2025 in the General Surgery Department of Al-Azhar University Hospitals. The study was approved by the research ethics committee in the Al-Azhar Faculty of Medicine. Every single patient who took part in the trial gave their informed consent.

Inclusion criteria:

Individuals whose colon cancer is operable, as well as those who are medically eligible for surgery

Exclusion criteria:

After a thorough medical history, physical exam, and any necessary preoperative tests, our study included patients with metastatic right-sided colon cancer (stage IV), patients with irresectable right-sided colon cancer, and all patients who met the inclusion criteria.

Sample size and randomization:

Our patients were randomly assigned to one of two groups using a computer-assisted randomization (or card) system: Group A consisted of 20 patients who underwent a full mesocolic right hemicolectomy; Group B included 20 patients who underwent a full mesocolic right hemicolectomy with the help of laparoscopy and manual assistance.

Preoperative assessment:

Every patient had a thorough medical history obtained, then a physical exam, a local examination, and standard laboratory testing. The radiological examination made use of computed tomography (CT) scans and conventional X-rays. Most patients underwent a full colonoscopy to the caecum, as well as a barium enema, intravenous urinalysis, positron emission tomography (PET) scan, bone scan, and colonoscopy.

Operative steps:

Laparoscopic technique:

The surgeon stands between the patient's knees in the modified lithotomy position, which is the ideal patient position. The infra- or supra-umbilical position was the most typical for inserting the optic trocar. Another possible position is supine.

On the left side of the centerline, you can see two operational trocars. The specifics of the anatomy and the surgeon's personal preference dictated the vast range of trocar positions, sizes, and numbers. Two fingers below the umbilicus, in the right mid-clavicular line, is where another helping port was inserted for traction.

The peritoneum was sliced on both sides, starting in the middle of the vascular pedicle, and preparation was done along the ileocolic pedicle from central to peripheral. Initial focus was on locating the pedicles in the mesenteric and middle colic regions. The next step was a central transsection of the ileocolic and right colic (if accessible) vessels.

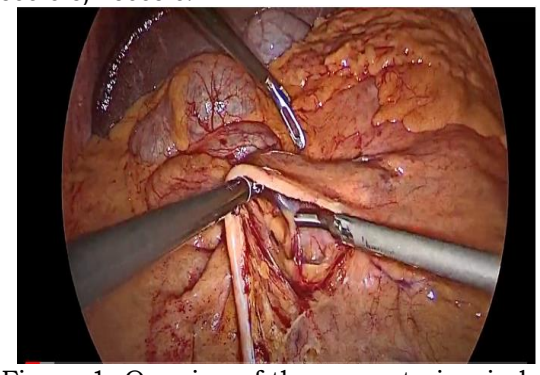

Figure 1. Opening of the mesenteric window by harmonic to expose the iliocolic pedicle of vessels.

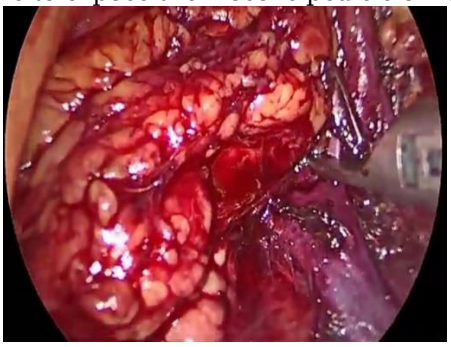

Figure 2. Clipping of rt branch of mcv.

When dissecting the ascending colon or caecum, the right colon was mobilized from the medial to the lateral approach using either the mesofascial or retrofascial planes. Next, starting at the proximal transverse colon and working our way up to the hepatic flexure.

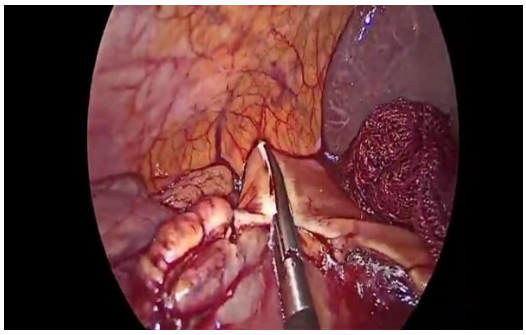

Figure 3. Mobilization of the hepatic flexure laterally.

Figure 4: Mobilization of the right colon laterally.

Transection of the ileal stump and transverse colon stump by stapling was done, and intracorporeal ileo-transverse anastomosis by stapling, then a single pelvic drain was inserted. A pfennistiel incision was made to deliver the excised specimen, and it was sent for histopathology.

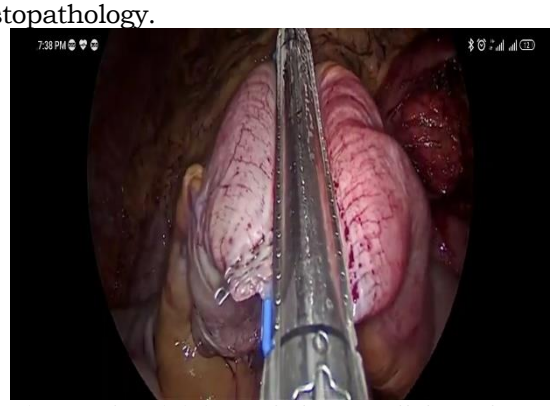

Figure 5. Division of the small bowel margin by staple.

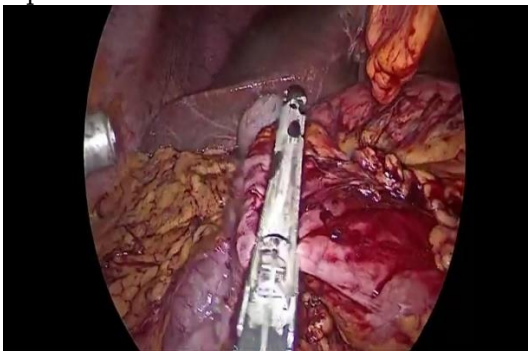

Figure 6. Division of the transverse colon stump.

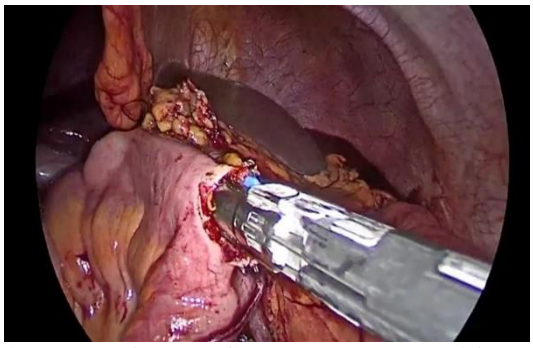

Figure 7. Iliotransverse side-to-side anastomosis.

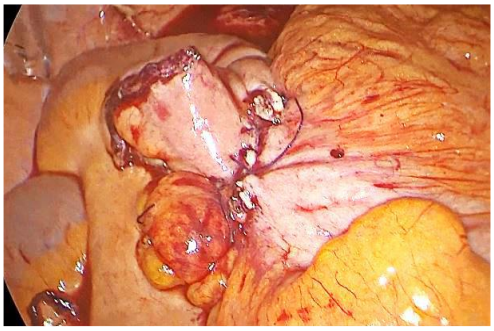

Figure 8. Side-to-side anastomosis.

Post-operative morbidity:

Using the Clavien-Dindo classification7, we classified postoperative morbidity as follows: Grade I, Grade II, Grade IV, and Grade V. Any variation from the normal postoperative course was deemed postoperative morbidity.

Ethical consideration:

The study ensured that all patients gave their informed consent. The research ethics committee at Al-Azhar Faculty of Medicine also gave their blessing.

Statistical analysis:

I used SPSS v26 (IBM Inc., Chicago, IL, USA) to complete the statistical analysis. The data distribution was checked for normality using the Shapiro-Wilks test and histograms. The mean and standard deviation (SD) were used to display the quantitative parametric data. The non-parametric quantitative data were displayed using the interquartile range (IQR) and median. Numbers and percentages were used to represent qualitative variables. $P<0.05$ was deemed significant, which is the accepted level of significance in this study.

3. Results

Table 1. Information on the patients' demographics.

		(N=20)
AGE (YEARS)	Mean±SD	51±9
SEX	Male	8(40%)
	Female	12(60%)
BODY MASS INDEX	Mean±SD	36±4

The average age (±SD) was 51 (±9) years. Twelve (60%) ladies and eight (40%) guys were present. The mean (±SD) body mass index was 36(±4) kg/m2, (table 1).

Table 2. Comorbidities of the studied patients.

	(N=20)
SMOKING	12(60%)
DIABETES MELLITUS	4(20%)
HYPERTENSION	5(25%)

There were 12(60%) patients' smokers, 4(20%) patients had diabetes mellitus and 5(25%) patients had hypertension, (table 2; figure 9).

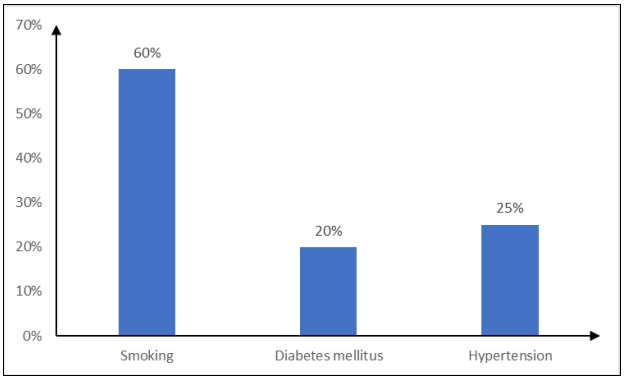

Figure 9. Comorbidities of the studied patients.

Table 3. Preoperative symptoms of the studied patients.

	(N=20)
BLEEDING	4(20%)
CONSTIPATION	0(0%)
WEIGHT LOSS	8(40%)
PAIN	14(70%)

Bleeding was present in 4(20%) patients, weight loss was present in 8(40%) patients, pain was present in 14(70%) patients and constipation wasn't present in any patient, (table 3; figure 10).

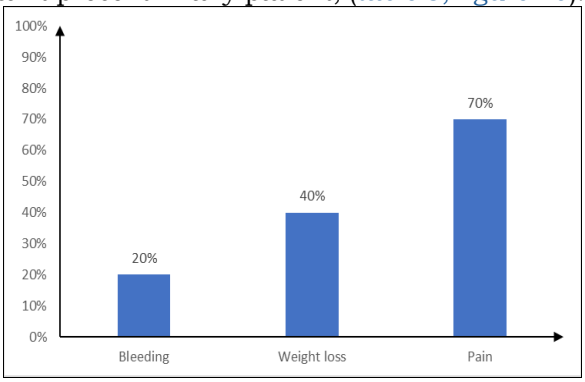

Figure 10. Preoperative symptoms of the studied patients.

Table 4. Preoperative laboratory findings of the studied patients.

		(N=20)
HEMOGLOBIN (G/DL)	Mean±SD	11.3±1.5
WBCS (109/L)	Mean±SD	7.72±2.26
ALBUMIN (G/DL)	Mean±SD	3.5±0.3
CEA	Median (range)	2.5(0.5-19)
CA19.9	Median (range)	21(2-150)

CEA:Carcinoembryonic antigen, CA:Cancer antigen.

Hemoglobin was with a mean value (±SD) of 11.3(±1.5) g/dl. WBCs were with a mean value (±SD) of 7.72(±2.26) 109/l. Albumin was with a mean value (±SD) of 3.5(±0.3) g/dl. CEA ranged from 0.5 to 19 with a median 2.5. CA19.9 ranged from 2 to 150 with a median 21, (table 4).

Table 5. Intraoperative characteristics of the studied patients.

		(N=20)
TYPE OF ANASTOMOSIS	Side to side	20(100%)
	End to side	0(0%)
STAPLER USE		20(100%)
METHOD OF DISSECTION	Harmonic	20(100%)
	Diathermy	0(0%)
	Covering ileostomy	0(0%)
BLOOD LOSS (ML)	Median (range)	100(50-250)
OPERATIVE TIME (MIN)	Mean±SD	133±21
TIME OF ANASTOMOSIS (MIN)	Median (range)	35(25-40)

Side to side anastomosis, stapler use and harmonic dissection were present in all patients. Covering ileostomy wasn't present in any patient. Blood loss ranged from 50 to 250 ml with a median 100 ml. Operative time was with a mean value (±SD) of 133 (±21) min. Time of anastomosis ranged from 25 to 40 ml with a median 35 ml, (table 5).

4. Discussion

The idea behind CME and CRM procedures is that the mesorectum is composed of two layers, the visceral and parietal, which lie in two planes and surround the rectum like an envelope. These layers contain the lymphatics and supplying vessels. The rectum and the lymph nodes around it are surgically removed during TME, a more extreme oncological operation. However, the idea of "envelope" mesentery in colon cancer surgery has only been the subject of a small number of investigations. The colon is encased in the parietal and visceral peritoneal layers in the same way as the mesorectum.[7,8]

The average amount of blood loss was 80 ml, and the average operation time was 150 minutes, according to a study of 36 patients who had CME. The median operating time for group (A) was 150 minutes, whereas for group (B) it was 180 minutes, according to the same study. Hospitalization and the duration needed for bowel movements were two and twelve days, respectively. Three instances (8.5%) had associated morbidities.[9]

The present research, which also included 40 patients with CME, found that groups A and B had an average operating time of 97±11 and 133±21 minutes, respectively. Both groups also had an average blood loss of 100 ml. Participants in the study required a hospital stay of 3(2-5) days and 2(1-4) days, respectively.

In addition, the following information on the perioperative outcomes in 156 patients who had CME with CVL is known: the average time of the operation was 191.5±56 minutes. A total of 85.6 millilitres of blood was lost. The average number of days spent in the hospital after surgery was 13.9±6.1. Starting to sip fluid orally took an average of 4.7 days. The average duration for

consuming only liquids was 6.3±2 days. On average, it took 7.7±2.7 days to start a regular diet. There were 23.1% of problems that occurred after the operation. Three patients (1.9%) experienced respiratory issues, while thirteen patients (8.3%) had local wound complications (infection and/or dehiscence). One patient, accounting for 0.6% of the total, developed postoperative haemorrhage. Two patients, or 1.3% of the total, developed an intra-abdominal abscess. Two patients, or 1.3% of the total, experienced chyle leakage. Only one patient died 30 days after the operation as a result of excessive bleeding on day four following the procedure.[10] No cases of chyle leakage, postoperative respiratory problems, or death were identified in this investigation.

Huang et al.,[11] We studied the postoperative results of laparoscopic versus open CME and found that the former did not require any cases to be switched to open surgery. There was no statistically significant difference between the two groups with regard to the mean operating time. Almost identical to the open group, the laparoscopic group's operation time was 194±57 vs. 177±51 min, with a p-value of only 0.118. When comparing the two groups in our study, we discovered that the open group had a much shorter operating time ($p<0.001$). The main reason for the difference in operating time was the lengthier dissection time for the laparoscopic group, which was significantly different in terms of reconstructing time ($p<0.001$).

Mori et al.,[3] reviewed the results of a retrospective study including 31 patients who had laparoscopic CME for right colon cancer and had no complications during the procedure. The average amount of time spent operating ranged from 165 to 420 minutes. The median time for the laparoscopic group's operation was 97±11 minutes in our study. Two major postoperative problems, ileus and anastomotic haemorrhage, were experienced by the majority of patients. Two instances of leaking (10%) and four cases of wound infection (20%) were among the five problems documented in this study.

Athanasiou et al.,[12] assessed the safety of whole mesocolic excision in right colon cancer by analyzing its short-term results. No death was observed, 13.1% had Clavien-Dindo complications (grade III or more), and 5.3% required reoperation, despite unfavourable clinical characteristics (7% of individuals were 75 years old or older, 32% were in ASA class III, and 30% had a body mass index (BMI) greater than 28). The median length of surgical specimens was 34.5 cm, with a mean of 24.3 lymph nodes collected. The median length of the proximal margin was 16.8 cm, while the median length of the distal margin was 14.3 cm.

Laparoscopic right hemicolectomy involving total mesocolic excision was studied by Melich and colleagues to determine operating duration and postoperative outcomes. The median value of the operating duration in that 81-case study was 220 minutes. After some time had passed, the average operating time had dropped from 250 minutes to 200 minutes. On average, 31.3 lymph nodes were removed during the procedure, and 3.6% of patients reported major complications. Even after just a short time with this method, cumulative sum analysis revealed the expected rates of complications and cancer outcomes.[13]

Limitations: A limited number of patients and the follow-up period of the patients post-operatively is relatively short, preventing sufficient evaluation of the long-term oncological outcomes.

4. Conclusion

The laparoscopic approach for right hemicolectomy with complete mesocolic excision has some advantages over the open approach, especially regarding post-operative course and pathological outcome. The disadvantage associated with long operative time can be handled over time, as the more operations to be done, the higher the learning curve the surgeon achieves and of course, a shorter operative time.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article

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Conflicts of interest

There are no conflicts of interest.

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