Scientific Research Publishing

Surgical Science, 2022, 13, 429-434
https://www.scirp.org/journal/ss
ISSN Online: 2157-9415
ISSN Print: 2157-9407

Outcome of Laparoscopic versus Open Colorectal Cancer Surgery

Mohannad Eledreesi, Ahmad Alayed, Youssef Alishi, Abdullah Ghabban, Osamah Aldraiwish, Feras Alahmed

Department of Surgery, King Salman Aramid Forces Hospital, Tabuk, Saudi Arabia
Email: drmaledrisy@gmail.com

How to cite this paper: Eledreesi, M., Alayed, A., Alishi, Y., Ghabban, A., Aldraiwish, O. and Alahmed, F. (2022) Outcome of Laparoscopic versus Open Colorectal Cancer Surgery. *Surgical Science*, **13**, 429-434.
https://doi.org/10.4236/ss.2022.139051

Received: August 1, 2022
Accepted: September 27, 2022
Published: September 30, 2022

Abstract

Introduction: Since the first laparoscopic-assisted colon resection was introduced in 1991 by Jacobs *et al.*, it has gradually become popular. Increasingly more colorectal surgeons admit that the laparoscopic technique leads to quicker functional recovery and improved short-term results when compared with the open approach. However, the laparoscopic technique has not previously been proven to gain significant benefits in colorectal surgeries. Recently, oncologic outcomes of colorectal cancer resection, in terms of lymph node harvest number and excision safety margin lengths, achieved under laparoscopy could be comparable to those obtained using the conventional open technique. However, the curability of colorectal cancer under the laparoscopic technique remains controversial because of the uncertainty about the overall recurrence rate. **Objective:** To study the outcome of colorectal surgeries in our department in order to compare laparoscopic surgery (LS) versus open surgery (OS) of colorectal cancer procedures in terms of operations duration, blood loss, intra and post-operative complications. **Methods:** Review of all colorectal cancer patients who underwent open and laparoscopic procedures between January 2014 and January 2020. Excluding patients, those have non-malignant tumors. Included in data collection are the patients' demographic information, type of surgery, diagnostic test, complications, operative time, and hospital admission period. We will take the information from files of patients and our documentations during clinic visits. **Results:** A total of 101 patients underwent colorectal cancer surgery at King Salman Armed Forces Hospital from 1/1/2014 till 1/1/2020. Of these, 63 were male (62.3%). Of these colon cancer were 68 cases (67%). The mean age was 47.2 years. Comorbidities included diabetes 13 (12%), hypertension 10 (9.9%), IHD 16 (15%), ESRD 4 (3.9%). Of these 41 were smokers (40.5%). Mean Body Mass Index (BMI) was 31.2 kg/m^2. Mean hospital stay 7 ± 2 days for OS and 5 ± 2 for LS. Fifty nine patients (58.4%) underwent OS. 7 cases (6.9%) of LR had conversion. **Conclusion:** LS of colorectal cancer has better

short-term results than OS but longer operative time.

Keywords

Colon Cancer, Rectal Cancer, Colorectal Cancer

1. Introduction

Surgery is the only curative treatment for colorectal cancer. Curative surgery requires resection of the primary tumour with negative margins and a complete oncologic lymphadenectomy. The resected colic segment depends on vascularization and lymphatic drainage at the tumour site and, according to the American Joint Committee on Cancer, a minimum of 12 lymph nodes should be retrieved in surgical specimens. Otherwise, tumour stage could be underestimated, and a suboptimal treatment could be offered [1].

Traditionally, colorectal cancer resection has been performed exclusively through open surgery. However, following successful laparoscopic procedures, such as chole-cystectomy, appendectomy and treatment of incisional hernias, this surgical approach has gradually been introduced first in the treatment of colon cancer and then in the treatment of rectal cancer [2].

2. Objective

To study the outcome of colorectal surgeries in our department in order to compare laparoscopic surgery (LS) versus open surgery (OS) of colorectal cancer procedures in terms of operations duration, blood loss, intra and post-operative complications.

3. Methods

Review of all colorectal cancer patients who underwent open and laparoscopic procedures between January 2014 and January 2020. Excluding patients those have non-malignant tumors. Included in data collection are the patients' demographic information, type of surgery, diagnostic test, complications, operative time, and hospital admission period. We will take these information's from files of patients and our documentations in clinic visits.

4. Results

A total of 101 patients underwent colorectal cancer surgery at King Salman Armed Forces Hospital from 1/1/2014 till 1/1/2020. Of these, 63 were male (62.3%). Of these colon cancer 68 cases (67%) (**Figure 1**) and 33 were rectal cancer (33%) (**Figure 2**). The mean age was 47.2 years. Comorbidities included diabetes 13 (12%), hypertension 10 (9.9%), IHD 16 (15%), ESRD 4 (3.9%). Of these 41 were smokers (40.5%). Mean Body Mass Index (BMI) was 31.2 kg/m^2. Mean hospital stay 7 ± 2 days for OS and 5 ± 2 for LS. Fifty nine patients (58.4%)

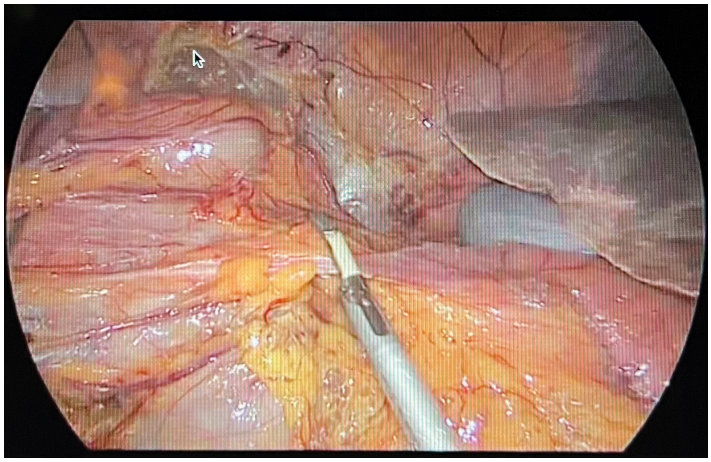

Figure 1. Colon cancer.

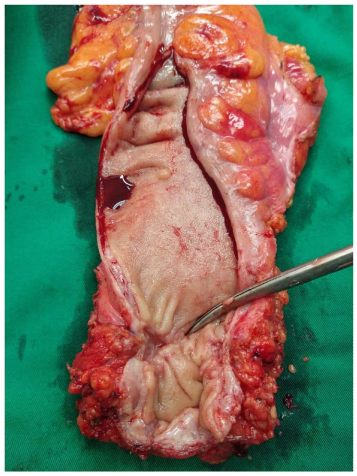

Figure 2. Rectal cancer.

underwent OS (Figure 2). 7 cases (6.9%) of LR non had conversion. Mean operative time was 190 minutes (128 minute and 252 minute for OS and LS, respectively). Five cases (4.9%) had recurrence of cancer (Three after OS and two after LS with rate of 5.7% and 4.7%, respectively). Three cases (2.9%) developed leak (2 cases in OS and one cases in LS with rate of 3.3% and 2.3%, respectively). Three cases (2.9%) developed seroma (2 cases in OS and one case in LS with rate of 3.3% and 2.3%, respectively). Three cases (1.9%) developed hematoma (2 cases in OS and one case in LS with rate of 3.3% and 2.3%, respectively. Two cases (1.9%) developed fistula (one case in OS and one case in LR with rate of 1.9% and 2.3%, respectively). Four cases (3.9%) developed pelvic collection (3 cases in OS and one cases in LR with rate of 5.7% and 2.3%, respectively) (Table 1). No reported vascular or bowel injury.

Table 1. Rate of complications.

Complications	OS	LS
Recurrence	5.7%	4.7%

Continued

Leak	3.3%	2.3%
Seroma	3.3%	2.3%
Hematoma	3.3%	2.3%
Fistula	1.9%	2.3%
Pelvic collection	5.7%	2.3%
Wound infection	13%	4.7%

5. Discussion

In 2007, Liang and colleagues published results of a randomized trial conducted in Taiwan by a single surgeon. Time to recurrence after colon cancer resection was not significantly different between the laparoscopic and open procedure (p = 0.36). The cumulative incidence of recurrence was 17% with laparoscopy and 21.6% with open surgery [3]. In 2009, Ng and colleagues presented results of a randomized trial conducted in a single centre in Hong Kong to evaluate long-term oncologic efficacy of laparoscopic surgery for proximal rectal cancer (12 - 15 cm from the anal verge). After a median follow-up of about 110 months, no difference was found between laparoscopic and open surgery in terms of overall survival (p = 0.30), cancer-related survival (p = 0.60) and disease-free survival (p = 0.70) in patients with stage I - III rectal cancer. Mean survival was not different for stage IV cancer (p = 0.16). During the 10-year follow-up period, 37.3% of patients assigned to laparoscopy and 38.8% of patients assigned to open surgery died; 15.3% and 16.4% were rectal cancer-related deaths, and 18.6% and 19.4% were other cancer-related deaths, respectively. Recurrence rates (local 7.1% v. 4.9%, p = 0.68; distal 12.3% v. 18.1%, p = 0.37), mean number of lymph nodes harvested (11.5 v. 12, p = 0.70) and positive resection margins (2.6% v. 1.3%, p = 0.62) were similar with laparoscopic and open surgeries, respectively [4]. Survival is the most crucial concern for assessing success for malignant disease treatment. This study included a 60-month follow-up and compared LR and OR for non-metastatic colorectal cancer. The results of cancer-related survival and incidence of tumor recurrence favored the LR group, despite that there was no statistically significant difference regarding the oncological results. The Clinical Outcome of Surgical Therapy study, which was the largest randomized controlled trial conducted so far, also showed the same results as ours and even overall survival between the two groups after a median four-year follow-up [5]. In 2011, Huang and colleagues conducted a meta-analysis including 6 clinical trials (n = 1033) that evaluated efficacy of laparoscopic surgery in rectal cancer treatment. Three-year overall survival (p = 0.11, 4 trials) and disease-free survival (p = 0.11, 3 trials) were not significantly different after laparoscopy or open surgery. After a follow-up ranging from 32.8 to 112.5 months, local recurrence rates after laparoscopic and open surgery were not statistically different (p = 0.21, 4 trials). No difference was observed between laparoscopy and open sur-

gery for the mean number of lymph nodes harvested ($p = 0.43$, 5 trials); positive circumferential resection margins were also similar (7.9% v. 5.4%, $p = 0.63$, 5 trials) [6]. Three additional meta-analyses compared short-term oncologic outcomes after laparoscopic and open surgery for rectal cancer and showed no difference between the procedures in terms of the mean number of lymph nodes harvested and the rate of positive resection margins [7] [8] [9].

6. Conclusion

Laparoscopic surgery for colon and rectal cancer is associated with better short-term outcomes, whereas long-term outcomes regarding survival and recurrence rates are comparable. Nevertheless, long-term results in rectal surgery remain to be seen. Early recognition of anastomotic leakage remains a challenge, though multiple improvements have allowed better management of this complication. Enhanced recovery programs or fast-track surgery also resulted in reduced length of hospital stay and overall complications without affecting patient safety. Laparoscopic Surgery was also found to be oncological safe but longer operative time.

Conflicts of Interest

The authors declare no conflicts of interest regarding publication of this paper.

References

[1] Wilkinson, N. and Scott-Conner, C.E. (2008) Surgical Therapy for Colorectal Adenocarcinoma. *Gastroenterology Clinics of North America*, **37**, 253-267. https://doi.org/10.1016/j.gtc.2007.12.012

[2] Martel, G. and Boushey, R.P. (2006) Laparoscopic Colon Surgery: Past, Present and Future. *Surgical Clinics of North America*, **86**, 867-897. https://doi.org/10.1016/j.suc.2006.05.006

[3] Liang, J.T., Huang, K.C., Lai, H.S., *et al.* (2007) Oncologic Results of Laparoscopic versus Conventional Open Surgery for Stage II or III Left-Sided Colon Cancers: A Randomized Controlled Trial. *Annals of Surgical Oncology*, **14**, 109-117. https://doi.org/10.1245/s10434-006-9135-4

[4] Ng, S.S., Leung, K.L., Lee, J.F., *et al.* (2009) Long-Term Morbidity and Oncologic Outcomes of Laparoscopic-Assisted Anterior Resection for Upper Rectal Cancer: Ten-Year Results of a Prospective, Randomized Trial. *Diseases of the Colon & Rectum*, **52**, 558-566. https://doi.org/10.1007/DCR.0b013e31819ec20c

[5] Clinical Outcomes of Surgical Therapy Study Group (2004) A Comparison of Laparoscopically Assisted and Open Colectomy for Colon Cancer. *The New England Journal of Medicine*, **350**, 2050-2059. https://doi.org/10.1056/NEJMoa032651

[6] Huang, M.J., Liang, J.L., Wang, H., *et al.* (2011) Laparoscopic-Assisted versus Open Surgery for Rectal Cancer: a Meta-Analysis of Randomized Controlled Trials on Oncologic Adequacy of Resection and Long-Term Oncologic Outcomes. *International Journal of Colorectal Disease*, **26**, 415-421. https://doi.org/10.1007/s00384-010-1091-6

[7] Wu, Z., Zhang, S., Aung, L.H., *et al.* (2012) Lymph Node Harvested in Laparoscopic versus Open Colorectal Cancer Approaches: A Meta-Analysis. *Surgical Laparosco-*

py, *Endoscopy & Percutaneous Techniques*, **22**, 5-11. https://doi.org/10.1097/SLE.0b013e3182432b49

[8] Aziz, O., Constantinides, V., Tekkis, P.P., *et al.* (2006) Laparoscopic versus Open Surgery for Rectal Cancer: A Meta-Analysis. *Annals of Surgical Oncology*, **13**, 413-424. https://doi.org/10.1245/ASO.2006.05.045

[9] Gao, F., Cao, Y.F. and Chen, L.S. (2006) Meta-Analysis of Short-Term Outcomes after Laparoscopic Resection for Rectal Cancer. *International Journal of Colorectal Disease*, **21**, 652-656. https://doi.org/10.1007/s00384-005-0079-0