Cancer Surgery
ISSN: 2573-542X

Ahmed et al., Cancer surgery (Los Angeles, Calif.) 2018, 3:1
DOI: 10.4172/2573-542X.1000118

Research Article Open Access

Forty-Eight Hours Hospital-Stay after Fast-Track Laparoscopic Colorectal Surgery: A Prospective Study

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Abstract

Objective: To examine the safety and feasibility of a two-day hospital stay regimen after laparoscopic colorectal surgery in a referral center.

Patients and methods: This prospective study involved 50 patients with colorectal cancer scheduled for laparoscopic colorectal surgery (LCS). They were randomly allocated into one of two groups; FTS Group (n=25) had LCS within fast-track regimen extending for 48 hours postoperatively only and Control Group (n=25) had LCS with conventional care program. Fast-track care was employed with its pre-, intra- and postoperative phases. In FTS, patients were discharged after 48 hours if discharge criteria were fulfilled (ambulating, afebrile patient tolerating oral feeding under adequate pain control). Postoperative complications were recorded.

Results: The two groups had comparable baseline characteristics, outcome of surgery and rate of complications. There was no significant difference between the two groups in the rates of conversion to laparotomy (p=1.000), readmission (p=0.235), and reoperation (p=0.609). Fifteen patients (75%) of the FTS group met discharge criteria and discharged 48 hours after surgery. Delayed discharge was due to postoperative ileus (n=3), uncontrolled blood sugar (n=1) and chest infection (n=1). The median duration of hospital stay in the Control group was 7 days (range: 6-9 days).

Conclusion: A two-day hospital stay after LCS is safe and feasible under fast-track regimen. It did not increase the rate of complications of readmissions. Patients fulfilling standardized criteria can be safely discharged on the second postoperative day with a low readmission and complication rate.

Keywords: Fast track surgery; Laparoscopic colectomy

Introduction

Rapid and complication-free recovery is the primary goal for patients undergoing colon and rectal surgery. Traditional colorectal resection is associated with a relatively high complication rate (8-20%) and a postoperative hospital stay of 8-12 days [1]. Since its introduction in the early 1990s, laparoscopic colorectal surgery is gaining increasing popularity. Several studies emphasized its advantages over open surgery of lesser pain, earlier recovery of gut transit and shorter hospital stay [2,3]. Its use increased from 13.8% in 2007 to 42.6% in 2009 of all colorectal resections [4].

Even though laparoscopic colorectal surgery allows an earlier recovery and discharge from the hospital, a short hospital stay has not been routinely achieved [5] with reported mean hospital stay rates varying from 4 to 15 days [6].

The concept of multimodal perioperative care (fast-track surgery, enhanced recovery after surgery programs) is widely accepted as the standard of care at present [7]. Combining laparoscopy with enhanced recovery after surgery (ERAS) was associated with a shorter hospital stay, low complication rate, and a low readmission rate [8-10] With this protocol, a mean hospital stay between 3.5 and 4.5 days has been reported [11,12].

The aim of this work was to examine the safety and feasibility of a two-day hospital stay under fast-track care regimen after laparoscopic colorectal surgery in a referral center.

Patients and methods

This prospective study involved a group of 50 patients with colorectal cancer scheduled for laparoscopic colorectal surgical intervention. They were recruited from the National Cancer Institute and As-Salam International hospital. Inclusion criteria were patients with colonic or high rectal cancer aged up to 75 years with an ASA class 1 or 2 and a body mass index (BMI) <35 kg/m^2. Patients who started and completed open colorectal surgery, having a malignant bowel obstruction or unenthusiastic to participate were excluded.

Patients were randomly allocated to one of two groups. The assignment of patients to either group was done by a random computer-assisted allocation. The allocation was done by the use of opaque envelopes with assignments. FTS Group (n=25) had Fast-track laparoscopic colorectal surgery regimen extending for 48 hours postoperatively, and Control Group (n=25) were managed with conventional laparoscopic colorectal surgery program.

Methods

Baseline demographics, BMI, previous abdominal surgeries, preoperative diagnosis, postoperative outcomes, and readmission and

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Received: October 22, 2018; **Accepted:** November 19, 2018; **Published:** November 26, 2018

Citation: Ahmed IS, Mahmoud AM, Debaky Y, Abed SMA, Adlan S (2018) Forty-Eight Hours Hospital-Stay after Fast-Track Laparoscopic Colorectal Surgery: A Prospective Study. Cancer surgery (Los Angeles, Calif.) 3: 118. DOI: 10.4172/2573-542X.1000118

reoperation rates were recorded.

Perioperative care protocol for FTS Group:

1. Preadmission information and counseling

2. No mechanical preoperative bowel preparation was done.

3. Preoperative fasting for two hours for liquids and for six h for solid food

4. Pre-anesthesia medication: from midnight before surgery patients did not receive medications known to cause long-term sedation.

5. Prophylaxis against thromboembolism: subcutaneous enoxaparin sodium 40 mg was given 12 hours before the expected time of lumbar epidural catheter insertion and continued at 40 mg daily until 12hours before the removal of the epidural catheter and the discharge.

6. Antimicrobial prophylaxis: patients received single-dose of a 3rd generation cephalosporin for prophylaxis against both anaerobes and aerobes about one hour before surgery.

Standard anesthesia protocol

Long-acting intravenous/epidural opioids were avoided in all patients. A multimodal analgesic regimen was adopted. A loading dose of intravenous (IV) ketorolac 30 mg and dipyrone sodium 20 mg/kg were given and lumbar epidural anesthesia (LEA) commenced preoperatively with continuous infusion containing bupivacaine 0.125% with fentanyl 2 micrograms/ml at a rate 6-12 ml/hour and continued for postoperative. The nasogastric intubation was used only intraoperatively. Intraoperative normothermia was maintained with an upper-body forced-air heating cover to prevent intraoperative hypothermia. IV dexamethasone 8 mg and ondansetron 8 mg (single dose) were given after induction of anesthesia to prevent postoperative nausea and vomiting (PONV).

Perioperative fluid management

A preload of 500 mL colloid was given before epidural anesthesia. During surgery, lactated Ringer's solution infusion a rate of 4 ml/kg/hour was administered. Blood loss was replaced 1:1 with colloids. Red cell transfusion was given according to a preoperative target hematocrit which depends on age and condition of the heart. Target hematocrit was 26 when the age >65 with good heart condition. The target hematocrit is determined at 28 if one of these two factors was present. For patients were older than 65 and had cardiomyopathy, the target haematocrit was 30. Urinary catheterization was maintained for 24 hours after the operation. According to Chang [13], conversion was defined as the need for laparotomy to accomplish the procedure or premature abdominal incision for colorectal dissection or vascular control.

Postoperative pain management

In the Post-Anesthesia Care Unit (PACU), patients received continuous lumbar epidural bupivacaine 0.125% and fentanyl 2 microgram/ml at a rate of 6-12 ml/hour. The epidural catheters were removed before discharge from PACU. Afterward, ketorolac 30 mg /8 hours was given throughout the postoperative course. Oral analgesia (paracetamol) was administered when the patient was able to tolerate oral intake.

Postoperative Early mobilization and nutritional care

Independence and early mobilization were encouraged. Patients were strongly encouraged to get out of bed for a period longer than two hours starting on the day after the operation. Postoperative serial CBC and CRP were measured. Sips of water were allowed in the postoperative day (POD) 0, and then a liquid diet was given in POD 1. On POD 2, soft diet was allowed.

Discharge criteria were ambulating afebrile patient without tachycardia, tolerating oral feeding under adequate pain control with oral analgesics. Leukocytic count or C-reactive protein should be non-rising and sufficient support at home was ensured. All patients of the FTS group were discharged after 48 hours unless the discharge criteria were not fulfilled.

Follow up was completed within one month (immediate postoperative outcome). Postoperative complications were divided into surgical complications (i.e., wound infection, anastomotic leak, postoperative bleeding) and general complications (i.e., cardiovascular, deep venous thrombosis).

Statistical methods

Statistical analysis was done using IBM SPSS Statistics version 22 (IBM Corp., Armonk, NY, USA). Numerical data were expressed as a mean and standard deviation or median and range as appropriate. Qualitative data were expressed as frequency and percentage. Chi-square test (Fisher's exact test) was used to examine the relationship between qualitative variables. For quantitative data, comparison between two groups was made using independent sample t-test or Mann-Whitney test. All tests were two-tailed. A p-value <0.05 was considered significant.

Results

There was no significant difference between the two studied groups regarding age, gender, and BMI (Table 1). Right colon cancer was more common in control group while recto sigmoid/upper rectal cancer was more common in FTS group (p=0.008). Accordingly, the type of procedure performed was different between the two groups.

	FTS Group (n=25)	Control Group (n=25)	p value
Age (years)	51.9 ± 9.0	51.1 ± 7.8	0.738
Gender, male/female	15-Oct	18-Jul	0.37
Body mass index	29.2 ± 5.2	28.3 ± 4.3	0.508
History of Previous abdominal surgeries	7 (28%)	5 (20%)	0.508
Preoperative diagnosis			
Right colon cancer	3 (12%)	12 (48%)	
Left colon/sigmoid cancer	12 (48%)	7 (28%)	0.008
Rectosigmoid/upper rectal cancer	10 (40%)	4 (16%)	
Other (FAP)	0 (0%)	2 (8%)	

Table 1: Baseline characteristics of the two studied groups

	FTS Group (n=25)	Control Group (n=25)	p value
Conversion to open	5 (20%)	4 (16%)	1
Surgical complications			
Wound infection	4 (16%)	2 (8%)	0.667
Anastomotic leak	2 (8%)	1 (4%)	0.609
General complications	2 (8%)	3 (12%)	1
Readmission rate	3 (12%)	0 (0%)	0.235
Reoperation rate	3 (12%)	1 (4%)	0.609

Table 2: Results of outcome and complications of the obstructive colorectal cases

The two groups were comparable in the outcome of surgery and rate of complications (Table 2). There was no significant difference between the two groups in the rates of conversion to laparotomy (p=1.000), readmission (p=0.235), and reoperation (p=0.609). General complications were in the form of chest infection, cardiovascular complications, and deep vein thrombosis.

Five patients of the FTS group were converted to open surgery. Fifteen of the remaining 20 patients (80%) met the discharge criteria and were discharged 48 hours after surgery. The discharge of five patients (20%) was delayed beyond the scheduled 48 hours due to different reasons. Postoperative ileus was the cause of two extra days in hospital in 3 patients (12%). The remaining two patients needed three more days in hospital; one due to uncontrolled blood sugar, and the other for treatment of chest infection. The median duration of hospital stay in the Control group was 7 days (range: 6-9 days).

Discussion

The primary target of laparoscopic colorectal surgery (LCS) is reducing the requirement of pain control, rapid gastrointestinal recovery, and shortening of postoperative hospital stay [14]. Ten years after the introduction of LCS, fast-track surgery (FTS) was introduced by the Kehlet group. It involved multiple perioperative measures combining patient education, epidural or regional anesthesia, minimally invasive techniques, optimal pain control, and early enteral feeding and ambulation [15,16]. Integration of FTS into LCS looks like the ideal way for rapid and safe postoperative recovery. This was the idea of the current study.

Many previous studies highlighted the role of FTS during laparoscopy in the enhancement of postoperative recovery of gastrointestinal function, reduction of complications rate and shortening the duration of postoperative hospitalization. A retrospective study reported a median hospital stay of 7 days for patients treated with FTS combined with laparoscopic rectal cancer resection [17]. Other prospective studies reported median postoperative stay between 3.7 and 5.5 [18-22]. The relatively lengthy hospital stay in the retrospective analysis mentioned above can be attributed to the high frequency of leakage reported in this study and that most of the cases underwent LAR with diverting ileostomy that require extra-postoperative care. In the current series, no patients with low rectal cancer were involved, and we did not perform diverting stoma for any patient.

In the current study, we tested the assumption of application of FTS regimen up to 48 hours postoperatively in a group of patients with colorectal cancer managed by LCS. The selection of 48 hours to apply FTS regimen was based on the average time to regain intestinal movement and to pass flatus and the resumption of liquid diet reported in previous studies [18,23,24].

Laparoscopic resection was successful in 20 patients (80%) of the FTS group; 15 of them were discharged safely after 48 hours. Two patients (10%) were readmitted within 11 days due to anastomotic leakage. On the other hand, the median duration of hospital stay after conventional care was 7 days (range: 6-9 days).

Five patients needed extended hospital stay beyond the 48 hours; postoperative ileus (POI) was the cause in three of them. POI is the most common cause for delayed hospital discharge after abdominal surgery [25]. The exact mechanism is controversial, but three major mechanisms are supposed to play a role in POI: neural sympathetic inhibitory overactivity, opioids, and intestinal inflammatory responses [25-27]. The multimodal postoperative fast-track approach has been shown to reduce the duration of POI after open or laparoscopic abdominal surgery to 24-48 hours in most patients [27].

In the current study, FTS resulted in a comparable outcome of surgery and rate of complications compared to the conventional care after LCS. There was no significant difference between FTS and conventional care in the rates of conversion to laparotomy, readmission, and reoperation. All cases of reoperation were due to anastomotic leakage which is a complication of surgical technique unrelated to FTS regimen.

The absence of mechanical preoperative bowel preparation in the current study was not associated with a significant increase in infectious complications or anastomotic leakage. The primary purpose of mechanical bowel preparation is to reduce postoperative complications and facilitation of the intraoperative bowel handling. Modern practice questioned this procedure. Now it is believed that elective colon resection can be safely accomplished without preoperative mechanical bowel preparation [28]. The omission of mechanical preparation was not associated with impaired healing of colonic anastomosis or an increased incidence of wound infection [28,29].

Adjustment of intraoperative fluids is an essential part of the fast-track regimen. The infusion of excess intraoperative fluids during the traditional care protocols increases the risk of pulmonary interstitial edema and postoperative hypoxia. Excess fluid can exaggerate gastrointestinal edema which may slow the recovery of gastrointestinal function [18].

Proper multimodal management of postoperative pain is crucial for FTS protocol as pain is the single most important factor leading to delay in ambulation and prolongation of hospital stay [30]. In the current study, we used continuous thoracic epidural analgesia in the PACU, then ketorolac and paracetamol during the remaining postoperative stay. Other investigators use patient-controlled analgesia with IV morphine without increase of hospital stay [31]. In colectomy patients, ketorolac was found to reduce narcotic usage and provide a more rapid return of bowel function [32]. Early mobilization and diet progression are essential items of all rapid recovery protocols [22]. These items are enhanced by proper pain control and resumption of gastrointestinal function.

The combination of the perioperative measures included in the fast-track regimen employed in the current study ensured rapid recovery from surgery that allowed the limited hospital stay of 48 hours. Early discharge is restricted by pain, organ dysfunction, nausea and vomiting, ileus, hypoxemia, fatigue, and immobilization. The idea of 48 hours to discharge was successful in 75% of the patients in the current study. Postoperative ileus was the main extending factor, and the anastomotic leak was the only cause of readmission. Therefore, better measures of bowel management may improve the gastrointestinal outcome which may enhance the chances of the suggested 48 hours fast-track regimen.

Conclusion

This study suggests that a two-day hospital stay after LCS is safe and feasible under fast-track regimen. It did not increase the rate of complications of readmissions. Patients fulfilling standardized criteria can be safely discharged on the second postoperative day with a low readmission and complication rate. However, owing to the small number of patients involved in this study, we cannot give a solid recommendation to follow this approach unless its benefit/complication balance is confirmed in a study of large number of patients.

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