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# Outcome of laparoscopic versus open resection for rectal cancer in elderly patients



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## ABSTRACT

**Background:** Laparoscopic colorectal resection has been gaining popularity over the past two decades. However, studies about laparoscopic rectal surgery in elderly patients with long-term oncologic outcomes are limited. In this study, we evaluated the short-term and long-term outcomes of laparoscopic and open resection in patients with rectal cancer aged  $\geq 70$  y. **Methods:** From 2007–2012, a total of 294 consecutive patients with rectal cancer from a single institution were included, 112 patients undergoing laparoscopic rectal resection were compared with 182 patients undergoing open rectal resection.

**Results:** Seven (6.3%) patients in the laparoscopic group required conversion to open surgery. The two groups were well balanced in terms of age, gender, body mass index, American society of anesthesiologists scores, site, and stage of the tumors. Laparoscopic surgery was associated with significantly longer median operating time (220 versus 200 min;  $P = 0.005$ ), less estimated blood loss (100 versus 150 mL;  $P < 0.001$ ), a shorter postoperative hospital stay (8 versus 11 d), lower overall postoperative complication rate (15.2% versus 26.4%;  $P = 0.025$ ), wound-related complication rate (7.14% versus 17.03%;  $P = 0.015$ ), less need of blood transfusion (8.04% versus 16.5%;  $P = 0.038$ ), and surgical intensive care unit after surgery (12.5% versus 22.0%;  $P = 0.042$ ) when compared with open surgery. Mortality, quality of surgical specimen, lymph nodes harvested, positive distal, and circumferential margin rate were not significantly different between two groups. The estimated 3-y survival rates were similar between two groups.

**Conclusions:** Laparoscopic rectal surgery is safe and feasible in patients  $>70$  y and is associated with better short-term outcomes when compared with open surgery.

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## 1. Introduction

Colorectal cancer is the fourth most common cancer in China [1]. With improved life expectancy of Chinese people, an

increasing number of people will survive into their seventies. These people have a high incidence of colorectal cancer and also have more comorbidities and reduced functional reserve than younger patients [2]. Surgery remains the

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mainstay for resectable colorectal cancer. However, previous studies demonstrate that elderly patients undergoing open colorectal resection are associated with a high mortality and morbidity [3,4].

Laparoscopic colorectal resection has become popular during the past two decades. A series of randomized, prospective clinical trials have confirmed that laparoscopic colectomy is associated with better immune and inflammatory response, short hospitalization, more rapid postoperative recovery, and equally long-term oncologic outcomes compared with open surgery [5–12]. On the contrary, minimally invasive surgery for rectal cancer remains controversial, because of the anatomic complexity of the pelvis and more technical expertise demands for total mesorectal excision (TME) and preserving the autonomic nerves than colectomy. The main concern is that the oncologic outcomes maybe compromised by laparoscopic rectal cancer surgery. Substantial evidence is lacking, but some multicenter, prospective, randomized clinical trials are undergoing [12–16]. In addition, data on laparoscopic *versus* open resection in elderly rectal cancer patients with long-term outcomes are limited.

In this study, we evaluated the short-term and long-term outcomes of laparoscopic and open resection in rectal cancer patients aged  $\geq 70$  y.

## 2. Patients and methods

The ethics committee at Cancer Hospital, Chinese Academy of Medical Sciences approved the study, the protocol conformed to the ethical guidelines of the 1975 Declaration of Helsinki. From 1 June 2007–1 June 2012, consecutive patients with rectal cancer aged  $\geq 70$  y who underwent laparoscopic or open resection in our institution were retrieved. All the patients were diagnosed before surgery by colonoscopy with biopsy, the patients whose tumors were  $>15$  cm away from the anal verge and those who only had simple stoma formation were excluded.

All the surgeons in this study perform both laparoscopic and open rectal surgery. All the patients were given the option of open and laparoscopic surgery. The choice of surgical approach was made between patient and surgeon after the risks and benefits of different approaches had been explained adequately. A total of 294 patients were included in this study, 112 patients underwent laparoscopic resection and 182 patients underwent open resection.

All the patients received computed tomography scan, abdominal ultrasound, and barium enema before surgery. Transrectal ultrasonography was performed in 189 (64.3%) patients, and 157 (53.4%) patients received pelvic magnetic resonance imaging for preoperative staging. As we previously described about the technique details of laparoscopic surgery for rectal cancer, multiport techniques were used for all the patients and TME principle was followed [17]. Bowel mobilization, division of vessels, and dissection of lymph nodes were performed laparoscopically. For anterior resection, the specimen was retrieved through a small abdominal incision and intracorporal anastomosis was performed using a circular stapler. Postoperative managements were the same between laparoscopic and open groups.

Postoperative specimens were examined by at least two pathologists specialized in colorectal cancer. The specimens were examined grossly and microscopically. Intraoperative perforation was defined as unintended perforation of the tumor or the adjacent bowel during surgery. The quality of TME specimen was determined using pathology reports and scored using three grades: good, intact mesorectum with only minor irregularities of a smooth mesorectal surface. No defect is deeper than 5 mm, and there is no coning toward the distal margin of the specimen; moderate, moderate mesorectal bulk, but with irregularities of the mesorectal surface. Moderate coning of the specimen is allowed; poor, little mesorectal bulk with defects down to the muscularis propria and/or very irregular circumferential resection margin. Circumferential resection margins were considered involved when a microscopic tumor was  $\leq 1$  mm from the mesorectal fascia.

Demographic and clinicopathologic parameters were documented prospectively, including age, sex, body mass index (BMI), prior history of abdominal surgery, and American society of anesthesiologists (ASA) scores. Operative procedure details were recorded, including operating time and estimated blood loss. Tumor stage and margin status were ascertained based on final pathologic assessment. Tumors were staged according to the American Joint Committee on Cancer (seventh edition) staging system. Postoperative complications were monitored for 30 d after surgery, mortality was defined as death within 30 d after surgery. Data of last follow-up and vital status were collected on all patients. After hospital discharge, patients were suggested to visit the doctors every 3 mo within first 2 y and every 6 mo for a total of 5 y.

Patients who required conversion were included in the laparoscopic group because data were analyzed according to an intention-to-treat basis. Continuous variables are expressed as median and were analyzed with the Mann–Whitney *U*-test, whereas categorical ones are expressed as percentage value and were analyzed by chi-square test or Fisher exact test when appropriate. Overall survival was defined from the date of operation to the date of death. Recurrence was defined by either imaging studies or pathologic findings. Disease-free survival was defined as the time from operation to local recurrence, metastasis, or death. Kaplan–Meier method was used to analyze the survival of patients, and the curve of survival between groups was analyzed by the log-rank test. All statistical tests were two-sided, and a *P* value of  $<0.05$  was considered statistically significant. Data were analyzed by Statistical Package for the Social Science 18.0 for Windows (Statistical Package for the Social Science Inc, Chicago, IL).

## 3. Results

A total of 294 patients were included in this study, 38.1% (112/294) patients underwent laparoscopic resection and 61.9% (182/294) patients underwent open resection. The clinical characteristics of patients were presented in Table 1. The two groups were well balanced in terms of age, gender, BMI, prior history of abdominal surgery ASA scores, location, and stage of the tumors.

The operative outcomes were detailed in Table 2. Types of operation were not statistically different between groups.

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