

Laparoscopic Colorectal Resection in Octogenarians Is as Good as in Younger Patients

Wisam Khoury, Razan Khoury, Yoram Kluger, Ahmad Assalia, Ahmad Mahajna*

Department of General Surgery, Rambam Health Care Campus, The Technion-Institute of Technology, Haifa, Israel
Email: *a_mahajna@rambam.health.gov.il

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Abstract

Purpose: To assess the feasibility and safety of laparoscopic colorectal resection among octogenarians. **Method:** All patients who underwent laparoscopic colorectal resection were identified from an IRB approved, prospectively maintained laparoscopy database of a single surgeon, between the years 2004-2010. The patients were classified into two subgroups, below and above the age of 80 years (octogenarians and non octogenarians). Also, an additional group of patients, age above >80 years, who underwent open colon or rectal resection, was identified from the departmental database, while matching for age, gender, ASA score, type and indication (benign or malignant) for surgery. The subgroups were compared for postoperative morbidity and recovery parameters. **Results:** Seventy four patients underwent laparoscopic colorectal resection procedures by a single surgeon (20 octogenarian and 54 non-octogenarian patients). Mean age was 85.2 vs 62.1, respectively. Colon cancer was the most common indication for surgery in both groups of octogenarians. The Conversion rate was comparable between non and octogenarians. Postoperative morbidity rate and length of hospital stay were significantly higher after open procedures as compared to laparoscopic ones, in octogenarian and non octogenarian patients, 50% vs 15% vs 13%, $p = 0.0001$, and 12.4 vs 8.9 vs 7.6 days, $p = 0.01$, respectively. **Conclusions:** Laparoscopic colorectal resection is feasible and safe in octogenarians.

Keywords

Laparoscopy, Colorectal Surgery, Octogenarians, Postoperative Outcomes

1. Introduction

Life expectancy has significantly increased over the last decades, and major op-

erations are now frequently required in elderly patients. Advanced age is a risk factor which may drive surgeons to omit operative treatment in this particular group. In addition, age related comorbidities are a serious obstacle that may not allow general anesthesia in the advanced age groups, and may be associated with high postoperative morbidity rate [1] [2].

Laparoscopic approach has been widely employed in abdominal operations. Laparoscopy and pneumoperitoneum are usually associated with physiologic changes that affect the pulmonary and cardiovascular systems [3]. The cumulative effects of pneumoperitoneum and age related comorbidities, may limit the use of laparoscopic technique in the elderly patients [4] [5].

Laparoscopic technique is frequently used for colorectal procedures [6] [7] [8]. It was found feasible and safe. Moreover, multiple benefits over the open technique have been reported. Decreased postoperative pain, early return of bowel function, low perioperative complications rate, faster postoperative recovery and decreased disability are well known advantages [4] [5] [6] [7] [9] [10] [11]. Those benefits may eliminate age related outcomes in the elderly patients.

Since most common indications for colon or rectal resection in the elders, *i.e.* pelvic floor disorders, colorectal malignancy and diverticulosis [10], can be approached laparoscopically, and since one may never be too old to undergo a laparoscopic colectomy [8] [12], we assume that elderly patients may further benefit the laparoscopic technique.

Most studies that have discussed the laparoscopic colorectal surgery in elderly patients have evaluated patients above 65 years old. It is still not well defined whether octogenarians (age >80) may gain benefits from laparoscopic colectomy as in younger patients [4] [5] [6] [12].

This study aims to assess the feasibility and safety of laparoscopic colorectal resection among octogenarians, and to define benefits in terms of early outcomes as compared to younger patients and to same age counterparts undergoing open colorectal surgery. Since it is a single surgeon series, a reliable outcome as compared to previous published papers are expected.

2. Patients and Methods

All patients who underwent laparoscopic colon or rectal resection were identified from an institutional review board (IRB) approved, prospectively maintained laparoscopy database of a single surgeon at Rambam health care campus, between the years 2004-2010. The surgeon has completed a two years training in laparoscopic surgery after general surgery residency, and practicing surgery for a total of 14 years. Generally, all patients who require bowel surgery at this service will be operated on using the laparoscopic technique, except for patients who cannot tolerate pneumoperitoneum, due to heart and/or respiratory failure, or patients with multiple previous laparotomies.

The patients were classified into two subgroups, above and below the age of 80 years (octogenarians and non octogenarians). Also, an additional group of patients, age above 80 years, who underwent open colorectal resection, was identi-

fied from the departmental database, while matching for age, gender, ASA score, type and indication (benign or malignant) for surgery. Open procedures were performed by several experienced staff surgeons. Patients with a history of multiple previous abdominal operations were excluded from the control group.

Patients' demographics, disease characteristics, intraoperative details, and early postoperative outcomes (within 30 days after surgery) were collected, from the database and charts review.

Intraoperative details included operative time, conversion rate and intraoperative complications *i.e.* bowel injury, hemorrhage or cardiovascular complications. Postoperative outcomes pertained to length of hospital stay (LOS), postoperative complications *i.e.* cardiovascular complications, leak or abscess, wound infection, other infectious complications and postoperative ileus (defined as lack of bowel movement within 5 days post surgery or reinsertion of nasogastric tube due to vomiting). Also were collected the reoperation and readmission rates, and mortality events.

The subgroups were compared for early morbidity and mortality, and recovery parameters, aiming at assessing the differences in outcomes among octogenarians undergoing open and laparoscopic colorectal procedures, and also to evaluate outcomes of laparoscopic colorectal procedures in octogenarian as compared to younger patients.

3. Statistical Analysis

Descriptive data were presented as mean \pm standard deviation (SD), and median (range), number of patients and percentages. The student's *t*-test was used to compare normally distributed variables; otherwise the Mann-Whitney nonparametric test was applied. Comparison between groups for discrete variables was performed by the chi-square test or Fisher's exact test when appropriate. A *P* value ≤ 0.05 was considered statistically significant.

4. Results

4.1. Patients

A total of eighty three patients underwent colon or rectal resection by the same surgeon during the study period. Laparoscopic technique was used in 74 patients. Twenty patients were 80 years or older and 54 were <80 year old. Mean age was 85.2 and 62.1 years respectively. The control group consists of 20 octogenarian patients who underwent open colorectal procedures with mean age of 85.3 years. Patients' demographics are listed in **Table 1**. The octogenarian groups included a higher percentage of females as compared to the non octogenarian group.

Of the laparoscopic subgroups, more patients in the octogenarian subgroup were operated for malignant disease. Types of the surgical procedures distributed equally between the subgroups, **Table 1**. The conversion rate in the octogenarian and non octogenarian groups was comparable 5% vs. 7.4%, *p* = 0.99,

respectively (**Table 2**). A similar trend was noticed with regard to intraoperative complications and operative time, **Table 2**.

4.2. Outcomes

Early postoperative morbidity and LOS were significantly greater in the open group as compared to the laparoscopic octogenarian and non octogenarian subgroups, 50% vs. 15% vs. 13%, $p = 0.0001$, and 12.4 ± 7 vs. 8.9 ± 5.1 vs. 7.6 ± 7 days, $p = 0.01$, respectively. Postoperative morbidity and LOS were significantly greater in the open octogenarian group as compared to their laparoscopic counterparts, **Table 3**. In particular, there was a trend towards higher infectious complication rate in the open group, without however reaching statistical significance, 20% vs 5%, $p = 0.34$. Noteworthy, is the comparable postoperative morbidity rates and LOS in both laparoscopic subgroups, **Table 3**. Similar trend was noticed with regard to postoperative mortality 0%, in both groups, while one mortality event was documented in the open group. There was no significant difference between groups in terms of early readmissions and reoperations, **Table 3**.

Table 1. Patient and disease characteristics, indication and type of surgery.

	Laparoscopy Age >80 (N = 20)	Laparoscopy Age <80 (N = 54)	Open Age >80 (N = 20)	<i>p</i> -value*	<i>p</i> -value**
Age, years (mean \pm SD)	85.2 \pm 4.4	62.1 \pm 15.3	85.3 \pm 3.3	0.0001	0.93
Gender (female/male)	13/7	15/39	13/7	0.54	1
ASA score (mean \pm SD)	2.6 (\pm 1)	2.2 (\pm 1.1)	2.8 (\pm 1.1)	0.103	0.55
Indication for surgery				0.29	0.69
Colon/rectal cancer	14	27	15		
Adenoma	2	5	3		
Diverticular disease	1	17	1		
Volvulus	2	3			
Bowel obstruction	1	2	1		
Inflammatory bowel disease		1			
Type of operation				0.42	0.99
Right Hemicolectomy	12 (60%)	20 (38%)	12 (60%)		
Left Hemicolectomy	1 (5%)	7 (12.4%)	1 (5%)		
Sigmoidectomy	3 (15%)	12 (22%)	3 (15%)		
Subtotal Colectomy	1 (5%)	1 (1.9%)	1 (5%)		
Anterior Resection/Abdominoperineal Resection	3 (15%)	12 (22.7%)	3 (15%)		

SD—standard deviation. *Laparoscopic groups age >80 vs age <80. **Octogenarians laparoscopic vs open groups.

Table 2. Intraoperative data.

	Laparoscopy Age >80 (N = 20)	Laparoscopy Age <80 (N = 54)	Open Age >80 (N = 20)	<i>p</i> -value
Operative time; min (median (range))	100 (60 - 200)	110 (45 - 270)	109 (50 - 240)	0.14
Intraoperative complications	0	0	0	
Conversion rate	1 (5%)	4 (7.4%)	N/A	0.71*

N/A—Not applicable. **P*value for laparoscopic groups.

Table 3. Postoperative outcomes.

	Laparoscopy Age >80 (N = 20)	Laparoscopy Age <80 (N = 54)	Open Age >80 (N = 20)	<i>p</i> -value*	<i>p</i> -value**
Length of stay (days ± SD)	5.1 ± 8.9	7.6 ± 7	12.4 ± 7	0.45	0.045
Postoperative morbidity	3 (15%)	7 (12.9%)	10 (50%)	1	0.04
Infectious	1 (5%)	3 (5.5%)	4 (20%)	1	0.34
Hemorrhage	0	1 (1.85%)	1 (5%)	0.99	0.99
Paralytic Ileus	1 (5%)	0	2 (10%)	0.27	1
Cardiovascular	0	1 (1.85%)	1 (5%)	0.99	0.99
Neurological	0	0	1 (5%)	1	0.99
Pulmonary	0	1 (1.85%)	1 (5%)	0.99	0.99
Urinary	0	1 (1.85%)	0	0.99	1
Other	1 (5%)	0	0	0.27	0.99
Reoperations	1 (5%)	1 (1.85%)	1(5%)	0.47	1
Readmissions	1 (5%)	3 (5.6%)	4 (20%)	1	0.34
Mortality	0	0	1 (5%)	1	0.99

SD—standard deviation. *laparoscopic groups age >80 vs age <80. **octogenarians laparoscopic vs open groups.

Recovery parameters, *i.e.* time to first flatus and time elapsed to resume diet, were significantly greater in the open colorectal surgery group, **Table 4**. Time period to first bowel movement was comparable between groups. By using a pair wise comparison, it was found that differences between groups were mainly generated from the difference between the open and laparoscopic groups.

5. Discussion

Minimally invasive colorectal surgery has been reported with decreased morbidity as compared to open procedures [10] [12]. However, despite the faster recovery, reduced pain and other advantages [4] [5] laparoscopic colorectal surgery in the advanced age group, *i.e.* age >80 years, is still debatable. In particular, it has not been well defined whether octogenarians may gain the same benefits of the laparoscopic approach as in younger individuals [12] [13].

Table 4. Recovery parameters.

	Laparoscopy Age >80 (N = 20)	Laparoscopy Age <80 (N = 54)	Open Age >80 (N = 20)	<i>p</i> -value
First flatus (days); Median (range)	3.5 (2 - 8)	3 (1 - 8)	5.5 (2 - 9)	0.037
First bowel movement (days); Median (range)	4 (0 - 8)	4 (0 - 9)	5 (2 - 10)	0.094
Diet (days); Median (range)	3 (1 - 9)	4 (1 - 8)	6 (2 - 11)	0.017

SD—standard deviation.

In the present study, based on a single surgeon series, we compared the early postoperative outcomes of laparoscopic colon and rectal resection in octogenarian and younger patients. We assumed that early recovery and low postoperative morbidity related to laparoscopy [6] [11], may eliminate possible age related differences in outcomes [1] [2] [14]. Indeed, postoperative morbidity and recovery parameters were comparable in laparoscopic octogenarian and non octogenarian patients. Neither infectious complications nor cardiopulmonary ones were higher in octogenarians. Thus, we can assume that minimally invasive approach for colon and rectal resection in octogenarians is safe, and it may decrease postoperative morbidity rate in a similar manner to younger age group. Conversely, increased morbidity following laparoscopic colorectal surgery has been previously reported in older rather than younger patients [14]. However, in this particular study the rate of general complications was significantly higher in the older patient group with greater prevalence of preoperative comorbidities, but there were no significant differences in terms of intraoperative or postoperative surgical complications or conversion rate between the groups [14].

We believe that our study presents a reliable data since it is a single surgeon series. This may, in turn, contribute to the comparable results in the different laparoscopic age groups. In particular, laparoscopic colorectal surgery in skilled hands is associated with better outcomes [15], which probably eliminated the differences between the different age groups. Surgeon performance which has also been reported to impact operative outcomes [16], has been eliminated in the present study, and therefore our study reports more reliable results from this perspective.

Herein we also compared the laparoscopic octogenarian group with same age counterparts who underwent open colorectal surgery, aiming at highlighting the differences of laparoscopic and open approaches in this age group. Favorable outcomes were documented in the laparoscopic group, which is well with previously published data [11]. Of note, it is not only that the laparoscopic technique is superior to the open one in this age group, but it may also improve postoperative outcomes, so it is similar to that of younger patients.

The correlation between age, operative technique, open or laparoscopy, and operative time is controversial [9] [11] [17]. Surgeons' experience, on the other

hand, is associated with significant decrease in operative time, particularly, for minimally invasive procedures [5]. It is of further interest, since operative time may affect postoperative outcomes [18]. In the present study, no significant difference in operative time between the three groups was demonstrated, which contributed to comparable outcomes between the different laparoscopic sub-groups.

Several limitations should be addressed. First, the small sample size of the octogenarian group. Second, the open procedures were performed by several surgeons with variable experience, therefore the postoperative outcomes are expected to be high.

6. Conclusion

Our results demonstrate that the minimally invasive colorectal surgery is equally safe and effective in octogenarian and non-octogenarian patients. The increased morbidity associated with open procedures in octogenarians is further supports the superiority of the laparoscopic approach in this age group. Therefore, Laparoscopy should be encouraged in elderly patients, in particular, in patients without major comorbidities and with no definite contraindications.

Disclosure

Drs. Wisam Khoury, Razan Khoury, Yoram Kluger, Ahmad Assalia, and Ahmad Mahajna have no conflict of interests or financial ties to disclose.

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