Colorectal Surgery in a Community Hospital.
Results of Open vs. Laparoscopic Colon Surgery in Octogenarians.

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Abstract

Background: 15% of U.S. population is over the age of 65, and nearly half are over the age of 75. The most rapidly growing segment of the elderly population is over the age of 85. Methods: After Institutional Review Board approval, a retrospective chart review was performed of a prospectively entered database from January 1999 to March 2007. Patients were divided into two groups. The first group (group 1) consisted of patients that received laparoscopic colorectal (LC) resections. The second group (group 2) consisted of patients that received open colorectal resection (OC). Both groups were matched for age, ASA, and type of surgery. Primary end-points were intra-operative complications, operative times, conversion rates, postoperative complications, mortality, diet and length of hospital stay.

Results: Ninety-eight patients were matched in a blinded and consecutive manner. The mean age in both groups were 84 years old; ASA was 2.67 + 0.59 in group 1 and 2.87 + .57 in group 2. Operative time (minutes) was 171.3 + 71.8 in group 1 versus 145.4 + 67.75 in group 2; time to resume regular diet (in days) 4.2 + 2.6 and 4.8 + 3.04 respectively. Hospital stay (in days) 6.21 + 4.47 in group 1 and 7.37 + 4.52 in group 2 respectively. Mortality in group 1 was 3 patients (3%) and 8 patients (8%) in group 2.

Conclusion: Laparoscopic colorectal surgery in octogenarians is feasible. It offers a shorter time to resume diet as well as shorter length of hospital stay.

KEYWORDS: laparoscopy, colon, octogenarians, elderly, colectomy, colorectal surgery, community hospital.
Introduction

Since 1950, the United States has been in the midst of a profound demographic change: rapid population aging, a phenomenon that is replacing the earlier “young” age-sex structure with that of an older population. Census data predict a 43% increase in individuals who are 80 years and older by 2010.

Incidence of colorectal diseases is more common in elderly patients and surgeons will continue to be confronted with elderly patients with diseases of the colon and rectum requiring surgical intervention. The steadily increasing age of the population mandates that potential benefits of new techniques and technologies be considered for older patients. Particularly in colorectal surgery recent developments are of special relevance to older patients.

Minimally invasive surgery is the most important revolution in surgical technique since the early 1900s. In the past few years, the field of minimally-invasive or laparoscopic surgery has continued to increase. Some of the growth is due to high patient demand, but it’s up to surgeons to prove that new procedures are safe and effective. Today, laparoscopic surgery is the standard of care, or operation of choice for many procedures such as cholecystectomy or Nissen fundoplication.

In 1991, surgeons first began performing laparoscopic-assisted colon resections to treat colorectal cancer and other disorders. Laparoscopic colorectal surgery has been shown to be safe and feasible and several benefits have been consistently reported, including rapid convalescence, reduced postoperative pain and therefore, less pain medication, shorter duration of hospital stay and improved quality of life compared to conventional surgery.

It is well documented that elderly patients are more susceptible to postoperative complications, especially cardiac and respiratory complications, since they have more frequent occurrences of co-morbid conditions. It has been proven that
Laparoscopic surgery can reduce alteration in respiratory and other physiological parameters so it may be beneficial in the elderly, but few studies have looked at how the elderly fare after laparoscopic colorectal surgery. Among geriatric patients, octogenarians represent the group with the highest incidence of concomitant disease, with a limited functional reserve and need for special care.

The aim of this study is to review the outcome of octogenarians undergoing major colorectal surgery and compare the results with open colorectal resections in a similar age group in a community teaching hospital.

**Methods**

From January 1998 to July 2006, 98 patients 80 years and older underwent laparoscopic colorectal resection. After Institutional Review Board approval, retrospective chart review from a prospective database of 499 laparoscopic colorectal cases were studied. Patients were matched for age (±3 years), American Society of Anesthesia Score (ASA), diagnosis and procedure (right colectomy, sigmoidectomy, low anterior resection, left hemicolecotomy, transverse colectomy, ileocolic resection and others) to an equivalent group of patients having undergone open colectomies. Patient data also included indication for surgery, complications, leak rate, length of stay, length of operation, days to resume regular diet and mortality (within 30 days). Converted patients were analyzed within the laparoscopic group using an intent-to-treat analysis. Continuous variables were expressed as mean ± standard deviation. Results were evaluated with chi-squared, fisher exact test. A $P$ value less than 0.05 was considered significant. Patient demographics are included in table 1.

**Results**

Ninety-eight patients were successfully matched manually following the matching criteria, blinded to other variables and consecutively. Group 1 patients underwent laparoscopic colon resections and group 2 patients had open colon resections. The
mean age was 84 for both groups. Gender distribution was 57 females in group one and 53 in group 2. The diagnoses of the patients were also matched benign to malignant being 59/39 in the laparoscopic group and 58/40 benign versus malignant in the open surgery group (Table 2). Breakdown of the surgical procedures is shown in Table 3. ASA (American Society of Anesthesia score) distribution is seen in Table 4 and was equally distributed. Most patients had associated diseases of various organ systems and were classified as ASA class III by their Anesthesiologist.

Mortality included three patients in group 1 (one myocardial infarction, one associated myocardial infarction and pneumonia and the third with cardiogenic shock, atrial fibrillation and pneumonia) and eight patients died in group 2 (three with cardiac complications, two with pneumonia, one lung metastasis, sepsis and one with ARDS. Laparoscopic surgery is associated with a slight decrease in mortality, however this did not reach statistical significance. No intraoperative complications were seen in the open group and the laparoscopic group had one ureteral injury, one spleen laceration and one enterotomy.

Postoperative complications were intraabdominal abscess in two patients in each group, anastomotic leak in two patients of the laparoscopic group and one in the open group.

Postoperative analysis of clinical complications is shown in table 4. Pneumonia was noted in one patient in laparoscopic group and two patients in the open group; urinary tract infection was found in one patient in each group; cardiac complications occurred in one patient in the laparoscopic group and five patients in the open group. Total number of complications was two versus seven respectively.

Operative time was another outcome measured. The open surgery group was significantly shorter than the laparoscopic cases (171 vs. 145 minutes) shown in table 5. The conversion rate was 18% (19 of the 98 patients). Conversion was due to adhesions and technical difficulty in 13 patients, one patient due to small bowel injury, one patient because of bulky tumor size and posterior attachment of the tumor,
one due to phlegmon from diverticulitis, one due to perforation of the colon, one conversion due to difficult visualization of the ureter and the last patient due to bleeding.

**Discussion**

Health care trends in the past decade have changed due to a progressive shift in population in terms of life expectancy. With increasing life expectancy, the proportion of the population surviving and needing health assistance, including colorectal surgery, will rise. Etzioni DA, Beart RW Jr, and colleagues have reported the impact of the aging population on the demand for colorectal procedures. (21)

There is data to suggest that age alone is not a bad prognostic factor in patients receiving gastrointestinal cancer surgery. Associated comorbidities are common in very old patients and these comorbidities are mainly responsible for the increased surgical risks in this group of very old patients. Many surgeons are still reluctant to perform a laparoscopic colorectal resection in elderly patients.

Very few reports focus on elderly patients, who represent a growing proportion of population with a higher risk of developing colorectal disorders. In a very recent study, Hardiman KM, et. al have described disparities in the treatment of colon cancer in octogenarians.(22) The authors have shown in their study that although octogenarians make up a large portion of the patients treated for colon cancer, they are treated less aggressively. While some of the treatment differences may be explained by medical factors, demographic factors may affect treatment decisions as well.

Laparoscopic surgery in elderly patients was initially performed with reservations because of the possible adverse effects of hypercarbia, the increased intra peritoneal pressure from the pneumothorax and patient positioning on the limited cardiac and
pulmonary reserve. Most colon and rectal operations have a high degree of complexity, making the laparoscopic approach technically challenging.

The improved short-term outcome after laparoscopic surgery compared to open surgery may be the consequence of reduced surgical trauma. The outcomes of studies on laparoscopic resection for colon cancer reflect experiences of the past decade. During this period, laparoscopic surgical techniques have improved substantially as a result of growing experience and improved technology that allows better video imaging, and safer and more efficient tissue handling and homeostasis. Procedure times have dropped and undue tissue manipulation has decreased.

In a prospective case matched control study by Vignali A and colleagues, patients having laparoscopic surgery had a faster recovery of bowel function and a significant reduction of the mean length of hospital stay. Laparoscopy allowed better preservation of postoperative patient independence compared with that of the open group. They concluded that laparoscopic colectomy for cancer in octogenarians is safe and beneficial including preservation of postoperative independence and a reduction of length of hospital stay.

Similarly, a study done by Stocchi L, from Mayo Clinic determined rates of complications and extent of benefits for laparoscopic-assisted colectomy compared with open colectomy in patients older than age 75. They found that laparoscopic-assisted colectomy is safe and beneficial, preserving postoperative independence when compared with open colectomy.

Recent studies by Frasson M and colleagues showed that laparoscopy improved short-term postoperative outcome more in elderly patients than in younger patients. They concluded that advanced age was associated with higher morbidity and longer length of stay only in patients who underwent open colorectal surgery. Yakioshyy et al showed that surgical outcome after laparoscopic colectomy for patients 80-90 years old was much the same for those 60 years or younger.
Furthermore, Sklow and coworkers reported faster recovery after laparoscopic colectomy than after open colectomy in patients older than 75 years, despite a longer operating time compared with open surgery.(29)

Although a study by Bao Q. Tang and colleagues (30) showed laparoscopic colon surgery is a technically feasible option in a community hospital, there is little published data on the possible selective advantage of laparoscopic colon surgery in the elderly population. Most of the published studies are from University Hospitals. We respectfully suggest that literature from academic centers may not be an appropriate yardstick for community surgeons who may practice with limited resources.

The aim of our study was to compare outcomes of laparoscopic colorectal resection to open colorectal resection in patients older than 80 years in a community hospital setting. Our study is not a randomized controlled trial and the possibility of selection bias cannot be excluded. The strength of the study is a large sample size which allowed us to evaluate risk adjusted results in patients older than 80 years old who underwent laparoscopic and open colon resection. Most of our patients had benign disease and maximum numbers of procedures were right colectomies.

Operative time was less in the open colon surgeries than the laparoscopic surgeries, which can be explained by the learning curve of six general surgeons, one laparoscopic surgeon and one colorectal surgeon in our practice.

The postoperative mortality in the laparoscopic group was 3% and 8% in open group, which is not statistically significant and comparable to other series. The difference may prove significant as the number of patients increase.
Other favorable variables in laparoscopic colorectal resections were early return to regular diet and shorter period of ileus in comparison to open colorectal resections group.

The conversion rate was 18% comparable to other major studies that showed conversion rates from 11% to 29%. Most of the conversions in our study were because of locally advance disease and technical difficulties. Only two conversions were due to intraoperative complications.

This review supports the evidence that laparoscopic colon resection is well tolerated in the octogenarian. It is therefore reasonable and a better alternative to offer laparoscopic colon and rectal resection to patients older than 80 years of age in a community teaching hospital.
References


### Table 1: Patient Demographics

<table>
<thead>
<tr>
<th></th>
<th>Group 1 Laparoscopic Surgery</th>
<th>Group 2 Open Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients* (n)</td>
<td>98</td>
<td>98</td>
</tr>
<tr>
<td>Age* (years)</td>
<td>84 ± 3.4 (80-93 range)</td>
<td>84 ± 3.6 (80-94 range)</td>
</tr>
<tr>
<td>ASA*</td>
<td>2.67 ± 0.59 (2-4)</td>
<td>2.87 ± .57 (2-4)</td>
</tr>
<tr>
<td>Female</td>
<td>57</td>
<td>53</td>
</tr>
<tr>
<td>Male</td>
<td>41</td>
<td>45</td>
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*P > 0.05
### Table 2: Diagnosis

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Laparoscopic (n)</th>
<th>Open (n)</th>
<th>P value</th>
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<tbody>
<tr>
<td>Benign</td>
<td>59</td>
<td>58</td>
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<tr>
<td>Malignant</td>
<td>39</td>
<td>40</td>
<td>NS</td>
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Table 3: Breakdown of Surgical Procedures Performed

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Laparoscopic (n / %)</th>
<th>Open (n / %)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Right Hemicolecctomy</td>
<td>66 (67%)</td>
<td>67 (68%)</td>
<td>NS</td>
</tr>
<tr>
<td>2. Left Hemicolecctomy</td>
<td>12 (12%)</td>
<td>8 (8%)</td>
<td>NS</td>
</tr>
<tr>
<td>3. Sigmoid Colectomy</td>
<td>8 (8%)</td>
<td>13 (13%)</td>
<td>NS</td>
</tr>
<tr>
<td>4 Transverse Colectomy</td>
<td>4 (4%)</td>
<td>4 (4%)</td>
<td>NS</td>
</tr>
<tr>
<td>5. Low anterior resection</td>
<td>5 (5%)</td>
<td>5 (5%)</td>
<td>NS</td>
</tr>
<tr>
<td>6. Ileocolic Resection</td>
<td>1 (1%)</td>
<td>-</td>
<td>NS</td>
</tr>
<tr>
<td>7. Colon Resection</td>
<td>2 (2%)</td>
<td>1 (1%)</td>
<td>NS</td>
</tr>
<tr>
<td>Total</td>
<td>98</td>
<td>98</td>
<td></td>
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</table>
Table 4: procedure type (open vs laparoscopic) and the American society of anesthesiology classification

<table>
<thead>
<tr>
<th>ASA</th>
<th>open</th>
<th>laparoscopic</th>
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<tbody>
<tr>
<td>I</td>
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</tr>
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<td>II</td>
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</tr>
<tr>
<td>III</td>
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<td>IV</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>total</td>
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