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Anastomotic leaks: technique and timing of detection

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Anastomotic leak; Timing of detection; Laparoscopic and open colectomies

Abstract

BACKGROUND: Despite the proven benefits of laparoscopic colorectal surgery, the rate of anastomotic leaks has not changed. This study looked at the time of presentation of anastomotic leaks between laparoscopic and open colectomies.

METHODS: Retrospective chart review was performed between July 2008 and 2012. Two groups were created, laparoscopic and open. The time of presentation of significant leaks requiring reoperation were compared between the groups by index colectomies. Statistical analysis is presented as paired t test and chi-square test (P < .05).

RESULTS: From 1,424 segmental colectomies, the anastomotic leak rate between the two groups was not statistically significant (P = .69). No difference in the time of leak detection was evident (P = .67). Mortality rate was equal between the groups. The overall complication rate of the entire cohort was statically significant (P ≤ .001).

CONCLUSION: The timing of anastomotic leak detection does not differ between laparoscopy and open colorectal resections.

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The robust scientific evidence supporting the benefits of minimally invasive laparoscopic surgery in the colorectal field can be found in the literature. Such benefits include a decrease in the length of stay (LOS), better pain control, improvement in pulmonary function, and decrease in the incidence of wound infection and cardiovascular events, as well as less overall complications.

The inflammatory response after a surgical insult has also been reported to be less in laparoscopic colectomies compared with open colectomies, characterized by a decrease in soluble mediators such as cytokine interleukin-6, or an increase in interferon gamma, an immunomodulator of the cell-mediated immunity.1,2 These findings could suggest an earlier detection of leaks, since there maybe lesser inflammatory response that could mask early leak symptoms. Currently, it is uncertain if anastomotic leaks following laparoscopic colectomy present differently than with open surgery. The description of the leak timing detection between these 2 groups and patterns of detection (early vs late) is lacking in the literature.

This study seeks to determine the influence of surgical approach on clinical presentation of anastomotic leaks by comparing and contrasting open colectomy with laparoscopic colectomy.
Methods

Between July 2008 and 2012, a total of 1,424 segmental colectomies were performed within our institution. A retrospective review of the clinical chart and hospital records from this population was performed and subsequently divided into 2 groups (laparoscopic/open) on the basis of the surgical approach.

All segmental colectomies were included regardless of whether these were performed in an elective or emergent fashion. Rectal resections were not included. Patients transferred from outlying institutions with an abscess or leaks were excluded unless they had these complications after surgery at our institution.

The primary end point of our study was to compare the time of presentation of anastomotic leaks with significant clinical impact and radiographic confirmation, leading to reoperation between laparoscopic versus open colorectal resections for index operation.

Demographic features analyzed were age, sex, and race. The LOS after reoperation and the mortality rate between the two groups with significant clinical anastomotic leaks were also analyzed. The overall complication rate of the entire cohort after initial surgery was reported, including patients with anastomotic leak requiring reoperation as well as those patients with complications other than an anastomotic leak.

Statistical analysis was performed comparing the laparoscopic and open groups with regard to the timing of anastomotic leak detection, and LOS utilizing a paired t test. The leak rate between the groups was correlated using chi-square test, with significance set at .05 (P ≤ .05).

Results

Over a 5-year period, 654 patients underwent a laparoscopic segmental colectomy and 770 underwent an open colectomy.

A total of 24 patients (1.7%) were found to have an anastomotic leak requiring reoperation, including 15 women (62.5%) and 9 men (37.5%). The mean age of the patients with a leak was 57.6 years (range: 32 to 83 years).

Ninety-one percent of the patients who had an anastomotic leak were considered to be a white-caucasian and 8% belonged to another ethnical group such as Asian (n = 1) or Latino (n = 1). Of all the anastomotic leaks for both laparoscopic and open groups, the most common indication of the index colectomy was diverticulitis, and the procedure most frequently performed was sigmoidectomy (Table 1).

The overall leak rate in the laparoscopic group was 1.8% (12/654), and 1.6% (12/770) in the open group, with no statistical differences (P = .69). The timing of leak detection between the two groups was very similar. The combined mean time after index operation was 9.8 days: 8.6 ± 11.6 days in the laparoscopic group and 11.2 ± 16.7 days in the open group (P = .67).

Computed tomography scan of the abdomen and pelvis was utilized to diagnose the anastomotic leak in 15 (62.5%) of the 24 patients, contrast enema was obtained in 3 (12.5%) cases, and with the remaining 6 patients, 2 (8.3%) patients had plain films as initial work up before reoperation. Four patients were taken to the operating room secondary to severe clinical peritonitis without further imaging work up.

The LOS was similar in both groups after reoperation, with an average of 16.3 ± 2.1 days in the laparoscopic group and 20.2 ± 2.8 days in the open group (P = .28; Table 2).

In terms of mortality rate, no differences were found with one deceased in each group.

All mortalities were attributed to complications arising from sepsis.

The overall rate of complications after the initial surgery of the entire cohort between the two groups was statically significant, the complication rate for the laparoscopic group .26 ± .03 in comparison with the open group 1.15 ± .08 (P ≤ .001; Table 3).

Comments

The literature is replete with studies on the rate of anastomotic leak in colorectal surgery, emphasizing the fact that there is no difference between laparoscopic and open techniques. However, most recently, Levack et al

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<th>Table 1</th>
<th>Demographic features from patients with anastomotic leak</th>
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<td></td>
<td>Sex</td>
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<td></td>
<td>Male</td>
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<tr>
<td>Laparoscopic</td>
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<td>(n = 12)</td>
<td>5</td>
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<td>Open</td>
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IC = ileocecectomy; LC = left colectomy; REC = right extended colectomy; RC = right colectomy.
described in a retrospective study a lower leak rate during laparoscopic sigmoidectomy compared with open.

The overall leak rate in our study was 1.7%, which is similar to most other published series, while the leak rate in the laparoscopic group was 1.8%. El-Gazzaz et al described an increasing rate of anastomotic leaking among the patients who underwent laparoscopic colorectal surgery in Crohn’s disease (4.9%).

In our study, 1 patient with Crohn’s disease had an anastomotic leak after a laparoscopic ileocecectomy.

All 24 patients with an anastomotic leak were confirmed in the operating room, eliminating the bias of radiological false-positive results. The goal of this study was to focus in the timing of anastomotic leak detection and if there was any association with laparoscopic surgery in the development of a specific pattern of leak (early vs late).

We did not find any difference in the time of presentation of anastomotic leak between the two groups after segmental colectomies. Hyman et al reported an overall mean time of 12.7 days in the diagnosis of anastomotic leak. However the time of diagnosis of anastomotic leaks for laparoscopic or open approach was not described. Nonetheless, these results are similar to our study (9.8 vs 12.7 days).

The published mortality rate for a patient who suffers an anastomotic bowel disruption is reported to range from 12% to 27%. In our study, the overall mortality rate associated to a significant clinical anastomotic leak was .13% (.15 laparoscopic and .12 open). The overall 30-day postoperative mortality rate reported in El-Gazzaz et al study was .6% for the laparoscopic group and 1% in the open one. However, the mortality rate associated with an anastomotic leak was 7.5%. This increase in the mortality rate compared with our study might be explained secondary to more complex populations such as patients with Crohn’s disease, as well as the difficulty level of the cases performed in the author’s institution.

At the present time, a standardized, global consensus of the definition of anastomotic leak is lacking in the literature. As Bruce et al demonstrated in his systematic review of studies assessing the incidence of anastomotic leaks after gastrointestinal surgery, 56 separate definitions of “anastomotic leak” were found. This discrepancy may lead us to believe that there is a subestimation of the real rate of anastomotic leak.

There are several limitations to a retrospective study of this nature. For one, only leaks that required operative intervention were reviewed, so these leak rates are likely underestimated to some extent and the results cannot be generalized to smaller leaks managed nonoperatively.

In addition, as the leak rates were low in both groups, our comparisons are subject to Type II errors.

Patients were treated accordingly to the experts’ opinion-based algorithm, as reported by Phitayakorn et al. Multiple risk factors have been associated with the development of anastomotic leak, which have been widely described in multiple articles. It is not the primary goal of this study to analyze these risk factors.

**Conclusions**

Despite the advantages offered by laparoscopic surgery, the clinical presentation of significant leaks requiring reoperation do not differ from those leaks from open colectomies, including the absence of any pattern or delay in the detection of the anastomotic leak.

The overall rate of complications in the colorectal field continues to be lower after laparoscopic surgery, which have been corroborated in multiple studies.

**References**

Discussion

Anthony J. Senagore (Saginaw, MI): Clearly in colorectal surgery, the holy grail is effectively reducing the rate of an anastomotic leak. And when it does, unfortunately, occur, you try to recognize it early. You should be credited on your outstanding survival with only one mortality in each group for what can be a very devastating complication and reported mortality rates approaching 30%. It appears that all of the reported leaks in your series were clinically significant and required reoperation. Did you identify any patients that either had an abscess adjacent to the anastomosis that was drained either transluminally or by percutaneous drainage and had the leak close? Were there any patients who had drains placed at the index operation and developed a controlled fistula that avoided a reoperation? Secondly, it appears that the mean for the open patients was a bit longer. Do you have a histogram of the timing of the leaks to see was there really a trend that you found earlier in the laparoscopic patients or vice versa? And one of the frequent contentions made about adverse outcomes due to leaks is delayed recognition. You have a fairly classic time frame of day five to ten or so for finding the leaks. Did you have any signal at all in your data for that?

Jrebi: We had a different project where we looked at our overall leak rate, which included also an abscess that require percutaneous drain placement versus conservative management, whether abdominal colectomy or proctectomy emergent or elective and the overall leak rate was 7%. Yes, some of the patient who had just a fistula with an abscess and they had a percutaneous drain placement, their fistula was healed in the majority of patients. So looking at laparoscopic cases, I have a histogram. There were 2 patients, one in each group that they presented very late, or actually they went to the OR after 2 months from their surgery, and I exclude these two patients and recalculated the data to see if they skewed or biased the result. Laparoscopic patients presented one day earlier, perhaps because there is less insult and this inflammation, so maybe that’s why patient developed peritonitis earlier than patient who had an open colectomy.