Laparoscopic-Assisted Ileocolic Resection for Crohn’s Disease

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ABSTRACT

Background: This study reviews our experience with laparoscopic-assisted ileocolic resection in patients with Crohn’s disease. The adequacy and safety of this procedure as measured by intraoperative and postoperative complications were evaluated. Special attention was paid to the group in which laparoscopy was not feasible and conversion to laparotomy was necessary.

Methods: Between 1992 and 2005, 168 laparoscopic-assisted ileocolic resections were performed on 167 patients with Crohn’s ileal or ileocolic disease. Follow-up data were complete in 158 patients.

Results: In 38 patients (24%), conversion to laparotomy was necessary. Previous resection was not a predictor of conversion to laparotomy. Average ileal and colonic length of resected specimens was 20.9 cm and 6.5 cm, respectively, in the laparoscopic group, versus 24.9 cm and 10.6 cm in the converted group. Twenty of 120 specimens (16.6%) in the laparoscopic group were found to have margins microscopically positive for active Crohn’s disease. None of the 38 specimens in the converted group had positive ileal margins.

Conclusions: Laparoscopic-assisted ileocolic resection can be safely performed in patients with Crohn’s disease ileitis. The finding of positive surgical margins following laparoscopic resections compared with none among conventional resections has to be thoroughly evaluated.

Key Words: Crohn’s disease, Laparoscopy, Ileocolic resection.

INTRODUCTION

Utilization of minimally invasive techniques is increasing in colorectal surgery. As surgeons gain more experience and instrumentation technology advances, more challenging procedures are attempted. Intestinal resection for Crohn’s disease (CD) is challenging even with laparotomy. Acute and chronic inflammation, fistulization, and abscesses make dissection and mobilization difficult. In 1995, we published our experience with 25 patients and demonstrated that laparoscopic-assisted ileocolic resection was feasible in patients with CD. In that early report, resections in patients with a large mass or fistulae often could not be completed laparoscopically. With greater experience and technological advances, minimally invasive techniques have become applicable in a greater number of patients with complex CD-related pathology, such as secondary surgery and the presence of fistulizing disease or abscesses. As a result, criteria for selecting which patients might be candidates for laparoscopic-assisted ileocolic resection (LAICR) have become more liberal.

The aim of this study was to review our experience with LAICR in patients with CD during the past 13 years. Specific attention was paid to assessing the adequacy and safety of this procedure, the incidence of intra- and postoperative complications, and an assessment of the adequacy of the resection as defined by disease-free margins. In an attempt to assess changes in patient selection and our performance during this 13-year experience, we divided our experience into 3 time intervals.

METHODS

From a prospectively maintained practice database, all patients undergoing attempted LAICR for CD between 1992 and 2005 were reviewed. Complete follow-up data were available in 158 cases. Patient demographics, perioperative data, and surgical pathology reports were evaluated. Gross and microscopic evaluation of all specimens was performed by pathologists without specific knowledge of the conduct of the surgical procedure.

Some cases were excluded from attempted laparoscopy because of the preference of the surgeon. Surgical technique was generally uniform, and the senior authors were
all familiar with laparoscopic intestinal techniques. Mobilization of the colon was performed laparoscopically. Abscesses were drained and fistulae divided by using laparoscopic techniques. The specimen was extracted through the incision, and the mesenteric divisions as well as the anastomosis were preformed extracorporeally.

Based on previously reported data, conversion to an open technique (laparotomy) was defined as a fascial incision >6 cm in length.1

To evaluate any change in our experience or outcomes during this 13-year period, we divided the entire group arbitrarily into 3 time intervals (1992 to 1997, 1998 to 2001, 2002 to 2005).

**Statistical Analysis**

Statistical analysis was performed using the chi-square and Student t tests. Statistical significance was determined as P≤0.05.

**RESULTS**

Between 1992 and 2005, LAICR for CD was attempted in 168 patients. Data were complete in 158 including 95 women (60%) and 63 men (40%). The average age was 34.5 years (range, 13.9 to 93.8).

One hundred twenty-four patients (78.4%) underwent primary ICR, 31 patients (18.9%) underwent secondary resection, and 3 (1.8%) patients underwent tertiary resection. LAICR was completed in 120 patients (76%). Thirty-eight patients (24%) had fascial incision >6cm and were considered to have been converted to laparotomy (CL). The most common reasons for conversion to laparotomy were adhesions (47%). However, the conversion rate to laparotomy in patients for whom this was not a primary resection was 61%. This was not statistically different from the conversion rate in patients undergoing primary ICR, which was 24%.

Average LAICR operating time was 144 minutes compared with 172 minutes in the CL group. This difference was statistically significant (P<0.05). Intraoperative complications were noted in 20 patients. These usually occurred during the laparoscopic portion of the case and were, in most cases, the reason for conversion. Nineteen enterotomies and one bleeding episode were reported. Postoperative complications consisted mostly of prolonged ileus (5 patients), anastomotic leaks (2 patients), one portal and mesenteric vein thrombosis, and one bleeding episode requiring reoperation. No statistical significance was found when comparing the LAICR to the CL groups.

Postoperative hospital stay was 5.9 days in the LAICR group versus 7.4 days in the CL group (P<0.05).

The average ileal length resected was 20.9cm in the LAICR group versus 24.9cm in the CL group. This difference was not statistically significant. The average colon length resected was 6.5cm in the laparoscopic group versus 10.6cm in the converted group (P<0.01).

In the LAICR group, 20 patients (16.6%) had microscopic margins consistent with CD. In the CL group, zero patients had positive margins (P<0.001).

No differences in the OT, intra- and postoperative complications, length of stay, or conversion rate to laparotomy were noted when data divided into 3 time intervals (1992 to 1997, 1998 to 2001, 2002 to 2005) was analyzed.

**DISCUSSION**

Surgery for CD is challenging whether performed with laparotomy or laparoscopic techniques. Our early experience with 25 patients who underwent LAICR for Crohn's disease ileitis demonstrated the feasibility and safety of the technique in a highly select group of patients.1 The presence of a large mass combined with complex intraabdominal fistulae proved to be a predictor of failure to complete the procedure laparoscopically.

In all cases, an attempt at laparoscopy was initiated. Because the laparoscopic part is included in the operating time, a significant difference appears between the LAICR and the CL groups.

With increased experience and improved technology, such as tissue-sealing devices and minimally invasive stapling instruments, LAICR is achievable in patients with complex CD (fistulae, abscesses, and previous surgery). When evaluating our experience in each time interval, it is obvious that during the later intervals we were attempting and completing more cases with more complex CD pathology and more patients who had previous ICR. In this series, 78.5% of patients had a primary ICR, and 21.5% had either secondary or tertiary ICR. Secondary and tertiary resections constituted 18% of the patients from 1992 to 1997 and 28% of the patients in the interval from 2001 to 2005 (Figure 1). The conversion rate to laparotomy in patients for whom this was not a primary resection was 61%. However, this was not statistically significant from the conversion rate in patients undergoing primary resection, which was 24%.
LAICR obviously requires an “extraction incision.” In our initial results from 1995, the average length of fascial incision was 5.5 cm. We therefore made an arbitrary decision to define any extraction incision >6 cm as a conversion to laparotomy.

Numerous authors\textsuperscript{3–6} have reported that the use of minimally invasive techniques shortens postoperative length of hospital stay, and the current study confirms this.

The most common reason for conversion was the presence of adhesions (47%) (\textbf{Figure 2}). Unlike our first report from 1995,\textsuperscript{1} the presence of a mass and fistulæ accounted for only 15% of the reasons for conversion to laparotomy. It is possible that in the later time interval, experience was gained, and cases with more complex pathology, such as fistula or abscess, could be completed laparoscopically. Although more intraoperative complications occurred in the CL, most of the complications occurred during the laparoscopic portion of the procedure (enterotomies, bleeding). No statistically significant difference existed in postoperative complications between the 2 groups.

To determine the adequacy of the resection, 2 parameters were compared\textsuperscript{1}: the length of small and large bowel resected and\textsuperscript{2} the involvement of the surgical margins. The data suggest that when a laparoscopic procedure was performed, shorter lengths of bowel were resected. This difference was significant when comparing the length of the right colon resected in the LAICR group and the CL group. The length of the Crohns' involvement of the ileum varies, and it is therefore impossible to evaluate “resected ileal length” as a measure of adequacy or optimal mobilization. It is possible that mobilization of the ascending colon near the hepatic flexure during the laparoscopic portion was suboptimal, thus limiting the extent of the colon resection.

Evaluation of the different time intervals reveals no statistically significant differences when comparing operating time, length of stay, conversion to laparotomy, intra- or postoperative complications, length of large and small bowel resected, or positive resection margins. Of the entire group of 158 patients, 17% had ileal margins positive for CD. All of these patients were in the LAICR group. No patients with positive margins were in the CL group (P<0.001). The relevance of microscopically positive margins has been evaluated previously.\textsuperscript{6–11} While these reports demonstrated no increase in anastomotic complications or higher recurrence rates when resection margins are microscopically positive, the difference in margin positivity between the LAICR and CL groups is striking (\textbf{Figure 3}).

\textbf{CONCLUSION}

LAICR is a safe and feasible procedure for patients with CD. Compared with our earlier reports,\textsuperscript{1,2} secondary and tertiary ICR were performed more commonly. Advanced minimally invasive techniques and surgical devices enable

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\includegraphics[width=\textwidth]{figure1.png}
\caption{Primary, secondary, or tertiary ileocecocolic resection over time intervals.}
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\includegraphics[width=\textwidth]{figure2.png}
\caption{Major causes for conversion to laparotomy.}
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\includegraphics[width=\textwidth]{figure3.png}
\caption{Positive microscopic margin involvement of the ileum and ascending colon. A comparison of the laparoscopic and converted groups.}
\end{figure}
surgeons to perform resections in patients with more complex Crohn’s pathology than previously.

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