Case Analysis

Laparoscopic Surgery in the Treatment of Iatrogenic Colonoscopic Perforation

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Key Words
Laparoscope;
Colonoscopy;
Perforation

Purpose. Colonic perforation is one of the most serious complications of colonoscopy. Surgical intervention is the standard treatment. The aim of our study was to assess the outcome of laparoscopic surgery in the treatment of iatrogenic colonoscopic perforation.
Methods. From January 2003 to December 2010, data of 12 consecutive patients who had undergone laparoscopic surgery for iatrogenic colonoscopic perforation were collected for retrospective review.
Results. Eight patients were men; the mean age of the 12 patients was 56 years. Eight patients had received therapeutic procedures in the form of a polypectomy. Most of the perforation sites were in the sigmoid colon (n = 8). The mean perforation size was 2 cm and mean operative time was 110 minutes. The operative procedure included primary repair (n = 9) and resection with anastomosis (n = 3). No conversion or colonic diversion was needed. One surgical complication of wound infection was detected. There was no surgical mortality.
Conclusion. Laparoscopic surgery on colonoscopic perforations, in experienced hands, is a viable alternative to the open approach.
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Colonoscopy is currently a standard and widely used technique in screening for colorectal cancer. Iatrogenic colonic perforation during colonoscopy is the most serious complication during diagnosis or treatment. Perforation rates of 0.03%-0.1% have been reported for diagnostic procedures.[1-3] Perforations occur in 0.4%-2% of therapeutic procedures such as polypectomies,[1,2,4-7] and the rate may be as high as 10% in endoscopic submucosal dissections.[8,9] Surgery is usually indicated if perforation occurs. However, since the bowel is usually clean at the time of the polypectomy, it may be safe to close a small or suspected perforation using endoclips, thus allowing for conservative management.[1,10,11] However, early surgical intervention should strongly be considered if endoclips cannot be deployed effectively. Typically, a laparotomy with segmental resection is needed for the resolution of this event; the laparoscopic approach could be another alternative to minimize complications from this event. Our study aimed to assess the outcome of laparoscopic surgery in treatment of iatrogenic colonoscopic perforations.

Methods

From January 2003 to December 2010, we carried out a retrospective review of 12 patients who had

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undergone laparoscopic surgery for treatment of iatrogenic colonoscopic perforation in our hospital. Patients who had performed poorly, had previous abdominal surgical history, had ASA levels of > 2, or had unstable vital signs such as septic shock were excluded.

Patient characteristics, indications for colonoscopy, time taken for operation, size of perforation, length of hospitalization, and complications detected were collected via medical chart review. The operative methods, operation time, and the perforation site were analyzed. The data were presented as mean ± standard deviation (SD).

Results

There were 8 men and 4 women in the study, all of whom had undergone laparoscopic surgery for iatrogenic colonoscopic colon perforation. The mean age was 56 ± 8.67 years (range; 44-73 years). Eight patients received a polypectomy as the therapeutic procedure. Patient age, sex gender, indication for colonoscopy, and procedure followed are summarized in Table 1.

Three (25%) of these patients were noted to have a perforation during examination due to the discovery of intra-abdominal organs, and received surgical intervention within 3 hours and could not be repaired by endo-clip closure. All patients developed persistent and progressive abdominal pain and distension. At night, these patients displayed signs of peritoneal discomfort upon physical examination. All patients underwent CXR. Computed tomography was arranged if CXR findings were negative for free air. Three of these patients were diagnosed within 3 hours. Seven of these patients were diagnosed within 3-24 hours and two patients were diagnosed after more than 24 hours had elapsed. Preoperatvie fasting and prophylactic antibiotics were given in highly suspected patients. During operation, Mild to morderated peritoneal contamination was noted with dirty ascites and some fibrin coating in abdomen. The perforation sites were located in the sigmoid colon or the rectosigmoid junction in 8 patients (66.7%), the T-colon in 2 patients (16.7%), the D-colon in 1 patient, and the cecum in 1 patient. The size of the perforations ranged from 1 to 4 cm (mean; 2 ± 0.85 cm). The operative procedures included the following: laparoscopic simple closure in 9 patients (75%) as shown in Fig. 1, laparoscopic anterior resection in 1 patient, laparoscopic right hemicolectomy in 1 patient, and laparoscopic segmental resection of the T-colon in 1 patient. The operation times ranged from 50 to 180 minutes (mean; 110 ± 19.6 minutes). No conversion or colonic diversion was needed. We recorded 1 post-operative complication in the form of wound infection on post-surgery day 5; treatment was provided in the form of secondary wound closure after debridement and wet dressing.

Table 1. Patient characteristics and indication of colonoscopy

Characteristics	
Total No. of patients	12
Age (years)	56 ± 8.7 (44-73)
Gender (n)	
Male:Female	8:4
Indication for colonoscopy	
Health examination	5 (42%)
Gastrointestinal bleeding	4 (33%)
History of polyps	2 (16%)
Bowel habit alteration	1 (8.3%)
Procedure of colonoscopy	
Diagnostic procedure	4 (33%)
Therapeutic procedure	8 (67%)

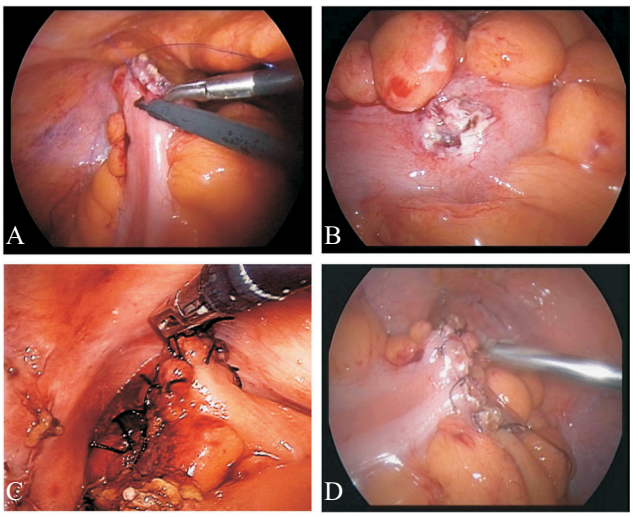

Fig. 1. A: Perforation in the sigmoid colon. B: Debridement of perforation. C: Primary repair of perforation. D: Two-layer sutures.

Durations of hospitalization ranged from 4 to 15 days (mean; 7.25 ± 3.2 days). There was no surgical mortality. The perforation sites, operation methods, and surgical outcomes are listed in Table 2.

Table 2. Surgical procedures and outcomes

Perforation site	
Sigmoid colon	8 (66.7%)
T-colon	2 (16.7%)
D-colon	1 (8.3%)
Cecum	1 (8.3%)
Perforation size (cm)	2 ± 0.85 (1-4)
Operation method	
Laparoscopic simple closure	9 (75%)
Laparoscopic anterior resection	1 (8.3%)
Laparoscopic right hemicolectomy	1 (8.3%)
Laparoscopic segmental resection	1 (8.3%)
Operation times (minutes)	110 ± 19.6 (50-180)
Length of hospitalization (days)	7.25 ± 3.2 (4-15)
Post-operative morbidity	
Surgical site infection	1 (8.3%)

Discussion

Iatrogenic colonoscopic perforation is the most serious complication of colonoscopy. Pre-operative education and close observation are the key points for early diagnosis. Mortality from perforations has decreased to 0% in most cases, with the highest reported occurrence being 0.02%.[12] Patient age exceeding 75 years, the presence of multiple co-morbidities, diverticulosis, bowel obstruction, and therapeutic colonoscopy have been shown to increase the risk of perforation.[12-14] Additionally, high-anesthetic risk patients with colonic perforation experience a longer hospital stay and have a poor prognosis.[15]

In our study, we selected patients who were younger than those in other studies and had good performance without septic shock or previous surgical history.

Three patients in our study had been noted to have a perforation during examination due to the discovery of intra-abdominal organs, and could not be repaired by endoclips closure. Since the bowel is usually clean at the time of the polypectomy, it may be safe to close a small or suspected perforation using endoclips, thus allowing for conservative management.[1,10,11] However, early surgical intervention should strongly be considered if endoclips cannot be deployed effectively. The other patients were diagnosed and received treatment within 30 hours with diffused peritoneal signs and did not experience septic shock. Standing CXR or decubitus KUB was the first choice for diagnosis due to their high specificity and cost-effectiveness. Due to these diagnostic methods' high sensitivity, computed tomography must be arranged if CXR and KUB produce negative findings.

We prefer early diagnosis and early intervention for patients of this sort; although some studies found that conservative treatment with intravenous antibiotics, hydration, and withholding oral intake could be successful in selected patients.[16,17] Conservative treatement was usually given for patients in stable clinical condition without peritoneal signs. On the other hand, surgical intervention was performed in patient with unstable vital signs with diffuse peritonitis, or toxic signs.[16] In our study, we found that the rectosigmoid/sigmoid colon are the most common perforation sites, which is similar to that of other studies.[16,18,19] Perforation may be caused by direct perforation, barotraumas, or therapeutic procedures. A laparoscopic colectomy or simple repair is effective in resolving colonic perforation due to colonoscopy; it might possess advantages over the open approach, such as a shorter hospital stay. Further, there were no differences in the rate of complications.[20,21] Early operative intervention through primary repair represents a safe and effective treatment method.[22]

Conclusion

Colonoscopy is currently a standard and widespread technique used in screening for colorectal cancer but is independently associated with bleeding and perforation when carried out by a low-volume endoscopist. As a rule, a laparotomy with segmental resection is needed for the resolution of this event. In experienced hands, laparoscopic surgery on colonoscopic perforations is a viable alternative to the open approach and could be another choice to minimize complications from this event.

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病例分析

以腹腔鏡手術治療大腸鏡造成的醫源性大腸穿孔

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目的 大腸穿孔是大腸鏡造成的最嚴重併發症之一。標準的治療方式是手術介入。這個研究的目的是評估以腹腔鏡手術治療大腸鏡造成的醫源性大腸穿孔的癒後。

方法 針對 2003 年 1 月至 2010 年 12 月間，連續的 12 位以腹腔鏡手術治療因大腸鏡造成醫源性大腸穿孔的病人資料，進行病例記錄的回溯性研究。

結果 12 位病人的平均年齡是 56 歲，其中八位病人為男性。有八位病人是因為接受息肉切除等治療性大腸鏡術式所造成。乙狀結腸是穿孔最常見之處。穿孔的大小平均是 2 公分，平均手術時間為 110 分鐘。手術的術式包括：腹腔鏡直接修補 (9 例) 和大腸切除及縫合 (3 例)。沒有病人需要術中轉換成傳統剖腹探查或是需要大腸改道。有一位病人發生傷口感染的手術併發症。沒有因手術造成死亡病例發生。

結論 熟練的醫師以腹腔鏡手術修補大腸造成的大腸穿孔是一個開腹手術之外另一個可行的選擇。

關鍵詞 腹腔鏡、大腸鏡、穿孔。