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Laparoscopy improves clinical outcome of gastrointestinal fistula caused by Crohn's disease

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ABSTRACT

Background: Benefits of laparoscopic surgery in the management of gastrointestinal fistula caused by Crohn disease need to be fully elucidated. We conducted this retrospective study to investigate the safety and feasibility and emphasize the advantages of laparoscopy compared with that of laparotomy for patients with gastrointestinal fistula caused by Crohn disease.

Materials and methods: A total of 1213 patients with gastrointestinal fistula in our center were screened, and 318 qualified patients were enrolled and divided into laparoscopy ($n = 122$) and laparotomy ($n = 196$) groups. Postoperative complications, length of hospital stay, systemic stress responses to surgery, postoperative mortality, and economic burden were collected and compared.

Results: A total of 125 laparoscopic interventions were performed with a conversion rate of 20.0%. Fifteen *versus* 84 postoperative complications were obtained in laparoscopy and laparotomy groups, respectively ($P = 0.0033$). Total hospitalization was 22.7 d and 38.0 d in laparoscopy and laparotomy groups, respectively ($P < 0.0001$). Postoperative hospitalization was 10.9 d and 24.8 d in two groups, respectively ($P < 0.0001$). Elevation curve of serum C-reactive protein and procalcitonin in response to laparoscopy was significantly lower than that to laparotomy. Reduced postoperative mortality ($P = 0.0292$) and postoperative cost ($P = 0.0292$) were observed in laparoscopy instead of laparotomy group.

Conclusions: Laparoscopic approach is safe and feasible and could improve clinical outcome in gastrointestinal fistula patients with Crohn disease.

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1. Introduction

The incidence of Crohn disease has been increasing in recent decades [1–3]. Crohn disease is characterized by transmural inflammation that can result in gastrointestinal fistula. Management of gastrointestinal fistula is challenging, because it is usually associated with intra-abdominal and systemic infection, acid-base and water-electrolyte disturbance, and severe malnutrition that could result in sepsis or even multiple organ dysfunction syndrome. It is potentially life threatening and therefore requires intensive management and innovative strategies.

Surgery is required in up to 96.7% of patients with gastrointestinal fistulizing Crohn disease during their lifetime, with

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13.6% patients undergoing one operation, 27.7% receiving two operations, and 55.45% requiring additional surgical procedures. Besides, the cumulative risk of surgery rises to 58.7% within 5 y after diagnosis [3].

Laparoscopic intervention was initially not considered for the treatment of gastrointestinal fistula, especially when complicated with Crohn disease because of extensive intestinal inflammation, thickened mesentery, and skipping lesions throughout the intestine [4–6]. However, laparoscopy becomes gradually accepted in such scenario and has been related to decreased hospital stay, reduced surgical site infection rate, and better abdominal wall integrity [7,8].

Nevertheless, laparoscopic surgery is still difficult to be implemented into the treatment of gastrointestinal fistula complicated with Crohn disease. Severe adhesion caused by prior abdominal surgeries or extensive inflammation, large intra-abdominal mass or abscess, internal fistula between bowel and adjacent organs (such as bladder and vagina) often present in fistulizing Crohn patients. As a consequence, resection of involved segment and primary anastomosis is difficult to be achieved by laparoscopic procedures.

Current literature provides limited information regarding the utilization of laparoscopy in gastrointestinal fistula caused by Crohn disease. Advantages of laparoscopy in the management of this category of patients remain to be fully unraveled. Herein, we reported our experience of laparoscopy in 122 cases of gastrointestinal fistula caused by Crohn disease and investigated the safety, feasibility, and advantages of laparoscopy compared with those of laparotomy in the management of these complex patients.

2. Materials and methods

2.1. Ethical considerations

This study has been approved by the Institutional Review Board of Jinling Hospital, Nanjing University. Consent from participants was not required in this retrospective study.

2.2. Patients

Gastrointestinal fistula caused by Crohn disease including entero-visceral, entero-cutaneous, or entero-enteral fistula. Crohn disease-related anastomotic fistula was included as well. All patients with Crohn's disease registered in our Gastrointestinal Fistula Unit at Jinling Hospital between January 2010 and March 2015 were retrospectively collected (Fig. 1). According to the management strategy, 318 Crohn disease patients with gastrointestinal fistula received surgical treatment and were divided into laparoscopy group (122 patients) and laparotomy group (196 patients).

The diagnosis of Crohn disease was made based on the clinical symptoms, radiologic, endoscopic, and pathologic evidence. All data of enrolled patients were retrieved from the medical record system of our hospital, reviewed and collected by the same physician. Inflammatory biomarkers, including C-reactive protein (CRP) and procalcitonin (PCT), were measured before the surgery (day −1) and after the surgery (day 0, 1, 3, 5, 7, and 14) according to the standard medical care protocol.

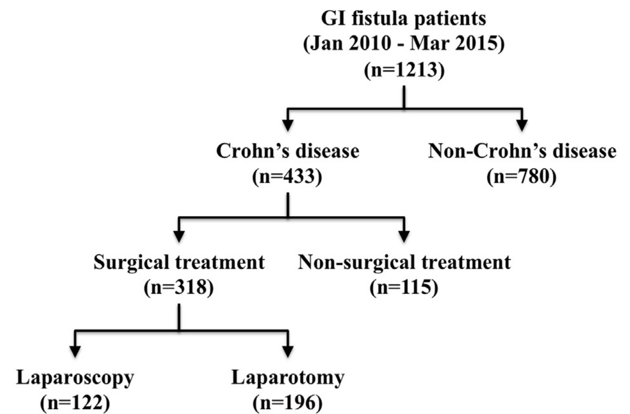

Fig. 1 – Enrollment flowchart. A total of 1213 patients with gastrointestinal fistula between January 2010 and March 2015 were collected. Among 433 Crohn disease patients, 318 received surgical treatment and were divided into laparoscopy (n = 122) and laparotomy (n = 196) groups.

All enrolled patients came from the Gastrointestinal Fistula Unit and were management by the same medical team, which included two surgeons, two assistant surgeons, and four residents. The two surgeons performed both laparoscopic and laparotomy procedures with their respective assistants. The selection of either laparoscopy or laparotomy was made by the surgeons, who took into consideration of prior abdominal surgical history, type, and location of existing fistula, intra-abdominal adhesion evaluated by preoperative CT scan and physical and nutritional status of the patient.

2.3. Preoperative management

For Crohn patients with gastrointestinal fistula admitted into our unit, we initially corrected existing water–electrolyte and acid–base imbalance, controlled the infection using proper surgical drainage and antibiotics, improved nutritional condition using parental nutrition and enteral nutrition (if applicable), induced remission of Crohn disease by proper medications, and encouraged them to reinforce physical rehabilitation.

The purpose of the preoperative management was to ameliorate their physical and nutritional status, effectively control the infection, and eventually induce and maintain disease remission. A definitive operation would be subsequently considered to solve the existing fistula.

Crohn disease activity was evaluated by the Crohn disease activity index (CDAI). Scoring criteria of CDAI has been described elsewhere [9]. Remission of Crohn disease was defined as CDAI score <150 points.

2.4. Statistical analysis

Continuous variables were described as mean ± standard deviation and compared using unpaired student t-test. Categorical variables were described as number with percentages, and compared using Fisher exact test or chi-square test. The

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