Application of Succus Entericus Reinfusion in a Patient with Rectal Cancer and Jejunal Diverticulum: A Case Report and Literature Review

Jiang Peng Wei#, Xiao Hua Li#, Qing Chuan Zhao

Division of Gastrointestinal Surgery, Xijing Hospital of Digestive Diseases, the Fourth Military Medical University, Xi’an, Shannxi 710032, China.

Abstract: We herein report the case of a patient with rectal adenocarcinoma who underwent low anterior resection in our hospital. The patient experienced general peritonitis, septic shock, and ardent fever on postoperative day 3. An exploratory operation revealed a perforated proximal jejunal diverticulum. The patient then underwent total parenteral nutrition and succus entericus reinfusion. The metabolic disturbances and cachexia rapidly improved after reinfusion of intestinal secretions, and the patient was successfully cured without requiring a prolonged period of parenteral nutrition. Our data support the saying “If the gut is working, use it.” Our report also confirms the value of succus entericus reinfusion in the successful treatment of a spontaneous perforation of Meckel’s diverticulum after low anterior resection of the rectum.

Key words: Low anterior resection; Rectal cancer; Succus entericus reinfusion; Meckel’s diverticulum

Introduction

Temporary double enterostomy was often made in patients submitted to jejunum perforation or necrosis-combined with severe intra-abdominal infections. These enterostomy cause large volumes of fluid loss, leading to severe dehydration, electrolyte imbalances, and malnutrition usually resulting from intestinal failure, contributing to morbidity and mortality [1,2]. Total parenteral nutrition, the intravenous infusion of glucose, plasma, and emulsified fat into humans proved feasible [3]. However, it is complex and has been associated with increased complications such as line-associated infections, vascular thrombosis, cholestatic liver disease, metabolic bone disease, and cholelithiasis [4]. Enteral nutrition have become a preferred alternative to parenteral nutrition as a result of the comparative convenience, greater safety, and efficacy of enteral nutrition therapy [5]. It may be delivered via a surgically implanted tube, such as a gastrostomy tube or a jejunostomy tube, with the rate of administration controlled using an infusion pump, gravity drip system, or as boluses via a syringe [5].

Here we report a successful use of the succus entericus collected from the proximal enteric stoma using a flow measurement device for reinfusion through a rubber catheter with a balloon into the distal stoma, aiming to provide adequate nutrients.

Case Report

A 64-year-old man was admitted to our hospital in March 20, 2018. With three months history of rectal bleeding. An anal examination allowed palpation of only the lower edge of the mass, at 8 cm from the edge of the anus. A colonoscopy revealed an approximately 4 cm in diameter polyoid mass with a thick stalk, an irregular lobulated margin, small ulcers at the peak and easily induced contact bleeding at the rectosigmoid junction. Biopsies of the tumor revealed moderately differentiated adenocarcinoma, and the distance from the anal verge to the tumor was 8 cm. Laboratory tests showed an albumin level of 41.6 g/L and hemoglobin of 164 g/L. The tumor marker levels were within normal limits as follows: CEA, 6.89 ng/ml; AFP, 8.45 ng/ml; CA19-9, 0.661 U/ml; CA125, 10.6 U/ml. The patient’s body mass index was 24.3 kg/m² and the Nutrition Risk Screening Score (NRS 2002) was 3. An abdominal contrast-enhanced computed tomography (CT) scan revealed a 3 cm heterogeneous and enhancing mass located in the upper rectum. A chest CT was within normal limits. T2-weighted magnetic resonance imaging (MRI) showed a high intensity mass in the rectum. There was no evidence of direct invasion of the tumor around the rectum, and no evidence of lymph node involvement or distant metastasis. We therefore defined his cancer as clinical stage 2; cT3, cN0, cM0 according to the Union for International Cancer Control Classification of Malignant Tumors, 7th edition. We did not recommend neoadjuvant chemoradiotherapy.

Laparoscopic low anterior resection (Lap-LAR) and transverse colostomy were conducted. Three days after the operation, the patient presented with acute severe diffuse abdominal pain and nausea and occasional vomiting. His abdomen was distended and firm on...
palpation in all four quadrants. The surgical consultant elicited guarding and rebound tenderness. His bowel sounds were present but greatly diminished. The preoperative diagnosis was a perforation of Meckel's diverticulum or small bowel perforation. He was promptly taken to the operating room for surgical exploration. While running the bowel, a perforated proximal jejunal diverticulum was found. We performed a resection of the Meckel's diverticulum in the jejunum and then a temporary double enterostomy was made to prevent anastomotic leakage.

Total parenteral nutrition (PN) was initiated on the 1st postoperative (PO) day. On the 7th PO day, a rubber hose, which was anchored on the abdominal wall with the ostomy bag, was inserted into the distal stoma. The ostomy bag was connected through a flow measurement device [6] (Figure 1). The ostomy bag protected the skin from the corrosive digestive fluids (Figure 2). This technique was applied to collect intestinal secretions from the proximal stoma and to reinfuse these secretions into the distal part of the intestine. This was associated with an early increase in the serum albumin level and body weight, as well as decreased body edema, allowing PN to be halted within one week.

![Image](image1.png)

**Figure 1** Schematic for extra-corporeal gastrointestinal circulation

The postoperative hemoglobin level after the removal of the Meckel’s diverticulum was 102 g/L, indicating a decrease compared to the level of hemoglobin (164 g/L) measured in the General Surgery Department. The other postoperative laboratory tests revealed the following values: serum albumin, 30 g/L; retinol-binding protein, 30 mg/L; and pre-albumin, 190 mg/L. The patient's condition was improved after 7 days of succus entericus reinfusion. The laboratory tests revealed that the hemoglobin level was increased to 135 g/L, the serum albumin to 40 g/L, the retinol-binding protein to 42 mg/L, and the pre-albumin level to 375 mg/L. Succus entericus reinfusion prevented further electrolyte disturbances, allowing the patient to maintain a satisfactory nutritional status. Two weeks later, he was discharged from the hospital to prepare for chemotherapy. The device has no fixed replacement time, and the drainage tube is only re-fixed when the fistula bag is replaced. This recovery equipment will be removed in approximately six months after the patient completes a closure operation.

![Image](image2.png)

**Figure 2** The ostomy bag can protect the skin from the corrosion of digestive juice. The skin around the stoma was clean in the course of nearly 6 months.

**Discussion**

Malnutrition has been recognized as a significant contributor to morbidity and mortality in cancer patients. Malnutrition is associated with a decreased quality of life, and significant weight loss is a biomarker of a poor prognosis in cancer patients [7]. Nutrition intervention can help cancer patients maintain their bodyweight and nutrition stores, offering relief from symptoms and improving their quality of life [8]. Poor nutrition practices, which can lead to undernutrition, can contribute to an increase in the incidence and severity of treatment side effects as well as an increase in the risk of infection and mortality [9]. Here, we presented the case of a patient with rectal cancer who underwent low anterior resection but developed a small bowel perforation at a jejunal diverticulum. He suffered from significant nutritional problems, and was finally treated with succus entericus reinfusion instead of prolonged parenteral nutrition. While essential and clearly beneficial for many, PN is associated with numerous complications, ranging from an increase in systemic infections to a loss of immune reactivity [10,11]. In other studies, PN has been demonstrated to increase the levels of inflammatory cytokines and decrease the regulatory cytokines within the bowel wall, leading to a pro-inflammatory state in the gastrointestinal tract [12,13]. Moreover, PN can also lead to a decline in phosphatidylinositol 3-kinase (PI3K)/phospho-Akt.
(p-Akt) activity, affecting downstream signaling, thus reducing epithelial cell proliferation, and contributing to intestinal mucosal atrophy [14].

However, with proximal small-bowel stomas, enteral nutrition frequently seems impractical because of the high output from the stoma. Considering this, the current trend is to feed enterally whenever possible [15], following the ideology that “if the gut is working, use it”. In the present case, we used a specially designed apparatus that included a roller pump for aspiration (Figure 3). Although the aspiration and measurement are discontinuous, the reinfusion is continuous at a computed rate corresponding to the stoma output. The output is collected by an ostomy bag appliance connected to the aspiration side of the machine. Reinfusion was performed through a silicone rubber balloon catheter inserted well into the distal intestine. This device establishes a true extracorporeal gastrointestinal circulation on. Our results demonstrate this technique to be feasible. The device collects proximal stoma intestinal fluid in the ostomy bag by gravity instead of negative pressure, so there is no intestinal injury. A 15-year prospective cohort in a referral center showed that chyme reinfusion corrected intestinal failure by restoring intestinal absorption, allowing 91% of patients to be weaned from PN. It can also contribute to improving the patient’s nutritional status and to reducing abnormal plasma liver tests, and is feasible at home [16]. In an experimental study, Coetsee E [17] demonstrated that refeeding enteroclysis is feasible in selected patients with a proximal enteric fistula or stoma, and an adequate nutrition, water and electrolyte balance can be also achieved without resorting to parenteral infusions.

There are several clinical advantages associated with this technique. First, intestinal losses can be reduced during the early phase of treatment when maintenance of the fluid and electrolyte balance is particularly challenging. Second, as sepsis is controlled, optimal utilization of the remaining absorptive capacity for enteral nutrition is permitted. Later, with the use of SER, the fluid loss is minimized and reinfusion improves hydration and supplies nutrients, including the pancreatic and biliary secretions essential for digestion. This improves the absorption of carbohydrates, fat and nitrogen in patients with severe intra-abdominal infections.

In conclusion, our case demonstrates that the use of extracorporeal gastrointestinal circulation to provide continuous reinfusion of succus entericus into the distal gut yields decreases in the stomal flow from temporary enterostomies, improving protein metabolism, and promoting a better nutritional status.

Conflict of Interest
The authors disclose no conflicts.

Funding
The National Natural Science Foundation of China (No. 81472699)

References:

Figure 3 The specially designed apparatus consisting of a roller pump for aspiration. Collection is by an ostomy bag appliance connected to the aspiration side of the machine. Reinfusion is through a silicone rubber balloon catheter inserted well into the distal intestine.


