FMT for chronic intestinal obstruction caused by constrictive pericarditis: a case report

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Case report

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Abstract

A 62-year-old man presented to our department with repeated vomiting, abdominal pain, bloating, and constipation. Echocardiography and computed tomography revealed his thickened pericardium with multiple eggshell-like calcifications, and incomplete intestinal obstruction. Colonoscopy showed extensive focal erosions in the colonic mucosa. After fecal microbiota transplantation, the patient's nutritional status was improved, intestinal obstruction was relieved, and his cardiac function his was restored. This case may provide a new option for the treatment of refractory incomplete intestinal obstruction.

Introduction

The human intestinal microbiota is composed of 10^{13} to 10^{14} microorganisms, which is combined in a certain proportion to maintain the dynamic balance of the microecology.¹ And the intestinal flora is closely related to some physiological activities by producing a large number of metabolites, including endogenous vitamins, short-chain fatty acids (SCFA), and neuroactive substances, etc.² However, it can also have undesirable interactions with the host. For example, it appears to be involved in the pathogenesis of diverse diseases such as obesity, diabetes, gastrointestinal diseases, cancer, and cardiovascular (CV) diseases.^{3,4} Fecal microbiota transplantation (FMT) is a treatment for diseases by transplanting functional bacteria isolated from the feces of healthy donors into the gastrointestinal tracts of recipient patients, and then remodeling the intestinal flora. In recent years, FMT is mainly used for the treatment of recurrent clostridium difficile infection (CDI), as well as the exploratory researches of various flora-related diseases, like inflammatory bowel disease (IBD), irritable bowel Syndrome (IBS), metabolic syndrome (MS), liver disease, autism spectrum disorder (ASD), autoimmune disease and immunodeficiency disease.^{5,6,7}

Intestinal obstruction is a disease characterized by symptoms of intestinal obstruction are bloating, abdominal pain, vomiting, ceasing exhaust and defecate. Acute intestinal obstruction is often encountered in the emergency department and requires surgical treatment. Although not as urgent as the acute, severe chronic intestinal obstruction can cause serious consequences, such as intestinal necrosis, perforation, and respiratory and heart failure. In the early stages of onset, it can be manifested as incomplete intestinal obstruction. And the incidence of it has increased significantly with the gradual aging of society.⁸ Studies have found that intestinal obstruction can lead to bacteria overgrowth (BO).⁹ At the same time, the blocked circulation can damage the integrity of the intestinal epithelium and the barrier function of the intestinal mucosa, eventually leading to bacterial translocation (BT). These changes may cause intestinal micro-ecological imbalance and systemic inflammatory response (SIR), which can induce multiple organ dysfunction syndrome (MODS). Clinically, refractory intestinal obstruction is occasionally encountered, especially the elder with more complex etiologies and complications, leading to the limitations of treatment. To our best knowledge, there is no study have reported the effect of FMT on patients with chronic incomplete intestinal obstruction.

Here, we report a case of a 62-year-old man, with chronic incomplete intestinal obstruction caused by constrictive pericarditis (CP), achieved effective remission after FMT.

Case Report

The patient, 62-year-old, had suffered from repeated abdominal pain, bloating, constipation, leg edema and dyspnea after exercise for 9 months, without receiving effective treatments. And he presented to our department when his symptoms were exacerbated with nausea and vomiting. He had a history of chronic CP. Pericardial knock and hypoactive bowel sounds were discovered upon auscultation. Serological examination showed that B-type natriuretic peptide (BNP), C-reactive protein (CRP), procalcitonin (PCT) and serum albumin (ALB) were 127 pg/ml, 46 mg/L, 0.95 ng/ml and 33.2 g/L, respectively. Echocardiography revealed the patient's thickened pericardium with multiple eggshell-like calcifications, and the left ventricular ejection fraction (LVEF) was 43%. Ultrasound images of the abdomen indicated hepatic congestion and ascites, which was about 5 cm deep in the rectovesical pouch. And computed tomography (CT) (Fig. 2. A, B) revealed the following: 1) pericardial thickening and calcification, 2) pleural effusion, 3) liver congestion, 4) small intestinal dilatations, flatulence, effusion, 5) intestinal mucosal image enhancement, 6) abdominal effusion. Based on these findings, the patient was diagnosed with chronic incomplete intestinal obstruction, chronic constrictive pericarditis, and cardiac insufficiency. Therefore, diuresis, improving circulation, nourishing the myocardium, liquid diet, gastrointestinal decompression, enema, catharsis, antibiotics, and other routine treatments for intestinal obstruction were performed for more than one week. There was no remission in his gastrointestinal symptoms, and even tended to worsen. Then, colonoscopy revealed extensive focal erosions in the colonic mucosa (Fig. 3. A), and histopathology showed acute inflammation in the mucosa (Fig. 3.C).

The 16S rRNA sequencing analysis of the patient's stool sample revealed the lower diversity and relative abundance of his intestinal flora. Therefore, we decided to try FMT for treatment. With reference to the standardized FMT implementation scheme, the frozen fecal microbiota suspension provided by the Chinese fecal microbiota bank were delivered to the patient's ileocecal junction through the endoscopy channel. Subsequently, special drugs such as antibiotics were ceased, but low residue liquid diet, diuretic, improve circulation and other treatments were continued. The next day after FMT, the patient resumed bowel movements, accompanied by relief of abdominal pain and bloating symptoms. On the third day after FMT, the patient's was discharged after having a normal diet. One week after discharge, colonoscopy showed no obvious erosions were found in the colonic mucosa (Figure. 3B). At the fourth week, the patient's weight increased by 2.5 kg, while CRP, PCT, BNP and ALB all returned to normal ranges (Fig. 1. A, B). Cardiac ultrasound showed that the patient's LVEF increased to 50%. CT showed that pleural effusion disappeared, and intestinal flatulence and peritoneal effusion decreased (Fig. 2. C, D). During subsequent follow-up, the patient only had occasional slight bloating and no more severe symptoms under normal diet. The frequency and form of faeces returned to be normal, and the nutritional status was significantly improved. At the same time, he didn't experience symptoms of heart failure (HF) such as shortness of breath, legs edema. One year later, the patient underwent pericardectomy, but the severe and extensive calcification prevent the pericardium from being completely removed. In the third year, the

patient was re-admitted to the hospital due to similar symptoms. After examinations, the diagnosis was the same as before, and FMT was performed again. Until now, the patient has not experienced severe abdominal symptoms and is in good health.

This case report was approved by the Regional Ethics Review Board at Southwest Medical University (approval number 2019/101), and the patient gave written informed consent for participation and publication of this case report.

Discussion

We performed FMT on a patient who was diagnosed with chronic incomplete intestinal obstruction which may caused by CP and HF. Clinically, patients with CP or HF are usually in a state of liver and intestinal congestion, accompanied by anorexia, bloating and other abdominal symptoms. These symptoms lasted more than nine months in this patient, and there was no relieve in his symptoms after treatments. Next, colonoscopy revealed the scattered inflammation which may caused the severe symptoms. Previous studies have confirmed FMT can be used to intestinal inflammation, for example, Ding et al.¹⁰ performed FMT on patients with carbapenem-resistant Enterobacteriaceae (CRE), and Blanchaert¹¹ concluded that FMT can treat ulcerative colitis (UC). Therefore, we performed FMT on this patient. Surprisingly, after FMT, the inflammation decreased and his clinical symptoms and cardiac function improved. We believe that CP prevented the blood from returning to the heart, leading to intestinal congestion and edema, weakening intestinal peristalsis and causing intestinal obstruction. The latter can cause intestinal flora disorders, BT and inflammation, which further exacerbates the cardiac insufficiency. His heart, intestine and flora seemed to form a vicious circle, which was blocked by the intervention of FMT.

One month after FMT, the flora analysis revealed both the structure and diversity of the patient's intestinal flora were similar to these of the donors. And previous studies have confirmed that a richer gut microbiome and a more reasonable composition of flora are important for the maintenance of the intestinal barrier, immune system and nutrient metabolism.^{12,13} It is worth noting that the abundance of Bacteroides was significantly reduced after treatment. Bacteroides can decompose choline, carnitine and others and finally produce Trimethylamine N-oxide (TMAO), a key contributor to CV disease pathogenesis.^{14,15} And the reduction of Bacteroides could partly explain the improvement of patients' heart function. The results showed the predominant flora was Prevotella after FMT. A study on the relationship between dietary structure and intestinal flora revealed that Prevotella is closely related to a high-carb diet, which is called the "Mediterranean Diet".¹⁶ It is recognized as the healthiest dietary structure in the world, because it can promote the optimization of the intestinal flora, such as increasing the diversity of the intestinal flora, improving the probiotic abundance and the concentration of fecal SFCAs. On the one hand, these products can promote the absorption of various nutrients such as amino acids, and improve glucose tolerance and blood lipid distribution.^{17,18} On the other hand, they can improve the intestinal barrier function by affecting the permeability of intestinal epithelium and suppresses enteritis by regulating the balance of immune system.^{19,20}

Conclusion

To sum up, when FMT restored the patients' intestinal flora imbalance, the intestinal functions are improved, including barrier, digestion and absorption. And in line with this, there was a relief in the patient's HF and an amazing improvement in his nutritional status, providing conditions for the operation. However, the fiberboard was not completely removed by the operation, so the factors restricting the heart still existed, resulting in his relapse one year later. Then we performed FMT for the second time and still achieved splendid results. And this case provides new ideas for the treatment of refractory incomplete intestinal obstruction, but the effect and safety need more clinical studies to verify.

Declarations

Availability of data and materials

All data sets used and/or analyzed in this study are also available from the corresponding authors.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Gang Luo and Muhan Lv developed the design and concept of the study. Huan Chen, Zijie Wang, Qing Hu and Mingming Deng obtained the data. Gang Luo, Muhan Lv, Huan Chen, Zijie Wang, Qing Hu and Mingming Deng were involved in analysis and interpretation of the data. Huan Chen and Zijie Wang wrote the paper. All authors read and approved the final manuscript.

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Figures

Figure 1

Various indicators after FMT. (A) Changes of CRP, BNP, RVFWT, ALB and LVEF. (B) Changes of PCT. * RVFWT: right ventricular free wall thick- ness.

Figure 2

CT images: (A) and (B) shows images before FMT. (C) and (D) shows images after FMT.

Figure 3

Results of colonoscopy. (A) Before FMT. (B) One week after discharge. (C) Histopathology of biopsy tissue before FMT.

Figure 4

Flora analysis. (A) Analysis of Shannon index. (B) Flora composition: Donor1 and donor2 are fecal microbiota suspensions for the first and second FMT, respectively; WXY_Q_170416 and WXY_0425 represent the samples of the patient before FMT, respectively; Others represent samples after FMT.