

Recovery of allografted small intestine function

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Abstract

AIM: To investigate recovery of the allografted small intestine function after clinical small bowel transplantation (SBT).

METHODS: The structure of the graft was evaluated by endoscopic biopsy and histopathologic examination. Graft functions were assessed by D-xylose absorption, barium studies, nitrogen balance calculation, and blood and stool cultures. Nutritional status of the recipients was judged by measurement of body weight and serum protein concentrations.

RESULTS: The recipient discontinued total parenteral nutrition (TPN) and resumed oral nutrition 100 d after SBT. On oral diet, the patient maintained a normal nutritional status, gained weight by 3 kg, and had a normal serum albumin concentration (40.2 g/L \pm 0.2 g/L). Satisfactory D-xylose absorption was achieved 8 wk after the operation. Nitrogen balance of the gut was maintained well and increased gradually. Serial mucosal biopsy showed normal structures 2 wk after grafting, without evidence of rejection and graft versus host diseases (GVHD). Barium studies conducted on the 10th day and 38th day by barium studies revealed that the grafted small bowel motility showed normal patterns of peristalsis and transit. No bacterial translocations were noted.

CONCLUSION: Function of the grafted small intestine recovered satisfactorily 100 d after transplantation, indicating good clinical outcome of SBT.

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Key words: Nutritional support; Small intestine/transplantation; Small intestine/physiopathology

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INTRODUCTION

Successful small bowel transplantation (SBT) can improve the life quality for patients dependent on long-term total parenteral nutrition (TPN). The ultimate goal of SBT is to restore normal gastrointestinal function. The purpose of this study was to evaluate the function of allografted small intestine after a clinical SBT.

MATERIALS AND METHODS

A clinical SBT was performed on March 12, 1994. The recipient was a 31-year-old woman who had severe short bowel syndrome and was dependent on long-term TPN. The donor was a 28-year-old man who had died of brain injury. Both the donor and the recipient were of blood type O. The graft was transplanted in an orthotopic location. The donor superior mesenteric artery (SMA) with a Carrel patch was anastomosed to the recipient aorta, while the donor portal vein was anastomosed to the recipient superior mesenteric vein (SMV). The grafted small intestine was anastomosed to the native gastrointestinal tract, exteriorizing the distal segment of the graft about 10 cm in length as a stoma^[1]. Immunosuppression was achieved with cyclosporine A (CsA), tripterygium wilfordii (GTW), methylprednisolone, and prostaglandin E₁ (PGE₁). Histopathologic studies of endoscopy-guided biopsies were performed twice a week. Enteral feeding was initiated 4 d after surgery and then gradually increased in volume and concentration as the parenteral feeding was reduced and eventually stopped. Further, 2% glutamine (Glu) was added to the enteral feeds. The patient's nutritional status was assessed principally by measurement of body weight and serum protein levels. D-xylose absorption^[2] and nitrogen balance were measured to assess the graft absorption function. Motility of the small bowel was assessed by barium studies on the 10th and 38th postoperative days. Bacterial translocation was judged by frequent blood and stool cultures.

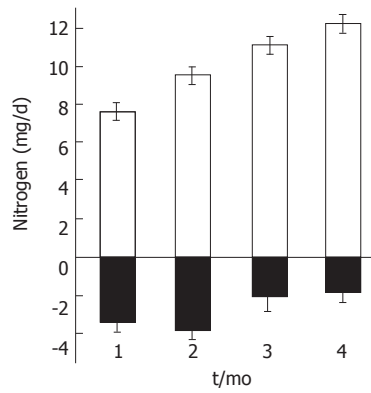


Figure 1 Calculation of nitrogen balance of the gut.

RESULTS

The patient was free from dependency on TPN 100 d after the operation. Steady weight gain (3 kg) and normal albumin concentration ($40.2 \text{ g/L} \pm 0.2 \text{ g/L}$) had been achieved on enteral feeding alone. Satisfactory absorption of D-xylose was documented 8 wk after surgery. Positive nitrogen balance of the gut was achieved in the post-operative course (Figure 1). Barium studies showed that the transit and peristalsis patterns of the graft were normal. Serial intestinal biopsies showed that the mucosa was mildly edematous, with villous blunting and infiltration of some mononuclear cells into the lamina propria and submucosa in the first 2 wk. However, the mucosa was restored to its normal appearance without any evidence of rejection or graft versus host disease (GVHD) at 2 wk after the operation. No bacterial translocation occurred postoperatively.

DISCUSSION

We treated the short bowel syndrome successfully by SBT for the first time in our country. One hundred days after the transplantation, the functions of the allografted small intestine were restored satisfactorily, and the patient could maintain a normal nutritional status by oral diet

only, without the need for further parenteral supplement. The graft had a normal structure with good performance in its functions of absorption, motility, and barrier protection.

Factors impairing the functions of intestinal graft include surgery, rejection, and infection. The measures taken to improve the graft functions in our patient included shortening the ischemic period of the graft, improving the surgical technique, preventing rejection and infection, and protecting the intestinal barrier function. Skilled execution of the vascular anastomosing technique could avoid the stenosis of the anastomosis. After revascularization, the use of low-dose dopamine would promote the graft blood flow. To shorten the graft ischemic time, especially warm ischemic time, the quality of the graft could be improved by ice cooling of the abdominal cavity and immediate *in situ* perfusion through an aortic cannula with cold Eurocollins solution. The graft was transported to the operating room as soon as possible and the retrieval was done carefully. A matched donor was selected, and a reasonable immunosuppressive protocol was adopted to prevent rejection. Additionally, to improve gut barrier function after SBT, early enteral feeding was provided to stimulate mucosal growth and preserve the tight junctions of intestinal epithelial cells. Glu was supplemented to supply the gut with essential nutrients^[3], and oral antibiotics were used to reduce the microbial flora in the graft.

Thus, this case demonstrated that SBT is a feasible option for patients with short bowel syndrome.

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