Plasma exchange in small intestinal transplantation between ABO-incompatible individuals: A case report

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Abstract. The aim of this study was to investigate the application of plasma exchange in small intestinal transplantation between ABO blood type-incompatible patients. A small intestinal transplantation case between ABO-incompatible individuals is hereby presented and analyzed. The main treatment included plasma exchange, splenectomy and immunosuppression. The patient undergoing small intestinal transplantation exhibited stable vital signs. A mild acute rejection reaction developed ~2 weeks after the surgery, which the patient successfully overcame. The subsequent colonoscopy and pathological examination revealed no signs of acute rejection. In conclusion, plasma exchange in combination with anti-immune rejection therapy proved to be an effective scheme for the management of small intestinal transplantation between ABO-incompatible patients.

Introduction

Small intestinal transplantation is a procedure involving several aspects, such as anti-immune rejection treatment, transplanted organ procurement, surgical technique, perioperative management and prevention of infection following surgery (1). Rejection and infection are the two major issues compromising surgical success. Currently, allogeneic small intestinal transplantation appears to be a viable treatment option for intestinal failure and short bowel syndrome. Small intestinal transplantation between ABO-incompatible individuals may cause a severe rejection response, affecting the survival of the intestinal recipient (1-3). The ABO blood antigens are glycoproteins on the membrane surface of red blood cells. These antigens are also detectable on the vascular endothelial cells of the grafted small intestine. The small intestinal transplantation between ABO-incompatible individuals may lead to a series of complement reactions. Once the complement system is activated, it may quickly occlude the blood vessels and cause thrombosis, resulting in graft failure (4). This is the report of a successful small intestinal transplantation case between ABO-incompatible individuals.

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Case report

Patient and donor characteristics. The patient was a 17-year-old female, weighing 40.5 kg, with A Rh^+ blood type and an anti-B antibody titer of 1:64, who underwent a small intestinal and partial colon resection following acute diffuse peritonitis and mesenteric artery thrombosis. The donor was the recipient's father (43-years old; blood type, AB).

Plasma exchange and antibody titers. Rituximab (Rh^+) was used to reduce the patient's B lymphocyte numbers 18 days prior to surgery. In order to reduce the patient's antibody titers, the double-filtration and separation method was used for plasma exchange (5). The first plasma exchange was performed 9 days prior to transplantation. A total of 4 plasma exchanges were performed. Therefore, the blood IgM antibody titers were reduced to 1:1. The patient's small intestine was resected due to of serve necrosis. After 1 year and 2 months, a section of the small intestine (length, 190 cm) from the donor was transplanted into the recipient. The titers of anti-B IgM antibodies remained 1:4 1-7 days after surgery and were <1:4 at 4 months after surgery. Colonoscopy and pathological examination suggested that the transplanted small intestinal mucosa was slightly swollen and no erosions or ulcers were observed, while the mucosal villi was clear. There was marginal mucosal hyperemia, which indicated mild rejection. Therefore, we asministered 100 mg ATG, rehydration mutritional support and corrected electrolyte balance. Following treatment, the colonoscopy and pathological examination was performed again. The results showed that the mild rejection had markedly faded. The patient stayed in the hospital for 65 days and showed no acute rejection response. Tacrolimus (2.0 g/d) was injected through an intravenous miro-pump on the day of the surgery as well as on the following day. The doses of anti-thymoglobulin (ATG) were maintained at 100 mg/d 3 days prior to and after surgery. Pawnee Long succinate (1,000 mg/d) was used on the day of the surgery and the dose was gradually reduced to 10 mg/day within the first month following surgery.

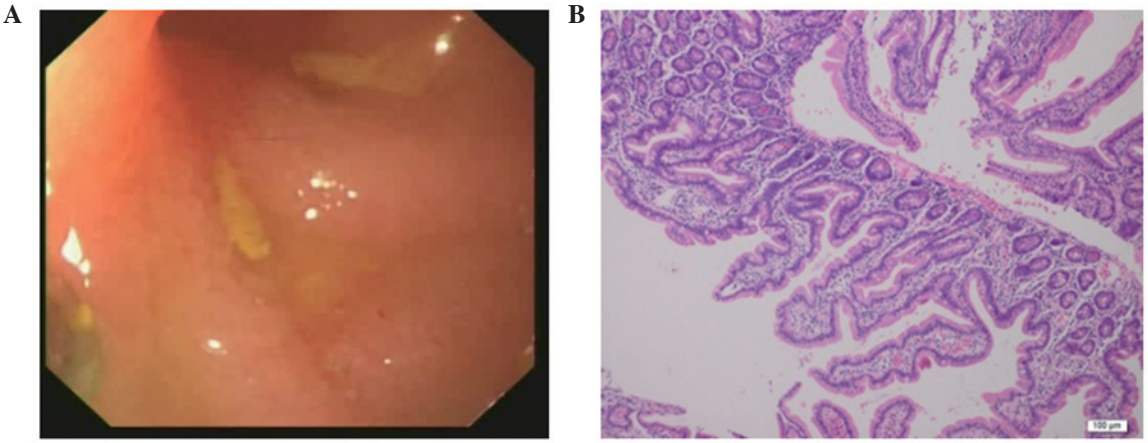

Figure 1. Examination of the small intestinal graft. (A) Enteroscopy of the small intestine of the recipient at 8 months after surgery, revealing a normal mucosa. (B) Hematoxylin and eosin staining revealing normal structure of the transplanted intestinal mucosa at 8 months after surgery (magnification, x400).

Post-surgical findings. No bleeding was detected in the stoma effluent after the surgery. The patient developed no complications, such as diarrhea, had stable weight and normal periodic blood hemoglobin, total serum protein and albumin levels. The D-xylose absorption test (6) revealed a normal urine discharge rate of 30-40%.

Single-balloon enteroscopy of the small intestine was performed at 8 months post-surgery to assess the efficacy of the procedure. The mucosa at the anastomosis site was smooth, of rosy colour, with clearly visible villi under enteroscopy, without erosions or exudation (Fig. 1A). On microscopic examination, the hematoxylin and eosin (H&E) staining revealed no abnormal mucosal structure at a distance of 4 and 10 cm from the stoma, with a neutrophilic infiltration of the lamina propria, but no detectable rejection reaction (Fig. 1B). These results suggested that surgery was successful.

Discussion

Small intestinal transplantation under conditions of blood group incompatibility may stimulate a hyperacute and acute rejection reaction (7). If the titers of blood type antibodies are relatively high, a hyperacute rejection reaction may occur within minutes to hours after the transplantation. Hyperacute rejection is one of the main reasons leading to early death of the recipients (8). Therefore, plasma exchange was performed several times prior to transplantation in order to reduce the anti-B antibody titers in the serum of the recipient in the present case, which were maintained between 1:1 and 1:4. Tacrolimus, ATG, Pawnee Long succinate and mycophenolate mofetil capsules were used to avoid immune rejection. Sulperazon, ornidazole, vancomycin and ganciclovir were administered in order to prevent infection, whereas γ globulin and albumin were used to prevent hypoproteinemia, thus protecting against rejection, infection and any additional complications (9,10).

To summarize, the purpose of small intestinal transplantation is to restore small intestinal function. The presented case was successful, indicating that the use of plasma exchange in combination with immunosuppressants is applicable in organ transplantation between ABO-incompatible individuals.

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