

Autologous Marrow Intrahepatic Infusion Promotes Immune Reconstruction in AIDS Patients

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1. Abstract

AIDS late immune function is low, prone to a variety of opportunistic infections. The application of antiviral drugs, anti-tuberculosis drugs and other treatments may cause liver damage, and further aggravate the immunodeficiency. In 2 patients with advanced AIDS complicated with intestinal tuberculosis, on the basis of antiviral, anti-tuberculosis and nutritional support treatment, the lesions of intestinal tuberculosis were surgically excised and implanted through the right omental vein at the infusion port, and autologous bone marrow was transfused into the liver through the infusion port. Patients with CD4T lymphocytes gradually increased, the blood around the detection of HIV virus, physical gradually improved. It turned out to be a gradual recovery from terminal AIDS. It is suggested that autologous bone marrow infusion through portal vein may promote immune reconstitution.

2. Case Report

With the popularization and application of antiretroviral drugs, the survival period of HIV patients has been significantly prolonged. However, if the disease is advanced, with severe immunodeficiency and opportunistic infections, the patient may still die of various complications, even with antiretroviral therapy, where immune reactivation is very slow. On the basis of antiretroviral treatment, anti-tuberculosis treatment and nutritional support treatment, two patients with AIDS complicated with intestinal tuberculosis who were on the brink of death were treated with right omental vein intubation embedded infusion port and autologous bone marrow infusion through

portal vein. The patients underwent progressive immune reconstruction and achieved obvious clinical effects. The report is as follows:

3. Case A

The patient is a 33-year-old male. Progressive emaciation, intermittent diarrhea, abdominal pain, fever for 2 years, obvious abdominal pain and abdominal distension, vomiting for 8 days, was admitted to surgery with AIDS complicated with intestinal tuberculosis and complete intestinal obstruction. Examination on admission showed a state of cachexia and severe malnutrition. Abdominal distension, tenderness throughout the abdomen, weak bowel sounds. WBC 2.6×10^9 /L, HB100 g /L, PLATE36 $\times 10^9$ /L. CD4T lymphocytes were only 1 cell/ul. CD8T lymphocytes were only 83 cells /ul. HIV viral load 99300copy/ml, serum albumin 24.4g/L. X-ray examination revealed a small amount of effusion in bilateral pleural cavity, intestinal dilatation and multiple gas-liquid levels in the abdominal cavity.

On May 2, 2013, exploratory laparotomy under general anesthesia see (Figure 1) revealed multiple caseous necrosis lesions in the abdominal cavity, extensive intestinal adhesions, and terminal ileum obstruction. Removal of caseous necrosis and abdominal drainage were performed, and ileostomy was performed (Figure 2). Continuing nutritional support, anti-tuberculosis, and antiviral therapy. Six months after surgery, the patient had 20 cells /ul of CD4T lymphocytes. Still very thin. In the second operation, the ileostomy was closed, and the ascending colon was anastomosed. At the same time, a tube was placed through the right omental vein, and an implantable bone marrow infusion device was embedded in the upper abdomen

see (Figure 3). Then, the autogenous bone marrow was collected by puncture through the anterior superior iliac spine, and the autogenous bone marrow was injected into the portal vein through the bone marrow infusion device. 40ml of bone marrow was injected each time, and autogenous bone marrow was injected once every 1 month, for a total of 3 times. One month after the second operation, CD4T lymphocytes were 54 cells /ul. Two months after the second operation, CD4T lymphocytes were 70 cells /ul. Six months after the second operation, CD4T lymphocytes were 280 cells /ul. The HIV viral load was undetectable, the patient's overall condition improved significantly, the patient gained 6 kg in weight within 6 months, and the anti-TB medication was stopped after 18 months of continuous use. They are still on antiretroviral drugs, have an undetectable viral load and live as normal, healthy people see (Figure 4). CD4T lymphocyte 420cell/ul, the immune system basically recovered to the normal state. The patient with advanced AIDS eight years ago is now basically back to healthy life.



Figure 1: AIDS intestinal obstruction, CD4T lymphocytes 1 cell/ul. Prepare for surgery under general anesthesia.



Figure 2: Excision of the lesions of peritoneal caseous necrosis, ileostomy, and peritoneal drainage were performed.



Figure 3: CD4T lymphocytes 20 cell/ul 6 months after the first operation. The stoma was closed, ileum ascending colon anastomosis was performed, and the upper abdomen was subcutaneously implanted into the infusion port for autologous bone marrow infusion.



Figure 4: CD4T lymphocytes 210 cell/ul 12 months after the second operation. HIV viral load was undetectable and the overall condition improved significantly.

4. Case B

The patient was a 24-year-old male. Due to intestinal obstruction, emergency operation was performed. An exploratory laparotomy revealed intestinal plate adhesions, and a gastrostomy was performed. Abdominal drainage was placed and the abdomen was closed. Post-operative high fever persisted for 40°C. In the ICU, Tylenol and Van-gosteroids did not respond. CD4T lymphocytes were only 1 cell/ul per microliter. Acid-fast bacilli were detected in sputum and abdominal drainage fluid, serum bilirubin 230 mmol/L and albumin 30g/L. Gastrostomy and abdominal drainage were performed (Figure 5). Primary diagnosis: 1. intestinal tuberculosis, intestinal adhesion, intestinal fistula and abdominal infection, diffuse peritonitis, 2. tuberculosis, 3. AIDS 4. Septic shock 5. Acute liver injury.



Figure 5: Gastrostomy was performed in the external hospital. After abdominal drainage, continuous high fever was observed.

On the basis of antiviral, anti-tuberculosis, and liver-protecting nutritional support treatment, autologous bone marrow was injected through a small incision in the upper abdomen through the right omental vein infusion port, and a double cavity tube was placed in the right lower abdomen for continuous abdominal negative pressure

drainage. Eight months later, the general condition improved significantly (Figure 6), and the immune function gradually recovered. CD4T lymphocytes were 160 cells /ul. A second operation was performed to repair the ileocecal intestinal fistula. Postoperative wound infection, secondary healing after local dressing change (Figure 7). Continue antiviral therapy. After 3 years of follow-up, physique improved significantly. CD4T lymphocytes 280 cells /ul.



Figure 6: After autologous bone marrow was injected into the infusion port via right retinal vein intubation, the overall condition improved, and CD4T lymphocytes increased.



Figure 7: After 8 months, a second operation was performed to relieve intestinal adhesion and repair intestinal fistula. The wound is infected with secondary healing.

5. Discussion

Immune dysfunction and post-operative sepsis are the most common complications of HIV infection [1-6]. Antiretroviral drugs can control the large number of replication of HIV in CD4T lymphocytes, so that the constant destruction of the immune system is under control, and the patient's immune function can be gradually rebuilt. However, when the immunity of patients is extremely damaged, the reconstruction of immune function in many patients is slow, and some patients are endangered by opportunistic infection or AIDS-related tumors before the reconstruction of immune function. There-

fore, in the treatment of AIDS, on the basis of antiretroviral drug therapy, the promotion of immune reconstitution therapy is an important content to prolong the life of patients.

In patients with AIDS complicated with decompensated cirrhosis and hypersplenism, we performed splenectomy plus transomental vein catheterization, which was connected to the infusion port and buried subcutaneously in the upper abdomen. After the operation, the autologous bone marrow was injected into the liver through the right omental vein and portal vein. The results showed that the liver function improved significantly and the severe cirrhosis was reversed to mild cirrhosis. In addition, during the follow-up, it was unexpectedly found that the CD4T lymphocytes in the patients increased significantly, that is, the immune redevelopment was promoted [7-8]. After splenectomy in patients with AIDS cirrhosis, the rapid increase of neutrophils, red blood cells and platelets is because the site of destruction of these cells is reduced after the splenectomy of the hyperfunctional spleen, while the normal hematopoietic function of the bone marrow causes the rapid increase of these blood cells. Hematopoietic stem cells in the bone marrow differentiate into lymphoid stem cells, which then differentiate into precursor T cells. The precursor T cells need to enter the thymus to mature into T lymphocytes. Since the thymus in adults gradually shrinks, T lymphocytes should not increase rapidly. It is known that the liver has hematopoietic function during the embryonic period, so we hypothesized that autologous bone marrow hematopoietic stem cells, after infusion into the liver, could promote the extrathymus development of precursor T cells under the action of certain cytokines. If this hypothesis holds, then portal venous infusion of autologous bone marrow should also promote T cell proliferation in AIDS patients without cirrhosis [9-10].

The first patient was cleared of abdominal tuberculosis and continued with antiretroviral therapy, anti-tuberculosis and nutritional support. The patient experienced an increase in CD4T lymphocytes from 1 cell/ul to 20 cell/ul within 6 months after the first surgery. Then the second operation closed the ileostomy and performed an ileal ascending colon intestinal anastomosis. At the same time, the infusion port was embedded through right omental vein intubation and autologous bone marrow infusion was performed through portal vein intrahepatic infusion. CD4T lymphocytes increased from 20 cells /ul to 210 cells /ul 12 months after the second operation. It significantly promoted immune reconstitution. Now, more than 8 years after the operation, CD4T lymphocyte 420 cell/ul, viral load cannot detect the presence of HIV virus in the peripheral blood, this case of advanced AIDS patient was basically cured clinically. The second patient had AIDS enteric tuberculosis and peritonitis sepsis with acute liver injury and significantly increased bilirubin. On the

basis of anti-viral and anti-tuberculous nutritional support and other treatments, the small incision in the upper abdomen was used to bury the infusion port, and autologous bone marrow was injected into the portal vein, which had the effect of repairing liver injury and promoting immune reconstruction. The treatment of these two patients suggests that in patients with very low CD4T lymphocytes, combined with antiretroviral therapy and nutritional support, plus autologous bone marrow infusion via portal vein may promote immune reconstruction and gradually recover to health.

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