

Pancreas Transplantation After Liver Transplantation: A Case Report

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ABSTRACT

Our aim was to describe the clinical indications, surgical technique, and clinical outcomes of a pancreas transplantation, performed 4 years after liver transplantation, as treatment for new-onset, uncontrolled diabetes mellitus in a 53-year-old man. Liver transplantation was performed for end-stage liver disease secondary to hepatitis B virus infection and hepatocellular carcinoma. The patient had no history of diabetes prior to the liver transplantation. The decision to proceed with a pancreas transplantation was made when the patient's blood sugar levels could not be normalized despite insulin doses >100 IU/d. A modified cadaveric transplantation technique was used, with the recipient's inferior vena cava dissected for anastomosis with the portal vein of the graft, using a diamond-shaped patch procedure. Moreover, the right common iliac artery was anastomosed with a Y-graft in the pancreas graft, and the duodenum remnant of the graft was anastomosed to the recipient's duodenum using a side-to-side procedure. The 6-month postoperative follow-up included repeated endoscopic biopsy of the graft duodenum, with no evidence of thrombosis or rejection of the graft, with glucose level within normal limits without requirement for diabetic drugs. To our knowledge, this is the first reported case of pancreas transplantation after liver transplantation.

THE USE of immunosuppressant drugs, such as calcineurin inhibitor or steroids, has been associated with new onset of diabetes after transplantation (NODAT) [1]. Although most patients with NODAT recover over time, some cases do progress to uncontrolled diabetes, which is a major risk factor for mortality from all causes, as well as for deterioration of the graft function [2,3]. Brittle, or labile, diabetes mellitus is an indication for an isolated pancreas transplantation [4]. However, performing an isolated pancreas transplantation carries the risk for complications caused by using immunosuppressant drugs instead of insulin. For this reason, simultaneous pancreas and kidney transplantation (SPK) or pancreas transplantation after kidney transplantation (PAK) are preferred over isolated pancreas transplantation [5].

This clinical reasoning could be relevant with regard to the management of NODAT after liver transplantation. Specifically, if NODAT after liver transplantation cannot be controlled using intensive insulin therapy, performing a pancreas transplantation could provide an effective treatment option for this brittle diabetes. The aim of our report

was to describe the clinical indications, surgical technique, and clinical outcomes of one case of pancreas transplantation after liver transplantation performed to manage uncontrolled NODAT. To the best of our knowledge, this is the first case report regarding the use of pancreas transplantation within this clinical context.

CASE REPORT

A 53-year-old male underwent a pancreas transplantation 4 years after a liver transplantation. Liver transplantation was performed for hepatorenal syndrome due to end-stage liver disease resulting from hepatitis B infection and two hepatocellular carcinomas on segments 4 and 8 of his liver. After transplantation of the cadaveric liver, the patient's liver functions recovered to normal range on laboratory tests, with no evidence of tumor recurrence on

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Fig 1. The arterial Y-graft and the diamond-shaped vein anastomosis site are shown.

laboratory or radiographic findings. High-dose hepatitis B immunoglobulin was administered periodically, with the level of hepatitis B antibody maintained >500 mIU/mL during the first year after liver transplantation and >300 mIU/mL thereafter to prevent hepatitis B infection and tumor recurrence. Although liver function was being maintained within normal range, glycemic control could not be adequately achieved despite various treatments, including change in immunosuppressant drugs (Tacrolimus to Everolimus), withdrawal of corticosteroid therapy, and intensive insulin therapy. At the time of pancreas transplantation, the patient's hemoglobin A1c was $>12\%$, despite doses of insulin >100 IU/d, with the patient experiencing frequent hypoglycemic symptoms. The C-peptide level was 2.57 ng/mL at the time of pancreas transplantation. Using the guidelines established by the American Diabetes Association and the World Health Organization, he was diagnosed with type 2 diabetes [6].

A 225-g pancreatic graft was retrieved from a 19-year-old man who had sustained a traumatic subarachnoid hemorrhage. Relevant characteristics of the donor included a body mass index of 23.3 kg/m², and his hemoglobin A1c level was 5.2%. Anti-thymocyte globulin (thymoglobulin) was used for induction, and tacrolimus and

mycophenolate mofetil were prescribed. By post-transplantation day 7, the dose of steroid was decreased to 10 mg/d, with cortisone therapy discontinued at 2 months postsurgery.

A standard bench procedure was used to transplant the pancreas graft. On the cadaveric side, a Y-graft was used for anastomosis of the splenic and superior mesenteric artery and the iliac artery. A diamond-shaped patch was applied to graft the portal vein to prevent anastomotic stenosis. The residual duodenum and small bowel were not removed from the graft to prevent duodenal edema after reperfusion, with a plan to remove these remnants after reperfusion. On the recipient side, there was some adhesion due to the previous liver transplantation. Therefore, after adhesiolysis, a right-sided medial visceral rotation (ie, the extended Kocher maneuver) was performed to create space for the pancreas graft and dissection of the vessel anastomotic sites. The inferior vena cava and the portal vein of the graft were anastomosed first, using a diamond-shaped patch, with the right common iliac artery of the graft subsequently anastomosed to the Y-graft artery (Fig 1). After reperfusion, bleeding was controlled and the duodenum and jejunum remnants of the graft were expanded due to exocrine excretion from the pancreas graft. After excision of the remnant jejunum and duodenum, the graft duodenum was anastomosed to the recipient's duodenum using a side-to-side procedure.

Postoperatively, central venous pressure was maintained at 5 mm Hg to prevent venous congestion, and intravenous heparin (~ 400 –450 U/h) was initiated to prevent thrombosis. Computed tomography was performed on postoperative days 1 and 9, with no evidence of vascular thrombosis of the graft or bleeding (Fig 2). Endoscopic inspection of the graft duodenum and protocol mucosal biopsy of the graft duodenum were performed at 3 weeks, 3 months, and 6 months postoperatively with no evidence of rejection in the graft duodenum at all time points of assessment (Fig 3). A mild elevation in serum amylase and lipase (within a 2-fold increase of the reference value) was identified during the first postoperative month, subsequently decreasing to normal levels. No drug treatment for diabetes was prescribed, with no signs or symptoms of hyperglycemia identified during the 6-month post-transplantation follow-up. The patient's hemoglobin A1c level was maintained at $<6\%$ (Fig 4), and normal liver function was maintained, with no evidence of hepatitis B infection or tumor recurrence.



Fig 2. Postoperative computed tomography images, in axial view (left panel) and coronal view (right), with no evidence of thrombosis or edema on the pancreas graft.

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