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Percutaneous Approach for Human Islet Transplantation

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THIS report describes the application of the percutaneous approach for islet cell infusion into the portal system. Percutaneous transhepatic puncture and catheterization of the portal vein is a widely accepted radiographic method, which is currently used in diagnostic and therapeutic procedures.¹

MATERIALS AND METHODS

Two male patients, aged 29 and 36 years, received combined cadaveric kidney-islet grafts for end-stage renal disease secondary to type I diabetes mellitus. The kidneys and pancreas were obtained from multiorgan donor procurement.² The organs were preserved in UW solution and packed on ice. The pancreas of the kidney donor was the source of the primary islet allograft in the 29-year-old patient. A second islet preparation was infused 2 days later by the percutaneous approach. The 36-year-old recipient received a kidney allograft and islets from a different donor 8 days after the kidney transplant. The human islet preparation were obtained by a modification³ of the automated method⁴ for human islet isolation. After documentation of patency of the portal vein by Doppler ultrasonography the right midaxillary line and the tenth or eleventh rib interspace were used as landmarks to locate peripheral portal vein branches. After prepping the skin in this area with betadine solution, the interspace was palpated and anesthetized with 2% lidocaine. A short skin incision was made and a 22-gauge Chiba needle was introduced into the liver via the incision in the midaxillary line. The needle was passed through the parenchyma in the coronal plane to the edge of the spine. A portal vein branch was isolated by injecting radiopaque contrast (iopamidole 300) through the Chiba needle while slowly withdrawing the needle. The position of the needle and the contrast injection were observed fluoroscopically. A portal vein branch was identified by observing the pattern of distribution of contrast.⁵⁻⁷ When the branch was identified, a 0.18-in steel guide was introduced through the needle lumen. A 4F or 5F catheter was passed over the guide wire through the liver parenchyma into the lumen of the portal vein. Radiopaque contrast was injected through the catheter and an angiogram was obtained to outline the anatomy of the intra- and extrahepatic portal vein (Fig 1). The pancreatic islet cells were then slowly infused by gravity through the catheter into the main portal vein. The islet infusion lasted 10 to 20 minutes. There were no complications. When the infusion was completed, the catheter was withdrawn and the patient was kept at bed rest for 3 hours with periodic monitoring of the vital signs and hematocrit.

RESULTS AND DISCUSSION

The percutaneous approach for intraportal islet infusion was uneventful and well tolerated in both patients. The procedure is readily accessible and could allow to perform intrahepatic cell transplants without the need for prolonged hospitalization or laparotomy. We were unable to find any detailed description of this approach, even though it has been used in several patients undergoing allotrans-

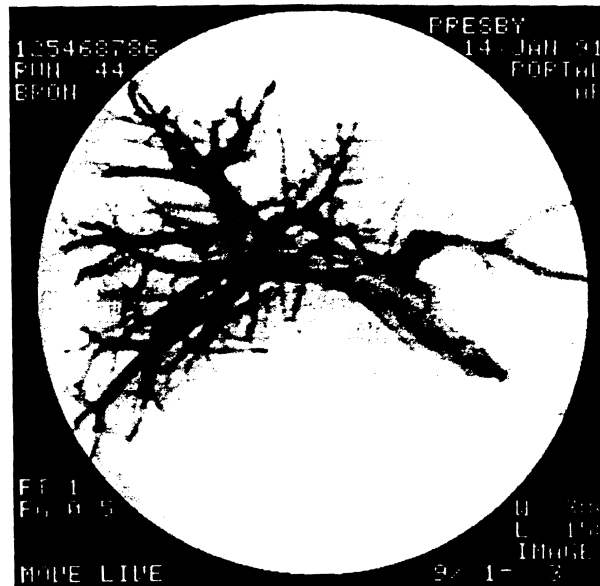


Fig 1. Angiogram outlining the anatomy of the intra- and extrahepatic portal vein.

plantation,⁸ autograft,⁹ and pig-to-human xenografts (Groth et al, presented at the Third International Congress on Pancreatic and Islet Transplantation, Lyon, 1991). The percutaneous approach could be of assistance in those cases in which the islet transplant is performed after an established kidney allograft or in cases in which multiple donors are used.

In the future, if islet transplantation becomes feasible before the requirement for kidney transplant, the percutaneous approach could allow the islet implant to be performed as an outpatient procedure.

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