ABSTRACT

Introduction. The use of Celsior solution for organ preservation has not been thoroughly studied in pancreas transplantation. The aim of this study was to compare University of Wisconsin and Celsior solutions for preservation of pancreas grafts.

Patients and methods. From March 1995 to December 2005, 72 patients with type 1 diabetes underwent pancreas transplantation. There were 42 men and 30 women, with a mean age at transplantation of 38.1 ± 7.5 years (range: 27 to 55 years), and a mean duration of diabetes of 22.5 ± 6.6 years. Recipients were classified into two groups according to the preservation solution: (A) Celsior (n = 28, 38.9%) and (B) Wisconsin (n = 44, 61.1%).

Results. The donor and recipient characteristics were similar in both groups. There were five cases of venous thrombosis in the Wisconsin group and two in the Celsior group (P = NS). The venous drainage technique in the former group was portocaval in 19 patients and portoiliac in 25; in the Celsior group, portocaval in 23 patients and portoiliac in five (P = .001). Enteric drainage was used in 19 patients from the Celsior group and 17 patients from the Wisconsin group (P = .01). Actuarial 2-year graft survival was 74.6% in the Wisconsin group and 77.4% in the Celsior group (P = NS).

Conclusions. No differences were observed in venous thrombosis between the two groups. The lower rate of venous thrombosis with the portocaval technique was related to the type of venous drainage rather than the type of preservation solution. Celsior solution may be considered as good as Wisconsin solution for pancreas transplantation.
Hyperglycemia or hyperamylasemia, hemodynamic instability, or long periods of intensive care unit stay were not considered absolute contraindications. The final decision to accept a pancreas graft for transplantation was based on the gross appearance of the graft and the vessels before and after visceral perfusion.

In all cases the pancreas graft was placed on the right side of the pelvis with an arterial anastomosis (“Y” graft) to the common iliac artery. The venous drainage technique was portoiliac (common iliac vein) in 30 cases and portocaval (distal vena cava) in 42 cases. Bladder drainage was performed in 36 cases, and enteric exocrine drainage in 36 cases.

Graft pancreatitis was defined as an elevation of serum amylase concentration in excess of twice the normal upper limit, with clinical or radiological evidence of pancreas injury. Venous pancreas thrombosis was considered to be the absence of blood flow on Doppler ultrasound and/or angiography, and demonstrated at reoperation.

Differences between means and proportions were assessed by Student t test and chi-square test; the comparison of qualitative and quantitative variables was made by analysis of variance. Graft and patient survivals were estimated using the Kaplan-Meier method. A P value less than .05 was considered statistically significant. The analyses were performed with SPSS 11.5 for Windows.

RESULTS

Donor and recipient characteristics were similar in both groups, except for recipient age and recipient body mass index (BMI), which were higher in the Celsior group (Table 1).

Arterial hypotensive events, cardiac arrest, norepinephrine use, age, BMI, creatinine, glycemia, and donor serum amylase were similar in both groups. Recipient variables were also similar in terms of sex distribution and time of diabetes mellitus evolution. The mean cold ischemia time was 500 ± 95 minutes (range = 270 to 690) for the Wisconsin group compared with 522 ± 98 minutes (range = 355 to 750) for the Celsior group (P = NS). In the Wisconsin group portocaval anastomosis was performed in 19 patients and portoiliac in 25, while in the Celsior group the venous drainage was portocaval in 23 cases and portoiliac in five (P = .001). Enteric drainage was performed in 19 cases in the Celsior group and 17 cases in the Wisconsin group; the bladder-drained technique was more frequent in the Wisconsin group (27 vs 9 cases; P = .01). Celsior solution was used more frequently in association with enteric drainage and a portocaval anastomosis.

There were five cases of venous graft thrombosis in the Wisconsin group and two in the Celsior group (P = NS). When the venous drainage technique was included in the analysis, no significant differences were found between the two groups in terms of thrombosis. Graft pancreatitis occurred in 15 (34.1%) cases in the Wisconsin group and 7 (25%) in the Celsior group (P = NS). Enteric or bladder leakage was evident in two cases in the Wisconsin group (one bladder and one enteric) and in five patients in the Celsior group (three enteric and two bladder; P = NS). Four patients died (5.6%); two in the Wisconsin group, namely, one after an enteric leakage and the other because of venous graft thrombosis and acute respiratory distress versus two in the Celsior group, namely, one because of necrotizing pancreatitis and aspergillus infection, and the other due to massive bleeding from graft pancreatitis with disruption of the arterial anastomosis. Actuarial 2-year graft survival was 74.6% for the Wisconsin group as compared with 77.4% for the Celsior group (P = NS). Actuarial 2-year recipient survival rates were 94.7% in the Wisconsin versus 84.4% in the Celsior group (P = NS).

DISCUSSION

The availability of a single preservation solution suitable for all thoracic and abdominal grafts would greatly facilitate donor surgical procedures. Celsior solution has been used in several transplants, such as lung, liver, heart, kidney, and pancreas. However, it is unclear which is the best solution to be used in pancreas trans-
plantation, although Wisconsin solution has been traditionally used in most transplantation centers. The present study reported preliminary results with the two solutions at our institution. The groups were similar save for recipient age and BMI, which showed more adverse values in the Celsior group. Most patients in the Celsior solution group had various surgical techniques compared with the Wisconsin group, which showed a higher rate of enteric and portocaval venous drainage. In our experience, portocaval anastomosis was associated with a significantly lower rate of venous thrombosis than portoiliac anastomosis, though this did not appear to be a direct effect of the type of preservation solution. The leakage rate, the cold ischemia time, and clinical graft pancreatitis were similar in both groups. In conclusion, Celsior solution is as good and safe as Wisconsin solution for pancreas graft preservation. As it is already used for heart, lung, liver, and kidney transplants, Celsior can be considered a standard preservation solution for multiorgan procurement.

REFERENCES