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Importance of Technical Aspects in the Beginnings of a Pancreas Transplantation Program

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ABSTRACT

Pancreas and kidney transplantation is the treatment of choice for patients with type 1 diabetes mellitus and terminal renal insufficiency. Herein we have presented a series of 35 patients transplanted between 2002 and 2009 including periods before and after 2007 divided based on introduction of some technical aspects.

In the first phase (learning period) we have noted complications related to pancreatic surgery with a morbidity among 12 of 18 patients (66.6%). In the second period (stabilization period), complications appeared in 6 out of 17 patients (35.2%; $P < .028$). The reoperation rate was 83.3% in the learning period and 23.5% in the stabilization period ($P < .03$). Seven transplantectomies were performed in the first period ($P < .004$). Five patients died, all of them in the learning group ($P < .019$).

Changes in the technical aspects of the procedure were responsible for improved outcomes obtained among pancreas and kidney transplantations.

HISTORICALLY, pancreas transplantation has had a high percentage of surgical complications, which has limited its expansion, but in recent years results have significantly improved.[1] The aim of the present report is to describe surgical complications and outcomes occurring after simultaneous pancreas and kidney transplantation (SPK).

MATERIALS AND METHODS

Owing to type 1 diabetes mellitus and terminal renal failure, refering dialysis, 35 patients underwent SPK between 2002 and 2009. We divided the series into two periods: period A before 2007 (n = 18) and period B after 2007 (n = 17). In 2007, these technical aspects were introduced:

- For donor surgery: 1) use of a vascular sealing and section device (Ligasure Atlas); 2) infusion of the graft only through the arteries (1 litre) and drainage through the portal vein; 3) change in the preservation solution (Wisconsin in period A and Celsior in period B); 4) liver and pancreas procurement done en bloc before back table separation; 5) cold ischemia time <12 hours.
- For back table surgery: 1) duodenum reduced to 8–10 cm, locating the papilla of Vater through a catheter; 2) use of an iliac/femoral artery graft.
- For recipient surgery: 1) systemic venous drainage with an anastomosis to the inferior vena cava; 2) Enteric exocrine drainage to the ileum or jejunum close to the duodenum of the graft; 3) intestinal anastomosis of 1 cm in two layers.

Chi-squared test was used for categoric variables, Student *t* test for continuous variables with a normal distribution, and Mann-Whitney *U* test for those with a nonparametric distribution. The Kaplan-Meier method was used for survival analysis. *P* values of <.05 were considered to be significant.

RESULTS

Donor and recipient characteristics in both groups were homogeneous. Operative and postoperative outcomes are summarized in Table 1. The cumulative survival rate for group A was 83% in the first year, 77% in the third year, and 69% in the fifth year. Median survival rate of the series was 58 months. In group B, the average follow-up has been

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Table 1. Outcomes in both Periods–Group A, Learning Period Before Surgical Changes; Group B, Stabilization Period After Surgical Changes

	Group A (n = 18)	Group B (n = 17)	*P* Value
Technical surgical aspects			
Preservation solution (Wisconsin/ Celsior)	17/1	1/16	.001
Surgical time (min)	293.3	246.5	NS
Cold ischemia time (min)	357.5	486.5	NS
Warm ischemia time (min)	155.4	94.7	.001
Arterial anastomosis (SMA/graft)	10/8	0/17	.001
Venous anastomosis (iliac vein/vena cava)	9/9	0/17	.001
Postoperative outcomes			
Intensive care unit mean stay (days)	6.2	3.9	.02
Hospital mean stay (days)	33.72	21.53	.04
Mean glycemia at discharge (mg/dL)	133.7	90.2	.002
Mean HbA1c at discharge (%)	5.9	6.7	NS
Mean C peptide at discharge (ng/ml)	6.4	5.6	NS
Insulinotherapy at discharge	8	17	
Morbidity			
Infectious complications	11	5	.02
Intraabdominal infections	8	1	.02
Venous graft thrombosis	3	0	.02
Pancreatitis	5	0	.02
Reoperation rate	15	4	.03
Renal complications	3	4	NS
Pancreas graft loss	10	0	.0001
Mortality	5	0	.019

11 months (range 0–23), with 100% survival in the second year.

DISCUSSION

Surgical complications, also defined as technical failure, have been the Achilles heel of pancreas transplantation. They have been described among 15.3% of SPK and are the most common cause of graft loss (39.3%), although in recent years they have declined owing to better surgical techniques in both the donor and the recipient,[1,2] as by confirmed our experience.

Bacterial infections are a major cause of graft loss and 30% of deaths. Among our recipients, 86% experienced at least one infection. In most patients (almost all of them in group A), infections were secondary to perforation or suture leakage.

Cases of pancreatitis were frequent in the present series, and all of them occurred in the learning group. We attributed this complication to long warm ischemia periods and/or technical errors of narrowing the papilla in the preparation of the duodenal segment during back table surgery. There are often peripancreatic collections with high pancreatic enzymes levels, which may require percutaneous drainage or open surgery if they are not properly drained by the postoperative drain. We consider them in the context of small fistulae due to normal inflammatory responses after transplantation. Therefore, we do not remove peritoneal tubes until the amylase levels have become normal or the volume is low (<50 mL/24 h). Graft thrombosis is the most frequent (7%–13%) serious complication.[3,5] It usually occurs in the first week after transplantation, accounting for 70% of technical failures.[3] In the present series we had only two patients with this complication; one of them appeared in the context of pancreatitis. It is not clear whether the preservation solution plays a role in the appearance of thrombosis or pancreatitis, but since our routine use of Celsior have not diagnosed any further cases.

Overall, our results are similar to those obtained by the Minnesota group in the 1990s,[3] owing to the learning curve. Fortunately, in the current period of stabilization our outcomes are similar to those in larger series.[3,4]

In conclusion, our results in the second period (stabilization) were much better than those in the first period (learning), owing to improved surgical techniques.

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