

## Re-operation in Pancreas Transplantation

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### ABSTRACT

**Background.** Surgical complications in pancreas transplantation are associated with increased morbidity and graft loss. The purpose of our study was to determine the frequency of re-operation in early and late postoperative of pancreas transplantation and its impact in relation to graft survival, patient survival, and hospital mortality.

**Methods.** We conducted a retrospective study of 238 pancreas transplants performed from 2001 to 2011. We analyzed surgical complications that led to the early and late re-operations by type of transplantation and its relation to pancreas graft survival, patient survival, and hospital mortality.

**Results.** We studied 61 re-operated patients (25.63%), 58 patients with early re-operation and 3 with late re-operation. The median of re-operations per patient was 1.48 (range, 1 to 5). Seventy-five surgical complications required 90 re-operations. The causes of early re-operations were bleeding (8.8%), pancreas graft thrombosis (6.3%), pancreatitis (2.9%), bowel obstruction (2.1%), leaks (2.1%), and evisceration (1.7%). The hospital mortality rate was 0.43%. Pancreas graft survival at 1 and 5 years is higher in the group of non-re-operated than in the re-operated group (98% vs 74% and 93% vs 57%;  $P = .0001$ ). Patient survival at 1 year is slightly higher in the non-re-operated group, but with no significant differences (99% vs 97%), and at 5 years the patient survival in the non-re-operated group is higher than in the re-operated group (98% vs 91%;  $P = .011$ ).

**Conclusions.** Surgical complications required re-operations that were associated with higher morbidity and lower pancreas graft and patient survival.

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**T**HE HISTORY of pancreas transplantation has had high morbidity and mortality rates. Surgical complications are important because they often lead to graft loss and increased mortality of the recipient that greatly increases the cost of the transplant [1–4]. In the 1980s, 25% of all pancreas grafts in the world were lost because of surgical complications through technical failure [2,3]. However, in recent decades, the complication rate has been significantly reduced, according to the latest detailed analysis available in the United States of pancreas transplant cases performed between 2004 and 2008, in which the rate technical failure of primary pancreas transplant was between 7% and 9% [5]. Advances in surgical technique, better donor identification, antibiotic prophylaxis, immunosuppression, organ preservation, diagnosis, and treatment of post-transplant complications have meant significant improvements in graft survival and patients receiving pancreas transplantation [6].

However, surgical complications after pancreas transplantation remain high, having a rate from 15% to 43% of re-operations, according to different studies [7–16]; these surgical complications needed re-operations, and these had from 74% to 89% of pancreatic graft loss [1].

The main objective of our research was to determine the frequency of re-operations in the early and late postoperative, depending on the type of pancreas transplant (simultaneous pancreas-kidney [SPK], pancreas after kidney [PAK], and pancreas transplant alone [PTA]); objectives were to analyze the impact of re-operations in pancreas graft survival, patient survival, and hospital mortality.

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**Table 1. Donor and Recipient Characteristics**

Donor characteristics	
Age (years $\pm$ SD)	30 $\pm$ 10.598
Sex (M/F)	61.3%/38.7%
Cold ischemia time (hours $\pm$ SD)	11 $\pm$ 3.133
Recipient characteristics	
Age (years $\pm$ SD)	39 $\pm$ 7.099
Sex (M/F)	65.5%/34.5%
BMI (kg/m <sup>2</sup> )	23.39 $\pm$ 3.80
Duration of diabetes (years $\pm$ SD)	25 $\pm$ 7.003
Time of dialysis (years $\pm$ SD)	2 $\pm$ 1.476
Peritoneal dialysis	62 (26.1%)

Abbreviations: SD, standard deviation; BMI, body mass index.

## MATERIALS AND METHODS

We performed a retrospective study of all patients who underwent pancreas transplantation from 2001 to 2011 at the Clinic Hospital of Barcelona.

All data were extracted from the medical records of the computing platform. The study included all patients who underwent pancreas transplantation in all varieties: SPK, PAK, PTA, and pancreas retransplantation (in combination with the kidney or pancreas isolated). Exclusion criteria were patients who were receiving pancreas transplantation with immediate transplantectomy of the pancreatic graft in the same surgical procedure. A database for collection and statistical analysis was developed with the use of the Statistical Package for Social Sciences (SPSS) version 17 for Windows. Survival analysis was performed with the use of survival curves of Kaplan-Meier and determined the long-rank test for survival difference between groups, with statistical significance level of  $P < .05$ .

### Definition of Terms

Early re-operation was defined as all re-operation involving the intraperitoneal and retroperitoneal cavity during the first 3 months after transplant of the pancreas.

Late re-operation was defined as all re-operation involving the intraperitoneal and retroperitoneal cavity or as a consequence of a surgical complication arising from pancreatic transplant 3 months after transplant of the pancreas.

Hospital mortality was defined as every death during hospitalization of patients or within 30 days after pancreas transplantation.

Acute pancreas rejection was defined as pancreas rejection episodes diagnosed by means of clinical symptoms accompanied by unexplained hyperamylasemia with positive pancreatic biopsy or combination of both and improvement with immunosuppressive therapy.

Chronic pancreas rejection was diagnosed by means of biopsy or defined as progressive deterioration of graft function over time without any other causes to explain.

Pancreas graft loss was defined as anatomic or functional pancreatic graft loss.

## RESULTS

We studied 246 pancreas transplants performed in 231 patients (219 transplants and 27 retransplant); 8 patients were excluded with immediate pancreas graft transplantectomy, for which the study was conducted with 238 pancreas transplants (212 primary transplants and 26 retransplant) in 224 patients. SPK transplants were performed mainly

**Table 2. Causes of Re-operations, Transplantectomies, Pancreas Graft Loss, and Hospital Mortality**

Complications	n (%)	Transplantectomy	Graft Loss	Hospital Mortality
Bleeding	21 (8.8%)		2	
Vascular graft thrombosis	15 (6.3%)	11	11	1
Pancreatitis/abscess	7 (2.9%)	1	2	
Bowel obstruction	5 (2.1%)		3	
Leaks	5 (2.1%)	3	4	
Evisceration	4 (1.7%)		0	
Other	2 (0.8%)	1	1	
Incisional hernia	3 (1.3%)		0	
Kidney graft complication	13 (5.5%)		3	
Total	75 (31.5%)	16	26	1

representing 83.6% of the series (199 patients), 11 PAK (4.6%), 2 PTA (0.8%), and 26 retransplantation (10.9%).

The general characteristics of the donors and recipients are observed in Table 1. In the preparation of the pancreaticoduodenal allograft before implantation, 91.3% were performed with the use of arterial anastomosis between the splenic artery and superior mesenteric artery and the rest were performed with the use of the Y-iliac graft. In the recipients, portocaval vein anastomosis was performed in 41% and porto-right iliac vein in 46.2%; the type of arterial anastomosis was with the right iliac artery 60.3% and right external iliac artery 39.7%. In all cases, we used enteric drainage through the use of a duodenojejunostomy. The immunosuppressive regimen was based on tacrolimus-mycophenolate and corticosteroids in 94.6% and 5.4% with cyclosporine-mycophenolate-corticosteroids. In the post-operative period, anticoagulation prophylaxis was initiated with the use of aspirin and dalteparin.

Sixty-one patients required re-operation, this meaning that the re-operation rate was 25.63%, in which 58 patients had early re-operations and 3 patients had late re-operations. The distribution of re-operated patients by type of transplant was 77.04% (47 patients) SPK transplantation, 8.20% (5 patients) PAK, 3.29% (2 patients) PTA, 9.83% (6 patients) PTA retransplantation, and 1.73% (1 patient) SPK retransplantation.

The median of re-operations per patient was 1.48 (range, 1 to 5 re-operations). Seventy-five surgical complications required 90 re-operations, of which 85 were early and 5 were late re-operations. The main cause of early re-operation was bleeding (8.8%), followed by pancreas graft thrombosis (6.3%), pancreatitis with or without pancreatic collection or peritonitis (2.9%), intestinal obstruction (2.1%), and anastomotic leaks (2.1%). Although bleeding was the leading cause of re-operation, there was no case of transplantectomy, whereas pancreas graft thrombosis was the main cause of transplantectomy (Table 2). The re-operations group presented 26 graft failures (16 transplantectomies and 10 from other causes such as acute or chronic rejection and vascular problems).

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