

Elena Orsenigo
Francesco De Cobelli
Marco Salvioni
Marco Cristallo
Paolo Fiorina
Alessandro Del Maschio
Valerio Di Carlo
Antonio Secchi

Successful endovascular treatment for gastroduodenal artery pseudoaneurysm with an arteriovenous fistula after pancreas transplantation

Received: 24 September 2002
Accepted: 2 April 2003
Published online: 18 June 2003
© Springer-Verlag 2003

E. Orsenigo · M. Cristallo · V. Di Carlo
Department of Surgery,
University Vita-Salute San Raffaele,
Milan, Italy

F. De Cobelli · M. Salvioni
A. Del Maschio
Department of Radiology,
University Vita-Salute San Raffaele,
Milan, Italy

P. Fiorina · A. Secchi (✉)
Department of Medicine,
University Vita-Salute San Raffaele,
Via Olgettina 60, 20132 Milan, Italy
E-mail: secchi.antonio@hsr.it
Tel.: +39-02-26432805
Fax: +39-02-26433790

Abstract The aim of this study was to demonstrate the usefulness of endovascular treatment for gastroduodenal artery pseudoaneurysm with an arteriovenous fistula after simultaneous pancreas–kidney transplantation. We describe the case of a 38-year-old man who underwent successful simultaneous pancreas–kidney transplantation. An asymptomatic pseudoaneurysm of the donor gastroduodenal artery with an arteriovenous fistula was incidentally diagnosed by routine color flow Doppler ultrasound (CDU) examination and confirmed by 3-D gadolinium-enhanced magnetic resonance angiography (MRA) 15 days after transplantation. Selec-

tive arteriography (via the right femoral artery) confirmed an arteriovenous fistula and a pseudoaneurysm of the donor gastroduodenal artery. The patient underwent successful endovascular embolization. At 11 months of follow-up, normal pancreatic function was reported. Endovascular treatment for gastroduodenal artery pseudoaneurysm with an arteriovenous fistula after pancreas transplantation obviates the need for surgical intervention.

Keywords Angiography · Vascular complications · Stent grafts · Pancreas transplantation · Pseudoaneurysm · Arteriovenous fistula

Introduction

The first pancreas transplantation was performed by William Kelly in 1966 at the University of Minnesota [1]. Recently, this operation has progressed to become routine in many transplant centers, but unfortunately the rate of surgical complications remains relatively high [2]. The list of technical complications includes allograft pancreatitis, vascular thrombosis, hemorrhage, pseudoaneurysm formation, arteriovenous fistula, anastomotic leakage, and abdominal infection [2]. Transplant-related pseudoaneurysms [3] and arteriovenous fistula formation [4] frequently lead to graft loss. Clinical presentation is variable, and the diagnosis may be suggested by physical examination [5]. On the other hand, arteriovenous fistula and pseudoaneurysm may be

misdiagnosed. Arteriovenous fistula formation is directly related to procurement technique: a non-specific “blind ligation” of mesenteric vessels along the inferior pancreatic border [6]. However, this approach continues to be used commonly. Pseudoaneurysm after pancreas transplantation has potentially serious consequences, including rupture, hemorrhage, and loss of the pancreatic graft [7, 8, 9]. For these reasons, pseudoaneurysm and arteriovenous fistula should be corrected as soon as suspected. Of the cases described previously, almost all were repaired surgically, with only few having been treated successfully by endovascular intervention [7]. We describe a pancreatic allograft gastroduodenal artery pseudoaneurysm with an arteriovenous fistula in a simultaneous pancreas–kidney transplant recipient successfully treated via an endovascular approach.

Case report

A 38-year-old uremic, type-1 diabetic patient was submitted to simultaneous cadaveric enterically drained pancreas–kidney transplantation. The donor pancreas was harvested with a duodenal segment in accordance with standard procedures. An end-to-end anastomosis was performed between the internal branch of the iliac vessels and the splenic artery. Furthermore, an end-to-side anastomosis was performed between the superior mesenteric artery and the external branch of the Y-iliac graft. Finally, an end-to-end anastomosis was performed between the gastroduodenal artery and the external branch of the Y-iliac graft. The pancreaticoduodenal graft was implanted in the right iliac fossa, and systemic venous

drainage was performed. An asymptomatic pseudoaneurysm of the donor gastroduodenal artery was incidentally found during routine abdominal color flow Doppler ultrasound (CDU) evaluation and confirmed by 3-D gadolinium-enhanced magnetic resonance angiography (MRA; Fig. 1) 15 days after transplantation. The pseudoaneurysm was 3 cm in diameter. Selective arteriography was performed via the right femoral artery. A straight 4-French catheter was advanced over a guide wire into the right common iliac artery. After contrast injection, an arteriovenous fistula with pseudoaneurysm originating from the donor gastroduodenal artery was apparent (Fig. 2). A Cobra hydrophilic 4-French catheter (Terumo; Japan) was selectively advanced over a guide into the gastroduodenal artery. A 3-French co-axial catheter

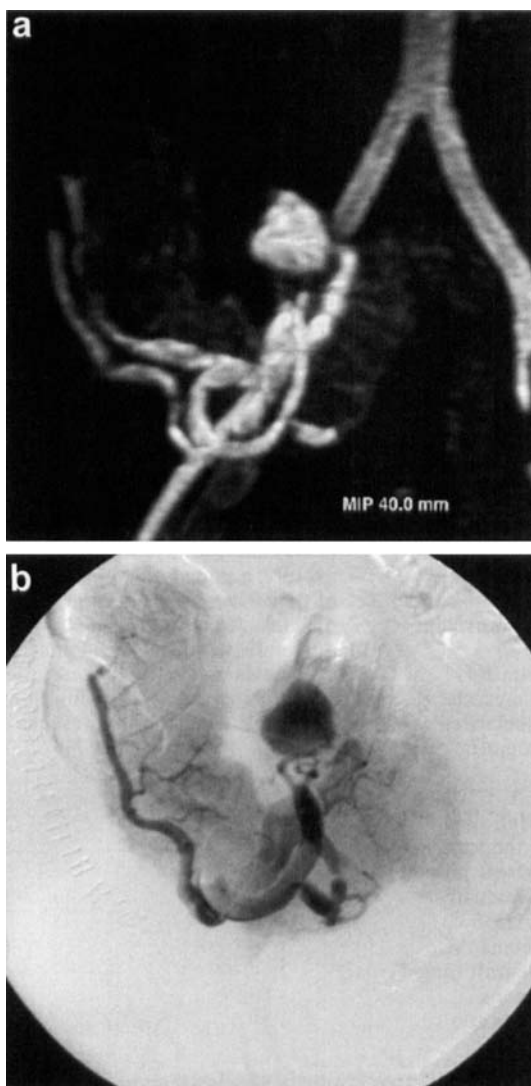


Fig. 1a, b Gadolinium-enhanced magnetic resonance angiography (a) and selective arteriography (b) showed pseudoaneurysm with arteriovenous fistula originating from a branch of the donor gastroduodenal artery. The pancreas was implanted in the right iliac fossa. The gastroduodenal artery, superior mesenteric artery, and splenic artery were anastomosed to the right common iliac artery by use of an arterial Y-graft derived from the donor iliac bifurcation



Fig. 2 Selective angiography of the distal branch of the donor gastroduodenal artery showed better the origin of the aneurismatic fistula



Fig. 3 Angiographic control after embolization with coils demonstrated complete occlusion of the aneurismatic fistula

(FastTracker-325; Boston Scientific/Target, Fremont, Calif. USA) was then inserted into the 4-French catheter and advanced into the distal branch where the fistula and the pseudoaneurysm originated. The pseudoaneurysm was embolized with two small (3 mm in diameter, 30 mm in length) fibered platinum coils (Boston Scientific/Target). Final angiographic control demonstrated complete occlusion of the fistula, with no filling of the pseudoaneurysm (Fig. 3). The pancreatic parenchyma was vascularized normally. During the follow-up period (11 months) there were no laboratory or clinical signs of pancreatitis. Endocrine pancreatic function was normal during the entire follow-up. At 11 months of follow-up, abdominal CDU examination confirmed complete occlusion of the pseudoaneurysm.

Discussion

Post-operative pancreatic allograft gastroduodenal artery pseudoaneurysm with an arteriovenous fistula following simultaneous pancreas-kidney transplantation is a vascular complication [7], rating from 0.3 to 20% [9, 10]. Their incidence is probably underestimated, since clinical manifestations may be extremely variable depending on the extension and site of the lesion. Most of the reported pseudoaneurysms originate from the site of vascular anastomosis and are frequently associated

with infection [7]. Diagnosis is often delayed, and treatment frequently involves removal of the transplant [7]. The initial diagnosis in our patient was established through routine ultrasound examination, and the confirmation was obtained by MRA. Angiography remains the gold standard for diagnosis and guidance to endovascular or surgical treatment. Recently, endovascular treatment has been proposed as an alternative to surgery [7]: the pseudoaneurysm and arteriovenous fistula can be eliminated by the application of an endovascular stent covering the site of the fistula [7]. In our case, the site of the fistula and pseudoaneurysm was distal and originated from a terminal branch of the gastroduodenal artery, contra-indicating the use of a stent. For these reasons, we decided to embolize the fistula with microcoils. We conclude that successful endovascular management of pancreatic allograft gastroduodenal artery pseudoaneurysm with an arteriovenous fistula is possible without the sacrifice of a functioning transplant. When feasible, embolization should be preferred, due to the risk of endothelial hyperplasia in the vessels of diabetic patients when treated with endoluminal stents. Selective embolization can obviate the need for operative intervention and has comparable results.

References

1. Kelly WD, Lillehei RC, Merkel FK, Idezuki Y, Goetz FC (1967) Allotransplantation of the pancreas and duodenum along with the kidney in diabetic nephropathy. *Surgery* 61:827
2. Phillips BJ, Fabrega AJ (2000) Embolization of a mesenteric arteriovenous fistula following pancreatic allograft: the steal effect. *Transplantation* 70:1529
3. Verni MP, Leone JP, De Roover A (2001) Pseudoaneurysm of the Y-graft/iliac artery anastomosis following pancreas transplantation: a case report and review of the literature. *Clin Transplant* 15:72
4. Lowell JA, Stratta RJ, Taylor RJ, Bynon JS (1996) Mesenteric arteriovenous fistula after vascularized pancreas transplantation resulting in graft dysfunction. *Clin Transplant* 10:278
5. Khan TF, Ciancio G, Burke GW 3rd, Sfakianakis GN, Miller J (1999) Pseudoaneurysm of the superior mesenteric artery with an arteriovenous fistula after simultaneous kidney-pancreas transplantation. *Clin Transplant* 13:277
6. Lowell JA, Bynon JS, Stratta RJ, Taylor RJ (1993) Superior mesenteric arteriovenous fistula in vascularized whole organ pancreatic allografts. *Surg Gynecol Obstet* 177:254
7. Tan M, Di Carlo A, Stein A, Cantarovich M, Tchervenkov JJ, Metrakos P (2001) Pseudoaneurysm of the superior mesenteric artery after pancreas transplantation treated by endovascular stenting. *Transplantation* 72:336
8. Ciancio G, Burke GW, Viciano AL, et al. (1996) Destructive allograft fungal arteritis following simultaneous pancreas-kidney transplantation. *Transplantation* 61:1172
9. Tzakis AG, Carroll PB, Gordon RD, Yokoyama I, Makowka L, Starzl TE (1989) Arterial mycotic aneurysm and rupture: a potentially fatal complication of pancreas transplantation in diabetes mellitus. *Arch Surg* 124:660
10. Snider JF, Hunter DW, Kuni CC, Castaneda-Zuniga WR, Letourneau JG (1991) Pancreatic transplantation: radiologic evaluation of vascular complication. *Radiology* 178:749