



## Gastric Outlet Obstruction by a Donor Aortic Tube After En Bloc Liver Pancreas Transplantation: A Case Report

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### ABSTRACT

We present the case of a 30-year-old female suffering from a type five maturity onset diabetes of the young deficiency, resulting in type 1 diabetes and terminal renal insufficiency. She also had chronic and refractory pruritis due to primary sclerosing cholangitis—like fibrosis. She underwent combined en bloc liver and pancreas transplantation and kidney transplantation. The postoperative course was complicated by a gastric outlet obstruction due to compression of the native gastroduodenal junction by the donor aortic tube. This was treated by construction of a roux-en-Y gastrojejunostomy at posttransplant day 24. To our knowledge, compression of the gastroduodenal junction by a donor aortic tube after combined liver and pancreas (or multivisceral) transplantation has not been reported previously.

**A**FTER THE PIONEER WORK on “cluster” splanchnic and multivisceral transplantation by Starzl et al<sup>1</sup> in the early 1960s, the technique was initially used in the late 1980s and early 1990s for the treatment of otherwise nonresectable upper abdominal malignancies.<sup>2–5</sup> This implicated first performing an oncologic debulking before en bloc transplantation of liver and pancreas (with or without the small intestine). Because of the poor results mostly due to tumor relapse<sup>2–5</sup> and the chronic organ shortage, the indication for cluster liver and pancreas transplantation shifted from malignant conditions toward benign diseases of the liver in patients with insulin-dependent diabetes mellitus. Here, surgery is less invasive because only a hepatectomy (instead of an upper abdominal exenteration) is performed. Another difference is that the native pancreas and upper gastrointestinal tract are preserved, resulting in less blood loss during surgery, and faster recovery of oral intake after surgery.<sup>6–9</sup> Also the omentum (useful in case of leak/fistula) and the spleen (important for defense against infection) are preserved. Arterial supply to these “cluster” liver and pancreas grafts is usually provided via an interposition donor aortic tube anastomosed to the recipient aorta. We report one case in whom this donor aortic tube caused a gastric outlet obstruction.

### CASE REPORT

A 30-year-old female (A+, cytomegalovirus-positive, 53 kg, 158 cm), diagnosed with a type five maturity onset diabetes of the young, was referred to our transplant center. She was diagnosed with type 1 diabetes at the age of 10 and became insulin-dependent at the age of 13. She later developed diabetic nephropathy (Biopsy-proven) and retinopathy. At the time of referral, her creatinine

clearance had dropped to 29 mL/min and radiological investigation showed the presence of several cortical renal cysts and a normal kidney volume. She had also primary sclerosing cholangitis—like fibrosis that by the time of referral had evolved in deteriorating liver function and refractory pruritis. Given the combined failure of liver, pancreas, and kidney, she was listed for combined liver and pancreas transplantation and kidney transplantation.

Suitable organs became available from a 21-year-old female donor (A+, cytomegalovirus-negative, 55 kg, 160 cm). Our group described the technique of combined liver and pancreas procurement and transplantation in details earlier.<sup>7</sup> Briefly, in the donor, the liver-duodeno-pancreatic graft was procured en bloc with an aortic patch including the celiac trunk and the superior mesenteric artery. This was followed by the procurement of the left kidney. In the recipient, the operative procedure started with a bilateral subcostal incision with median extension to the xiphoid. After mobilization of the liver, a donor aortic tube was implanted on the infrarenal receptor aorta in a retrocolic and anteduodenal fashion. After installation of a total extrarenal bypass (outflow cannulas in femoral and inferior mesenteric veins; inflow cannula in axillary vein), the hepatectomy was performed with preservation of the native inferior vena cava. The liver-duodeno-pancreatic graft was transplanted en bloc in a piggyback fashion with an end-to-side anastomosis of the donor suprahepatic vena cava to a large ostium created on the native inferior vena cava at the junction of the three

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sushepatic veins. Next, the previously implanted donor aortic tube was anastomosed to the donor aortic patch including the superior mesenteric artery and the celiac trunk.

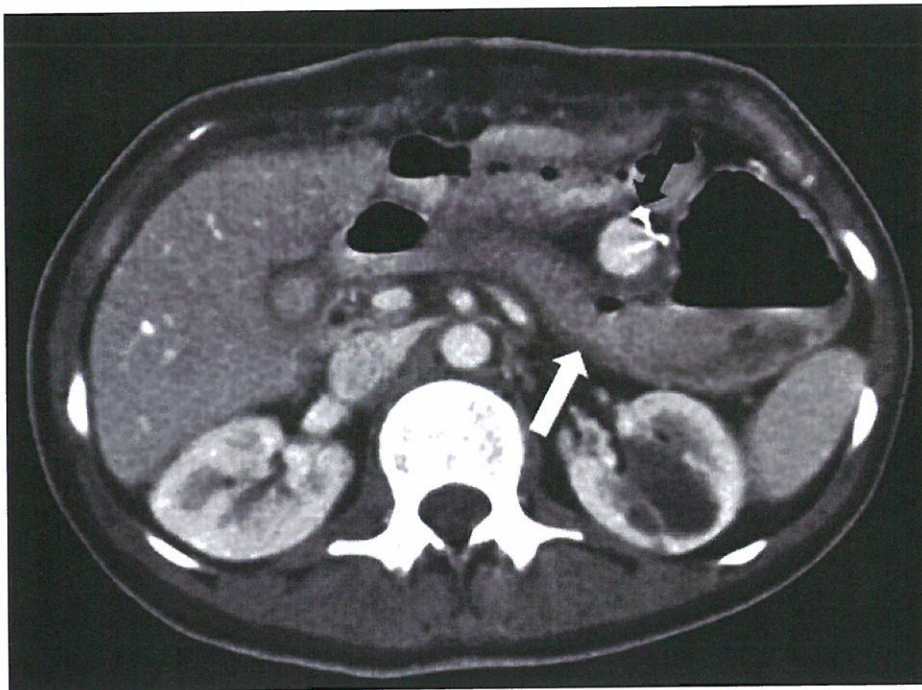
Finally and to augment the portal blood supply to the liver graft and decompress the native splanchnic viscera, the native portal vein was anastomosed in a piggyback fashion (end-to-side) to the dorsal aspect of the donor portal vein in the liver hilum. A two-layered side-to-side retrocolic duodenojejunostomy was performed for pancreatic and biliary drainage.

In a second phase, and via a separate classical hockey stick incision, a standard kidney transplantation was performed in the left fossa, implanting the renal vessels onto the iliac vessels. The whole procedure took approximately 10 hours. Two units of packed cells and 2 U of fresh frozen plasma were administered. The patient received immunosuppressive therapy consisting of basiliximab, tacrolimus, mycophenolate mophetil, and low-dose corticosteroids. At posttransplant day 7, an upper gastrointestinal protocol contrast study showed no leak at the duodenojejunostomy. There was fragmented passage of contrast at the native gastroduodenal junction. Oral intake was started and progressively increased but was not well tolerated, with nausea and early satiety. Initially these symptoms were attributed to multiple factors: persisting postoperative paralytic ileus, delayed gastric emptying and enteric neuropathy secondary to diabetes, electrolyte imbalance, and side effect of mycophenolate mofetil. This was treated conservatively with transient improvement. Because of resurgence and even aggravation of symptoms, a computed tomography scan with oral contrast (Fig 1) was performed at posttransplant day 17 to rule out a mechanical gastrointestinal (sub)obstruction. The latter showed external compression of the gastroduodenal junction by a relatively enlarged donor aortic tube causing a gastric outlet obstruction syndrome. This diagnosis was then confirmed with an upper gastrointestinal contrast study (Fig 2). Due to persisting obstructive symptoms, the patient was surgically reexplored at posttransplant day 24 and the

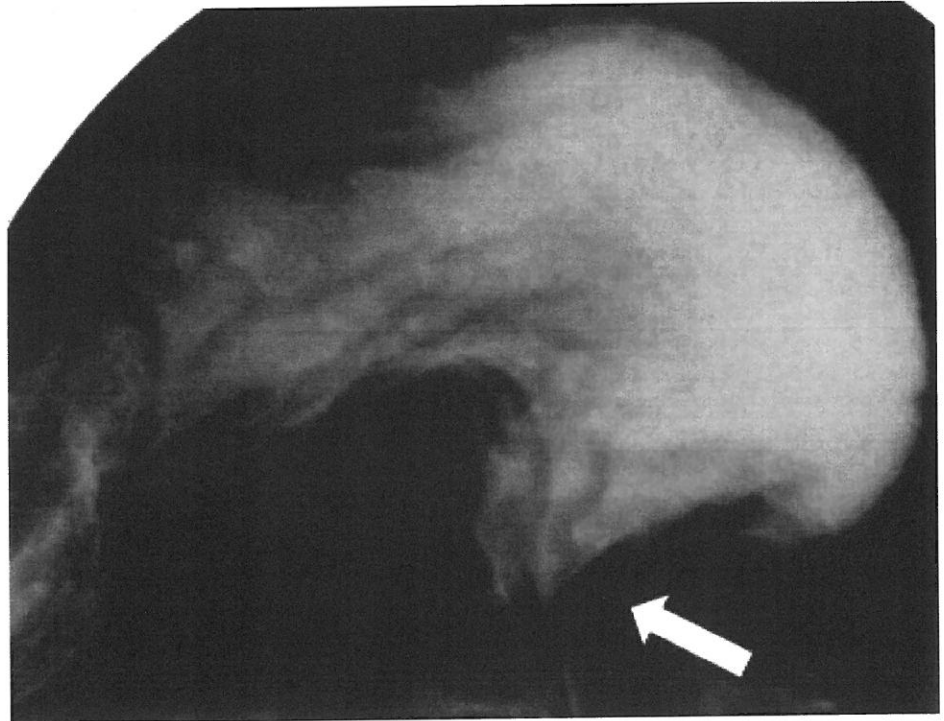
diagnosis of gastric outlet obstruction by the donor aortic tube was confirmed (Fig 3). A retrocolic roux-en-Y gastrojejunostomy was performed. At posttransplant day 27 an upper gastrointestinal contrast study (Fig 4) showed adequate gastric emptying partially anatomically via the native duodenum but preferentially via the newly constructed gastrojejunostomy. Oral intake was restarted—this time successfully—and the patient was discharged at posttransplant day 34. The patient is now 250 days posttransplant, insulin-free and with a normal kidney and liver function and a normal eating pattern. A control upper gastrointestinal contrast study at 3 months posttransplant (Fig 5) demonstrates gastric emptying via the roux-en Y limb.

## DISCUSSION

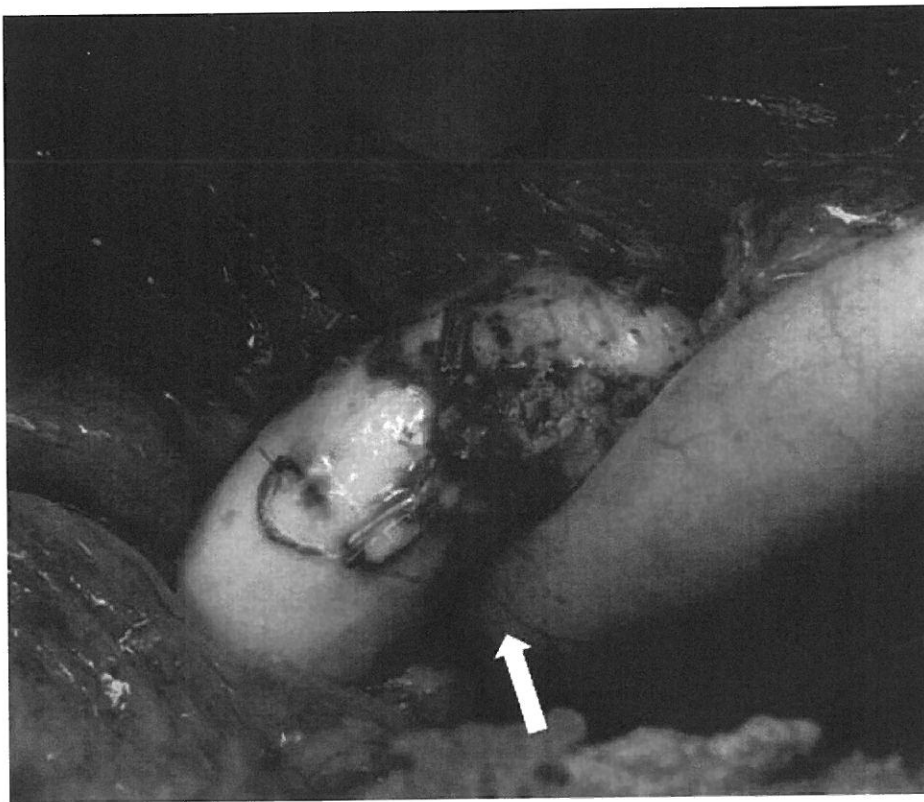
We describe a case of combined cluster liver and pancreas transplantation in which the donor aortic tube caused a gastric outlet syndrome that required surgical revision and construction of a gastrojejunostomy. The indication for the cluster liver and pancreas transplantation was a primary sclerosing cholangitis—like fibrosis in a patient with a type 1 diabetes. Kidney replacement was also indicated due to severe diabetic nephropathy. For patients in need of a liver and a pancreas transplantation, two surgical options are available: either a standard orthotopic liver transplantation followed by a standard heterotopic pancreas transplantation in the right or left fossa or an en bloc “cluster” liver and pancreas transplantation.<sup>6-9</sup> We chose the en bloc “cluster” liver and pancreas transplantation originally reported by Starzl et al.<sup>10</sup> We described this technique in details previously.<sup>7</sup> This is a rapid and simple technique since only three vascular anastomoses and one duodenojejunostomy have to be performed, while avoiding a separate biliary anastomo-



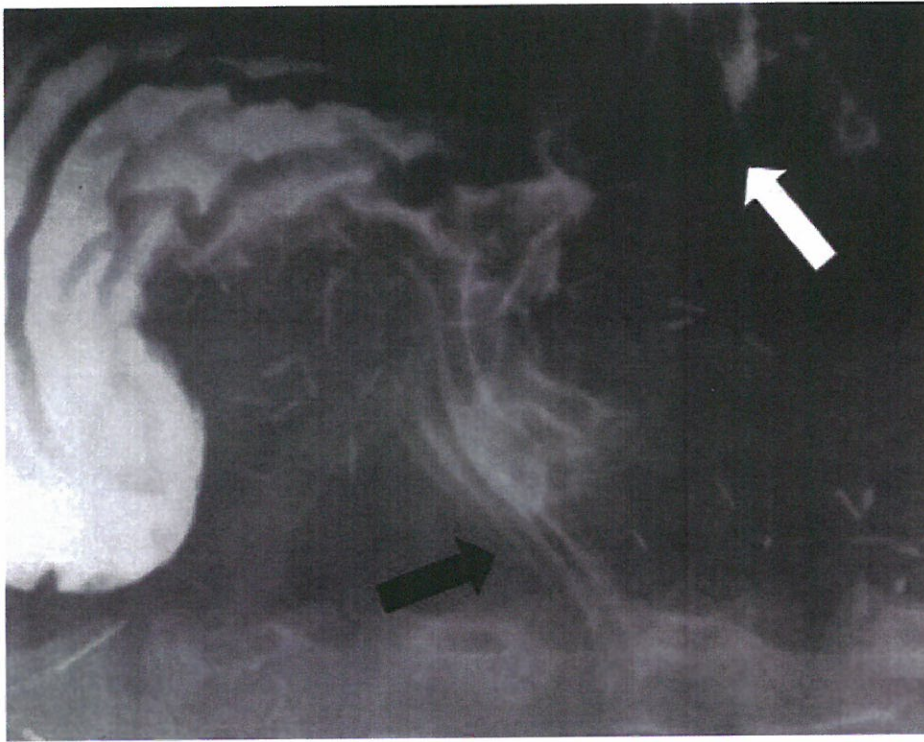
**Fig 1.** Computed tomography scan at post/transplant day 17 revealed an external compression of the gastroduodenal junction by a relatively enlarged donor aortic tube (black arrow) causing a gastric outlet obstruction syndrome (white arrow: duodenum).



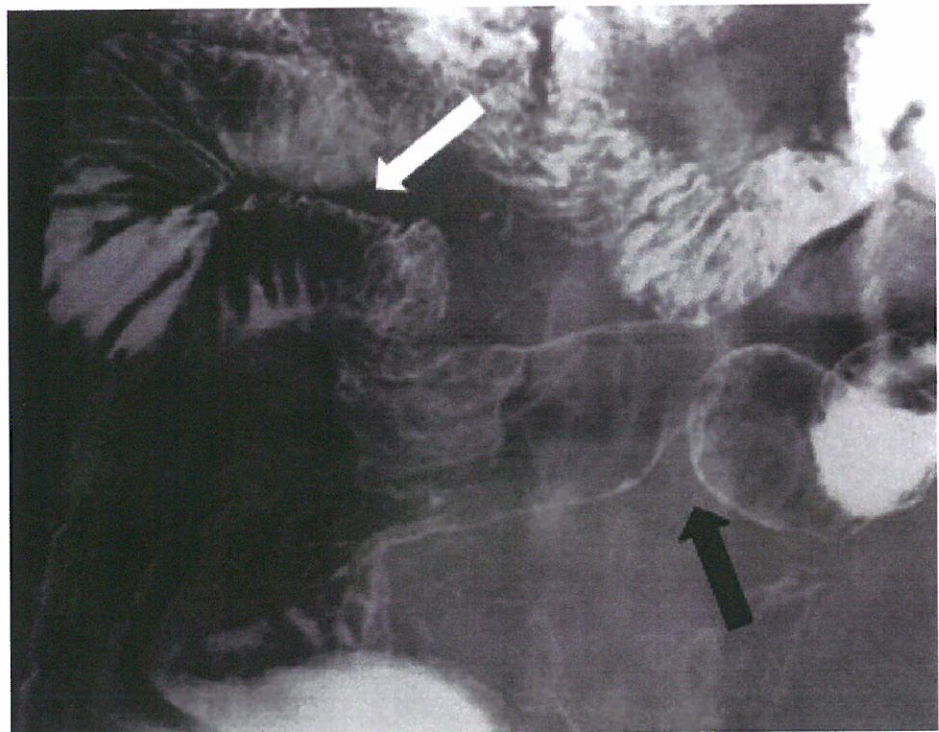
**Fig 2.** An upper gastrointestinal contrast study at posttransplant day 18 confirmed a gastric outlet syndrome (white arrow: vertical impression at the level of the antrum of a dilated stomach).



**Fig 3.** Perioperative image showing the aortic tub (black arrow) overriding and compressing the native antrum (white arrow).



**Fig 4.** An upper gastrointestinal contrast study at posttransplant day 27 showing adequate gastric emptying: partially anatomically via the native duodenum (black arrow) but preferentially via the newly constructed gastrojejunostomy (white arrow).



**Fig 5.** An upper gastrointestinal contrast study at 3 months posttransplant shows gastric emptying via the roux-en-Y limb (white arrow: gastrojejunostomy; black arrow: external compression of native antrum by aortic tube).

sis.<sup>7,10</sup> The pancreas is placed in its normal anatomic and physiological position, decreasing the risk of venous torsion and thrombosis and providing hepatotrophic insulin flow to the liver with perhaps better metabolic control.<sup>11</sup> Another possible immunologic benefit is that the liver may act as a "sink" for portally drained transplant antigens, promoting acceptance of the pancreatic graft.<sup>12,13</sup> A possible disadvantage of the en bloc technique is that repeat liver transplantation may become more difficult since the entire graft would probably have to be replaced. In addition, a complication related to the pancreatic graft (infection, thrombosis, etc) may jeopardize the liver component of the bloc. To our knowledge, a gastric outlet obstruction by a donor aortic tube has not previously been reported after combined liver and pancreas transplantation. Nonetheless, not many cases of combined en bloc liver and pancreas transplantation have been reported so far. In the previous cases of combined liver and pancreas transplantation performed at our center (data not shown), we placed the aortic tube retrocolically but indifferently in an ante- or retroduodenal position depending upon local anatomic conditions. In these cases, we did not observe an influence of the position of the aortic tube on a possible compression of the gastroduodenal junction. In the case described herein, the donor was slightly larger than the recipient and the donor aortic tube was particularly large, and this perhaps contributed to cause local compression. Ideally, donors smaller in size than the recipients should be used for combined liver and pancreas transplantation. A donor aortic tube is also classically used in multivisceral transplantation and here too, no cases of intestinal compression by the tube has been reported. It may be that multivisceral transplant recipients are less susceptible to this complication because these patients in general undergo native pancreatectomy and—unlike in combined liver and pancreas transplantation—there is no "arque" formed between the native and the transplanted pancreas that can facilitate compression. However, this complication has not been described after combined liver and intestinal transplantation, an operation during which the pancreas is usually transplanted en bloc with the liver

and the intestine and where the native pancreas is also left in place.

In conclusion, when performing an en bloc liver and pancreas transplantation (possibly accompanied by the intestine), or a multivisceral transplantation, the risk of a gastric outlet obstruction by the donor aortic tube should be kept in mind and attention should be paid to the correct positioning of this aortic tube.

#### REFERENCES

1. Starzl TE, Kaupp HA Jr, Brock DR, et al: Homotransplantation of multiple visceral organs. *Am J Surg* 130:219, 1962
2. Mielel L, Todo S, Tzakis A, et al: Treatment of upper abdominal malignancies with organ cluster procedures. *Clin Transplant* 4:63, 1990
3. Abu-Elmagd K, Bond G, Reyes J, et al: Intestinal transplantation: a coming of age. *Adv Surg* 36:65, 2002
4. Alessiani M, Tzakis A, Todo S, et al: Assessment of five-year experience with abdominal organ cluster transplantation. *J Am Coll Surg* 180:1, 1995
5. Starzl TE, Todo S, Tzakis A, et al: Abdominal organ cluster transplantation for the treatment of upper abdominal malignancies. *Ann Surg* 210:374, 1989
6. Chen Z, Meng F, Chen X, et al: Combined en bloc liver/pancreas transplantation in two different patients. *World J Gastroenterol* 15:2552, 2009
7. Pirenne J, Deloose K, Coosemans W, et al: Combined 'en bloc' liver and pancreas transplantation in patients with liver disease and type 1 diabetes mellitus. *Am J Transplant* 4:1921, 2004
8. Aguirrezabalaga J, Gomez M, Novas S, et al: Combined liver-pancreas transplantation: contribution of five cases. *Transplant Proc* 34:211, 2002
9. Mekeel K, Langham M, Gonzalez-Perralta R, et al: Combined en bloc liver pancreas transplantation for children with cystic fibrosis. *Liver Transpl* 13:406, 2007
10. Starzl TE, Todo S, Tzakis A, et al: The many faces of multivisceral transplantation. *Surg Gynecol Obstet* 172:335, 1991
11. Gaber AO, Shokouh-Amiri H, Hathaway DK, et al: Pancreas transplantation with portal venous and enteric drainage eliminates hyperinsulinemia and reduces postoperative complications. *Transplant Proc* 25:1176, 1993
12. Wang C, Sun J, Wang L, et al: Combined liver and pancreas transplantation induces pancreas allograft tolerance. *Transplant Proc* 29:1145, 1997
13. Wang C, Sun J, Li L, et al: Conversion of pancreas allograft rejection to acceptance by liver transplantation. *Transplantation* 65:188, 1998