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## BRIEF COMMUNICATIONS

### VENOUS-RIGHT ATRIAL BYPASS FOR SUPERIOR VENA CAVA THROMBOSIS DURING ORTHOTOPIC LIVER TRANSPLANTATION

ANTONIO D. PINNA,<sup>1,2</sup> ATSUSHI SUGITANI,<sup>1</sup> PATRICIA THISTLETHWAITE,<sup>3</sup> YOOGOO KANG,<sup>4</sup>  
LUIGI MARONGIU,<sup>1</sup> SATORU TODO,<sup>1</sup> THOMAS E. STARZL,<sup>1</sup> AND JOHN J. FUNG<sup>1</sup>

*Thomas E. Starzl Transplant Institute and Departments of Cardiothoracic Surgery and Anesthesiology,  
University of Pittsburgh, Pittsburgh, Pennsylvania 15213*

The introduction of veno-venous bypass during orthotopic liver transplantation (OLT\*) in 1984 avoided venous stagnation and hemodynamic instability during the anhepatic phase (1). In patients with superior vena cava (SVC) thrombosis or stenosis, the use of veno-venous bypass or the standard technique should be avoided because it can precipitate the onset of severe SVC syndrome (2). We describe here the use of a veno-right atrial bypass in a patient with SVC thrombosis who underwent simultaneous OLT and kidney transplantation.

A 51-year-old man with the diagnosis of cryptogenic cirrhosis and chronic renal failure underwent simultaneous OLT and renal transplantation at our institution on February 5, 1995. A LeVeen shunt had been implanted elsewhere in October 1994 for refractory ascites and was subsequently removed 4 weeks later due to infection and occlusion. At the time of transplantation, insertion of an oxymetric pulmonary artery catheter was attempted through both the right and left internal jugular veins, but it could not be advanced on either side. An intraoperative venogram showed thrombosis of the SVC with several small collaterals draining caudally (Fig. 1). An oximetric pulmonary artery catheter was subsequently inserted through the right femoral vein and positioned in the pulmonary artery. In order to infuse volume during the transplant, a Biomedicus venous cannula with a side port was inserted through the left femoral vein. This cannula also served as the outflow catheter for the inferior vena cava (IVC) during the subsequent bypass. After a median sternotomy, a single straight Bard cannula (no. 32), modified in order to have a side port for volume infusion, was placed in the right atrium and secured with two 2-0 Ethibond pledgeted purse-string sutures (Fig. 2). After transection of the bile duct and the hepatic artery, the portal vein was cannulated with a Gott shunt cannula (no. 9) and connected with the other cannulas to a centrifugal force pump.

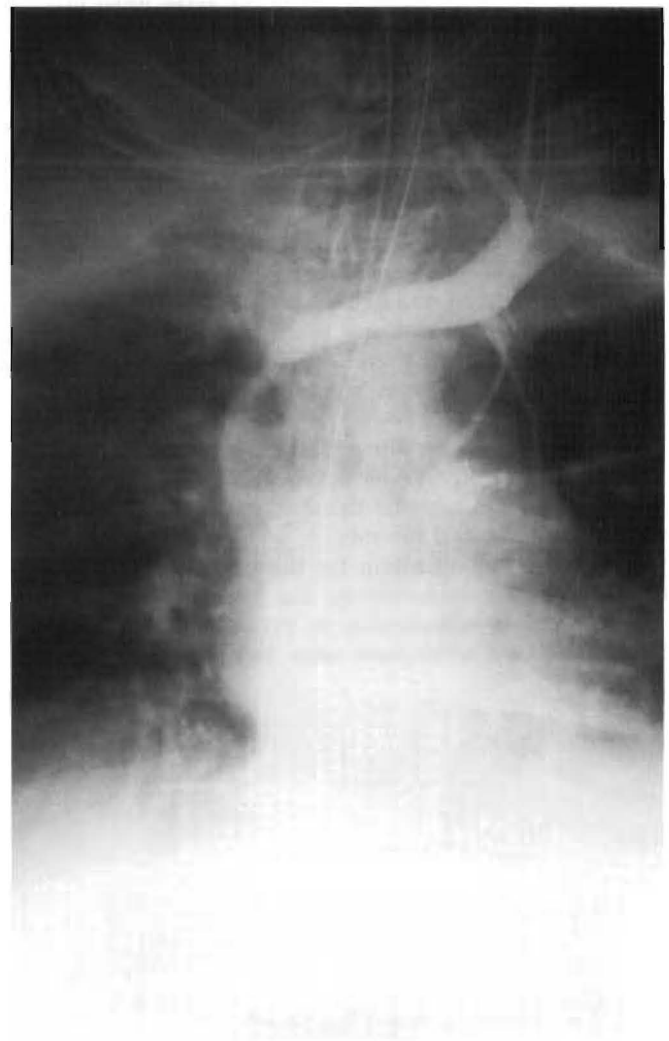


FIGURE 1. Intraoperative SVC venogram shows obstruction of the SVC at the junction with the left subclavian vein, right subclavian vein thrombosis with collaterals.

During the bypass, the flow was maintained at 3 L/min. The central venous pressure during bypass was 12 mmHg, and the pulmonary capillary wedge pressure was 16 mmHg.

<sup>1</sup> Thomas E. Starzl Transplant Institute.

<sup>2</sup> Address correspondence to: Antonio D. Pinna, MD, Thomas E. Starzl Transplant Institute, Falk Clinic, 4th Floor, 3601 Fifth Avenue, Pittsburgh, PA 15213.

<sup>3</sup> Department of Cardiothoracic Surgery.

<sup>4</sup> Department of Anesthesiology.

\* Abbreviations: IVC, inferior vena cava; OLT, orthotopic liver transplantation; SVC, superior vena cava.

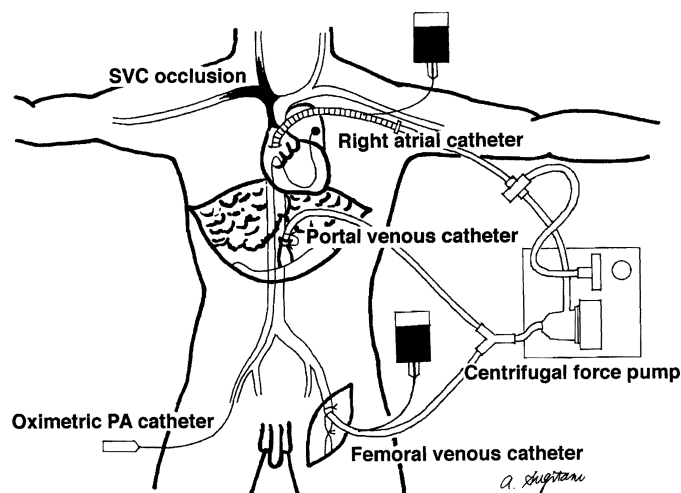


FIGURE 2. As shown in this scheme of the portal-atrial bypass, a femoral vein cannula and a right atrial cannula were used as infusion ports for volume replacement.

The hepatectomy was performed using the piggyback technique (3) to maintain blood flow through the IVC and preserve the pulmonary catheter. During the veno-atrial bypass, the patient was hemodynamically stable with a total blood loss of 7 U of packed red blood cells. After reperfusion of the liver allograft, the right atrial cannula was removed and the purse-string suture was ligated to close the right atrial defect. Two no. 28 thoracostomy tubes were left in the mediastinum, and the sternum was closed with interrupted wire. The left kidney from the same donor was transplanted into the left iliac fossa.

The patient had an uneventful postoperative course. He received an antiarrhythmic agent for prophylaxis against atrial fibrillation, and the immunosuppression was initiated using tacrolimus and steroids.

The LeVein modification for the peritoneovenous shunt has been used extensively for the treatment of refractory ascites since its introduction in 1974 (4). The incidence of SVC thrombosis or stenosis after LeVein shunt has been

reported with a variable incidence between 18.6% and 43% (5-7). Performing a liver transplantation in the presence of an SVC obstruction carries potential hemodynamic consequences, especially during the anhepatic phase. Volume infusion and hemodynamic monitoring were assured in this patient with an IVC access; interruption of the IVC was avoided by using the piggyback technique, and venous return was optimized with a portal-atrial bypass by right atrial cannulation. Given the concerns that had arisen because of this case, we currently assess SVC patency with Doppler ultrasound and SVC cavogram as needed in all candidates with prior LeVein shunt in order to detect the presence of SVC thrombosis or stenosis before liver transplantation. It would also be possible to use transesophageal echocardiography instead of a pulmonary artery catheter for hemodynamic monitoring if occlusion of the IVC is necessary (e.g., in the case of cancer patients).

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