

Transjugular Intrahepatic Portosystemic Shunt for Refractory Variceal Bleeding in a Patient with a Left Ventricular Assist Device

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ABSTRACT

Transjugular intrahepatic portosystemic shunt (TIPS) is an attractive therapeutic option in cirrhotic patients with recurrent variceal bleeding refractory to medical and endoscopic therapy. There is little known about the use of TIPS in patients with left ventricular assist devices (LVAD). We describe a patient with a durable continuous-flow LVAD and concurrent decompensated cardiac cirrhosis who underwent successful TIPS placement for recurrent variceal bleeding. The patient has had no rebleeding or encephalopathy in >12 months since TIPS placement.

INTRODUCTION

Cirrhotic patients with an episode of variceal bleeding are at a significant risk of rebleeding. Approximately 70% of cirrhotic patients present with recurrent variceal hemorrhage within a year of their index bleed, with the rebleeding risk being greatest immediately after an active bleeding episode.^{1,2} The American Association for the Study of Liver Diseases guidelines for secondary prophylaxis of variceal bleeding recommend a combination of non-selective beta blockers with endoscopic variceal band ligation to diminish the risk of rebleeding.³ A transjugular intrahepatic portosystemic shunt (TIPS) should be considered in certain cirrhotic patients with recurrent bleeding. Congestive heart failure, severe tricuspid regurgitation and severe pulmonary hypertension are absolute contraindications for TIPS. There is little known about the use of TIPS in patients who have a left ventricular assist device (LVAD).

CASE PRESENTATION

A 55-year-old man with ischemic cardiomyopathy supported with a HeartMate II (Thoratec Corp, Pleasanton, CA) continuous-flow LVAD (CF-LVAD) as a bridge to an orthotopic heart transplant presented with index bleeding secondary to grade-3 esophageal varices, which were successfully treated with esophageal band ligation. Despite a normal hepatic portosystemic venous pressure gradient and liver biopsy prior to LVAD placement (3 years prior), further evaluation with a liver biopsy during this hospitalization showed stage 3-4 fibrosis with features of zone-3 pericentral congestion and a hepatic portosystemic venous pressure gradient of 16 mm Hg. He had 3 subsequent episodes of rebleeding from varices that failed endoscopic therapy. During a multidisciplinary discussion, TIPS was proposed for refractory variceal bleeding in this high-risk patient. A transthoracic echocardiogram revealed severely depressed left ventricular function with an ejection fraction of 25-29%, normal right-ventricle size and

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function, and mild pulmonary hypertension (estimated pulmonary artery systolic pressure of 41 mm Hg) at a CF-LVAD speed of 9,000 rpm.

While there was a concern for increased volume delivered after TIPS and impending acute right-ventricle failure, a right-heart catheterization demonstrated normal right atrial pressure, mean pulmonary artery pressure, and pulmonary capillary wedge pressure of 8 mm Hg, 19 mm Hg, and 12 mm Hg, respectively, and a cardiac index of 2.71 L/min/m². This was reflective of adequate left ventricular unloading at his baseline pump and therefore a low risk for adverse cardiovascular events with a TIPS. The patient underwent a successful TIPS, which lowered his portosystemic gradient to 8 mm Hg. Post-procedure, he was aggressively diuresed to prevent transient right-heart failure. An echocardiogram showed severely depressed left ventricular function with an estimated ejection fraction of 30–34%, a mildly enlarged right ventricle, and an estimated pulmonary artery systolic pressure of 41 mm Hg. He was eventually discharged from the hospital after 4 days with close follow-up. He has had no further episodes of rebleeding; his most recent echocardiogram remains unchanged, and he awaits orthoptic heart transplant.

DISCUSSION

Variceal bleeding is a life-threatening complication in cirrhotic patients with a 6-week mortality as high as 20%.⁴ TIPS is a low-resistance channel that reduces portal pressure. TIPS is known to increase the cardiac output by approximately 50% and the right atrial and pulmonary artery pressures by almost 100%.^{5,6} Furthermore, diastolic dysfunction is prevalent in 40% of patients with advanced cirrhosis and is associated increased mortality post TIPS.⁷ Right ventricular failure is a well-known complication of CF-LVAD with an incidence of 11%.⁸ Alteration of the ventricular interdependence, pulmonary hypertension, increased right ventricular preload (secondary to an increase in cardiac output), and tachyarrhythmias are some of the mechanisms that can contribute to right ventricular dysfunction in patients supported with CF-LVADs.⁹ Because a TIPS could significantly increase right ventricular preload and predispose to right-heart failure in a high-risk VAD-dependent population, we suggest adequate optimization of pump speed, effective right ventricular unloading, and normal pulmonary pressures prior to the procedure. This case represents a patient who had

adequate right ventricular function on right heart catheterization prior to TIPS. Aggressive postoperative diuresis and careful attention to his LVAD parameters allowed the right ventricle to adapt to the hemodynamic changes from the TIPS. To our knowledge, this is the first case in which a TIPS was used for a patient with a CF-LVAD for recurrent variceal bleeding.

DISCLOSURES

Author contributions: AS Thomas wrote the manuscript. J. Estep and D. Victor edited the manuscript. D. Victor is the article guarantor.

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