

Balloon-Occluded Retrograde Transvenous Obliteration of a GastroRenal Shunt using Hydrogel-Coated Coil Embolization

Daniel T. Ginat, M.D., M.S., Wael Saad M.D., and Takashi Kitanono, M.D.

Balloon-retrograde transvenous obliteration (BRTO) can be an appropriate treatment modality for hepatic encephalopathy in the setting of portal-systemic shunting in selected patients. We describe a case of a large gastro-renal shunt that was successfully treated via combined BRTO and expandable hydrogel-coated coil embolization, with an emphasis on technique.

Introduction

Balloon-occluded retrograde transvenous obliteration (BRTO) is indicated for treatment for gastric varices with gastro-renal shunts at some institutions [1-5]. The technique involves injecting gastric varices with 5% ethanolamine oleate iopamidol for 30 minutes via a balloon catheter, while occluding the gastro-systemic shunt [1,2]. In certain conditions, such as in the presence of fundal gastric varices, standard BRTO is not effective. In addition, portal hypertensive changes, such as ascites and splenomegaly, can be aggravated shortly after BRTO in up to 82% of patients [6]. Instead, modified BRTO

techniques may be more appropriate. These include stepwise injection of the sclerosing agent, selective injection of the agent via a microcatheter, coil embolization of the afferent gastric veins, double-balloon catheterization, and BRTO with percutaneous transhepatic portal venous access or transileocolic venous access [1,2,7]. Auxiliary procedures such as infusion of 50% glucose solution into collateral vessels can improve the outcome of BRTO [8]. Perhaps the most significant complication of BRTO is the development of esophageal varices [9,10].

In this report, we describe the technique for treatment of gastric varices and gastro-splenic shunt in via BRTO in conjunction and expandable hydrogel coil embolization.

Case Report

A 60-year-old man with a history of end-stage liver disease secondary to hepatitis C, status post orthotopic liver transplant 15 years ago, presented with mental status changes attributed to hepatic encephalopathy. The encephalopathy was refractory to lactulose and rifaximin therapy.

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Abbreviations: BRTO, balloon-occluded retrograde transvenous obliteration; CT, computed tomography

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Figure 1. 60-year-old man with hepatic encephalopathy. Axial CT demonstrates multiple gastric varices (arrow).

CT of the abdomen revealed an enlarged left renal vein and a complex of gastric varices, suggesting gastrorenal shunting (Fig. 1). Consequently, percutaneous embolization of the shunt was requested.

Interventional Procedure

A Seldinger's needle was advanced into the right femoral vein and a 035 Rosen wire was inserted. An 8 French sheath was then inserted over the wire. A 5 French C2 catheter was inserted over the wire and the left renal vein was selected. A 035 guidewire was then advanced into the gastro-renal shunt. The catheter was advanced into the shunt and the wire was exchanged to a Rosen wire again. A 5 French balloon catheter was then advanced over the wire into the outflow vein of the shunt. A retrograde venogram was obtained while the outflow tract was occluded with the balloon (Fig. 2). The outflow vein was partially visualized. A microcatheter could not be advanced through the balloon catheter so a second puncture was made in the right groin. A 5 French sheath was inserted using a similar technique. A 035 C2 catheter was advanced into the renal vein. A Renegade microcatheter was then advanced through the catheter past the balloon into the shunt using 014 Transcend wire. The shunt was coiled using 6 Azure hydrogel detachable coils (Terumo, Somerset, N.J.). After approximately 15 minutes, complete occlusion of the shunt was observed (Fig. 3). There were no immediate

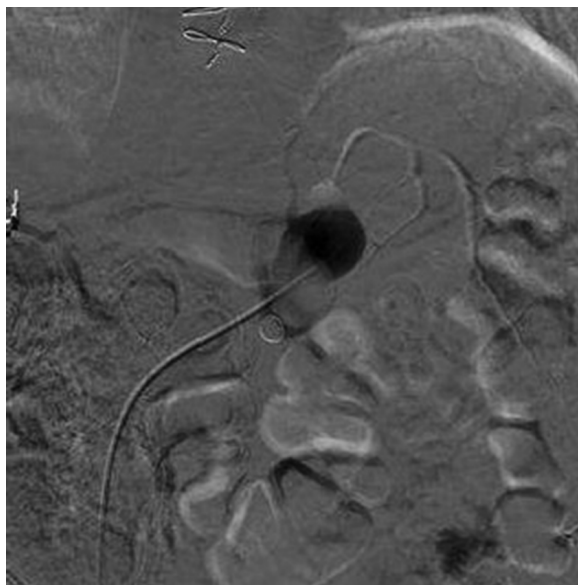


Figure 2. 60-year-old man with hepatic encephalopathy. Digital subtraction angiogram shows a 5 French balloon catheter inflated within the outflow tract.

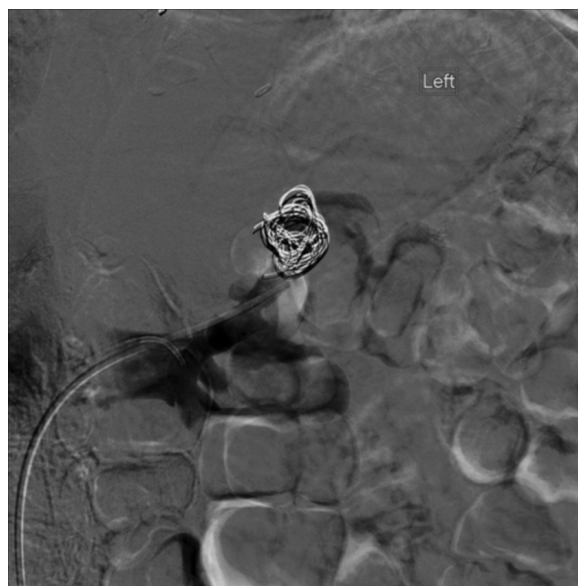


Figure 3. 60-year-old man with hepatic encephalopathy. A subsequent digital subtraction angiogram demonstrates coils inserted proximal to the gastro-renal shunt outflow tract, providing complete occlusion.

complications and the patient's symptoms improved.

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Discussion

BRTO has been shown to be suitable treatment option for portal-systemic encephalopathy secondary extrahepatic portal-systemic shunts, including gastro-renal, spleno-renal, and mesenteric-renal shunts in patients with and without liver cirrhosis [9-13]. Complete occlusion of portal-systemic shunts can be achieved using sclerosing agent injection [9,10,12]. It is essential to demonstrate under venography that portal venous flow redirected to the liver during the balloon occlusion.

In patients with gastric varices and hepatic encephalopathy, 1 and 3-year relapse-free survival rates of over 90% and 87%, respectively, have been reported with BRTO [10]. Good results have also been achieved by combining BRTO with embolic coils inserted via the renal vein, similar to our case [14]. However, our case is the first reported instance of use of expandable hydrogel coils for gastro-renal shunt occlusion. The advantage of this type of coil is that it can expand to several times its diameter, enhancing the extent of thrombosis. Therefore, this technique allows the use of fewer coils. Indeed, the hydrogel coil polymer provides about 5 times more filling volume for the 0.018" coil and 4 times more filling volume for the 0.035" coil compared to conventional coils.

BRTO in combination with self-expandable coil embolization can achieve satisfactory occlusion of gastro-renal shunts and immediate clinical improvement in patients with hepatic encephalopathy. Although not observed in our case, there is the theoretical risk of coil migration following balloon deflation. Therefore, additional experience and caution with this technique is warranted.

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Balloon-Occluded Retrograde Transvenous Obliteration of a GastroRenal Shunt using Coil Embolization

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