

# Short-Term Rebleeding Rates for Isolated Gastric Varices Managed by Transjugular Intrahepatic Portosystemic Shunt versus Balloon-Occluded Retrograde Transvenous Obliteration

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## ABSTRACT

**Purpose:** To assess the short-term rebleeding rate associated with the use of a transjugular intrahepatic portosystemic shunt (TIPS) compared with balloon-occluded retrograde transvenous obliteration (BRTO) for management of gastric varices (GV).

**Materials and Methods:** A single-center retrospective comparison of 50 patients with bleeding from GV treated with a TIPS or BRTO was performed. Of 50 patients, 27 (17 men and 10 women; median age, 55 y; range, 31–79 y) received a TIPS with covered stents, and 23 (12 men and 11 women; median age, 52 y; range, 23–83 y) underwent a BRTO procedure with a foam sclerosant. All study subjects had clinical and endoscopic evidence of isolated bleeding GV and were hemodynamically stable at the time of the procedure. Clinical and endoscopic follow-up was performed. Kaplan-Meier analysis was used to evaluate rebleeding rates from the GV.

**Results:** The technical success rate was 100% in the TIPS group and 91% in the BRTO group ( $P = .21$ ). Major complications occurred in 4% of the patients receiving TIPS and 9% of patients the undergoing BRTO ( $P = .344$ ). Encephalopathy was reported in 4 of 27 (15%) patients in the TIPS group and in none of the patients in the BRTO group (0%;  $P = .12$ ). At 12 months, the incidence of rebleeding from a GV source was 11% in the TIPS group and 0% in the BRTO group ( $P = .25$ ).

**Conclusions:** BRTO appears to be equivalent to TIPS in the short-term for management of bleeding GV. Further comparative studies are warranted to determine optimal management strategies in individual patients.

## ABBREVIATIONS

BRTO = balloon-occluded retrograde transvenous obliteration, EV = esophageal varices, GV = gastric varices, PSG = portosystemic gradient, TIPS = transjugular intrahepatic portosystemic shunt

Creation of a transjugular intrahepatic portosystemic shunt (TIPS) is commonly used to manage bleeding

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gastric varices (GV), with reported low rebleeding rates in the short-term (1–7). The balloon-occluded retrograde transvenous obliteration (BRTO) procedure has been described as an alternative treatment method for the management of bleeding GV, especially varices in the gastric fundus or cardia, which are often associated with spontaneous gastroduodenal shunts. BRTO may provide some benefits compared with TIPS with regard to maintaining more favorable hemodynamics for the preservation of liver function (8–14). However, there is a paucity of literature directly comparing the results of TIPS versus BRTO for the treatment of isolated bleeding GV. The purpose of this study is to compare the short-term rebleeding rate of isolated bleeding cardiofundal GV associated with the use of TIPS with the rate associated with BRTO based on the experience at a single center.

## MATERIALS AND METHODS

Institutional review board approval was obtained for this study. We performed a retrospective cohort comparison of consecutive patients from a single institution who had bleeding from isolated cardiofundal GV and were treated with either a TIPS using a covered stent or a BRTO procedure. Cardiofundal varices were defined as isolated if there were no associated high-risk esophageal or duodenal varices present. The review was performed using a procedural database (Hi-IQ; ConexSys, Inc, Albion, Rhode Island). Electronic medical records were reviewed for patient demographics; the presence of and etiology for the underlying liver disease; laboratory values; procedural information; and clinical, endoscopic, and imaging follow-up.

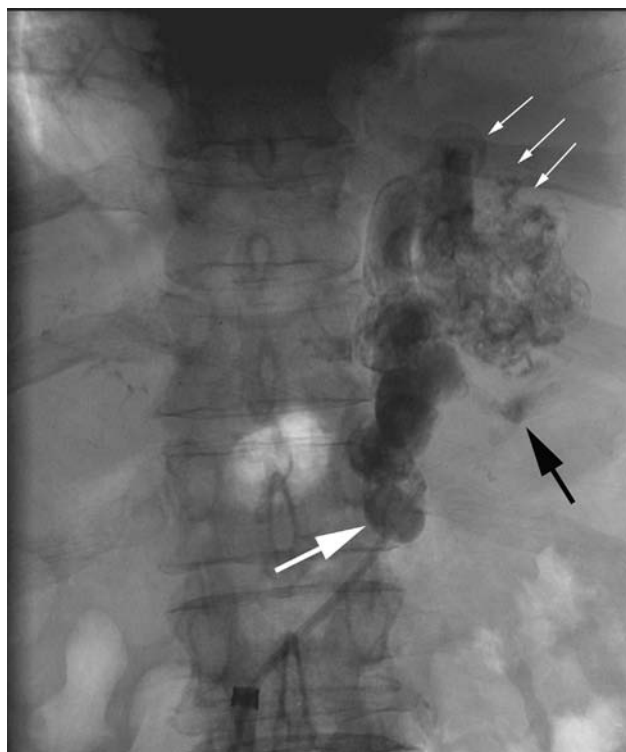
The period of evaluation was from January 1, 2002, to June 1, 2010. During the period from January 2002 to August 2007, 55 TIPS procedures were performed for gastrointestinal bleeding, 27 of which were for isolated cardiofundal GV. No TIPS procedures for isolated GV were performed after August 2007. All of the BRTO procedures were performed after this date. There were 50 patients identified to be eligible for inclusion in this comparative study. Of patients, 27 (17 men and 10 women; median age, 55 y; range, 31–79 y) received a TIPS, with (12 of 27; 44%) or without (15 of 27; 56%) supplemental embolization of the GV, and 23 (12 men and 11 women; median age, 52 y; range, 23–83 y) underwent BRTO. All of the patients had clinical and endoscopic evidence of bleeding from isolated GV; none of the patients had high-risk esophageal varices (EV). All patients were hemodynamically stable at the time of the TIPS or BRTO procedure. Hemodynamically unstable patients ( $n = 3$ ) and patients undergoing both TIPS and BRTO procedures simultaneously ( $n = 4$ ) for GV associated with EV or severe ascites were excluded from this comparison. All procedures were performed within 30 days of the index bleeding episode. Any patient follow-up was recorded. Kaplan-Meier analysis was used to compare the rebleeding rates of GV. Statistical testing between the GV rebleeding rate was by log-rank test. Discrete variables were compared using the Fisher exact test. A  $P$  value  $< .05$  was considered statistically significant.

Of the 23 BRTO procedures, 22 were included in a prior study by the same authors (14). This study provides further follow-up and comparison of outcomes with the TIPS group.

### BRTO Procedure

The BRTO procedure was performed using a 3% sodium tetradecyl sulfate (3% Sotradecol; AngioDynamics, Inc, Queensbury, New York) foam as an embolic agent and sclerosant as previously described (14). Briefly, the procedure was performed through a right femoral or internal jugular vein approach after placement of a 6-F

to 12-F introducer sheath (sheath size varied depending on the size of the occlusion balloon catheter used). Catheterization of the gastrosplenic shunt via the left renal vein was performed. An occlusion balloon catheter (balloon diameters, 8.5–32 mm) was coaxially advanced over a 0.035-inch, relatively stiff guide wire into the large venous shunt directly communicating with the left renal vein. Balloon occluded retrograde venography was performed to define the anatomy of the shunt and varices and to assess the flow dynamics. After embolization of any collateral veins using metallic coils (Tornado and Nester coils; Cook, Inc, Bloomington, Indiana), embolization of the shunt and the GV was performed via a microcatheter placed as close as possible to the varices using foam sclerosant of 3% Sotradecol mixed with gas (air or carbon dioxide) and ethiodized oil (Ethiodol; Savage Laboratories, Melville, New York) in a 2:3:1 ratio. The sclerosant mixture was injected until all of the GV were filled and the sclerosant mixture extended into the afferent (feeding) portal venous branch, which is commonly a short or posterior gastric vein and less commonly a left gastric vein (Fig 1). The occlusion balloons remained inflated for 4–12 hours after the procedure and were removed under fluoroscopy after stagnation of the sclerosant mixture was confirmed.



**Figure 1.** The BRTO procedure is performed by inflating an occlusion balloon (large white arrow) at the point of communication of the splenorenal shunt with the left renal vein and filling of the entire gastric variceal complex with the foam embolic agent and sclerosant (small white arrows), with the endpoint of embolization being slight filling of the feeding portal vein branch (black arrow).

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