Comparison of Percutaneous Transhepatic Variceal Embolization (PTVE) Followed by Partial Splenic Embolization versus PTVE Alone for the Treatment of Acute Esophagogastric Variceal Massive Hemorrhage

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ABSTRACT

Purpose: To compare the efficacy of percutaneous transhepatic variceal embolization (PTVE) followed by partial splenic embolization (PSE) with that of PTVE alone for the treatment of acute massive hemorrhage of esophagogastric varices in patients with cirrhosis unable to undergo alternative procedures.

Materials and Methods: Sixty-five patients with acute variceal massive hemorrhage were retrospectively studied, including 31 who underwent PTVE/PSE and 34 who underwent PTVE and refused PSE. Recurrent bleeding rate, survival rate, postoperative complications, number of days of hospitalization after PTVE, and outcome were evaluated. Peripheral blood cell counts and hemoglobin levels before and at 1 week and 6, 12, and 24 months after intervention were analyzed.

Results: Cumulative recurrent bleeding rates at 6, 12, and 24 months after intervention in the PTVE/PSE group were 3.2%, 6.7%, and 13.3%, compared with 20.6%, 36.7%, and 53.6%, respectively, in the PTVE group; the difference at each time point was statistically significant (all $P < .01$). There were more cases of ascites and portal hypertensive gastropathy after PTVE than after PTVE/PSE ($P < .05$). Survival rates at 6, 12, and 24 months in the PTVE/PSE group were 100%, 96.8%, and 96.8%, compared with 94.1%, 88.2%, and 82.4%, respectively, in the PTVE group. There were significant differences in peripheral blood cell counts and hemoglobin levels between the PTVE/PSE and PTVE groups at all observed time points (all $P < .01$).

Conclusions: PTVE/PSE not only has long-term efficacy in alleviating hypersplenism, but decreases recurrent bleeding and maintains hepatic reserve in patients with cirrhosis and esophagogastric variceal massive hemorrhage unable to undergo other procedures.

ABBREVIATIONS

EVL = endoscopic variceal ligation, TIPS = transjugular intrahepatic portosystemic shunt, HE = hepatic encephalopathy, PTVE = percutaneous transhepatic variceal embolization, PSE = partial splenic embolization, RBC = red blood cell, WBC = white blood cell

Esophagogastric variceal hemorrhage is a common and devastating complication of cirrhosis that results from portal hypertension and is associated with significant mortality and morbidity (1,2). As recommended by the American Association for the Study of Liver Diseases guidelines (3,4), a combination of pharmacologic and endoscopic therapies is the most rational approach to the treatment of acute variceal hemorrhage. However, endoscopic therapy is not possible when a clear endoscopic view cannot be obtained as a result of massive bleeding (5,6). Early and multiple recurrence of esophageal and gastric varices can occur even after endoscopic variceal ligation (EVL) (4,7).

Creation of a transjugular intrahepatic portal systemic shunt (TIPS) has emerged as an effective modality for

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the prevention of variceal bleeding, even as a rescue therapy after failure of endoscopic approaches (8), even though the use of endoscopic treatment and TIPS creation is restricted in patients with acute variceal hemorrhage who are in critical condition with active bleeding or hemorrhagic shock. The major problems associated with TIPS are inability to alleviate hypersplenism, an increased risk of hepatic encephalopathy (HE), and impaired hepatic function (2,9).

Conventional percutaneous transhepatic variceal embolization (PTVE) was introduced for the treatment of ruptured esophageal varices 30 years ago (10). It was recommended for the treatment of acute variceal massive hemorrhage and had a better short-term hemostatic effect than pharmacologic therapy (11). Partial splenic embolization (PSE) appears to be efficacious in reducing episodes of variceal bleeding, improving hematologic parameters, enhancing hepatic protein synthesis, and reducing the severity of HE (12–14). In the present study, we retrospectively analyzed data from 65 patients with acute massive hemorrhage from esophagogastric varices who underwent PTVE or a combined approach comprising PTVE followed by PSE performed 7–10 days later. Our aim was to compare PTVE/PSE with PTVE alone to assess the clinical efficacy of the two treatments for patients with cirrhosis and acute massive hemorrhage of esophagogastric varices unable to undergo alternative procedures in terms of hepatic functional reserve, recurrent bleeding rate, and survival.

MATERIALS AND METHODS

Study Design

Data from 95 patients with liver cirrhosis and variceal bleeding who underwent interventional treatment in our hospital from January 2010 to February 2012 were retrospectively analyzed. The 95 patients were enrolled for retrospective follow-up. Sixty-five of these patients who completely met the following eligibility criteria were enrolled in the study: (i) diagnosis of liver cirrhosis and portal hypertension without portal vein thrombosis, liver tumor, or cavernous transformation on clinical examination and ultrasonography (US), computed tomography (CT; **Fig 1a**), or magnetic resonance imaging (ie, with pharmacologic treatment, amount of acute massive bleeding >1,000 mL); (ii) patient had not undergone pericardial devascularization, splenectomy, TIPS creation, or endoscopic therapy for esophagogastric variceal bleeding; (iii) patient was in critical condition that did not permit pericardial devascularization, TIPS creation, or endoscopic therapy after 24 hours of medical therapy had been ineffective because of, eg, physical weakness or hemorrhagic shock; and (iv) patient had no catheterizable gastrorenal shunts and could not be treated by balloon-occluded retrograde transvenous obliteration. Thirty patients did not fulfill these criteria; of these, 10 had undergone PTVE at another hospital, nine underwent endoscopic therapy, five had a liver tumor, and six were lost to follow-up. Of the 65 included patients, 34 underwent PTVE alone and refused PSE, and 31 underwent PTVE/PSE. This study was approved by the ethics committee of the hospital, and written informed consent was obtained from all patients.

Treatment

After transhepatic puncture of a branch of the portal vein under digital subtraction angiographic guidance (Artis zeego; Siemens, Munich, Germany) with a percutaneous transhepatic cholangiography puncture set (Cook, Bloomington, Indiana), a 5-F sheath and a Cobra catheter (Cook) were introduced into the portal vein with a 0.035-inch guide wire (Cook) to measure the portal pressure. After splenoportography to confirm the location of the index varices as well as the feeding vessels and draining veins, the catheter was advanced into the main feeding vessel (left gastric vein). First, to embolize the vascular trunk, coils (3–10 mm × 5–12 cm) or microcoils (2–3 mm × 2–3 cm; Cook) were injected into the lower esophagus and gastric fundus vessels and all feeding vessels. Angiography was then repeated to assess the extent of variceal obliteration. Next, absolute ethanol was slowly injected to occlude the vascular bed until angiography confirmed that the blood flow in the varices had ceased completely. Splenoportography was repeated to assess the extent of variceal obliteration. If collateral circulation to esophagogastric varices from the portal vein was detected, the aforementioned procedure was repeated until the blood flow in the varices ceased completely (**Fig 1b**). Finally, the portal pressure was measured again and the puncture tract was embolized with coils. Postinterventional supportive care included treatment for anemia and hypoproteinemia by blood transfusion, reduction of ascites with human serum albumin, and systemic prophylaxis with antibiotic agents for at least 7 days after the procedure.

PSE was performed 7–10 days after PTVE in 31 patients in the PTVE/PSE group. The PTVE group was 34 patients who refused PSE after PTVE because they were worried about the postoperative complications of PSE. Briefly, splenic arterial angiography was performed by using a 5.0-F RH or Yashiro catheter (Terumo, Tokyo, Japan) to demonstrate the distribution of splenic arteries and collateral circulation routes. The tip of the catheter was placed at the splenic arteries in the middle or lower pole of the spleen. Polyvinyl alcohol particles (350–560 μm; Cook) were mixed with contrast media and 1 million units of penicillin G and/or 80 mg gentamicin. Under fluoroscopic guidance, the mixture was carefully injected manually through the catheter into the splenic arteries. PSE was performed progressively by means of repeated injections of polyvinyl alcohol under