Emergency Splenic Arterial Embolization for Massive Variceal Bleeding in Liver Recipient with Left-Sided Portal Hypertension

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Splenic vein thrombosis with gastric variceal bleeding is difficult to manage, and splenectomy may be necessary to stop variceal bleeding. The authors report the case of a post–orthotopic liver transplant patient with bleeding gastric varices secondary to splenic vein thrombosis treated by partial splenic artery embolization. Successful embolization was performed via transcatheter approach depositing Gianturco coils into the intrasplenic artery resulting in immediate cessation of variceal bleeding. No recurrence of bleeding was noted postembolization. In conclusion, splenic artery embolization can be used as treatment for postliver transplant variceal bleeding with hypersplenism. (*Liver Transpl 2005;11:1136-1139.*)

Despite recent advances in the treatment of variceal bleeding, emergent variceal bleeding remains on of the most demanding clinical challenges in the management of cirrhotic patients with end-stage liver disease. Gastric varices are even more challenging because of their high recurrence rate. Mortality in these high-risk patients is high.

In this study, we report on a post–liver transplant male patient who develops massive upper gastrointestinal bleeding from gastric varices secondary to splenic vein thrombosis successfully treated by splenic arterial embolization. The clinical presentation and management resulting to full patient recovery are described.

Abbreviation: PSE, partial splenic artery embolization.

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Received June 16, 2005; accepted June 23, 2005.

Supported in part by project grant NHRI-EX 93-9228SP from the National Health Research Institutes and Grant NSC 90-2314-B-182A-092 from the National Science Council, Taiwan.

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Published online in Wiley InterScience (www.interscience.wiley.com). DOI 10.1002/lt.20543

Case Report

A 41-year-old male of Chinese descent with hepatitis B virus–related end- stage liver disease underwent orthotopic liver transplantation from a deceased donor liver. Preoperative imaging modalities showed partial thrombotic occlusion of the proximal main portal vein, splenic vein, and part of the superior mesenteric vein. There were prominent, severe gastric and esophageal varices. Transplantation with full-size liver graft was performed. A 10-cm-long segment of donor common iliac vein was used as interposition graft connecting donor graft portal vein to recipient's native superior mesenteric vein. Portal vein thrombectomy was not done. Intraoperative and immediate postoperative courses were unremarkable.

The patient developed massive hematemesis (1090 mL/day), and hematochezia 19 days posttransplant,. Emergency panendoscopy revealed severe varices over the gastric body and antrum with largest at 3-cm diameter. Due to large variceal size, variceal ligation could not be performed. On computed tomographic angiography study, there was note of total occlusion of the splenic vein. The patient was subsequently referred for interventional radiologic procedures.

Prophylactic dose of gentamycin and vancomycin was given prior to intervention. Complete celiac and superior mesenteric artery injections using a 4F catheter were performed. Celiac arteriogram showed nonopacification of the splenic vein with hypersplenism and severe, tortuous gastric and perisplenic varices. The catheter was advanced over guidewire into the mid-splenic artery bypassing the distal pancreatic branches of the splenic artery. Embolization was performed using 8 (5 × 5 mm) Gianturco steel coils (Cook, Bloomington, IN) via flow guidance until blood flow into the splenic artery was almost completely impeded. Postembolization celiac arteriogram showed occlusion of most of the branches of the intrasplenic arteries with marked decrease in the varices previously noted (Fig. 1). Immediate postembolization course was unremarkable. Gentamycin and vancomycin were continued until postprocedure day 7.

After partial splenic artery embolization (PSE), the

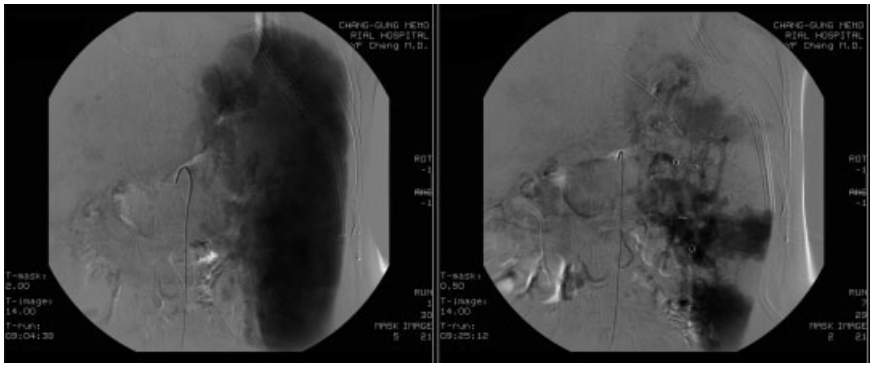

Figure 1. Postembolization celiac arteriogram showing occlusion of most branches of intrasplenic arteries with marked decrease in number and size of varices.

patient's gastrointestinal bleeding remarkably stopped and the platelet count increased from 63×10^3 to 328×10^3 in 2 weeks. The patient complained of mild left upper abdominal discomfort. This was effectively relieved by routine analgesics.

Postembolization ultrasound studies done using 4.0 MHZ scanner color Doppler ultrasound (Acuson 128 scanner, Acuson, Moutain View, CA) showed no change in the velocity and diameter of portal venous inflow in the liver graft. Liver enzymes showed good, functioning liver graft (Table 1).

Four weeks postprocedure, follow-up computed tomographic angiography showed infarction of the large spleen and markedly decreased size and number of gastric varices. There was no recurrence of upper gastrointestinal bleeding in the next 3 months.

Discussion

Several advances have been made in the treatment of variceal bleeding. However, variceal bleeding in a cirrhotic patient with end-stage liver disease poses a great challenge to every clinician.[1] Gastric varices are even more challenging due to difficulty of endoscopic approach and high recurrence rate. This high recurrence rate is associated with poor prognosis and decreased survival. The cumulative mortality of fundal varices is as high as 52% at 1 year.[2,3] The optimal treatment of gastric variceal bleeding remains controversial.[4]

Different treatment options for gastric variceal bleeding secondary to splenic vein thrombosis have been proposed. Splenectomy was considered the best

Table 1. Liver Function and Portal Vein Flows Before and After Splenic Artery Embolization

	T-bil (mg/dL)	BT (°C)	LUQ Pain	MPV Flow (mL/sec)
Day 1*	1.0	36.8	No complaints	26.01
PSE	1.0	37.3	Mild discomfort	†
Day 1‡	0.8	37.8	Mild discomfort	19.22
Day 2‡	0.9	38.1	No complaints	†
Day 3‡	†	37.6	No complaints	†
Day 4‡	2.0	38.2	No complaints	27.14
Day 5‡	1.4	37.9	No complaints	†
Day 6‡	1.5	37.6	No complaints	†
Day 7‡	1.2	37.6	No complaints	28.27

Abbreviations: T-bil, total bilirubin; BT, body temperature; LUQ, left upper quadrant; MPV, main portal vein; PSE, partial splenic artery embolization.
*Pre-PSE.
†No data available.
‡Post-PSE.

treatment of choice in the past.[5-7] Recent studies show that PSE is an effective method of controlling bleeding from gastric varices secondary to splenic vein thrombosis.[6-9] PSE restricts blood inflow to the spleen, while gastric varices are decompressed by decreasing blood volume through hyperkinetic outflow from the enlarged spleen. PSE without splenectomy is an option, therefore, for patients who are hemodynamically unstable despite supportive therapy and high-risk patients who are unlikely to survive an operation.[6,7,10]

In post–liver transplant recipients, reoperation for splenectomy is a complicated procedure especially during the early posttransplant period. The use of PSE in the aforementioned patients with hypersplenism provides a less invasive procedure compared to laparotomy to treat the thrombocytopenia, leukopenia, and left-sided portal hypertension.[11] PSE has been shown to have the same effects as splenectomy as well as reducing morbidity and mortality,[12] and the residual noninfarcted spleen can still perform immunological function.[13] Thus, overwhelming postsplenectomy sepsis from encapsulated microorganisms can be avoided.[14] Patients with hypersplenism scheduled for liver transplant have been also shown to improve in their hematologic abnormalities following PSE.

Collaterals draining into the main portal vein in patients with partial or complete occlusion of the splenic vein may occur. However, the communication between the main portal inflow and splenic vein was not well established in this patient. After PSE, no evidence of decreased portal inflow was found as manifested by normal liver enzymes. Insufficient portal venous return may be harmful to the liver graft. Likewise, excessive, hyperkinetic portal venous in-flow during the early phase of liver transplant is strongly associated with poor graft survival in small-for-size liver grafts.[15]

In this patient, a steel coil was usage as embolizer. The authors applied the technique of introduction of the steel coils into the intrasplenic artery via inflow guidance instead of superselective embolization, as it is easier to reach larger branches with higher velocity. When coils are released at the distal portion of the main splenic artery, subsequent coils are sent into other branches after the high-flow intrasplenic artery is occluded. The key to successful embolization using this method is that an interval of 2 to 3 minutes must be allowed for the first coil to effect its occlusive function before the next coil is released. In this case, it took only 30 minutes to achieve the desired satisfactory vessel occlusion.

Recent studies show that splenic artery embolization is an effective method for hypersplenism,[11] splenic artery steal syndrome,[16] and splenic artery aneurysm[17,18] in the liver transplant setting. The most common postembolization syndrome includes fever, left upper quadrant pain, small left pleural effusion, and leukocytosis. Hepatic artery thrombosis has been reported.[16] In our case, mild fever and left upper quadrant pain was relieved by routine analgesics.

In conclusion, the optimal treatment of gastric variceal bleeding secondary to splenic vein thrombosis is still controversial. Splenectomy is considered the treatment of choice by most authors. However, in emergent and difficult situations such as an early post–orthotopic liver transplant patient vis-à-vis with high-risk relaparotomy, the emerging role of transcatheter embolization should be considered. Splenic artery embolization is a quick, safe, and effective method of controlling gastric variceal bleeding in patients with left-sided portal hypertension associated with splenic vein thrombosis, even post–liver transplant.

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