

## Case Report

# Splenectomy and selectively devascularization for esophageal bleeding secondary to portal hypertension

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**Abstract:** Aim: Portal hypertension is a common disease with high mortality and poor prognosis, especially in the cases of bleeding due to portal hypertension, and secondary hypersplenism. Herein, we report a case-series of 6 patients who had bleeding from esophagus varices due to complicated portal hypertension and subsequently underwent splenectomy and selectively devascularization. Our objective was to evaluate the effects of this technique on the treatment of acute recurrent esophageal bleeding secondary to portal hypertension. Methods: We retrospectively analyzed the results of 6 patients with portal hypertension who underwent splenectomy and selectively devascularization from Jan 2010 to Mar 2014. The patients had undergone repeated endoscopic hemostatic treatment, transjugular intrahepatic portosystemic shunt (TIPS), liver transplantation or portal-vena cava shunt operation prior to splenectomy and selectively devascularization. Results: All the patients had splenectomy and selectively devascularization. The operative mortality for this procedure was null. Esophagus varices bleeding were controlled after operation in all patients. After a median follow-up of 17 months (range 3-36 months), one patient died of liver failure after 8 months; one patient had re-bleeding after 6 months and was easily controlled by medical treatment. For liver function improvement, 4 patients improved from preoperative Child class C to B. The other 2 patients improved to Child class A after surgery. Five patients had gastroscopy 6 months post surgery, and gastro-esophageal varices disappeared in 3 patients. Conclusion: Our results suggest the efficacy of splenectomy and selectively devascularization in the treatment esophagus varices bleeding due to complicated portal hypertension.

**Keywords:** Complicated portal hypertension, esophagus varices bleeding, selectively devascularization

## Introduction

Portal hypertension induces the development of porto-systemic collateral vessels. Esophago-gastric variceal bleeding is a severe complication of portal hypertension. Failure to control variceal bleeding and re-bleeding increases mortality of portal hypertension [1]. Nowadays, there are many treatments including vasoactive drugs, endoscopic techniques, transjugular intrahepatic portosystemic shunt (TIPS), are used in controlling acute variceal bleeding [2]. Endoscopic hemostatic treatment is recommended as a first option for patients with acute variceal bleeding [3]. However the rate of hemostasis failure of endoscopic procedure is not satisfactory, between 10-20% [4]. Recently, TIPS has been widely used as a rescue treatment [5], if variceal bleeding cannot be con-

trolled or early re-bleeding occurs. Although TIPS can improve the rate of hemostasis by decreasing the free portal pressure (FPP), the rate of encephalopathy is still 30% [6].

As a result, many portal hypertension patients suffering from repeated variceal bleeding after endoscopic hemostatic treatment or TIPS would require additional surgical intervention.

In this study, we report 6 complicated portal hypertension cases, previously treated by endoscopic hemostatic treatment, TIPS, shunt operation or liver transplantation, but continued to have variceal bleeding. Our objective was to evaluate the results of splenectomy and selectively devascularization in the treatment of acute recurrent esophageal bleeding secondary to portal hypertension.

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## Materials and methods

### Patients

From January 2010 to March 2014, splenectomy and selectively devascularization was performed in 6 patients with serious esophagus varices bleeding due to complicated portal hypertension, and secondary hypersplenism. The patients' age ranged from 44 to 65 years. Data of the patients are shown in **Table 1**. There were five male and one female. They all had liver cirrhosis secondary to bleeding portal hypertension. Their liver cirrhosis stages were all Child-Pugh C. Four patients had liver damage caused by chronic hepatitis B. One patient had hepatitis C, and one was diagnosed with primary biliary cirrhosis. All patients suffered from variceal hemorrhage for 3-6 times, and were subjected to endoscopic treatment for many times. Moreover, there were 3 patients who had TIPS, liver transplantation or shunt operation respectively. All patients had portal vein thrombosis.

### Operation procedures

The surgical procedure included: 1: Splenectomy; 2: Selective devascularization of proximal half of the stomach and the distal esophagus 8-10 cm above the gastric cardia (pic1), including all branches toward the esophagus and proximal stomach (pic2), but the natural portosystemic collateral vessels were preserved (pic3); 3. After devascularization, the distal esophagus 3 cm above the gastric cardia was transected and reanastomosed (pic4). The surgical procedure had taken about 240-330 mins for each patient.

## Result

Success of splenectomy and selectively devascularization was achieved in all patients. The operative mortality for the procedure was null as shown in **Table 2**. The bleeding stopped in all patients after the operation. Patients were then followed up from 8 months to 3 years. Unfortunately, case 2 died of hepatic failure after 8 months. Liver function of three patients improved from Child class C to B (case 1, 2, 6). The other 3 patients improved to Child class A (case 3, 4, 5) after the surgery. Five patients had gastroscopy 6 months post operation. Gastro-esophageal varices disappeared in 3 patients. Case 1 had re-bleeding for revascular-

ization 6 months post operation, which was successfully controlled by medical therapy.

## Discussion

This study showed that splenectomy associated with selectively devascularization was effective in the control of recurrent bleeding due to severe portal hypertension.

Variceal bleeding is the most severe complication of portal hypertension, which may occur in 30% of patients with cirrhosis with high mortality [7, 8]. The key of successful rescue is to control hemorrhage quickly and effectively. In early stages, non-surgical methods are the main choices [9]. Nowadays, endoscopic therapy became the common treatment in patients with variceal bleeding due to portal hypertension, but endoscopic therapy result in 40% recurrence rate [10]. Many Physicians prefer the non-surgical treatments. However repeatedly endoscopic therapy often bungles the optimal operation time. Bleeding recurrences may deteriorate liver function, increase the incidence of postoperative complications, and reduce opportunity of operation. On the other side, the presence of portal vein thrombosis is also an indicator of the failure to control active variceal bleeding and to prevent variceal rebleeding [11]. Portal vein thrombosis is also considered a relative contraindication for TIPS [12, 13]. Therefore, the 6 patients had indications of surgical procedure. Patients with repeated bleeding due to portal hypertension need surgical operation. The ideal surgical procedure should allow to control bleeding, protect liver function and lower the incidence of encephalopathy [14, 15]. Our six patients would have undergone a liver transplantation. But, in China, the majority of these patients cannot have liver transplantation because of the high cost and shortage of donor livers [16]. Currently, shunt and devascularization surgeries are two different surgical options available. Shunt surgery will decrease blood flow to the liver, prone to liver damage, and increase the occurrence of encephalopathy [17]. In these 6 patients, devascularization surgery would be the most appropriate treatment because of minimum surgical trauma and effective bleeding control. We used selectively devascularization to divide bleeding varices towards the esophagus and proximal stomach and preserve the natural portosystemic collateral vessels (paraesophageal vessels, coronary vein). This allows us to

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**Table 1.** Characteristics of patients

Cases	Gender	Age	Liver cirrhosis	Etiology	Child-Pugh	Times of bleeding	Portal vein thrombosis	Endoscopic band ligation	Endoscopic Injection sclerotherapy	TIPS	Liver transplantation	Porto-systemic shunt surgery
1	m	63	y	Hepatitis B	C	4	y	n	y	y	n	n
2	m	53	y	Hepatitis B	C	5	y	y	y	n	n	n
3	m	46	y	Hepatitis C	C	4	y	n	y	n	n	n
4	m	49	y	Hepatitis B	C	3	y	y	n	n	n	n
5	m	44	y	Hepatitis B	C	6	y	y	n	n	n	Portal-vena cava shunt
6	f	49	y	Primary biliary cirrhosis	C	4	y	y	n	n	y	n

m: male; f: female; y: yes; n: no.

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**Table 2.** Result after modified surgical procedure

Outcomes	Operative time (min)	Operative mortality	Rebleeding	Child-Pugh	Encephalopathy	Postoperative hospital stay (d)	Alive follow up (m)
1	270	n	after 6 month	B	n	17	26
2	300	n	n	B	n	24	died after 8 months
3	240	n	n	A	n	14	36
4	240	n	n	A	n	16	36
5	330	n	n	A	n	18	24
6	300	n	n	B	n	22	18

control bleeding, maintain the natural vein shunt between the portal and azygous, and guarantee the decrease of portal vein pressure into hepatic blood flow dynamic balance [18].

Conventional devascularization, such as Hassab, Sugiura divide totally bleeding varices including not only branches towards the esophagus and proximal stomach, but also left gastric vein trunk. Hemodynamic studies suggest that conventional devascularization increase the pressure of portal vein, and ensure portal blood flow towards the liver. But, the incidence of postoperative re-bleeding in early stage reaches up to 47% dramatically [19], due to rupture of reformative varices [20, 21]. We started from the middle 1990s to preserve left gastric vein trunk and esophageal vein in selectively devascularization procedure, by only dividing varices entering into the proximal stomach and esophagus. The purpose is to ensure the blood flow shunt from the portal venous to the systemic circulation. That can prevent rebleeding, and can appropriately reduce portal vein pressure due to natural portal azygos vein shunt so as to achieve dynamic balance [22].

It is different from spleen-renal vein shunt operation or portal-vena cava shunt operation [23, 24], and therefore should be preserved.

This study demonstrated the benefit of selectively devascularization in complicated portal hypertension patients. Selectively devascularization should be seriously considered when other treatment options are contraindicated. The results were good with no mortality, and low rate of re-bleeding and encephalopathy and even better long-term results.

### Conclusion

This study showed that splenectomy with selectively devascularization surgery could be con-

sidered as a valuable multidisciplinary approach to the treatment of recurrent bleeding secondary to portal hypertension, refractory to endoscopic treatment and TIPS.

### Disclosure of conflict of interest

None.

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### References

- [1] Yoshida H, Mamada Y, Tani N, Yoshioka M, Hirakata A, Kawano Y, Mizuguchi Y, Shimizu T, Ueda J, Uchida E. Risk Factors for Bleeding Esophagogastric Varices. *J Nippon Med Sch* 2013; 80: 252-259.
- [2] Erwin B. Portal hypertension and gastrointestinal bleeding: Diagnosis, prevention and management. *World J Gastroenterol* 2013; 31: 5035-5050.
- [3] Christos T, Maria K. Endoscopic treatment of esophageal varices in patients with liver cirrhosis. *World J Gastroenterol* 2014; 36: 13015-13026.
- [4] Yang L, Yuan LJ, Dong R, Yin JK, Wang Q, Li T, Li JB, Du XL, Lu JG. Two surgical procedures for esophagogastric variceal bleeding in patients with portal hypertension. *World J Gastroenterol* 2013; 48: 9418-9424.
- [5] García-Pagán JC, Caca K, Bureau C, Laleman W, Appenrodt B, Luca A, Abrales JG, Nevens F, Vinel JP, Mössner J, Bosch J; Early TIPS (Transjugular Intrahepatic Portosystemic Shunt) Cooperative Study Group. Early Use of TIPS in Patients with Cirrhosis and Variceal Bleeding. *N Engl J Med* 2010; 362: 2370-2379.
- [6] Funes FR, Silva Rde C, Arroyo PC Jr, Duca WJ, Silva AA, Silva RF. Mortality and complications in patients with portal hypertension who underwent transjugular intrahepatic portosys-

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- temic shunt (TIPS)-12 years experience. *Arq Gastroenterol* 2012; 49: 143-149.
- [7] Wright AS, Rikkers LF. Current management of portal hypertension. *J Gastrointest Surg* 2005; 9: 992-1005.
- [8] Sharara AI, Rockey DC. Gastroesophageal variceal hemorrhage. *N Engl J Med* 2001; 345: 669-681.
- [9] Sharma A, Vijayaraghavan P, Lal R, Behari A, Kumar A, Sikora SS, Saxena R, Kapoor VK. Salvage surgery in variceal bleeding due to portal hypertension. *Indian J Gastroenterol* 2007; 26: 14-17.
- [10] Avgerinos A, Armonis A, Stefanidis G, Mathou N, Vlachogiannakos J, Kougioumtzian A, Triantos C, Papaxoinis C, Manolakopoulos S, Panani A, Raptis SA. Sustained rise of portal pressure after sclerotherapy, but not band ligation, in acute variceal bleeding in cirrhosis. *Hepatology* 2004; 39: 1623-1630.
- [11] Amitrano L, Guardascione MA, Menchise A, Martino R, Scaglione M, Giovine S, Romano L, Balzano A. Safety and efficacy of anticoagulation therapy with low molecular weight heparin for portal vein thrombosis in patients with liver cirrhosis. *J Clin Gastroenterol* 2010; 44: 448-451.
- [12] Perarnau JM, Baju A, D'alteroche L, Viguier J, Ayoub J. Feasibility and long-term evolution of TIPS in cirrhotic patients with portal thrombosis. *Eur J Gastroenterol Hepatol* 2010; 22: 1093-1098.
- [13] Selzner M, Tuttle-Newhall JE, Dahm F, Suhocki P, Clavien PA. Current Indication of a Modified Sugiura Procedure in the Management of Variceal Bleeding. *J Am Coll Surg* 2001; 193: 166-173.
- [14] Wang YD, Ye H, Ye ZY, Zhu YW, Xie ZJ, Zhu JH, Liu JM, Zhao T. Laparoscopic splenectomy and azygoportal disconnection for bleeding varices with hypersplenism. *J Laparoendosc Adv Surg Tech A* 2008; 18: 37-41.
- [15] Jiang XZ, Zhao SY, Luo H, Huang B, Wang CS, Chen L, Tao YJ. Laparoscopic and open splenectomy and azygoportal disconnection for portal hypertension. *World J Gastroenterol* 2009; 15: 3421-3425.
- [16] Ma YG, Li XS, Zhao J, Chen H, Wu MC. Modified Sugiura procedure for the management of 160 cirrhotic patients with portal hypertension. *Hepatobiliary Pancreat Dis Int* 2004; 3: 399-401.
- [17] Wang Y. Surgical treatment of portal hypertension. *Hepatobiliary Pancreat Dis Int* 2002; 1: 211-214.
- [18] Selzner M, Tuttle-Newhall JE, Dahm F, Suhocki P, Clavien PA. Current Indication of a Modified Sugiura Procedure in the Management of Variceal Bleeding. *J Am Coll Surg* 2001; 193: 166-173.
- [19] Carbonell N, Pauwels A, Serfaty L, Fourdan O, Lévy VG, Poupon R. Improved survival after variceal bleeding in patients with cirrhosis over the past two decades. *Hepatology* 2004; 40: 652-659.
- [20] Hacıyanlı M, Genc H, Halici H, Kumkumoglu Y, Gur OS, Ozturk T. Results of modified Sugiura operation in variceal bleeding in cirrhotic and noncirrhotic patients. *Hepatogastroenterology* 2003; 50: 784-788.
- [21] Yoshida H, Mamada Y, Tani ai N, Tajiri T. New methods for the management of gastric varices. *World J Gastroenterol* 2006; 12: 5926-5931.
- [22] Cao H, Hua R, Wu ZY. Effects of combined splenorenal shunt devascularization and devascularization only on hemodynamics of the portal venous system in patients with portal hypertension. *Hepatobiliary Pancreat Dis Int* 2005; 4: 385-388.
- [23] De Cleva R, Herman P, D'Albuquerque LA, Pugliese V, Santarem OL, Saad WA. Pre- and postoperative systemic hemodynamic evaluation in patients subjected to esophagogastric devascularization plus splenectomy and distal splenorenal shunt: a comparative study in schistosomal portal hypertension. *World J Gastroenterol* 2007; 13: 5471-5475.
- [24] Orozco H, Tielve M, Ramos G, Mercado MA. Hemodynamic study of the patient with hemorrhagic portal hypertension: importance of the left renal vein in patients with a distal splenorenal shunt (Warren). *Rev Gastroenterol Mex* 2006; 71: 257-261.