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INSTITUTO NACIONAL DE CIENCIAS MÉDICAS Y  
NUTRICIÓN SALVADOR ZUBIRÁN  
DEPARTAMENTO DE CIRUGÍA GENERAL.

DISMINUCIÓN EN LA MORBILIDAD Y MORTALIDAD DE LA  
CIRUGÍA DE HIPERTENSIÓN PORTAL:  
REUBICACIÓN EN EL ARMAMENTARIO TERAPÉUTICO.

DIMINISHED MORBIDITY AND MORTALITY IN PORTAL HYPERTENSION  
SURGERY: RELOCATION IN THE THERAPEUTIC ARMAMENTARIUM.

TRABAJO DE INVESTIGACIÓN  
QUE PARA OBTENER EL TÍTULO DE

CIRUJANO GENERAL

PRESENTA

DR. JUAN JOSÉ PLATA MUÑOZ

ASESOR

DR. MIGUEL ÁNGEL MERCADO DIAZ

REVISORES

DR. HÉCTOR OROZCO ZEPEDA  
DR. LORENZO DE LA GARZA VILLASEÑOR  
DR. MIGUEL F. HERRERA HERNÁNDEZ  
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Titular del Curso de Especialización  
en Cirugía General de la UNAM.  
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Director de Cirugía General.  
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# Diminished Morbidity and Mortality in Portal Hypertension Surgery: Relocation in the Therapeutic Armamentarium

Miguel Angel Mercado, M.D., Héctor Orozco, M.D., Francisco J. Ramírez-Cisneros, M.D.,  
Carlos A. Hinojosa, M.D., Juan José Plata, M.D., Javier Alvarez-Tostado, M.D.

Although several effective therapeutic options are available for bleeding from portal hypertension, surgery has a well-defined role in the management of patients with good liver function who are electively operated. The aim of this investigation was to evaluate the operative mortality and morbidity of portal blood flow-preserving procedures in a highly select patient population. The records of 148 patients operated on between 1996 and 2000 using one of two techniques (selective shunts or a Sugiura-Futagawa operation [complete portoazygos disconnection]) were analyzed with particular attention to operative mortality, postoperative rebleeding, and encephalopathy. Survival was calculated according to the Kaplan-Meier method. Sixty-one patients had distal splenorenal shunts placed, and 87 patients had a devascularization procedure. Operative mortality for the group as a whole was 1.2%. In the group with selective shunts, the rebleeding rate was 4.9%, the encephalopathy rate was 9.8%, and the shunt obstruction rate was 1.6%. Survival at 24 months was 94% and at 48 months was 92%. In those undergoing devascularization, the encephalopathy rate was 5% and the rebleeding rate was 14%. Survival at 24 months was 90% and at 48 months was 86%. Portal blood flow-preserving procedures have very low morbidity and mortality rates at specialized centers. In addition, a low rebleeding rate is associated with a good quality of life. Low-risk patients with bleeding portal hypertension should be considered for surgical treatment. (J GASTROINTEST SURG 2001;5:499-502.)

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KEY WORDS: Portal hypertension surgery, shunt surgery, devascularization procedures

Treatment of bleeding portal hypertension has expanded widely over the past few years. Several treatment modalities are now available, each with its own particular indications and results in certain subsets of patients. In emergency situations, pharmacotherapy and endoscopic therapy are the treatments of choice.<sup>1</sup> Pharmacotherapy can also be used for primary prophylaxis,<sup>2</sup> and transjugular intrahepatic portosystemic shunts (TIPS) are indicated in refractory cases in the acute setting, as well as in patients with poor liver function who are awaiting a liver transplant.<sup>3</sup> Liver transplantation is considered the treatment of choice at many centers, because not only does portal pressure return to normal but liver function is also restored.<sup>4</sup>

Surgery may be considered in a subset of patients with good liver function whose principal problem is bleeding esophageal varices from portal hypertension.<sup>5</sup> The relative complexity of these operations as

well as their long-term results in terms of survival, which differ little from other treatment modalities, has restricted their utilization at many centers.

At our institution, surgery for portal hypertension has been maintained as a therapeutic option for several reasons: Selection of patients has broadened as technical expertise has become more highly developed. In this report we analyze the results of portal hypertension surgery (blood flow-preserving procedures) over the past few years, with special emphasis on mortality, and current indications for surgery, and status of patients.

## METHODS

Patients evaluated for management of bleeding esophageal varices from portal hypertension at our institution, either as an elective procedure or in the

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## METHODS

Patients evaluated for management of bleeding esophageal varices from portal hypertension at our institution, either as an elective procedure or in the

**Table I.** Criteria for patients undergoing portal hypertension surgery

History of bleeding portal hypertension
Good liver function
Albumin >3 g/dl
Prothrombin time <2 seconds
Direct bilirubin <2 mg/dl
No encephalopathy
No ascites
Good cardiopulmonary function
Good renal function
No hepatocarcinoma

emergency setting, are treated by a multidisciplinary team approach. Patients with acute bleeding are managed with endoscopic treatment and/or pharmacotherapy. Once the bleeding is controlled, liver function is evaluated. Patients in Child-Pugh class C remain on endoscopic and/or pharmacologic therapy. Some may be placed on the liver transplant waiting list according to whether or not they meet the criteria of our institution. Patients fulfilling the criteria listed in Table I are evaluated for portal hypertension surgery. These criteria reflect good liver function, good cardiac function, and good lung function. A prothrombin time of less than 2 seconds is indicative of an international normalization ratio of less than 1.16. This is a quick and easy means of evaluating liver function in addition to a serum albumin level above 3.5 g/dl. Celiac angiography is performed for complete evaluation of the complete splanchnic vessels in each patient. If adequate vessels are found (splenic vein and left renal vein), the patient is scheduled for a distal splenorenal shunt.<sup>6</sup> If no adequate vessels are found, the patient is scheduled for a Sugiura-Futagawa operation<sup>7</sup> or complete portoazygos disconnection.<sup>8</sup> During the postoperative period, routine angiography is performed (between 2 and 4 weeks postoperatively) to evaluate shunt patency and portal blood flow. Within the past 5 years, a total of 193 operations have been performed in 148 patients. The records of these patients were evaluated with a focus on operative mortality and morbidity. Survival curves were constructed according to the Kaplan-Meier method.

The following definitions were used in our evaluations: Rebleeding was defined as hematemesis and/or melena with hemodynamic decompensation (i.e., heart rate >100 beats/min and hypotension) and decreasing hemoglobin levels. Encephalopathy was determined by means of clinical evaluation and, when deemed necessary, motor function tests. Patients with categoric clinical signs of encephalopathy (i.e., sc.n-

nolence, asterixis, etc.) were considered positive, and no further tests were conducted. Three patients with no categoric signs were subjected to motor function tests. Quality of life was assessed according to our established criteria.<sup>5</sup> Patients with no need for hospitalization, no rebleeding, and no encephalopathy who were able to carry out their daily activities were considered to have a good quality of life. The opposite was true for those judged to have a poor quality of life.

## RESULTS

Sixty-one patients had a distal splenorenal shunt placed and 87 patients had a Sugiura-Futagawa operation or complete portoazygos disconnection (Table II). Operative mortality was 1.2% for the group as a whole. Nine patients in the distal splenorenal shunt group and five patients in the devascularization group were lost to follow-up. These patients were included in the Kaplan-Meier survival analyses.

### Distal Splenorenal Shunt

All of the patients in this group were cirrhotic, with a slight predominance of viral over alcoholic cirrhosis. There were five cases of primary biliary cirrhosis. Operative mortality was 1.6% (1/61). The rebleeding rate was 4.9% (3/61). The encephalopathy rate was 9.8% (6/61) and the shunt obstruction rate was 1.6% (1/61). Survival was 98% at 1 month, 94% at 24 months, and 92% at 48 months. Patients with encephalopathy were treated medically (protein-restricted diet, lactulose). Three of these patients met the criteria for liver transplantation and were placed on the waiting list.

### Sugiura-Futagawa Operation and Complete Portoazygos Disconnection

In 45 patients both stages of the operation (thoracic and abdominal) were performed, and in 42 patients only the abdominal stage was necessary. No operative deaths were recorded in this group. Forty-eight percent of the patients in this group had no cirrhosis on liver biopsy, whereas the remaining 52% had alcoholic or posthepatitis cirrhosis. These patients were selected for this type of operation because they were judged unsuitable for shunt surgery because of the presence of vascular abnormalities and/or thrombosis. No cases of esophageal dehiscence or fistulization of the modified esophageal transection were recorded. Five patients were lost to follow-up. At 5 years, the encephalopathy rate was 5% and the rebleeding rate was 14%. Survival was 100% at 1 month, 94% at 24 months, and 86% at 48 months.

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Table II. Patient characteristics

	DSRS	Devascularization
Total patients in each group	61	87
Cirrhosis	61	45 (52%)
Alcoholic	26	21
Viral	30	22
Primary biliary	5	2
No cirrhosis	0	42 (48%)
Prehepatic and/or idiopathic	0	42
Splenomesoportal patency	61	43
Operative mortality	1/61 (1.6%)	0
Rebleeding	3/61 (4.9%)	12/87 (14%)
Encephalopathy	6/61 (9.8%)	4/87 (5%)
Shunt obstruction	1/61 (1.6%)	
Survival at 60 months	90%	82%
Postoperative angiography	55/60	21/43
Portal vein		
Unaltered	45/55 (81%)	20/21 (95%)
Diminished	7/55 (13%)	0
Thrombosed	3/55 (5%)	1/21 (5%)

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DSRS = distal splenorenal shunt.

## DISCUSSION

Surgery for portal hypertension has evolved over the past 50 years and its location in the therapeutic armamentarium has varied widely. In the 1960s and 1970s it was the treatment of choice for all subsets of patients, but it soon became evident that surgery had only a minor impact on survival, although it did have a favorable outcome with regard to the rebleeding rate.<sup>9</sup> As other treatment modalities emerged, its role was redefined. Endoscopic treatment (sclerotherapy) emerged as a good alternate choice in emergency situations, replacing surgery at most centers around the world (including our own); one exception was Orloff et al.<sup>9</sup> from San Diego, who achieved superb results with total shunts in emergency situations. Pharmacotherapy also appears to be a good choice for patients in the acute setting.<sup>10</sup> The evolution of endoscopic therapy has made band ligation the treatment of choice for patients with acute bleeding episodes as well as those with poor liver function.<sup>11</sup> The TIPS procedure has a role in patients with acute bleeding refractory to endoscopic and pharmacologic therapy (as a short-term bridge to liver transplantation), and liver transplantation is indicated primarily for patients who have poor liver function concomitant with bleeding portal hypertension.

Patients with good liver function and a history of variceal bleeding all share the following characteristics:

1. They have a high probability of rebleeding (although they are better able to tolerate these episodes than Child-Pugh C patients).

2. Those treated with pharmacotherapy and/or endoscopic therapy have a high rate of rebleeding (30% to 50%). This rebleeding can cause patients with good liver function to develop posthemorrhagic liver failure, with a high probability of being reclassified as Child-Pugh C.
3. In patients treated with the TIPS procedure, high rates of encephalopathy and shunt obstruction are to be expected, which necessitate re-exploration and replacement of stents. The advantages of portal blood flow-preserving procedures are improved shunt patency (if a shunt is used) and a lower incidence of encephalopathy.
4. The disadvantages of liver transplantation are the shortage of donor livers and the well-known complications of immunosuppression. Although this treatment modality has had an extraordinary evolution, the morbidity and mortality of this procedure must be considered. Liver transplantation is indicated for patients with end-stage liver cirrhosis with or without bleeding portal hypertension. Portal hypertension surgery is indicated in patients whose principal problem is bleeding but who have an adequate liver reserve. Some patients with bleeding portal hypertension are not candidates for a liver transplant (e.g., alcoholic patients who continue to drink). Others, even though they are suitable candidates, will never receive a transplant because of the shortage of donor organs. Thus the most promising alternative may not always be

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Splenomesoportal patency	61	43
Operative mortality	1/61 (1.6%)	0
Rebleeding	3/61 (4.9%)	12/87 (14%)
Encephalopathy	6/61 (9.8%)	4/87 (5%)
Shunt obstruction	1/61 (1.6%)	
Survival at 60 months	90%	82%
Postoperative angiography	55/60	21/43
Portal vein		
Unaltered	45/55 (81%)	20/21 (95%)
Diminished	7/55 (13%)	0
Thrombosed	3/55 (5%)	1/21 (5%)

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DSRS = distal splenorenal shunt.

## DISCUSSION

Surgery for portal hypertension has evolved over the past 50 years and its location in the therapeutic armamentarium has varied widely. In the 1960s and 1970s it was the treatment of choice for all subsets of patients, but it soon became evident that surgery had only a minor impact on survival, although it did have a favorable outcome with regard to the rebleeding rate.<sup>9</sup> As other treatment modalities emerged, its role was redefined. Endoscopic treatment (sclerotherapy) emerged as a good alternate choice in emergency situations, replacing surgery at most centers around the world (including our own); one exception was Orloff et al.<sup>9</sup> from San Diego, who achieved superb results with total shunts in emergency situations. Pharmacotherapy also appears to be a good choice for patients in the acute setting.<sup>10</sup> The evolution of endoscopic therapy has made band ligation the treatment of choice for patients with acute bleeding episodes as well as those with poor liver function.<sup>11</sup> The TIPS procedure has a role in patients with acute bleeding refractory to endoscopic and pharmacologic therapy (as a short-term bridge to liver transplantation), and liver transplantation is indicated primarily for patients who have poor liver function concomitant with bleeding portal hypertension.

Patients with good liver function and a history of variceal bleeding all share the following characteristics:

1. They have a high probability of rebleeding (although they are better able to tolerate these episodes than Child-Pugh C patients).

2. Those treated with pharmacotherapy and/or endoscopic therapy have a high rate of rebleeding (30% to 50%). This rebleeding can cause patients with good liver function to develop posthemorrhagic liver failure, with a high probability of being reclassified as Child-Pugh C.
3. In patients treated with the TIPS procedure, high rates of encephalopathy and shunt obstruction are to be expected, which necessitate re-exploration and replacement of stents. The advantages of portal blood flow-preserving procedures are improved shunt patency (if a shunt is used) and a lower incidence of encephalopathy.
4. The disadvantages of liver transplantation are the shortage of donor livers and the well-known complications of immunosuppression. Although this treatment modality has had an extraordinary evolution, the morbidity and mortality of this procedure must be considered. Liver transplantation is indicated for patients with end-stage liver cirrhosis with or without bleeding portal hypertension. Portal hypertension surgery is indicated in patients whose principal problem is bleeding but who have an adequate liver reserve. Some patients with bleeding portal hypertension are not candidates for a liver transplant (e.g., alcoholic patients who continue to drink). Others, even though they are suitable candidates, will never receive a transplant because of the shortage of donor organs. Thus the most promising alternative may not always be

the one most readily available, and most of these patients will have recurrent bleeding episodes while they are on the waiting list.

5. Portal blood flow-preserving procedures performed by a highly skilled surgical team in a well-selected patient population offer excellent results. Over the past 5 years at our institution, we have achieved a very low operative mortality rate (1%) with very good 5-year survival, along with a low encephalopathy rate and a low rebleeding rate. No other option can offer such promising results. Nevertheless, for patients in Child-Pugh class C, replacement of the cirrhotic liver restores functional mass and relieves portal hypertension. Surgery for portal hypertension alone is not appropriate for these patients because a high morbidity and mortality can be anticipated.

Selecting the most suitable type of operation is crucial. When no adequate anatomy can be found, devascularization is a better option. In our surgically treated patients, extensive devascularization is used more frequently than shunts. In patients with a thrombosed portal vein (even one that has been recanalized) and a patent splenic vein, a shunt cannot be used. We have previously found that these patients have a high rate of shunt thrombosis. Patients with small splenic veins (<1 cm) were also excluded. It is possible that some of these patients would be considered for a shunt at other centers. Because we have achieved good (comparable) results with devascularization, we prefer to avoid the risk posed by an inadequate anatomy.

When the choice of operation is based on the individual characteristics of each patient, the results achieved with portal blood flow-preserving procedures in low-risk (Child-Pugh A and B) patients are excellent. Nevertheless, no studies (prospective, controlled, randomized) have been done comparing the five treatment options in low-risk patients. Our group has conducted a prospective, controlled, randomized study comparing beta blockers, endoscopic therapy, and portal blood flow-preserving procedures in low-risk patients, which showed better results for surgery when rebleeding rates were analyzed.<sup>12</sup> These findings confirm the role of surgery as a long-term bridge for patients awaiting liver transplantation when needed,<sup>13</sup> because many of these patients do well after the operation, maintaining good liver function and a

good quality of life. Liver transplant centers have the opportunity to reassess the role of portal hypertension surgery in the therapeutic armamentarium, because these centers usually have the technologically advanced facilities and highly skilled surgeons needed to ensure the success of types of operations.

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