Splenoportal Shunt

An Ideal Procedure in the Pacific

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Hypothesis: Splenorenal shunt, an accepted treatment to prevent recurrent variceal bleeding, is an ideal procedure for patients with psychosocial issues or limited access to tertiary medical centers.

Methods: We retrospectively reviewed the medical records of 34 patients (32 distal splenorenal shunts and 2 central splenorenal shunts) treated from January 1, 1995, through December 31, 2001, for demographic data, substance abuse status, psychosocial factors, previous treatments, Child class, length of hospital stay, operative transfusions, complications, and outcome.

Results: Of the 34 patients, 17 were from surrounding Pacific islands (as many as 3800 miles away from Honolulu, Hawaii). Sixteen patients were Child class A, and 18 were Child class B. Twenty-four patients were either homeless, actively involved in substance abuse, or being treated for psychiatric problems, and 20 patients were either uninsured or insured by third-party payers that did not cover liver transplantation. Four patients underwent distal splenorenal shunt for a failed transjugular intrahepatic portosystemic shunt. Patients received a mean of 1.3 U of packed red blood cells (range, 0-5 U), and 15 received no blood transfusions. Mean length of hospital stay was 12.7 days (9 days postoperatively). Perioperative mortality was 8.8%. Three patients rebled postoperatively, 2 because of gastric ulcers and 1 because of an inadequate shunt. The 1-year survival rate was 95% in the 20 patients for whom data were available.

Conclusions: Splenorenal shunt is an important treatment for noncompliant patients or patients living in remote areas where access to specialized treatments, such as endoscopy, transjugular intrahepatic portosystemic shunt, ultrasonography, and liver transplantation, is limited. We can achieve acceptable morbidity and mortality in this group of patients, although follow-up can be difficult.

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S BETTER medical care allows patients to live longer with complications of cirrhosis, variceal bleeding will become more prevalent. Liver transplantation is the ultimate option for complications of liver disease, but the harsh reality is that there are simply not enough livers for all patients with end-stage liver disease. Despite split-liver techniques, adult-sized live-donor liver transplants, and donors with expanded criteria, many patients will still die as a result of end-stage liver disease. Thus, it is important for liver surgeons and hepatologists to determine which patients are truly viable candidates for transplantation and which should be treated in a more palliative way.

Surgical shunts, the distal splenorenal shunt in particular, are an excellent choice for control of recurrent variceal bleeding. Rebleeding and encephalopathy rates are low, and shunt patency is excellent. Patients undergo a minimum of follow-up diagnostic studies, and this also appears to be cost-effective. Surgical shunts have been used to treat patients with variceal bleeding, as a definitive treatment and as a bridge to liver transplantation in patients with reasonable hepatic synthetic function.

See Invited Critique at end of article

Transjugular intrahepatic portosystemic shunts (TIPSs) have also been
Many areas do not have access to blood banks, endoscopy, abdominal ultrasonography, or interventional radiology. Several tertiary care centers on Oahu have the ability to perform TIPS, and about 60 such procedures were performed at our medical center from January 1, 1995, through December 31, 2001. It is often impossible to reevaluate the TIPS with ultrasonograms in patients who have no access to ultrasonography or who cannot return to Honolulu because of financial constraints. Because of problems with compliance and follow-up, we have increasingly recommended splenorenal shunts. In this article, we review our experience with this procedure.

We retrospectively reviewed the medical records of all patients who underwent splenorenal shunt during the 6-year period from January 1, 1995, through December 31, 2001. Demographic data, including age, sex, race, and island of residence, were noted. We also recorded the cause of the liver disease, the number of variceal bleeding episodes, and previous treatments. Psychosocial issues, including history of smoking, use of alcohol or other drugs, documented psychiatric history, living arrangements, and insurance status, were noted. Finally, information on encephalopathy, ascites, bilirubin, prothrombin time, and albumin were reviewed to calculate a Child-Pugh score. Patients were then classified as follows: Child A indicates a Child-Pugh score of less than 5; Child B, Child-Pugh score of 5 to 9; and Child C, Child-Pugh score of 10 or higher.

In terms of the treatment, we noted the type of splenorenal shunt, the number of blood transfusions required during surgical treatment, the length of the hospital stay, and whether the procedure was elective or semielective. Those patients undergoing elective splenorenal shunt were not bleeding at the time of admission but had bled recently on previous admissions. Semielective splenorenal shunt implied that the patient was bleeding on hospital admission but was stabilized for at least 3 days before surgical treatment and was not actively bleeding at the time of the operation.

We also reviewed the medical records for postoperative complications and rebleeding. Follow-up visits were recorded for patients who lived on Oahu. Patients on the neighboring Hawaiian Islands and other Pacific Islands were monitored by their local primary care physician, and follow-up by our group was made via telephone calls or clinic notes. For those patients who were supposedly lost to follow-up, we called all physicians involved, attempted to contact patients at their last known addresses and telephone numbers, and searched all published obituaries in both major newspapers in Hawaii from the time of the operation until the present.

### RESULTS

During the 6-year period from January 1, 1995, to December 31, 2001, 34 splenorenal shunts were performed by our group of surgeons. The mean patient age was 50.4 years, and there were 24 men and 10 women. Nineteen patients were white, 10 were Asian (Japanese, 2; Chinese, 2; Korean, 2; Filipino, 2; and Vietnamese, 1) and 5 were Pacific Islanders (Chamorroan, 3; Samoan, 1; and Marshallese, 1).

A little more than half the patients were from Oahu, the island on which these splenorenal shunts were performed at 3 tertiary medical centers (Table).
Eight patients were from Maui, a Hawaiian island (approximately 90 miles from Oahu), 4 patients were from Guam (3800 miles away), 2 patients were from the Big Island of Hawaii (210 miles away), 1 patient was from American Samoa (2598 miles away), and 1 patient was from Truk, a Northern Marianas island (approximately 3500 miles away) (Figure). All patients from islands other than Oahu were brought in by air ambulance. Endoscopy was not available in Samoa and Truk. At the time of these transfers, Doppler ultrasonography and interventional radiology were not available on any of these islands except Oahu.

Twenty-four of 34 patients undergoing splenorenal shunt had hepatitis C, alcoholic liver disease, or a combination of these diseases. Three patients had cryptogenic cirrhosis, and 2 patients had autoimmune disease or primary biliary cirrhosis. Two patients had noncirrhotic portal hypertension, including 1 with lymphoma and leukemia and another with schistosomiasis (Table).

With regard to psychosocial issues, 22 patients were either actively using alcohol or had abused alcohol in the past; 22 patients also had a history of smoking, with 14 currently smoking. Ten patients had a history of intravenous drug abuse, and 7 patients used other illicit drugs (cocaine, heroin, and methamphetamine). Eleven patients were currently employed, and 19 were currently unemployed, not including patients who were retired or disabled. Four patients had documented psychiatric problems for which they were being treated. Five patients were homeless, and 1 patient was imprisoned at the time of surgical treatment (Table).

Of the 34 patients who underwent splenorenal shunt, 14 patients had insurance that would also cover liver transplantation, if necessary. Eighteen patients had either state government– or Pacific Island–subsidized medical insurance that either did not cover liver transplantation or might cover it in a transplant center outside Hawaii, provided that certain criteria were met. Two patients were uninsured (Table).

Three patients underwent central splenorenal shunt because of massive splenomegaly and ascites in addition to bleeding, and the remaining 31 patients underwent distal splenorenal shunt with splenopancreatic-gastric disconnection. Fifteen operations were performed on an elective basis. The remaining 19 patients were admitted urgently for a variceal bleeding episode and stabilized for 3 to 8 days prior to undergoing surgical treatment. No patient was actively bleeding at the time of the operation. In patients for whom the information was available, 31 had a mean of 3 bleeding episodes before surgical treatment. Nine patients had operations following their first bleeding episode because of severe esophageal and gastric varices, and 4 patients underwent distal splenorenal shunt for a failed TIPS. Sixteen patients were Child class A, and 18 patients were Child class B on the day of the operation. Blood transfusions at the time of surgical treatment were from 0 to 5 U of packed red blood cells. The mean transfusion was 1.3 U, and 15 patients did not receive any transfusion. The mean length of hospital stay was 12.7 days total or 9 days postoperatively.

Two patients had early bleeding postoperatively that was related to gastric ulcers, but no interventions other
than transfusions and endoscopy were necessary. Rebleeding occurred in 1 patient who had an incomplete splenopancreatic-gastric disconnection and an extremely large left coronary vein. He underwent placement of a transjugular, intrahepatic, portosystemic shunt, which was complicated by portal vein thrombosis 4 months postoperatively. He then required a modified Sugita procedure (gastric devascularization and esophageal transection) for recurrent bleeding because he was not a candidate for transplantation.

No patient died intraoperatively or in the 7 days following surgical treatment. Three patients died in the 30-day period after splenorenal shunt. One patient died of massive liver failure on postoperative day 17. Another patient died on postoperative day 9 because of respiratory failure and a fungal infection probably related to steroid use for her autoimmune disease. The third patient died of complications related to acute pancreatitis on postoperative day 26.

Of the 31 patients who survived the perioperative period, 3 patients are known to have died of unrelated causes at 8 months, 3 years, and 4 years following the operation. Of the remaining patients, 24 are known to be alive, and 5 have been lost to follow-up; 3 patients who have been lost to follow-up have not appeared on any published obituary list since their operation. Two patients live in Guam and have not been seen by physicians there. Of the 20 patients for whom data are available and who survived the perioperative period, the 1-year survival rate was 95%.

multiple studies have confirmed the efficacy of splenorenal shunts. In series with 32 to 296 patients, perioperative mortality has ranged from 0% to 14%, and the likelihood of rebleeding has been 3.8% to 14%. The rate of portosystemic encephalopathy has been reported to be 5% to 19%. Maintenance of portal circulation by splenopancreatic disconnection plays a role in the development of encephalopathy. Spina et al demonstrated in 27 of 131 patients that those who underwent distal splenorenal shunt with splenopancreatic disconnection were much less likely to develop chronic encephalopathy (0% vs 17% in patients with no splenopancreatic disconnection). Those 18 patients (14%) who developed chronic encephalopathy tended to have abolished portal perfusion. Jin and Rikkers also confirmed that early portal vein thrombosis following distal splenorenal shunt contributed significantly to the development of both encephalopathy and severe ascites.

Nonsurgical TIPS is used to control variceal bleeding and treat refractory ascites. This is a minimally invasive procedure performed by interventional radiologists with high technical success rates (greater than 90%) and excellent initial control of bleeding in most series. Unfortunately, TIPS stenosis occurs in 50% to 70% of patients and accounts for a rebleeding rate of 15% to 30%. Encephalopathy also occurs in about 15% to 30% of patients, and TIPS can be used as a bridge to liver transplantation in patients with recurrent variceal bleeding. Early reports even suggested that TIPS could decrease blood loss at transplantation because of decreased portal hypertension. Later studies, however, demonstrated that blood loss, operative time, and length of hospital stay were not affected by the presence of a TIPS before liver transplantation.

A number of groups have directly compared outcome in patients undergoing distal splenorenal shunt vs TIPS. Two retrospective studies on Child class A and B patients demonstrated that patients who underwent TIPS had significantly higher rebleeding rates because of shunt stenosis and required more interventions. Helton et al conducted a prospective, randomized trial of 40 patients with Child class A or B scores and variceal bleeding: 20 underwent distal splenorenal shunt, and 20 underwent TIPS. The 30-day mortality was higher in patients who underwent TIPS (20% vs 0% in patients who underwent distal splenorenal shunt). The patients who underwent TIPS also had significantly more rebleeding episodes, diagnostic studies, shunt revisions, and hospitalizations. Total charges for a patient who underwent TIPS were $111 573 vs $61 934 for a patient who underwent distal splenorenal shunt. Finally, a decision analysis model by Zacks et al of Child class A patients with cirrhosis and variceal bleeding demonstrated that a patient who underwent TIPS survived a mean of 1.96 years and required 1.7 procedures at a cost of $41 685 compared with a patient who underwent distal splenorenal shunt, survived 1.86 years, and required 1.0 procedures at a cost of $26 951. They concluded that distal splenorenal shunt was more cost-effective.

Most will agree that distal splenorenal shunt is the procedure of choice for a Child class A patient with variceal bleeding. For patients who are Child class B or C, the possibility of a liver transplant looms in the future and often plays a role in deciding between TIPS or distal splenorenal shunt. Menegaux et al studied 38 patients who underwent liver transplantation; 25 had TIPS, and 32 had splenorenal shunt prior to transplantation. Patients who had a pretransplantation TIPS required fewer blood transfusions at the time of the operation and had shorter operative times and shorter hospital and intensive care unit stays. Abouljoud et al reviewed 35 patients with liver transplants, 18 with previous TIPS, and 17 with previous distal splenorenal shunt. No difference in the intraoperative transfusion requirement was noted, although the operative time was longer in the distal splenorenal shunt group. There were 3 deaths in the distal splenorenal shunt group compared with no deaths in the TIPS group. Intraoperative hemodynamics were better in the TIPS group because portal vein pressures were significantly higher. Both studies suggested that TIPS was perhaps a more favorable choice as a bridge to transplantation.

In general, it is difficult to study this group of patients in large, randomized, controlled prospective trials. These patients are frequently unreliable and noncompliant, with diseases that are often self-induced and ongoing. One study even reported that 19% of patients were lost to follow-up. Unfortunately, we have often been unable to document many of these psychosocial factors...
at the time the patient is admitted to the hospital with acute variceal bleeding. Four such patients in our series underwent distal splenorenal shunt after their TIPS had occluded, and we had determined these patients to be noncompliant or unsuitable candidates for transplantation. This approach has been described by Selim et al[28] who performed conversion of failed TIPS to distal splenorenal shunts in 4 patients with Child class A or B cirrhosis; however, these conversions were done for primarily technical reasons.

For the noncompliant patient and the patient who is not a candidate for a transplant, distal splenorenal shunt is the ideal procedure. Studies have consistently shown its efficacy and cost-effectiveness and the lack of need for future interventions. We have been able to perform distal splenorenal shunt with acceptable morbidity and mortality in patients who are frequently at a great distance from tertiary medical centers or who have significant psychosocial issues. Following a TIPS closely with ultrasoundograms or venograms is simply not possible in such situations because these tests are either not available or the patients are lost to follow-up and will only seek treatment with acute rebleeding. Thus, we propose that the 2 most important factors in deciding whether to use TIPS or distal splenorenal shunt are Child status and patient compliance or psychosocial factors. We have shown data here that most centers would be reluctant to report, but they reflect the reality of the nature of these patients. The presence of factors such as active substance abuse, hopelessness, lack of social or financial support, and distance from tertiary medical centers that can treat end-stage liver disease must be noted prior to any decision. These factors are generally discussed in determining appropriateness for liver transplantation and should be discussed before deciding between TIPS and distal splenorenal shunt as well. Although we would ideally like to study this issue in a controlled, prospective fashion, the nature of these patients will probably never allow for such a study.

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