

rebleeding. The one patient who rebled in this study apparently had suboptimal reduction of portal pressure (from 38 to 18 mm Hg) and required stent expansion to lower the portosystemic gradient to 8 mm Hg. What percentage of patients in larger studies will achieve adequate portal decompression to prevent variceal rebleeding? Will these figures compare favorably with the effectiveness of surgical shunts (5)? What will be the duration of shunt patency after TIPS? The mean follow-up in this study was only 5 mo, and two patients required balloon angioplasty of the stent to provide better decompression during this follow-up. If the duration of TIPS patency is shorter than that achieved by surgical shunting or if prolonged patency requires frequent interval venous portography and angioplasty, the procedure may be less applicable than anticipated.

The final issues to be determined are those of long-term complications and the relative cost of TIPS compared with other alternatives. The authors report that no patient had severe hepatic encephalopathy develop after TIPS, although we are not told whether milder forms of encephalopathy occurred. One would expect that once adequate portal decompression is achieved, encephalopathy will occur at a similar rate to that after surgical shunting (6). Finally, TIPS will have to be compared with medical therapy and sclerotherapy. Most clinicians use sclerotherapy as a first-line therapy for the prevention of variceal rebleeding and reserve surgical shunts for sclerotherapy failures, noncompliant patients or patients living in geographically remote areas with limited access to medical facilities (7). We must also consider what effect TIPS will have on subsequent liver transplantation. Presumably avoiding dissection of the porta hepatis will reduce the complexity of subsequent liver transplantation and thereby may reduce postoperative mortality and morbidity rates (8).

TIPS is an exciting new nonsurgical technique for managing variceal hemorrhage caused by portal hypertension. It is unlikely that this procedure will entirely replace other available techniques; rather, it will most likely be indicated for the prevention of rebleeding in selected groups of patients. Definition of these patient groups awaits results from larger studies that are needed to establish the safety and efficacy of TIPS compared with more well-established techniques for managing variceal hemorrhage.

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PERCUTANEOUS TRANSJUGULAR PORTOSYSTEMIC SHUNT: COMMENTARY ON THE TECHNICAL ASPECTS OF THIS NEW PROCEDURE

COMMENTS

Transjugular intrahepatic portosystemic shunt (TIPS) is an exciting new interventional procedure for the treatment of portal hypertension that is being investigated at several institutions, including the Miami Vascular Institute. In its current stage of development, TIPS should be performed only in a setting that is as ideal as is possible. Angiographic laboratory prerequisites for the performance of this procedure include high-resolution C-arm fluoroscopy, digital subtraction angiographic capability, and equipment and personnel to provide the patient with adequate analgesia, sedation and monitoring during the procedure. High-quality ultrasound should be available. Operator skills must include experience with standard catheter-guidewire manipulations and angioplasty techniques and familiarity with intrahepatic anatomy and stent deployment protocols.

TIPS presents several technical challenges to the experienced interventionist that were not detailed in the recent JAMA article by Zemel et al. Transjugular, fluoroscopically guided needle puncture of a central portal vein branch by way of a hepatic vein is a technique still in evolution. Several methods to assist in aiming the needle have been used, including transabdominal placement of a portal vein catheter, directing the puncture toward the expected location of the portal vein as demonstrated on previous computed tomography or arterial portography and directing the puncture toward the portal vein under a combination of fluoroscopic and ultrasound guidance. The first method requires a transabdominal puncture, a possible source of peritoneal hemorrhage. The latter two methods avoid this possible complication but may require multiple intrahepatic needle passes with a 16-gauge needle—a possible source of intrahepatic pseudoaneurysm formation. After an

initial learning curve where they used a transhepatic portal vein catheter as a target, Zemel et al. have found the second method satisfactory and have had no complications relating to this step in the procedure. A determination of the technique that is most reliable and is associated with the fewest complications will come only with a larger patient population and longer follow-up.

Advancement of angiographic catheters through cirrhotic liver parenchyma and initial dilatation of the transhepatic shunt tract present a second challenge to the operator. The diseased liver is fibrotic and can be quite resistant to the passage of catheters. Experience with and creativity in the use of the wide variety of catheters and guidewires available to achieve this goal are necessary to ensure success.

Choice and optimal deployment of the indwelling stent are the final, and perhaps most important, challenges presented to the operator performing TIPS. Two types of stents are currently undergoing investigation for this application in the United States: the Palmaz balloon expandable stent (Johnson and Johnson, Warren NJ) and the Wallstent (Schneider USA, Minneapolis MN). Zemel et al. confined their study to an evaluation of the Palmaz stent, which is rigid, relatively noncompressible

in its expanded state and expandable over a wide range of luminal diameters. In contrast, the Wallstent is flexible but somewhat more compressible. With either choice, the stent(s) must cover the entire length of the shunt to minimize the risk of shunt stenosis and thrombosis. The anatomic and physiological considerations that exist to favor the use of one of these stents over the other is as yet unknown. More studies, such as this one with its protocol of using only one type of stent, and longer follow-up will be necessary to answer this question.

The report by Zemel's group represents progress in the development of TIPS as a method to treat portal hypertension. These investigators are to be congratulated for their work. They and others pursuing organized clinical protocols to evaluate this procedure should be encouraged in their efforts.

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