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The role of TIPS in the management of portal hypertension: a new perspective

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Introduction

The Transjugular Intra-hepatic Porto-Systemic Shunt (TIPS) was introduced in the early 1990's by Josef Rosch. It rapidly gained popularity in the US where at that time we were performing many per week. Originally, it was utilized to treat variceal hemorrhage with good results but, over time, endoscopic banding procedures have become better and the shunt has fallen into relative disfavor due to its higher than expected closure rate. In the ensuing fifteen years, there have been many changes in the approach to the treatment of portal hypertension and more specific role for this specialized procedure.

Procedure

TIPS is a connection between the hepatic vein and the portal vein mimicking a surgically placed H-shunt to decompress the portal vein into the systemic circulation. The internal jugular vein is accessed and a catheter placed into the right hepatic vein because the RHV is the most posterior venous structure in the liver. A sheath is then placed and a 16-gage needle placed through the sheath and, since the needle is curved which can be directed anteriorly and medially. When blood is encountered as the needle is removed, contrast is injected and the portal vein is hopefully demonstrated. Otherwise another pass is made until the portal vein is encountered. A wire is then placed through the needle into the portal vein, the needle removed and a catheter placed into the portal vein. Pressures are measured and a venogram obtained which will show the coronary venous collaterals. This

venogram is helpful to demonstrate the exact entry point of the catheter into the portal vein. A stiff wire is then used and the catheter replaced by an 8mm diameter balloon which is then inflated throughout the tract and a stent then placed between the portal vein, through the hepatic vein, and to within millimeters of the junction of the hepatic vein and the IVC. The stents are then dilated to their maximal diameter, pressures measured again, and a final arteriogram performed. A ten-millimeter gradient between the portal vein and the right atrium is thought to be ideal. Surgical series have demonstrated that a pressure gradient of less than 7 mmHg may cause hepatic encephalopathy while those greater than 15 mmHg may result in continued hemorrhage. In these initial studies, the portal hypertension was well treated but the appearance of encephalopathy became noted. However, any ascites present at the time the TIPS was placed, was usually resolved by the 3 month follow up.

Problems can arise in the placement of these shunts with highly cirrhotic livers as these will shrink and rotate, distorting the anatomy. Available hepatic veins must be utilized so it is common to use the middle hepatic vein if the right is not at an advantageous angle.

After the shunt was placed, it was common to have the patient return within the first few months for re-dilation due to stenosis which was usually at the venous end if the stents did not extend to the junction with the IVC. Intra-shunt stenosis was most likely due to transgression of the shunt across small biliary ducts

and the addition of the bile to the blood resulted in rapid stenosis. Usually, the angioplasty of the stent repaired the stenosis but the patient required close follow up since they could recur.

Embolization of the coronary venous collaterals was initially performed in all patients but it was eventually decided that this was unnecessary if the varices did not fill on splenic venography at the end of the decompressive procedure.

Trends

Endoscopic banding procedures which were not very reliable in the early 1990's became much more so and were extended to include gastric varices. Repeated banding is usually performed until either the patient deteriorates to a point where he is unable to be banded again which will then necessitate the placement of a TIPS in an unstable patient or a liver transplant performed. Diffuse portal gastropathy, a dilation of small gastric veins due to the portal hypertension, has been and remains an indication for a TIPS.

To alleviate the problem of the stenosis in the shunt, various methodologies were tried but the successful two were to make the tract as short as possible between the portal vein and the IVC and to use covered stents. The first utilized a new technique, labeled a DIPS (Direct Intrahepatic Porto-Systemic Shunt) with ultrasound to identify the portal

vein, place a needle within the right portal vein followed by a catheter. A catheter had already been placed into the IVC via a transjugular approach. The needle was then utilized to join the two catheters through the intrahepatic segment of the inferior vena cava and a wire placed. The DIPS is then performed exactly like the TIPS but a covered stent is utilized. The potential for an extra-hepatic puncture requires the presence in the room of a covered stent that can immediately be placed.

Covered stents were originally the Wallgraft and of PTE. Current iterations utilize expanded polytetrafluoroethylene, the Viatorr stent (Gore, Inc). This stent has a covered end to be placed in the hepatic venous segment in TIPS with an open segment for deployment into the portal vein. Such stents are also used with the DIPS and are very effective. They have been noted to reduce the amount of intra stent stenosis to almost zero at six months. They are, however, very expensive.

Indications for the performance of either a TIPS or a DIPS have changed from the aggressive stance seen in the early 1990's to where they are requested for a patient who has intractable bleeding after numerous banding procedures, a means to rid the patient of the attendant ascites to his cirrhosis, or to shunt him as a bridge to transplant.

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