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Nonendoscopic management of gastric varices

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ABSTRACT

The endovascular approach to management of gastric varices can be a complex process with both complimentary and competing techniques. Optimal treatment involves a multidisciplinary approach with hepatologists, endoscopists, diagnostic radiologists and interventional radiologists. A thorough understanding of the patients liver function and anatomy is essential to determine the appropriate course of endovascular therapy. Preferred endovascular procedural management has changed dramatically in the past 30 years and is variable depending on operator experience and regional differences. This manuscript will cover our approach to gastric variceal management using transjugular intrahepatic portosystemic shunt (TIPS), balloon-occluded retrograde transvenous obliteration (BRTO), variants of TIPS and BRTO, and an algorithm outlining an approach to determine appropriate management techniques.

1. Introduction

Patients with underlying cirrhosis and portal hypertension have a 30% risk of developing varices. In patients who have developed varices, gastric varices (GV) represent 10%-20%. Although GV carry a lower risk of bleeding than esophageal varices (EVs), GV have higher rates of morbidity and mortality [1]. Upper gastrointestinal endoscopy continues to be the first-line diagnostic and management tool for managing upper gastrointestinal bleeding secondary to varices. However, definitive endovascular treatment is becoming more prevalent. Treating this patient population requires a multidisciplinary approach with hepatologists, endoscopists, diagnostic radiologists, and interventional radiologists [1,2].

As endovascular management has increased in prevalence for treatment of GV, there has been a significant amount of controversy about the optimal management of this patient population. This generally falls into 2 categories with some preferring portal decompression as primary treatment (ie, transjugular intrahepatic portosystemic shunt [TIPS]) and others advocating for direct obliteration of the GV with balloon-occluded retrograde transvenous obliteration (BRTO) [2,3]. However, given marked heterogeneity of this patient population, there is a role for both treatment approaches, and the interventionalist should be facile with each treatment technique. Herein, we provide an overview of endovascular treatment of GV using portal decompression or direct embolotherapy or both. In addition, indications and a treatment algorithm will be discussed for TIPS, TIPS variants, BRTO, BRTO variants, and combination procedures.

2. Transjugular intrahepatic portosystemic shunt

TIPS is able to achieve portal decompression through 2 main mechanisms. First, it provides a direct conduit between the portal venous system and the intrahepatic veins, thereby directly lowering the portal venous pressure. Second, TIPS leads to an increased effective arterial blood volume causing downregulation of the renin-angiotensin-aldosterone axis and increased natriuresis [4].

The evolution of the TIPS procedure began with initial experimental animal studies by Burgener and Gutieerrez [5] in 1979 and involved angioplasty of the intrahepatic tract . As time went on, feasibility with additional stent placement was demonstrated by Rosch et al [6] in 1987, and early reports of case series in humans started appearing in 1991 [7–9]. As reports began to be published with larger numbers of patients, it became clear that stent patency was a significant issue and strongly related to recurrent portal hypertension [10–12]. Animal models of TIPS placement combined with retrospective venographic analysis showed that many occlusions were likely secondary to biliary-TIPS fistulas [13]. Later animal studies showed that polytetrafluoroethylene (PTFE)

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encapsulated stents provided marked superior patency when compared with bare stents [14].

The typical TIPS procedure first involves access into the right internal jugular (IJ) vein. A 10-Fr sheath is used to secure access. A catheter is used to select the right hepatic vein, and a hollow needle is used to create a channel from the hepatic vein into a branch of the portal vein (PV). This is typically the right PV. After access into the right PV is achieved, the tract may be dilated with an angioplasty balloon and the sheath advanced into the PV. A Viatorr (W.L. Gore, Flagstaff, AZ) stent is placed with a 2-cm length of uncovered, self-expanding portion in the PV. The remainder of the Viatorr stent is covered by PTFE and is deployed in the intrahepatic tract. For emergent GV bleeding and secondary prophylaxis of GV bleeding, a 10-12 mm Hg portosystemic gradient is generally regarded as an acceptable target post-TIPS placement.

There are, of course, a number of variants of the TIPS procedure. The tract may be created from the middle and left hepatic veins to alternative branches of the PV. More elaborate approaches toward achieving continuity between the portal venous system and the systemic veins have also been described. These options include the splenic-assisted TIPS, retrograde TIPS, and direct intrahepatic portosystemic shunt (DIPS). Such techniques are needed when dealing with PV thrombosis or cavernous transformation.

A splenic-assisted TIPS technique (Figure 1) uses ultrasound-guided access into the splenic hilum. After securing vascular access, a wire is passed through the splenic vein and used to navigate through the intrahepatic PVs. At the same time, access into the hepatic veins is achieved in a similar fashion to conventional TIPS. A target (compliant balloon, snare, or wire) is used to guide the needle from the hepatic vein and into the diminutive PV. After visualizing needle passage to the chosen target, a wire is passed from the IJ access through to the recanalized PV and out through the sheath in the splenic access. After achieving through-and-through access, the remainder of the TIPS can proceed in the conventional fashion with the exception of stent extension through the length of the abnormal PV [15].

A retrograde TIPS uses a similar method as the splenic-assisted TIPS in that a wire is passed in retrograde fashion to a patent portion of the intrahepatic PVs. Access into the portal system is achieved through surgical exposure of a branch of the ileocolic vein. After access into the portal system is secured, a target (compliant balloon, snare, or wire) is advanced to the intrahepatic PVs. The remainder of the procedure continues in a similar fashion to the splenic-assisted TIPS [16].

A direct intrahepatic portosystemic shunt is created using intravascular ultrasound guidance combined with fluoroscopy. A puncture is made directly from the inferior vena cava through the caudate lobe of the liver and into the PV. After establishing wire access, the shunt is created with a PTFE-covered stent [17]. Potential advantages of this technique include real-time imaging guidance of needle puncture into the PV, decreased radiation, and decreased procedural time.

3. Balloon-occluded retrograde transvenous obliteration

BRTO is commonly regarded as originating with Kanagawa et al [18] in early 1990s. Although very popular in Asia, BRTO as a

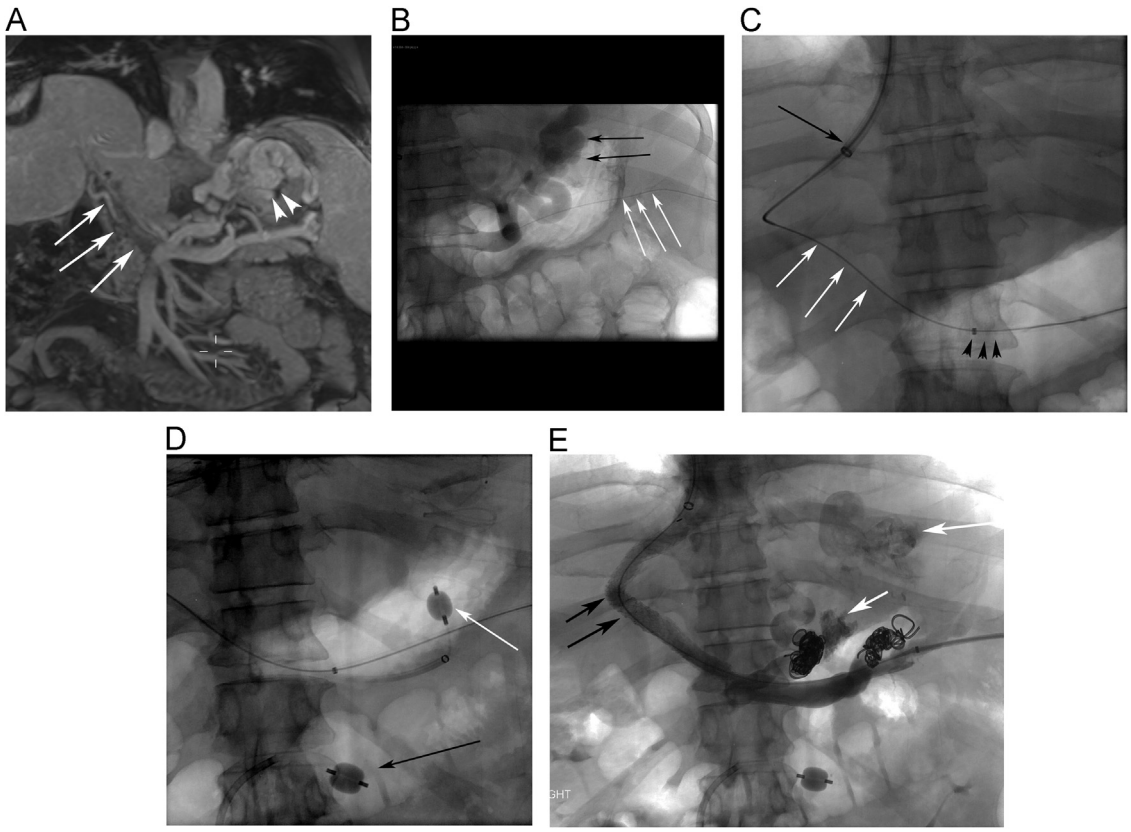

Fig. 1. Splenic-assisted TIPS with BATO and BRTO in patient with portal vein thrombosis and GV bleeding: (A) coronal MRI with contrast showing PV thrombosis (long white arrows) and large GV (white arrow heads); (B) transsplenic access (white arrows), splenic venogram showing gastric varices (black arrow) and gastrorenal shunt; (C) through-and-through wire access was established (white arrows) through a transjugular access sheath (long black arrow) and transsplenic access sheath (short black arrows); (D) post-TIPS, BATO, and BRTO were performed using a balloon in the inflow vein (white arrow) and a second balloon in the outflow vein (black balloon) to arrest the flow during administration of sclerosant; and (E) post-TIPS + BATO or BRTO and coiling of inflow veins. The portal vein and TIPS are patent (black arrows). The GV and gastrorenal shunt are sclerosed (white arrows).