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RE-DO TIPS REDUCTION: Successful Second Attempt of TIPS Reduction for Refractory Hepatic Encephalopathy with a Covered Balloon-Expandable Peripheral Stent

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Abstract

Introduction: Hepatic encephalopathy (HE) is a frequently occurring complication after transjugular intrahepatic portosystemic shunt (TIPS) placement, affecting around 5-35% of patients who undergo conventional therapy. In about 8% of cases, HE does not respond to optimal medical therapy and liver transplantation becomes the last resort. To manage refractory HE, TIPS reduction is a viable therapy with a technical success rate of 55-100% and a clinical success rate of 75%. When no other causes of refractory HE are present, a new TIPS reduction procedure can be considered an alternative treatment to control symptoms and act as a bridge to transplant.

Case Presentation: Following TIPS treatment for variceal bleeding, a 61-year-old male developed stage 4 hepatic encephalopathy (HE). Due to the lack of clinical improvement, he was referred for TIPS reduction. Upon transfer to our Institute, a new TIPS reduction treatment was performed by placing a covered peripheral balloon-expandable stent in an hourglass configuration within the existing device. The patient showed signs of improvement, awakening from a coma within 48 hours after the procedure.

Conclusions: If no other factors are contributing to refractory hepatic encephalopathy (HE), utilizing a covered peripheral balloon-expandable stent for a new transjugular intrahepatic portosystemic shunt (TIPS) reduction seems to be a viable option with favourable clinical outcomes.

Keywords: Portal Hypertension; Transjugular Intrahepatic Portosystemic Shunt (TIPS); TIPS Reduction; Refractory Hepatic Encephalopathy; Balloon-Expandable Stent.

Case Presentation

A 61-year-old man underwent, in another institution, an early transjugular intrahepatic portosystemic shunt (TIPS) implantation for secondary prevention of gastroesophageal varices bleeding with a final portosystemic gradient (PSG) of 6 mmHg. Five days after the procedure, he developed grade 4 hepatic encephalopathy (HE) that did not respond to optimal medical therapy. In consequence, a TIPS reduction was performed using a dedicated intrastent reduction system (Sinus Reduction Stent, OptiMed, Ettlingen, Germany), which resulted in a final PSG of 9 mmHg (Figure 1a) but without any clinical improvement. The patient was then transferred to our institution for an evaluation of hepatic transplantation. Considering the patient's critical condition with a persistent grade 4 HE, a multidisciplinary decision was made to attempt a second TIPS reduction while waiting for a liver transplant. Preventive oesophagoduodenoscopy (OGD) with gastroesophageal varices ligation was performed the day before the second TIPS reduction to reduce the risk of bleeding.

The portal vein (PV) lumen was gained from a right internal jugular vein access and catheterization of the Sinus Reduction stent, previously deployed within a Viatorr CX stent (VIATORR® Controlled Expansion, Gore, Flagstaff, USA), was performed. The PSG measured was 10 mmHg. Portography did not show any large portosystemic shunts but small gastric varices were identified and embolized proximally with a microvascular plug (MVP-5Q, Medtronic, USA) to prevent secondary rupture (Figure 1 b, c). Then an 8mm x 57mm BeGraft peripheral stent (Bentley, Hechingen, Germany) was placed inside the Sinus Reduction Stent with the distal end at the entrance of the TIPS into the portal vein using a 6F introducer, which was withdrawn before dilatation. BeGraft are ePTFE-covered, metallic stents equipped with semi-compliant balloons that extend from the stent ends. When the inflation pressure increases, it is directed towards the extremities of the balloon that are not covered by the stent, as they offer the least resistance. In order to achieve the Dog-Bone effect, the inflation lumen of the catheter, which is used to introduce contrast agent, is strategically placed to ensure that the stent extremities open simultaneously. Thanks to this characteristic, we were able to inflate the balloon below the nominal pressure to ensure the synchronized opening of both extremities while keeping the central portion narrowed. The balloon was then deflated and the introducer was advanced to the narrow central portion of the stent to ensure further stent stability during balloon removal (Figure 2a). Subsequently, the balloon and introducer were withdrawn to the proximal end of the stent and dilated to the rated burst pressure (RBP), enabling the optimal flaring of the proximal landing zone (Figure 2b). A new 8mm x 20mm semi-compliant balloon catheter (Armada, Abbott Vascular, CA, USA) was advanced into the distal landing zone of the stent and dilated to the RBP, obtaining the flaring of the distal extremity (Figure 2 c, d). The final PSG value was 28 mmHg. The next day a new OGD with preventive ligations of the gastroesophageal varices was carried out and moderate ascites was observed. At 48 hours after the procedure, the patient recovered from coma and improved quickly from a grade 4 to a grade 2 HE with electroencephalogram showing moderate nonspecific encephalopathy and no seizures. Brain CT and MRI performed the following days demonstrated no significant lesions. No major nor minor complications occurred after the procedure, in particular no gastro-intestinal bleeding. Ten days after the procedure, the patient underwent liver transplantation (MELD 36, CHILD 11).

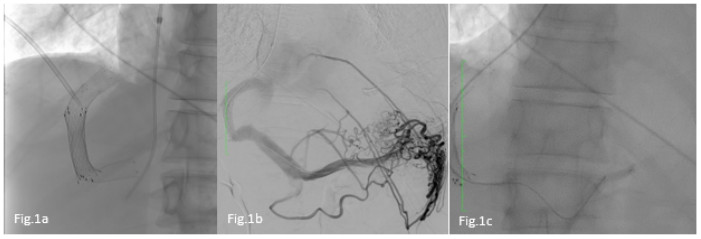

Figure 1a: TIPS with dedicated reduction system within; Figure 1b: Portography demontrated the presence of small gastric varices; Figure 1c: Control angiogram after variceal embolization with microvascular plug.

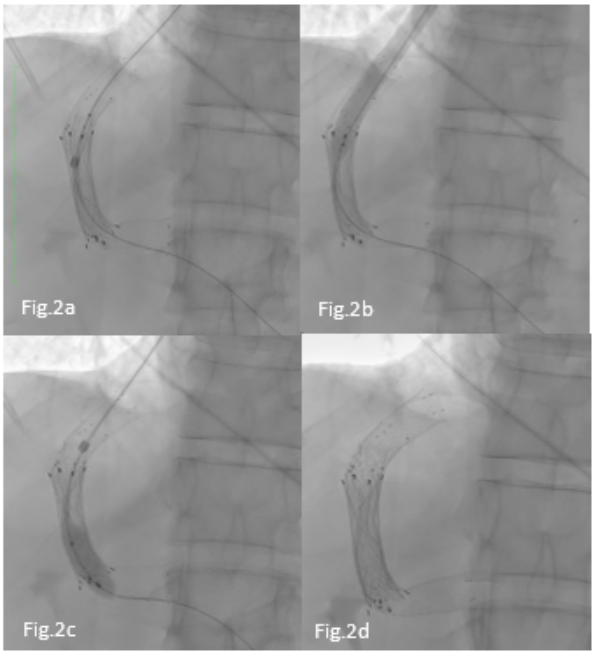

Figure 2a: 6F introducer advanced to the narrow portion of the stent to ensure further stent stability during balloon removal; Figure 2b: Balloon and introducer withdrawn to the proximal end of the stent and dilated to the rated burst pressure, enabling the flaring of the proximal landing zone; Figure 2 c, d: 8 mm x 20 mm semi-compliant balloon catheter advanced into the distal landing zone of the stent and dilated to rated burst pressure, obtaining the flaring of the distal extremity of the stent.

Discussion

Refractory HE after TIPS can result from various pathophysiologic mechanisms, such as intentional portosystemic shunting, excessive shunt diversion, and spontaneous portosystemic shunts (SPSS). Treating refractory HE is a complex task requiring collaboration among different specialists, with liver transplantation being the ultimate treatment option [1-4]. TIPS reduction or occlusion can be considered in such cases, with TIPS reduction being a preferred alternative due to the major complications associated with complete occlusion [5,6]. Different TIPS reduction techniques to create an 'hourglass configuration' are reported with a moderate to high technical success (55%-100%) and HE improvement reported in 71% of patients. However, adverse events were observed in 16% of patients [1,3]. In this case, the patient did not improve clinically following the first TIPS reduction treatment. As in other reports, a second TIPS reduction attempt was suggested [7,8].

Here, we described the first use of the Begraft peripheral covered stent to narrow the configuration inside the previously implanted device, leading to a significant increase of the PSG from 10 mmHg to 28 mmHg allowing neurological clinical improvement. In order to prevent bleeding complications caused by elevated portal pressure, the patient underwent OGD with varices ligation the day before and the day after the intervention, which was the same approach in another study [8].

Managing refractory HE after TIPS is complex and TIPS reduction remains a valuable option. If the initial TIPS reduction procedure fails to improve the patient's neurological condition and no other causes are identified, a RE-DO TIPS reduction may be a feasible treatment alternative leading to potential positive clinical outcomes.

Declarations of interest: none.

Conflict of interest: None of the authors have any financial relationship with any commercial entity that has an interest in the subject matter or materials discussed in this manuscript.

Author's Contribution: The authors confirm contribution to the paper as follows: study conception and design: GX, AR; data collection: PF, MP, AG; analysis and interpretation of results: IC, MP, AG; draft manuscript preparation: AI, GX; AR supervised the project. All authors reviewed the results and approved the final version of the manuscript.

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