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Effect of VIATORR stent in early ultrasound evaluation after transjugular intrahepatic portosystemic shunt (TIPS): A case report

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ABSTRACT

Shunt dysfunction is a major complication of transjugular intrahepatic portosystemic shunt (TIPS). Ultrasonography is a preferred method of shunt follow-up after TIPS, but some misjudgments can occur in cases of shunt dysfunction due to peculiarities of the VIATORR stent. Here we report one case and suggest that the first ultrasound evaluation for patients who received TIPS procedure with VIATORR stent should be performed one month after the procedure.

Introduction

The first transjugular intrahepatic portosystemic shunt (TIPS) surgery was performed in Freiburg, Germany, in 1988 by Richter.^{1,2} This technique is now commonly used for the treatment of complications due to portal hypertension.^{3,4} Shunt dysfunction, a major postoperative problem of TIPS, is defined as a loss of decompression of the portal venous system due to TIPS occlusion or stenosis.⁵ Many scholars have relied on Doppler ultrasonography (US) to identify shunt dysfunction in TIPS cases.^{6,7} In one study, contrast-enhanced US (CEUS) was used as the gold standard for assessing shunt dysfunction.⁸ We present a case of early ultrasound evaluation after TIPS with VIATORR stent use.

Case presentation

A 37-year-old man reported feeling bloating and nausea without obvious cause for 8 h; thereafter, he vomited approximately 200 mL of bright red liquid twice and expelled approximately 200 g of tarry stools. The patient had a 20-year history of hepatitis B, and a physical examination revealed anemia and pale conjunctiva. Gastroscopy showed severe esophageal varices and portal hypertensive gastropathy. An abdominal contrast-enhanced CT scan showed esophageal gastric varices, splenomegaly, mild ascites, and a main portal vein diameter that was significantly wider than normal. The final diagnosis was hepatic cirrhosis with esophageal gastric variceal bleeding. Informed consent was obtained

from the patient prior to the induction of anesthesia for the TIPS procedure. After puncture of the right internal jugular vein, a standard 10-F Rösch-Uchida transjugular liver access set was introduced into the inferior vena cava, a 5-F catheter was wedged with a tip in the branch of the right hepatic vein, and several transhepatic puncture attempts of the right branch of the intrahepatic portal vein were performed using the liver access set. After the shunt was established, a 5-F pigtail catheter with a hydrophilic guidewire were advanced into the splenic vein and portography was performed. The portal pressure gradient (PPG) was 21 mmHg. Following dilation of the shunt with an 8 mm × 6 cm PTA dilatation catheter, a 10-F transjugular sheath was advanced into the main portal vein through the transhepatic shunt. The sheath was withdrawn back to the postcava after 8 mm (6 cm + 2 cm) of the VIATORR stent graft was advanced into the transhepatic shunt. The stent was then released to cover the entire length of the shunt up to the junction of the hepatic vein and the postcava. All obvious coronary venous were embolized by metal spring coils. The PPG was repeatedly measured and the value was 8 mmHg. The bleeding stopped immediately after TIPS and the patient underwent routine Doppler US to evaluate the hemodynamic changes of the liver on the fourth day after TIPS. Unexpectedly, CDFI and CEUS showed no blood flow signals in the stent [Figs. 1 and 2]. Finally, on portography, the contrast agents in the stent were clear and the PPG value was 8 mmHg as previously [Fig. 3]. The patient is currently doing well and CDFI showed a normal blood flow signal in the stent at 1 month after TIPS [Fig. 4].

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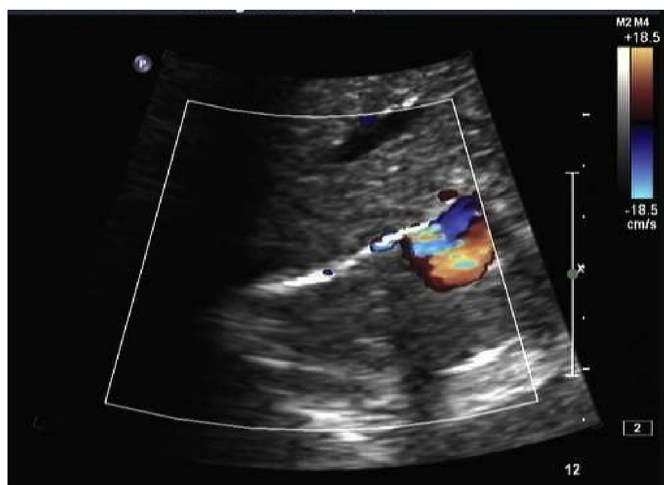


Fig. 1. The stent echo was present between the right hepatic vein and the portal vein, but no blood flow signal was visible in the stent using color Doppler flow imaging on the fourth day after transjugular intrahepatic portosystemic shunt. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

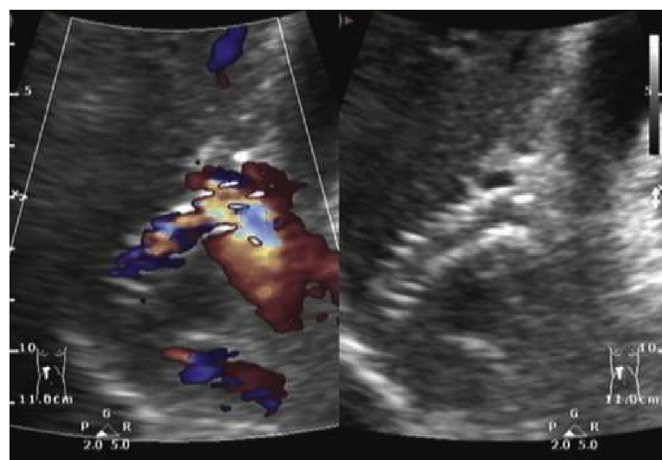


Fig. 4. Color Doppler flow imaging showing that the blood flow signal in the stent was normal at 1 month after transjugular intrahepatic portal shunt. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

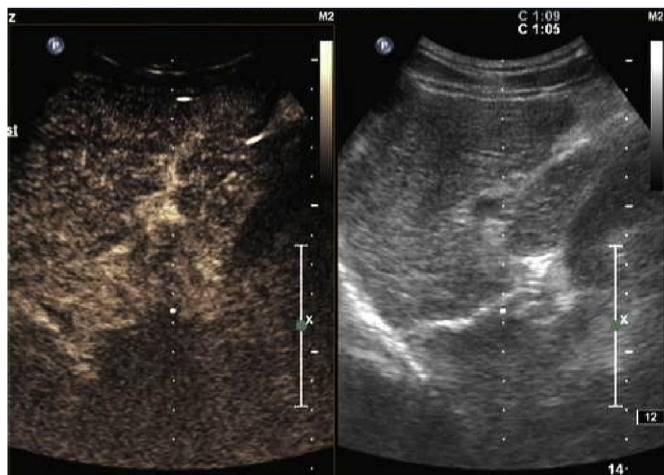


Fig. 2. No blood flow signal was visible in the stent imaged with contrast-enhanced ultrasonography.

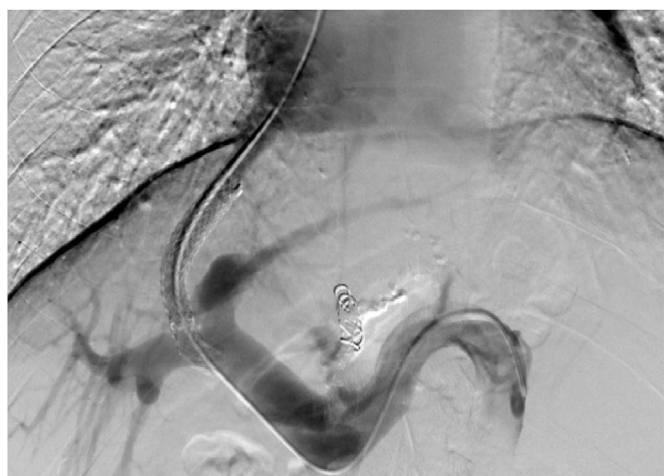


Fig. 3. The contrast agents in the stent are clearly visible on portography.

Discussion

One of the main disadvantages of TIPS is the frequent occurrence of shunt dysfunction; thus, maintaining shunt patency is the key to successful TIPS surgery. In one study, the shunt patency rate of the VIATORR stent graft at one year after TIPS was 89%.⁹ Thus, the regular monitoring of blood flow in the shunt is crucial. US is commonly used for shunt follow-up after TIPS because it is noninvasive, inexpensive, practical, and repeatable. US of TIPS shunts generally consist of CDFI and CEUS. CDFI findings can lead to misdiagnosis due to the non-display of blood flow signals,¹⁰ but CEUS can increase the diagnostic accuracy of TIPS shunt dysfunction because of the quality improvement of spectral duplex sonography¹¹ and the use of US contrast agents.¹² One study showed that the sensitivity and specificity of CEUS in the judgement of shunt dysfunction of TIPS were both 100%.¹³ Another study reported only 2 false negatives and no false positives among the CEUS examination results in the detection of TIPS dysfunction; thus, it was considered a simple and effective technique for TIPS follow-up.¹⁴ However, the studies above did not include cases within 1 week after TIPS. To our knowledge, few false positive results of CEUS in TIPS dysfunction have been reported on. In this study, we found that the phenomenon was associated with the material peculiarity of the VIATORR stent graft we used. The special design of the stent resulted in poor acoustic conditions on the CEUS examination. In fact, the proper insonation of the VIATORR is impeded by a thin layer of air that is trapped between the two e-PTFE layers of the stent graft, often yielding false-positive results suggestive of shunt occlusion.¹⁵

Including CEUS, US methods are influenced by many factors in the detection of TIPS dysfunction; thus, positive judgment results must be further confirmed. Portography is the most reliable manner to identify TIPS dysfunction, and a PPG measurement must be performed at the same time. Overall, we caution against the use of an US evaluation in patients within 1 week after TIPS with VIATORR stent use; rather, the first assessment should be performed at 1 month after the procedure.

CRediT authorship contribution statement

Heng Du: Data curation, Formal analysis, Writing - original draft.
Yong Yao: Funding acquisition, Supervision, Writing - review & editing.
Suyu He, Lei Feng, Hang Wu: Conceptualization, Methodology.

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Ethical approval

Written informed consent was obtained from the patient for publication of this report and any accompanying images.

Declaration of competing interest

No conflicts of interest and financial disclosures exists in the submission of the manuscript.

References

- Richter GM, Noeldge G, Palmaz JC, et al. Transjugular intrahepatic portacaval stent shunt: preliminary clinical results. *Radiology*. 1990;174:1027–1030.
- Rössle M, Richter GM, Nöldge G, et al. New non-operative treatment for variceal hemorrhage. *Lancet*. 1989;2(8655):153.
- Garcia-Tsao G, Bosch J. Management of varices and variceal hemorrhage in cirrhosis. *N Engl J Med*. 2010;362:823–832.
- Ginès P, Uriz J, Calahorra B, et al. Transjugular intrahepatic portosystemic shunting versus paracentesis plus albumin for refractory ascites in cirrhosis. *Gastroenterology*. 2002;123:1839–1847.
- Boyer TD, Haskal ZJ, American Association for the Study of Liver Diseases. The role of transjugular intrahepatic portosystemic shunt in the management of portal hypertension: update 2009. *Hepatology*. 2010;51:306.
- McNaughton DA, Abu-Yousef MM. Doppler US of the liver made simple. *Radiographics*. 2011;31:161–188.
- Wachsberg RH. Doppler ultrasound evaluation of transjugular intrahepatic portosystemic shunt function: pitfalls and artifacts. *Ultrasound Q*. 2003;19:139–148.
- Guo DD, Tang SS. Value of advanced dynamic flow versus color Doppler flow imaging in evaluating stent patency after transjugular intrahepatic portosystemic shunt. *J Clin Hepatol*. 2018;34:2599–2602.
- Saad WE, Darwish WM, Davies MG, et al. Stent-grafts for transjugular intrahepatic portosystemic shunt creation: specialized TIPS stent-graft versus generic stent-graft/bare stent combination. *J Vasc Intervent Radiol*. 2010;21:1512–1520.
- Benito A, Bilbao J, Hernández T, et al. Doppler ultrasound for TIPS: does it work? *Abdom Imag*. 2004;29:45–52.
- Fürst G, Malms J, Heyer T, et al. Transjugular intrahepatic portosystemic shunts: improved evaluation with echo-enhanced color Doppler sonography, power Doppler sonography, and spectral duplex sonography. *AJR Am J Roentgenol*. 1998;170:1047–1054.
- Jakobsen JA. Ultrasound contrast agents: clinical applications. *Eur Radiol*. 2001;11:1329–1337.
- Uggowitz MM, Kugler C, Machan L, et al. Value of echo-enhanced Doppler sonography in evaluation of transjugular intrahepatic portosystemic shunt. *AJR Am J Roentgenol*. 1998;170:1041–1046.
- Micol C, Marsot J, Boublay N, et al. Contrast-enhanced ultrasound: a new method for TIPS follow-up. *Abdom Imag*. 2012;37:252–260.
- Ferral H, Gomez-Reyes E, Fimmel CJ. Post-transjugular intrahepatic portosystemic shunt follow-up and management in the VIATORR era. *Tech Vasc Intervent Radiol*. 2016;19:82–88.