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Case Report

Use of a portal vein localization sheath in the single-needle pass technique for creation of a portosystemic shunt

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ABSTRACT

This study aimed to report a modification to the single-needle pass technique by use of a portal vein localization sheath for creation of a portosystemic shunt. The modification makes the single-needle pass technique a more straightforward procedure.

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Introduction

The transjugular intrahepatic portosystemic shunt (TIPS) is a well-proven treatment for complications of portal hypertension. However, this procedure has a long learning curve to become skillful. The most difficult step in TIPS is to establish transjugular systemic to portal vein wire access. TIPS usually requires a longer procedure time compared with other interventional procedures, and has a higher radiation exposure.

Therefore, an alternative method of using the single-needle pass technique for creation of a portosystemic shunt has been reported [1,2] in which the portal vein and systemic vein are connected with a long needle puncture. In the

single-needle pass technique, balloon dilatation of the portosystemic needle tract is a requisite for the transjugular wire to exit to the portal vein. However, in our patients, a 0.035" balloon catheter cannot traverse the portosystemic needle tract. We describe here a modification to the single-needle pass technique by using a portal vein localization (PVL) sheath.

Materials and methods

We retrospectively reviewed 7 patients in whom the portosystemic shunts were created by the modified

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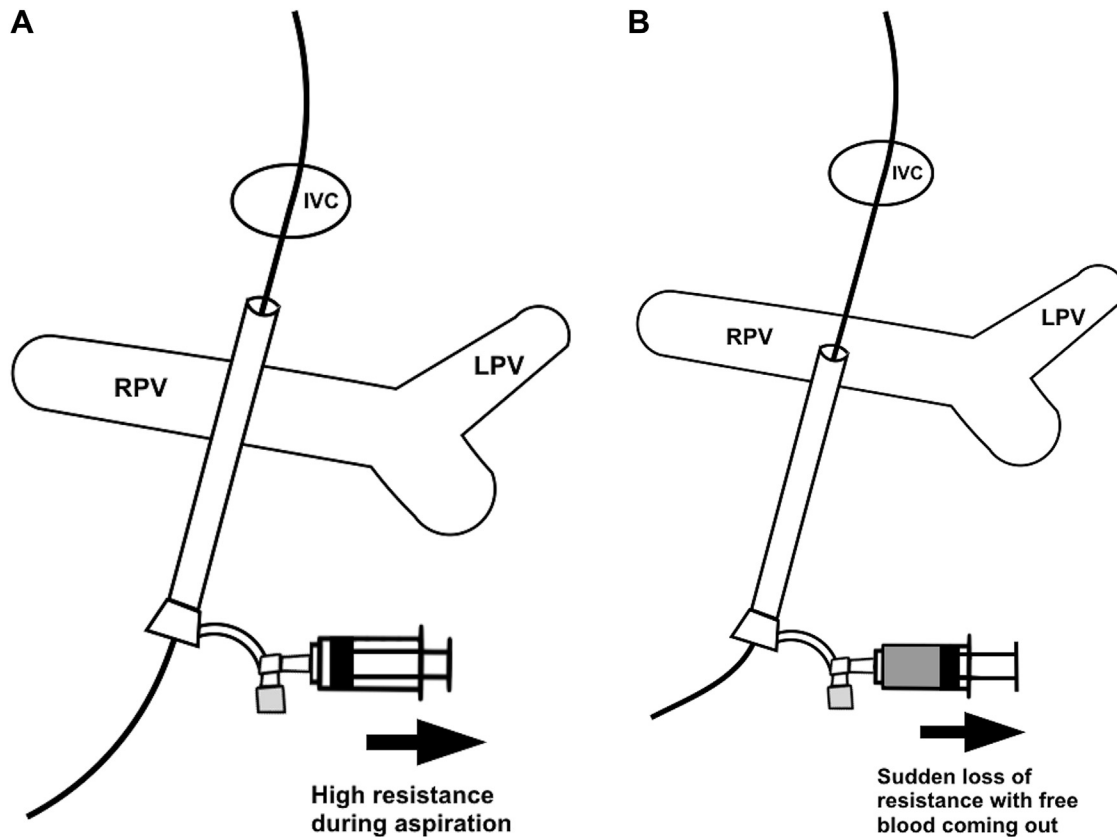


Fig. 1 – Schema showing how the portal vein localization (PVL) sheath works. (A) When the sheath tip is in the portacaval needle tract, a high resistance is encountered during aspiration and nothing comes out in the syringe. (B) When the sheath tip is already in the portal vein, a sudden loss of resistance can be felt during aspiration and blood comes out freely in the syringe. IVC, inferior vena cava; LPV, left portal vein; RPV, right portal vein.

single-needle pass technique using a PVL sheath from August 2010 to December 2015. Informed consent was obtained from all individual participants included in the study. Institutional review board's approval was obtained for review of the patient's records. The technical success and hemodynamic success were defined according to the guidelines by the Society of Interventional Radiology [3].

The modified technique

An animation video of this technique is available as a [Supplementary Video](#). We modified the single-needle pass technique by Raza et al [1] and Boyvat et al [2]. A trans-hepatic puncture was made through the portal vein and into the inferior vena cava (IVC) with an 18G Chiba Needle (20 cm; Top Corp., Shimotsuma-shi, Ibaraki, Japan). A 260-cm stiff hydrophilic wire (Radifocus Guidewire M; Terumo Corporation, Tokyo, Japan) was then threaded into the IVC and was snared out of an 8F sheath in the right internal jugular vein. After a through-and-through wire access was established, we attempted dilatation of the needle tract between the portal vein and the IVC (portacaval tract), by sending a 0.035" low profile balloon catheter (POWERFLEX PRO; Cordis, Miami, FL) via the jugular sheath. However, in

all the 4 patients, the balloon catheter could not be pushed into the portacaval needle tract because high resistance was encountered at the liver surface. Therefore, we used a 6F 25-cm sheath (Radifocus Introducer II; Terumo Corp) to dilate the liver all the way over the through-and-through wire access from the abdominal puncture site to the IVC. Instead of dilating the portacaval needle tract to find the portal vein, we then slowly pulled back the 6F sheath (the PVL sheath) to localize the portal vein. A 10-mL Luer-lock syringe was connected to the PVL sheath and was slowly pulled back until high resistance was encountered, which indicated that the sheath had been pulled into the liver parenchyma (Fig. 1A). During pullback of the PVL sheath, if the operator was in doubt, a hand injection of some contrast medium via the PVL sheath would be helpful to estimate how far the sheath tip had been away from the vena cava. We kept pulling back the PVL sheath against the high resistance until there was a sudden loss of resistance with free aspiration of blood in the syringe, which indicated that the sheath had already been in the portal vein (Fig. 1B). A hand injection venogram was performed to confirm the location of the portal vein. A 5F BER catheter (Cordis) was advanced over the wire via the jugular sheath until the catheter tip was abutting the PVL sheath tip or in the portal vein shadow on the roadmap image (Fig. 2A). When the wire was

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