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Sharp Recanalization of the Hepatic Vein Using a Chiba Needle in Budd–Chiari Syndrome

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Abstract

Hepatic vein recanalization in Budd–Chiari syndrome may require procedural modification if the endovascular approach fails. Sharp recanalization using the stiff end of a guidewire or a thin Chiba needle remains an effective technique in difficult-to-cross hepatic vein stricture. Of note, this technique requires utmost precaution to avoid catastrophic hemorrhage. The present case describes the successful recanalization of the middle hepatic vein using a 21-gauge Chiba needle through the percutaneous transhepatic route.

Keywords
- sharp recanalization
- Budd–Chiari syndrome
- Chiba needle

Introduction

In certain cases of Budd–Chiari syndrome (BCS), transjugular or transfemoral hepatic vein (HV) recanalization may not be possible, requiring a percutaneous transhepatic approach.[1,2] Long-standing and fibrotic occlusions are challenging to cross and may require procedural modifications, such as sharp recanalization, that is, crossing the occlusion using the stiff end of a guidewire or needle. This case report describes sharp recanalization of HV using a Chiba needle.[3,4]

Case History

A woman in her 30s presented to the outpatient department with complaints of right-sided upper abdominal pain and gradually progressive bilateral lower limb edema. A screening ultrasound of the abdomen showed hepatosplenomegaly with chronically occluded right and left HVs. The middle hepatic vein (MHV) had a short segment near ostial occlusion with its proximal dilatation and multiple venovenous collaterals. Color Doppler demonstrated monophasic flow in MHV. Inferior vena cava (IVC) was also prominent, with no flow at the right atrium (RA) and IVC (RA-IVC) junction. Thus, a diagnosis of BCS involving both HV and IVC was made. The patient did not have ascites or portal vein thrombosis. Bilateral lower limb Doppler was negative for deep vein thrombosis. Baseline laboratory parameters were unremarkable except for a low serum albumin of 2.9 g/dL. The detailed history was negative for prior thrombotic episodes, gastrointestinal (GI) bleeding, oral contraceptive pill intake, or any prior intervention.

Further contrast-enhanced computed tomography (CT) of the abdomen and pelvis confirmed the ultrasonography (USG) findings with hepatic congestion. IVC showed a calcified web at the RA-IVC junction with multiple retroperitoneal and paravertebral collaterals (►**Fig. 1**). Upper GI endoscopy showed small lower esophageal varices without any signs of recent bleeding. The prothrombotic workup was negative. Following a multidisciplinary discussion, anatomical recanalization of the MHV and IVC was scheduled.

Balloon angioplasty alone sufficed for optimal IVC recanalization. In the same setting, MHV recanalization was

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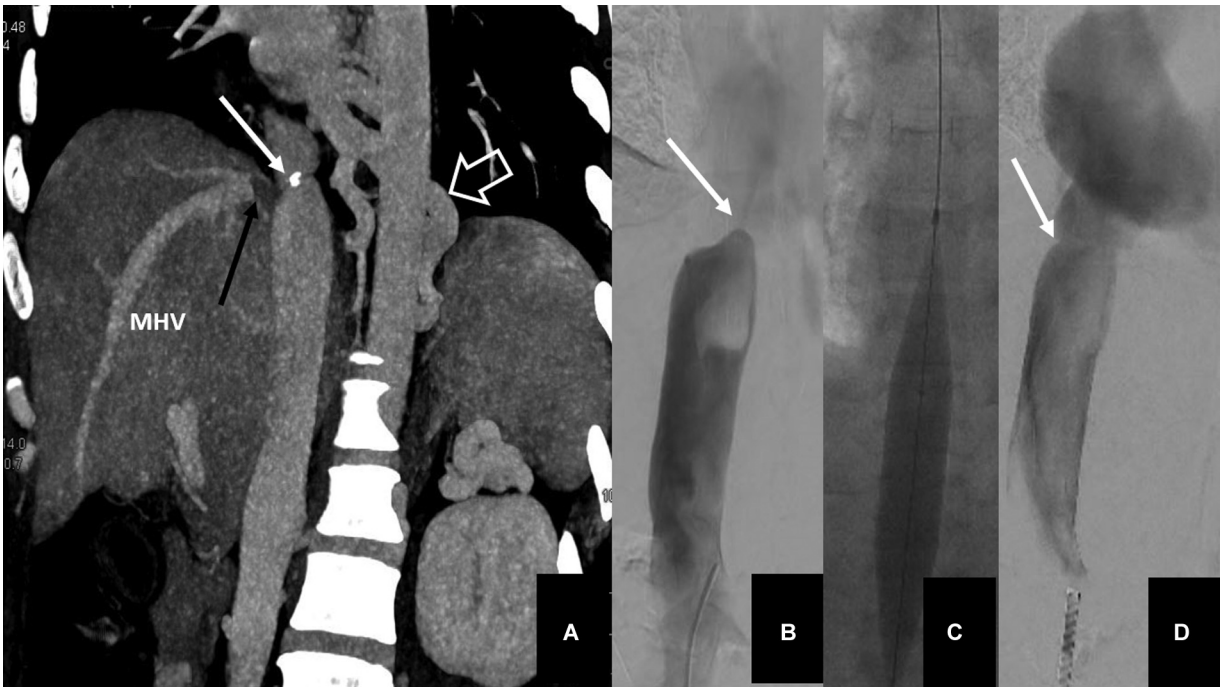

Fig. 1 (**A**) Oblique coronal MIP image showing a thin and calcified IVC web and short-segment fibrotic stricture of MHV. (**B–D**) IVC venogram confirmed the IVC occlusion (*white arrow* in **B**), which was then recanalized with an 18-mm balloon (*white arrow* in **D**). Azygous collaterals are indicated by the *open white arrow* in (**A**). IVC, inferior vena cava; MHV, middle hepatic vein; MIP, maximum-intensity projection.

attempted using transfemoral and transjugular approaches but was unsuccessful. Thus, a percutaneous transhepatic MHV recanalization was planned after a week.

The day before percutaneous MHV recanalization, enoxaparin was stopped. Using a Neff percutaneous access set (Cook Medical), percutaneous MHV was accessed under USG guidance. An MHV venogram revealed a short segmental occlusion near its ostium with multiple collaterals connecting the MHV to the IVC. Despite multiple attempts using a combination of various hydrophilic guidewires/catheters including the stiff back end of a hydrophilic guidewire (Terumo), MHV occlusion could not be crossed. Next, sharp recanalization of MHV using a Chiba needle was considered.

First, a right femoral venous access was obtained, followed by placement of a 10-Fr 45-cm vascular sheath to take an IVC venogram and to guide needle direction during sharp MHV recanalization. Right jugular access was also kept ready for snaring the guidewire once the guidewire had crossed the stricture. The sheath of the Neff set was wedged against the MHV occlusion, and a 21-gauge 65-cm Chiba needle was inserted through the dilator. After determining the correct needle trajectory by correlating contrast-enhanced CT (CECT) images and taking fluoroscopic images at various angles, the Chiba needle was forcefully advanced for about 2 cm until a giveaway was felt. Then, a contrast injection through the Chiba needle verified its tip position within the IVC (►**Fig. 2A–C**). Subsequently, a 0.014-inch guidewire (V-14, Boston Scientific) was inserted into the IVC and the heart, and then it was snared via the jugular access. The rest of the procedure was accomplished via the jugular approach. Despite prolonged balloon angioplasty using a 10-mm balloon, instant recoiling was noticed; hence, a 12 mm × 40 mm self-expanding metallic stent (Epic, Boston Scientific) was placed. A satisfactory forward flow with the disappearance of collaterals was observed following the HV stenting (►**Fig. 2D, E**). The percutaneous transhepatic route was ultimately obliterated using a 35-3-5 coil (Nester, Cook Medical) and 50% glue solution. A total of 4,500-IU heparin was given during the procedure. The patient was kept on enoxaparin and then switched to warfarin to maintain a target international normalized ratio (INR) of 2 to 3.

At the 1-month follow-up, the lower limb edema improved, and the abdomen discomfort subsided. At the 6-month follow-up, the serum albumin levels had improved to 3.3 g/dL with a patent MHV stent. No GI bleeding or ascites was found at her 1-year follow-up.

Discussion

The concept of sharp recanalization has been described in IVC obstruction in patients with BCS and chronic hemodialysis-related superior vena cava obstruction.[3–5] Sharp recanalization is often carried out with a stiff end of 0.035-/0.038-inch hydrophilic or microguidewire.[3,5] However, when it fails, extreme measures such as puncturing the obstruction with a long 21-/22-gauge Chiba needle or catheter/stylet assembly of a Rosch-Uchida transjugular liver access set (Cook Medical) may be taken into consideration. During sharp recanalization, the wire/needle must be correctly aligned along the course of the vein, which is confirmed by obtaining fluoroscopic images in different projections. If available, cone-beam CT aids in intraprocedural needle

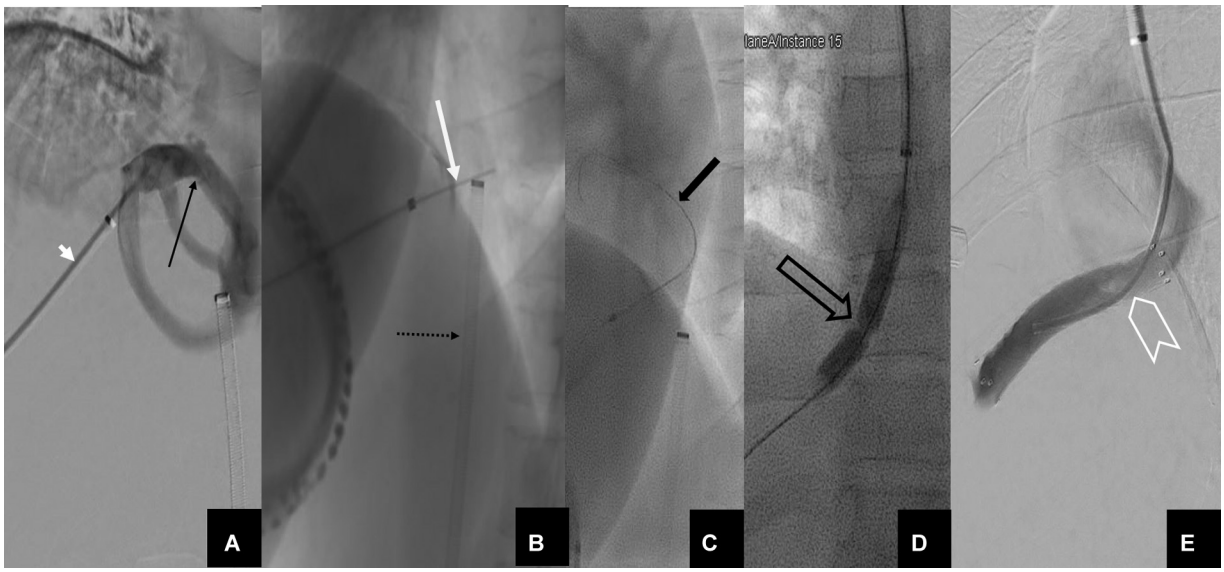

Fig. 2 (**A**) Percutaneous transhepatic access was obtained followed by a venogram through the sheath of the Neff set (*short white arrow*) that revealed occluded MHV with multiple venous collaterals joining MHV with IVC. (**B**) Under the fluoroscopic guidance, the occlusion was crossed using a 21-gauge 65-cm Chiba needle (*white arrow*), guided by a 10-Fr sheath (*dash black arrow*) placed in the IVC through the femoral route. (**C**) After crossing the occlusion, a 0.014-inch guidewire was advanced into the IVC and the heart (*black arrow*) and then snared via the jugular route to obtain a through-and-through access. (**D**) The stricture was serially dilated to 10 mm using balloons (*open black arrow*) and then (**E**) a 12-mm self-expanding metallic stent (*white arrowhead*) was placed to complete the procedure. IVC, inferior vena cava; MHV, middle hepatic vein.

guidance during sharp recanalization. When the occluded venous tract is curved, the stiffening cannula of the RUPS set provides better support and directional maneuverability so that the Chiba needle will not inadvertently injure any unintended target on its way. Notably, the stiffening cannula of the RUPS set might not be appropriate for percutaneous transhepatic sharp recanalization due to its larger profile, which increases the likelihood of puncture site bleeding. Alternatively, after making the tip curved on the back table, a coaxial needle (of appropriate diameter) of a semiautomatic biopsy gun may provide support and maneuverability to the Chiba needle.

Furthermore, an inflated balloon or a gooseneck snare can be placed as a target at the opposite end of the occlusion while attempting sharp recanalization.[4] In the present case, a 10-Fr-long vascular sheath was placed in the IVC as a target, and the right needle trajectory was verified by obtaining several fluoroscopic images from various angles. Notably, sharp recanalization carries risk of IVC/cardiac perforation, resulting in catastrophic hemorrhage.

Conclusions

Sharp recanalization is an effective strategy in case of difficult HV recanalization. Preprocedural imaging is imperative to plan this approach. Owing to its risk of vascular perforation, sharp recanalization should only be attempted in centers with adequate expertise.

Informed Consent

Informed consent was obtained from the patient's parents for publication of this case report and accompanying images.

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None.

Conflict of Interest

None declared.

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