



## Case report

# Collateral loop approach from left to right liver lobe: Endovascular recanalization of a hepatic vein in Budd-Chiari syndrome



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## ARTICLE INFO

## Article history:

Received 21 August 2016

Accepted 22 October 2016

Available online 24 October 2016

## Keywords:

Budd-Chiari

Angioplasty

Hepatic-vein

Interventional radiology

## ABSTRACT

We report the approach to a 29 year old patient presenting with the diagnosis of a Budd-Chiari Syndrome, with clinical deterioration after initial anticoagulation treatment.

The patient was proposed to endovascular treatment.

Through intra-hepatic shunting seen at angiography, and from a left to right liver lobe, a guide-wire was passed retrogradely and allowed sufficient support to perform hepatic vein angioplasty and stenting. The patient responded favourably and liver transplant was avoided.

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## 1. Introduction

The authors report a case of endovascular treatment of a Budd-Chiari syndrome, with recanalization and stent placement in an accessory right lower hepatic vein by a collateral loop-guided approach through a left-lobe partially patent hepatic vein.

## 2. Clinical history

A 29 year old patient, under hypocoagulation due to anty-phospholipid syndrome with two previous cases of deep vein thrombosis, recurred to emergency room. The patient had recently changed to a different type of dicumarinic treatment. She presented with acute abdominal pain, malaise, increase in abdominal girth. The patient was alert, oriented and cooperative. On inspection, the patient appeared icteric and a palpable liver was felt bellow the costal margins. Blood analysis revealed increased in liver enzymes, with a predominant hepatocellular changes (aspartate aminotransferase (AST) and alanineaminotrasnferase (ALT) were 138 U/L and 82 U/L respectively, an increase of 4.6-fold and 2.3-fold respectively). Billirubin levels were also increased (total billirubin of 4.02 mg/dL, with a direct level of 2.43 mg/dL). INR levels were 2,7. The patient presented also leucocytosis ( $12.3 \times 10^9/L$ ) and increased C-reactive protein levels (233). Abdominal ultrasound revealed the existence of ascites, increased liver size. Abdominal

CT showed additionally that the liver enhanced heterogeneously, with permeable inferior vena casa and absence of opacification of the hepatic veins.

The patient was diagnosed with a Budd-Chiari Syndrome. Decision between TIPS, liver transplant or continue hypocoagulation and support treatment pended toward continuing hypocoagulation with enoxaparin as the patient presented no signs of encephalopathy, and withholding dicumarinics as these made unable to assess liver function through Prothrombin time and INR at this time.

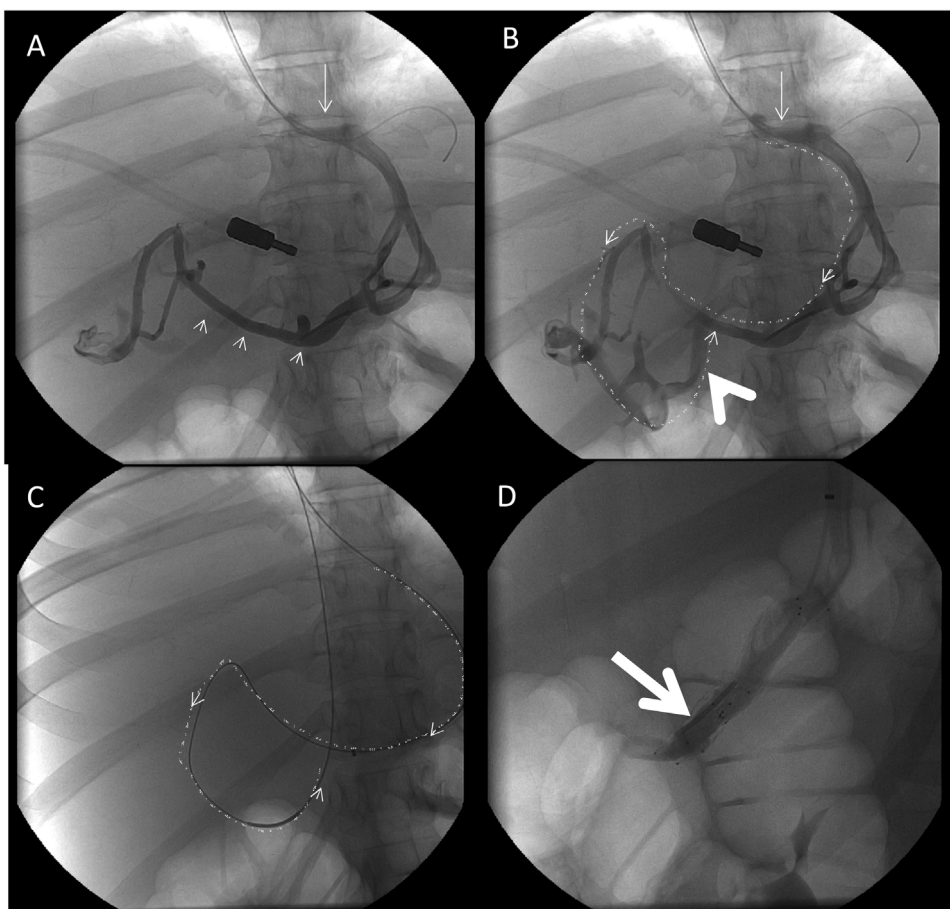
On follow-up, the patient had further increase in liver function test (AST and ALT were 539U/L and 220 U/L respectively, meaning an increase of 18-fold and 6.2-fold respectively from normal); bilirubin levels increased (total billirubin of 8.80 mg/dL with a direct level 7.60 mg/dL), as did the INR levels (INR = 4.45). Leucocytosis further increased ( $20 \times 10^9/L$ ) as did C-reactive protein (297). The patient was discussed for endovascular treatment, and the possibility of a TIPS was considered, with liver transplantation as a final treatment option.

She was referred to our institution for emergent endovascular treatment.

### Procedure planning and execution

On procedure planning, TIPS presented some problems in this specific patient. Firstly, despite leucocytosis, increased PCR and mild fever could be explained by the liver failure, an occult infective focus should be considered (empiric treatment with amoxicil and clavulanate was started). Secondly, the reported incidence of tran-shepatic puncture in TIPS is stated to be about 33% [1], a risk to be

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**Fig. 1.** (A) left lobe venography showing a permeable left hepatic vein (slim arrow), with intrahepatic collaterals (arrowhead). (B) continuing injection of contrast shows that the opacification of intrahepatic collaterals is followed by opacification of a right lower hepatic vein (fat arrowhead). Dotted line shows the orientation of the opacification during injection. (C) Nitinol guidewire passed through from the left to right lower hepatic vein. Arrowheads in dotted line shows the path taken by the wire. (D) fat arrow indicates deployed stent in the previously stenotic hepatic vein confluence.

considered in a patient with clearly abnormal coagulation status. Finally, from a technical standpoint, hepatic vein catheterization might be difficult due to the thrombus and distorted anatomy.

Procedure objectives were evaluation and possibly recanalization of the hepatic veins.

Vascular access was obtained through the right jugular vein with a 11 cm 6F introducer (Boston Scientific, Natick, Massachusetts).

A nitinol hydrophilic 0.035' (Terumo®) guidewire was passed retrogradely to the main left hepatic, the only one amenable of vascular catheterization despite the stenosis at its confluence with inferior vena cava, followed by a 4F Cobra catheter. Pre-procedure "occluded" hepatic vein pressure was measured at 27 mmHg.

Reverse portography was performed, with opacification of intrahepatic shunts. (Fig. 1A). A guidewire was progressed through intrahepatic shunts from the left to the right lobe where a variant double right hepatic vein was seen. (Fig. 1B) Despite the occluding thrombosis, it was possible to pass a guidewire retrogradely to the inferior vena cava by the lower right hepatic vein (Fig. 1C).

A second right jugular access was established (7F sheath) through which a "snare" was used to retrieve the floppy ending of the hydrophilic guidewire, previously passed through to the inferior vena cava

A 65 cm 4F multipurpose catheter (Cook®) was introduced through the "floppy" ending of the wire and into the right lower hepatic vein.

After this, the hydrophilic guidewire was pulled out of the catheter, by pulling from the "stiff" ending, and the catheter was

used for passing a 180 cm Amplatz Super Stiff™ (Boston Scientific™) through the second vascular access and into the right lower hepatic vein. This allowed sufficient support for placing two stent (14 × 40 mm, Zilverflex Cook®). (Fig. 1D) Balloon angioplasty was also performed on the left hepatic vein at the convergence with the inferior vena cava. After this, "occlusion" hepatic vein pressure was measured 10 mmHg.

The patient was transferred to an intensive care unit. She developed a right neck hematoma, with no further complications, having had been discharged after liver function and bleeding diathesis had been normalized. She resumed the previously prescribed anticoagulation regimen and liver transplantation was not required.

### 3. Discussion

Endovascular recanalization of the hepatic veins is usually performed by either balloon dilation or stent placement, with stent placement reducing the restenosis rate [2].

Results of endovascular "suprahepatic" venous obstruction have been good, potentially stopping liver damage caused by portal hypertension and preventing liver transplantation [3].

Antegrade percutaneous approaches are theoretically possible and have been described with success. However, unwanted complications are to be accounted for, as these patients typically present with decompensated liver failure, bleeding diathesis and risk suffering from serious life threatening intra-peritoneal bleeding [4].

Previously a retrograde hepatic vein angioplasty using a similar collateral loop-guided approach was reported, passing a guide wire through the caudate lobe, through intrahepatic collaterals, and out through another main hepatic vein in the same lobe, establishing an “intra-hepatic loop” [5].

TIPS remains an adequate alternative treatment to Chiari Syndrome. Unwanted problems correspond to possible liver capsule perforation, and the presence of a possible infectious at the time the procedure was considered necessary.

In this letter, we present another endovascular recanalization and stent placement in the hepatic veins. The main difference was that the only amenable venous access to the liver was through the left liver lobe, which allowed passing a guide wire through intrahepatic collaterals to the right liver lobe. To our knowledge, collateral loop-guided approach from the left to the right lobe hadn't been previously reported.

Hepatic “occlusion” pressure, representing portal hypertension, also decreased significantly.

Despite the ominous prognostic, the patient responded well to therapy, having been discharged, resuming the previous treatments, with no major complications.

In summary, this report presents a case of right hepatic vein angioplasty, successfully performed by a left lobe loop guided approach, achieved through collateral venous shunts.

#### Conflict of interest

No conflict of interest.

#### References

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