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Case Report

Endovascular resolution of post-surgical complications in the portal vein: Report of two cases ☆

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ABSTRACT

Stenosis of the portal vein is one of the main complications after hepatobiliar and pancreatic surgery, with a reported incidence of 19.6% after pancreaticoduodenectomy and 3% after liver transplant. It is associated with the intraoperative resection of the portal vein, local recurrence of the primary tumor and radiotherapy. The portal lesion secondary to bile drainage catheter insertion is extremely rare or unusual, with few cases described in the literature. This article describes 2 cases: the first of a male patients 49 years old post-operative to liver transplant with partial portal thrombosis and stenosis of the mesoportal joint, and the second a female patient 50 years old with history of cholecystectomy, exploration of the bile duct and placement of Kehr "T" tube with secondary portal lesion. The 2 cases were successfully treated through minimally invasive procedures by an interventionist radiologist.

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Introduction

Stenosis of the portal vein in liver transplant is an uncommon complication, with a reported incidence of 3% [1–3] and is associated with development of portal hypertension and graft rejection [4–7,9]. Surgical revascularization and retransplant were the treatments of choice [10]; However, current endovascular techniques are highly recommended because they have been shown to be safer and more efficient [11–13].

Percutaneous drainage of the bile duct is widely used in the treatment of benign and malignant diseases of the bile duct [14,15]; one option is transhepatic percutaneous bile drainage, which is a minimally invasive procedure, although not free of risks [15]. Although significant differences have not been reported in the rate of success in patients with dilated and undilated bile systems, it has been found that complications related with percutaneous transhepatic bile drainage are greater when performed in undilated bile systems with cirrhotic livers [14,16]. The portobiliary fistula is a complication that is recognized but uncommon, which can provoke significant hemobilia [15,16]. Currently, promising successful treatments by the interventionist radiologist have been reported.

Method/presentation of the cases

Case 1

Male patient, 49-years-old, Hispano-american, 65 kg, 160 cm tall, beekeeper, with background of high alcohol consumption and type 2 diabetes mellitus in treatment with glargine insulin 28 U every 24 hours and preprandial rapid insulin 3 U, without relevant family history. In 2020, he was diagnosed with cirrhosis that debuted with hemorrhages in the upper digestive tract treated with sclerosis vía endoscopy, and in July, 2022, orthotopic liver transplant was performed. In August, 2022, he presented with abdominal distensión, ascitis, hypertension, tachycardia, and dehydration.

Upon physical examination, he showed abdominal pain without signs of peritoneal irritation, asctis leakage through

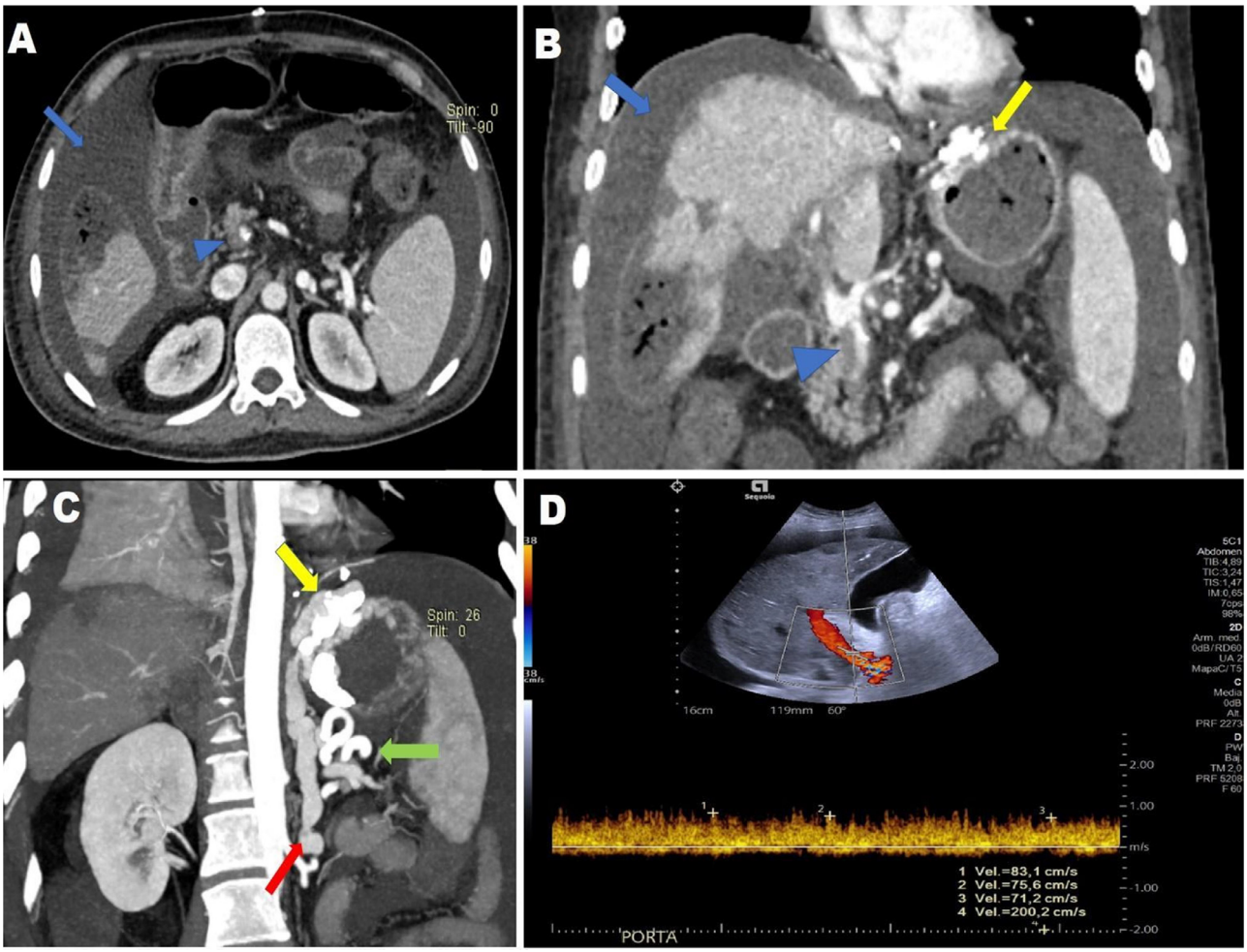

Fig. 1 – (A) Axial contrasted tomography. Ascitis (blue arrow); thrombosis of the mesoportal joint corresponding to a Yerdel grade III (blue arrowhead); (B) Coronal contrasted tomography. Ascitis (blue arrow); thrombosis in the mesoportal joint (arrowhead), gastric varices with embolization material (yellow arrow); (C) Coronal MIP reconstruction. Portosystemic shunts. Splenorenal (red arrow), gastrosplenic (Green arrow), gastric varices with embolization material (yellow arrow); (D) Doppler ultrasound. Elevation of post-stenosis speed. Ascitis.

the surgical wound and reduction in peristalsis, and it was decided to perform contrasted abdominal tomography, where Yerdel grade III portal thrombosis, ascitis, and splenogastric venous congestion with portosystemic shunts were found. Portal hypertension was confirmed by Doppler ultrasound (Fig. 1).

The patient was taken to percutaneous portography, where the findings of thrombosis of the mesoportal joint and the presence of portosystemic shunts was confirmed, and it was decided to perform portal vein plasty and to place a metallic stent.

Under ecographic guidance, a Chiba needle 21G was directed to puncture towards the branch of segment VIII of the portal vein, and a Cope 0.018 guide was introduced, exchanged with 0.035 hydrophilic guide with the Neff system to place vascular introducer 5 Fr. Through this, a straight diagnostic catheter 5 Fr was introduced, with which portography was performed, which showed absence of the passage of the contrast medium at the level of the mesoportal joint. The site of the stenosis was conquered with the hydrophilic guide and the catheter advanced to perform a new control, where stenosis and the presence of portosystemic shunts was confirmed (Figs. 2 and 3).

An introducer 8 Fr was exchanged and the metallic stent system advanced, mounted on a ball measuring 8 × 58 mm, which was located in the area of stenosis (Fig. 4), it was insufflated to 6 ATMS until an opening was observed in the area of the stenosis. In control portography, reperfusion of the portal vein and closing of the portosystemic shunts was observed, and no leaks were identified at the level of the stent (Figure 5) (Video 1). The track of the puncture was embolized with Gelfoam and the procedure was ended without complications. Two days after the procedure, the patient was released from the hospital, and in follow-up visit 2 weeks later ascitis

Fig. 3 – Portography, where stenosis was conquered with the help of hydrophilic guide (red arrow).

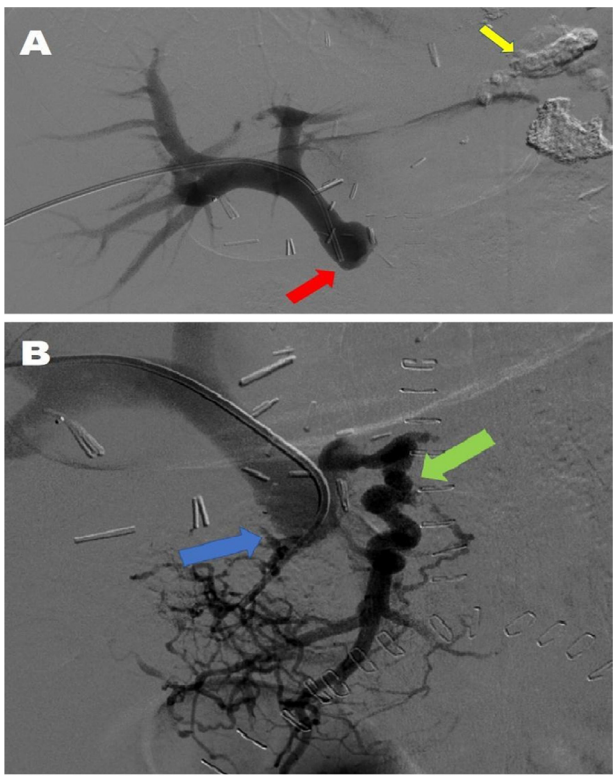

Fig. 2 – (A) Portography. Portal thrombosis (red arrow) and embolization material at the level of gastric varices (yellow arrow; (B) Portography. Site of stenosis (blue arrow) and portosystemic shunts (green arrow).

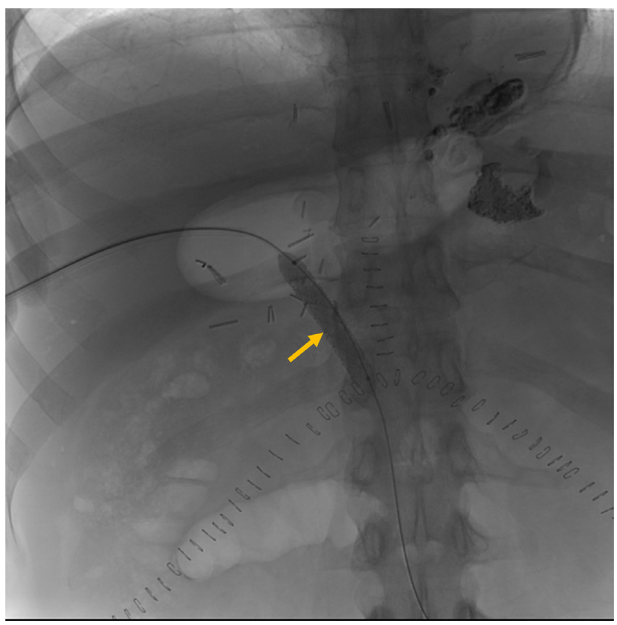

Fig. 4 – Stent system recovered and mounted on a ball, which was located in the area of the stenosis (yellow arrow).

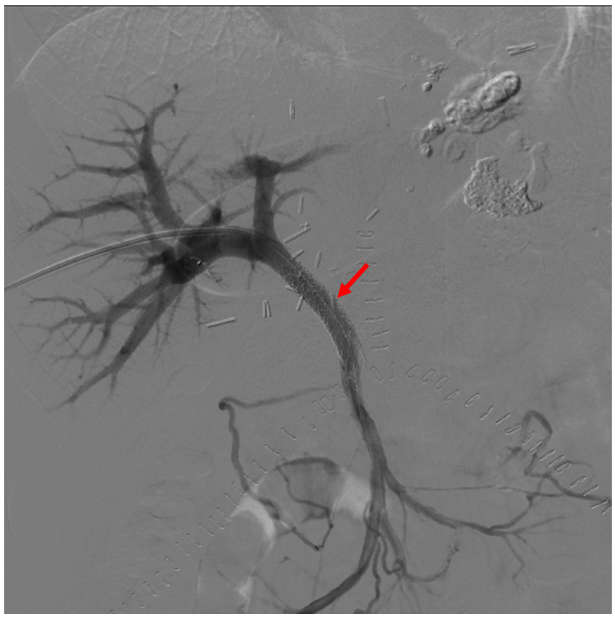

Fig. 5 – Reversion of the area of the stenosis with adequate flow through the stent, without signs of leakage (red arrow).

was observed through ultrasound resolution, and reduction in the portal hypertension with spectral Doppler.

Case 2

Female patient 50-years-old, Hispano-American, weight 63 kg, height 146 cm, secretary, with history of chronic lithiastic cholestystitis, treated by cholecystomy, exploration of the bile duct, placement of Kehr and Penrose "T" tube, who presented septic shock and apparent dysfunction of the probe, with elevated enzymes and markers of hepatic dysfunction. During the approach, a cholangioresonance was done, in which a bad position of the T probe was observed, with the cross-sectional transverse segment in the bile duct was identified, with the other extreme in the portal vein (Fig. 6), noting a vascular hepatopetus stain (Video 2). Due to the finding, a mixed transparietohepatic derivation of the bile duct was performed (Fig. 7), and the placement of a portal stent was planned.

In a second surgery guided by ultrasound and fluoroscopy, puncture was made with a Chiba needle of 21 G of a segmentary branch of the portal vein in segment IV to perform portography, later contrast medium was injected through the T probe and through fluoroscopy, and with the help of the ConeBeamCT application, the positioning of one end of the T probe inside the portal vein was confirmed. A guide 0.018 was introduced through the Chiba needle, and was exchanged for a hydrophilic guide 0.035 through the Neff system, and a vascular introducer 10 Fr was positioned and exchanged with a high-support guide, and placement of the covered expandable stent with ball proceeded (Figure 7). In the final control, the closing of the defect in the portal vein was observed, with adequate darkening of the intrahepatic portal system. The path of the introducer was embolized with Gelfoam, and the procedure ended without complications. The T probe was withdrawn without complications, and the patient resolved his framework of sepsis and showed improvement in the obstruction of the bile duct.

Discussion

Portal complications after liver transplantation are rare; however, portal stenosis and thrombosis correspond to one of the complications that generate greater graft rejection, in agree-

Fig. 6 – Cholangiography through mixed catheter of transparietohepatic derivation of the bile duct with bile catheter 8 Fr (green arrow). Note the absence of portal flow from the bile duct and the reduction of leakage through the stump of the cystic duct. The intrahepatic bile duct is not dilated (blue arrow).

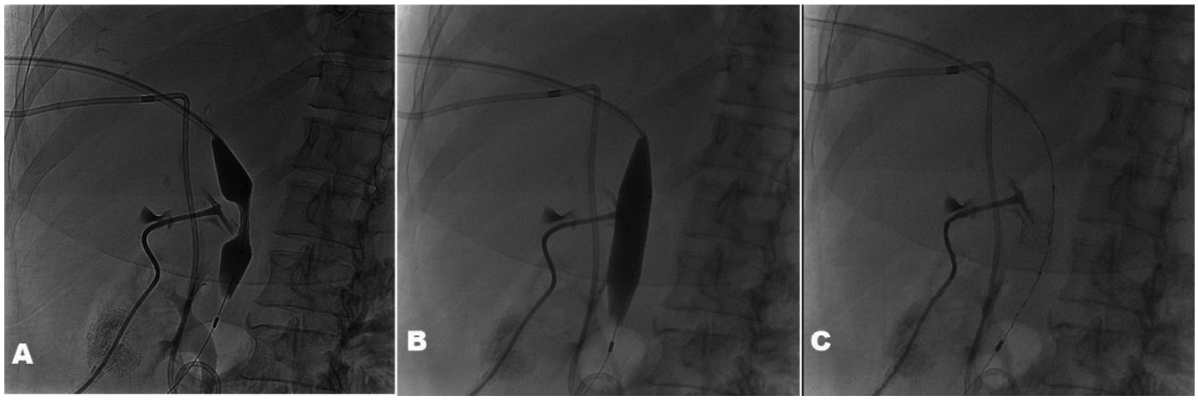

Fig. 7 – (A) Display of the portal stent. The stent was introduced mounted on a ball to the site of the defect; (B) the ball was insufflated for its release; (C) control was performed verifying adequate positioning and permeability of the portal without leaks.

ment with case 1 where endovascular treatment (stent with balloon) was performed with a transhepatic approach, subsequent favorable response consistent with current evidence that defines interventional management as the mainstay of treatment of portal thrombosis, with multiple reports of successful mechanical thrombectomy performed with a transhepatic or transjugular approach. Portal vein angioplasty and stenting were first reported by Olcott at the University of California, San Francisco [1–3]. The procedure is widely accepted as a safe and effective treatment for post-transplant portal vein stenosis [4,6]. Funaki et al reported that portal vein angioplasty for the treatment of portal stenosis had a recurrence rate of 50% in an average time of 6.3 months, while stent deployment showed 100% patency during a follow-up of 47 months [1,2,5,7] but long-term patency data are not yet available [8,9]; Regarding the follow-up in case 1, a control is reported two weeks after the procedure without complications with improvement with resolution of portal hypertension data in the spectral Doppler and decrease of ascites, to date there are no documented records in the described case of hospital readmission due to complications derived from the aforementioned management by interventional radiology.

The literature recommends the use of self-expandable metallic stents based on preliminary studies that have shown promising results [9–11]. Image-guided minimally invasive treatments are clinically effective techniques in the management of portal complications after transplantation [11,12] and it should be taken into account that periodic controls with Doppler ultrasonography and contrasted computed tomography are useful to prevent portal vein stenosis [3,11–13] as well as the control performed in case 1 with portal Doppler with resolution of portal hypertension data.

On the other hand, the Kehr T-tube is an instrument that has been used for more than a century as biliary drainage after surgery on the main biliary tract [14]. Although many surgeons consider it an indispensable tool after supraduodenal choledochotomy, others associate its use with a high rate of complications [14,15,20]. Case 2 of the present article presents an anomalous position of the "T" type of Kher that conditioned an infectious picture of bacteremia with sepsis, consistent with the most common complications related to the "T" tube referred to by current evidence, which are: Bilioportal fistula, biloma, biliary ascites, bacteremia and biliary peritonitis [14,20]; Bilioportal fistula is a documented but uncommon entity; its management is based on the clinical assessment of the patient, as well as on the experience of the interventional radiology team [15,16].

Among other complications, mild venous hemobilia is often treated conservatively or by changing and increasing the size of the drainage catheter until the tract matures completely [16]. The use of stent grafts for the treatment of significant venous hemobilia secondary to a portobiliary fistula has also been recommended in some case series. Chaitowitz et al reported the use of the stent-within-stent technique to obliterate a portobiliary fistula, which resulted from erosion of the stent into the adjacent portal vein. In another series, Peynircioglu and Cwikiel recorded the use of a stent in a patient with venous hemobilia complicated by a small asymptomatic hepatic infarction [14–16]. Comparatively in case 2, the technique consisted in the placement of a balloon expandable stent with subsequent expected outcome with closure of the portal vein defect with adequate opacification of the intrahepatic portal system corroborated by angiography after digital subtraction, without complications with subsequent removal of the T-tube with resolution of his sepsis picture showing improvement of the biliary tract obstruction [14–16].

Conclusions

The percutaneous transhepatic placement of the stent is a safe, effective treatment to treat portal venous stenosis caused by a benign entity from post liver transplant complication, from tumor recurrence after curative surgery on pancreatic or biliary neoplasies and/or biliportal fistula. In the patient with stenosis of the portal vein, the placement of stents increases the quality of life and prognosis by preventing the adverse effects of portal hypertension and, in cases of bilioportal fistula, of avoiding the main vascular complications (significant arterial and venous hemobilia), as well as the consequences secondary to cholangitis. Interventionist radiologists

are key members for the interdisciplinary treatment of these complications and are at the vanguard of the handling and treatment of these patients.

Ethical responsibilities

The authors state that for this research no experiments were performed on humans or animals.

Data confidentiality

The authors state that this article does not include patient data.

Right to privacy and informed consent

The authors state that this article does not include patient data.

Protection of people and animals

The authors state that the procedures followed comply with the ethical standards of the responsible committee on experimentation and the World Medical Association and the Declaration of Helsinki.

Patient consent

Written informed consent for the publication of this case report was obtained from the patients.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.radcr.2024.03.031.

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