Per-Cutaneous Trans-splenic Vein Thrombolysis of Acute Major Portal Vein Thrombosis in Post-Liver Transplant Recipient: A Unique Experience

A. Dogar[1],K. Ullah[1]*,Sh.Uddin[1],
Y. Memon[2],M. Zafar[2],H. Bilal[1],
A. Shoaib[1], A. Ghaffar[1],
S. Hasnain[1], Q. Soomro[1]

[1]Liver Transplant and HBP Department, Pir Abdul Qadir Shah Jeelani Institute of Medical Sciences, Pakistan
[2]Radiology Unit, Pir Abdul Qadir Shah Jeelani Institute of Medical Sciences, Pakistan

ABSTRACT

Portal venous thrombosis (PVT) is an uncommon complication in post-liver transplant recipients. The reported incidence is 1-4%. It may occur within a month, called early or after one month of transplantation, known as late PVT. Early PVT has a poor prognosis, leading to graft failure in most cases. Treatment of such cases is quite challenging because of difficult alternative portal inflow establishment. We performed successful thrombolysis of acute major PVT with a unique technique using ultrasound-guided percutaneous trans-splenic vein access in a post-liver transplant recipient. The per-cutaneous trans- splenic vein approach-based thrombolysis described here in this report might be very helpful in similar cases. This technique minimizes the potential risk of graft loss, avoids re-exploration, has a low risk of bleeding, and is cost-effective.

KEYWORDS: Portal vein thrombosis; Liver transplant; Thrombolysis; Trans-splenic

INTRODUCTION

Portal venous thrombosis (PVT) is an uncommon complication in post-liver transplant recipients. The reported incidence is 1-4% [1]. It may occur within a month, called early or after one month of transplantation, known as late PVT. Its early occurrence is common in more than 80% of cases, attributed to hyper-coagulability, portal venous stasis, and is seen in recipient requiring operative thrombectomy for pre-operative chronic PVT, and in conduits for portal vein reconstruction [2- 4].

Major PVT occurring in the early postoperative period has a poor prognosis and leads to graft failure in the majority of cases. Treatment of acute PVT in liver recipients is quite challenging because of the difficulty in alternative inflow establishment [5].

*Correspondence: Kaleem Ullah, MBBS, FCPS, Liver Transplant unit, Pir Abdul Qadir Shah Jeelani Institute of Medical Sciences, Gambat, Pakistan
ORCID: 0000-0001-7819-6910
Tel: +92-345-9451961
E-mail: drkaleempk@gmail.com

We performed successful medical thrombolysis of major acute PVT with a unique technique using ultrasound-guided percutaneous trans-splenic vein access in a post-liver transplant recipient.

CASE PRESENTATION

A seventeen-year-old male with chronic liver failure secondary to Budd Chiari syndrome with a Child-Pugh score of 11 (C) and MELD-Na of 20 referred to our center. Tri-phasic CT scan of the abdomen demonstrated cirrhotic liver, massive ascites, caudate lobe hypertrophy, and occluded hepatic veins, although IVC and portal vein was patent. Pre-operative thrombophilia workup showed a low protein C value; however, protein S, factor II, factor V, and antithrombin III values were normal. Lupus anticoagulant, anti-cardiolipin antibodies, and anti-phospholipid antibodies were also negative.

He underwent living donor liver transplantation using a right lobe graft weighing 764 g

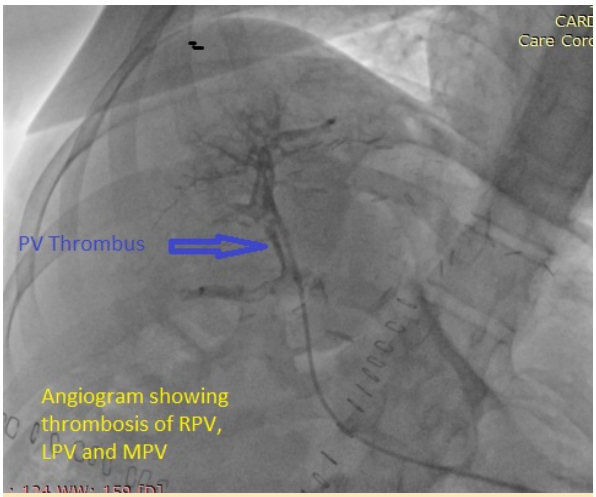

Figure 1: Angiography showing portal vein thrombosis before initiation of thrombolytic therapy.

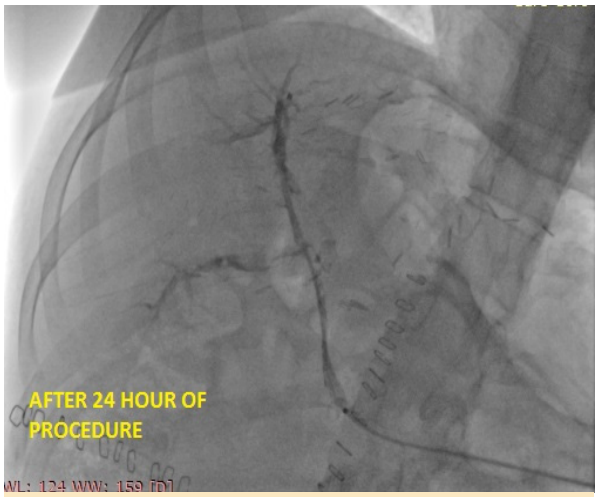

Figure 2: Angiography of patient after 24 hours (post thrombolytic therapy) showing partial resolution of thrombus.

with a graft recipient weight ratio of 1.3. The graft's portal vein was anastomosed with the recipient's portal vein in a continuous fashion using a 5/0 polypropylene suture. An operative doppler ultrasound scan showed a patent portal vein with normal blood flow.

On the first and second postoperative days the INR level was >2, so routine anticoagulation was started from the 3rd postoperative day (injection of enoxaparin sodium with a therapeutic dose of 1 mg/kg) and was planned to con - tinue up to 6 months. Complete blood count, INR, liver function tests, serum creatinine, and electrolytes were checked daily for the first ten days. As per protocol, a Doppler ultrasound scan of liver vasculature was performed within the first five consecutive days, which showed a patent portal vein and other vascular structures with normal flow. The drain output during the first week was 1500ml per day on average. The patient had a smooth recovery during the 1st postoperative week.

On the 8th postoperative day, the patient suddenly developed generalized mild abdominal pain with a 5 liter/24 hours high pelvic drain output. Liver enzymes were also elevated (ALT of 638U/L and AST of 545U/L). Doppler ultrasound was performed, which showed main portal vein (PV) occlusion by a major thrombus extending from the main trunk of the PV to the junction of the splenic and superior mesenteric vein. Tri-phasic CT scan confirmed the complete occlusion of the PV from the junction of the splenic and superior mesenteric vein to the intrahepatic portal vein branches. However, the splenic vein lumen was completely patent.

A multi-disciplinary meeting was called, and multiple options were discussed in detail including systemic anticoagulation therapy, surgical exploration, and radiologically guided splenic vein approach-based thrombolysis. Based on risks and benefits, it was decided to go for a radiological intervention procedure (a minimally invasive procedure) for timely lysis of thrombosis to prevent graft failure. Per-cutaneous trans-splenic portal vein cannulation was planned. This route gives direct access to the main PV and avoids liver injury. Discussion with the patient and family regarding possible complications, including bleeding, failure of the procedure, and injury to adjacent organs, was done. Informed written and video consent was obtained.

Per-cutaneous PV access was successfully achieved using an ultrasound-guided trans splenic vein approach. The first angiography was performed, which showed complete thrombosis of the main portal vein with extension into the intrahepatic branches (Fig 1). A 6 Fr sheath was placed into the splenic vein over a guidewire, and a catheter was advanced

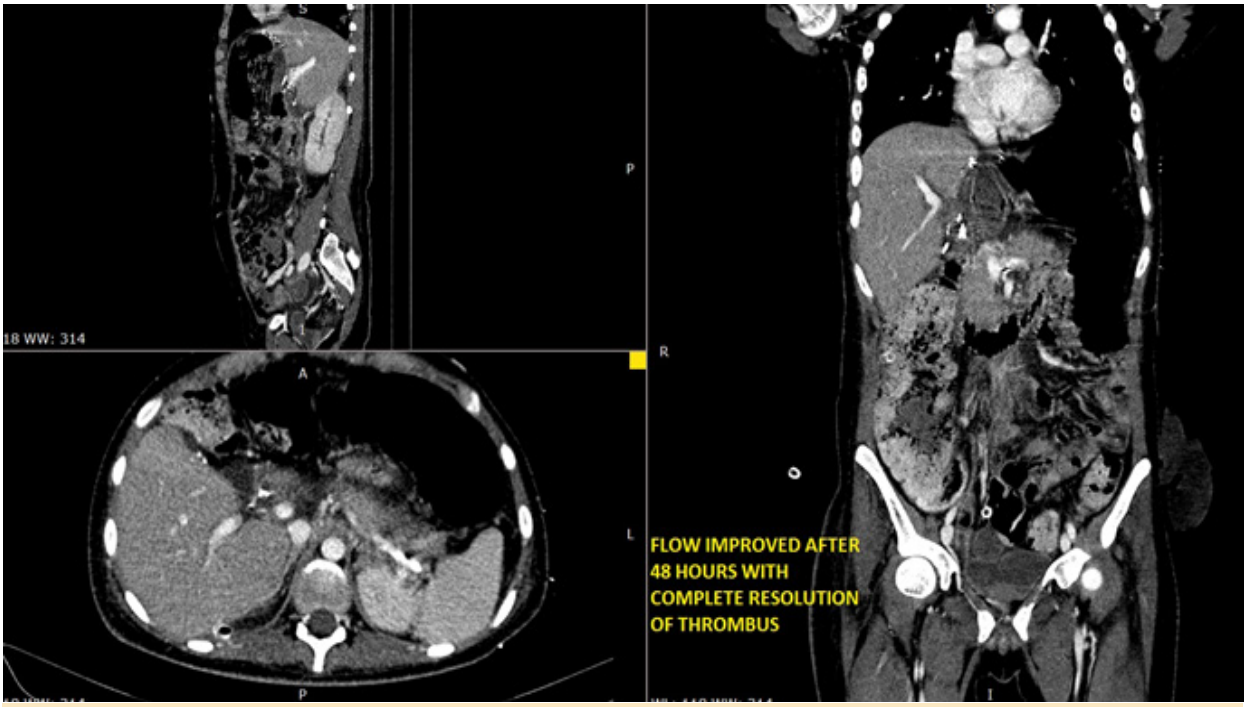

Figure 3: CT scan after 48 hours (post-thrombolytic therapy) showing complete resolution of thrombosis.

over the guidewire through the sheath into the portal vein. First, a bolus injection of 5mg of tissue plasminogen activator (TPA) along with 5000 units of high molecular weight heparin was given through the catheter. Then the patient was kept on a continuous infusion of 1mg TPA per hour along with heparin infusion over the next 24 hours. After 24 hours of continuous infusion, angiography was repeated, which showed improvement in the PV lumen patency but did not show complete thrombus resolution (Fig 2) Another 5 mg of TPA bolus was given, and infusion was continued with the same dose of 1mg/hour along with heparin infusion for another 24 hours. After 48 hours, Doppler ultrasound showed improved blood flow followed by CT scan, which showed maximal resolution of thrombus with a good portal flow (Fig 3).

DISCUSSION

The trans-splenic approach for PV intervention is a known but controversial modality. Few Studies have considered this as a safe route, with low complication rates, particularly for peri-splenic hematoma.[6-8]. In contrast, others have reported this to be a non-safe access for PV interventions [9, 10].

In cirrhotic patients, there is often splenomegaly with dilated splenic vein secondary to portal hypertension, which can facilitate percutaneous trans-splenic ultrasound-guided micro-puncture [11]. Our patient had also splenomegaly with a size of 21cm and a dilated splenic vein.

Generally, PVT can be treated with various treatment modalities, ranging from systemic anticoagulation to endovascular-based procedures and operative thrombectomy. Systemic anticoagulation is generally recommended for patients with minor and chronic PVT. Early anticoagulation has shown a higher recanalization rates [12, 13].

Endovascular treatment options are attractive alternatives to systemic anticoagulation and open thrombectomy in acute major PVT cases due to their minimally invasive nature, less time cosuming and less-costly qualities. Delivery of thrombolytic drugs directly to the thrombus site is more effective as it results in

quick resolution of thrombosis with minimal risk of systemic bleeding [12]. The three possible percutaneous routes for PV access include trans-jugular, trans-hepatic, and trans-splenic approaches. Various combinations of thrombolytic drugs and mechanical devices can be utilized through these approaches [12, 14, 15].

The PV access approach for the treatment of acute PVT varies from one institution to another and depends upon operator skills and case scenario [16]. The literature-based data on the experience of trans-catheter management of PVT in post-liver transplant recipients is minimal [1, 2, 12]. As a result, no definitive conclusions can be drawn regarding these procedures' technical successes, complications, and long-term results [1,15].

Acute PVT is less common but a dreadful complication in post-liver transplant recipients because it results in early graft failure. This case report highlights the effectiveness of trans-splenic access for portal vein cannulation in liver transplant recipients having acute PVT as it provides an easy access while avoiding liver graft injury, which is more common in the trans-jugular/trans-hepatic approach. In contrast to systemic therapy, intravascular thrombolytic therapy given in this patient has significant advantages as it prevents the risk of systemic bleeding. In comparison to surgical thrombectomy, this technique is beneficial in terms of cost-effectiveness and also avoids surgical stress-associated trauma.

This procedure is technically demanding and needs careful coordination and precision. The technical difficulty with access to the thrombosed portal vein has limited the overall success of such catheter-based therapies. The technique is associated with failed cannulation due to the complex anatomy of post-liver transplant recipients, adjacent organ injuries, and risk of bleeding. A highly skilled interventional radiologist is the critical person for the overall success of this procedure.

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