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Case Report

Percutaneous transhepatic embolization of gastro-esophageal varices for the treatment of variceal bleeding in portal vein thrombosis secondary to hepatocellular carcinoma: A case report[☆]

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ARTICLE INFO

Article history:

Received 4 January 2025

Revised 12 February 2025

Accepted 13 February 2025

Keywords:

Embolization

Hepatocellular carcinoma

Portal vein thrombosis

Variceal bleeding

Transhepatic approach

Gastro-esophageal varices

ABSTRACT

Percutaneous transhepatic embolization (PTE) is a minimally invasive and effective intervention for managing refractory variceal bleeding in patients with portal vein thrombosis (PVT) secondary to hepatocellular carcinoma (HCC). This case report highlights the successful application of PTE in a 69-year-old nonalcoholic male with chronic liver disease and HCC. The patient, previously treated with transarterial chemoembolization (TACE) for segment VIII HCC, presented recurrent hematemesis and significant anemia despite prior endoscopic esophageal variceal band ligation. Diagnostic imaging revealed portal vein thrombosis and extensive gastro-esophageal varices. Given the patient's unresponsiveness to conventional endoscopic treatments, an emergency PTE was performed. Using a percutaneous transhepatic approach, the left portal vein was accessed under real-time ultrasound guidance. Subsequent venography confirmed extensive varices draining into the splenic artery. Embolization involved deploying a combination of pushable coils and a 20% glue solution, which achieved complete obliteration of the varices, as confirmed by nonprocedure imaging. The track from the liver surface to the left portal vein was sealed using a glue-lipiodol mixture to prevent complications. The patient demonstrated significant clinical improvement postprocedure, with no further episodes of hematemesis. Hemoglobin levels stabilized following transfusion of packed red cells, and the patient was discharged in stable condition. This case underscores the role of PTE as a safe and effective salvage therapy for refractory variceal bleeding in complex cases involving PVT secondary to HCC.

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[☆] Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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<https://doi.org/10.1016/j.radcr.2025.02.055>

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Background

Variceal bleeding is a life-threatening complication of portal hypertension, often associated with advanced liver diseases such as cirrhosis and hepatocellular carcinoma (HCC). Gastro-esophageal varices develop due to increased portal venous pressure, typically resulting from obstruction or reduced flow in the portal venous system. This condition is further exacerbated in patients with portal vein thrombosis (PVT), a frequent finding in individuals with HCC. The presence of PVT not only increases the severity of portal hypertension but also complicates treatment options, making the management of variceal bleeding particularly challenging [1,2]. Current guidelines recommend endoscopic interventions, such as esophageal variceal band ligation, as the first-line therapy for acute variceal bleeding. These procedures are effective in achieving initial hemostasis but may fail in up to 20% of cases, especially in patients with severe portal hypertension or underlying complications like PVT [3,4]. Pharmacological therapies, including vasoactive agents like somatostatin or terlipressin, are often used alongside endoscopic treatments but are insufficient for long-term management in many cases [5].

In situations where endoscopic and pharmacologic treatments fail, transjugular intrahepatic portosystemic shunt (TIPS) placement is typically considered. However, TIPS may be contraindicated in patients with advanced HCC or extensive PVT, necessitating alternative interventions [6]. Percutaneous transhepatic embolization (PTE) has emerged as a critical salvage therapy for refractory variceal bleeding in such cases. This minimally invasive technique involves accessing the portal venous system percutaneously and embolising the afferent vessels feeding the varices. PTE is particularly advantageous in patients with complex anatomy or contraindications to TIPS, offering effective hemostasis with a favorable safety profile [7,8]. The efficacy of PTE in achieving hemostasis and reducing variceal recurrence has been demonstrated in multiple studies. Li et al. [9] conducted a meta-analysis of PTE and reported a high technical success rate, with most patients achieving immediate bleeding control and significant reductions in portal pressure postprocedure. Another study by Chawla et al. [10] highlighted the role of PTE in managing refractory varices, emphasizing its utility as a bridge therapy in patients awaiting definitive treatment or as a standalone intervention in high-risk cases.

This case report details the successful application of PTE in a patient with HCC, PVT, and recurrent variceal bleeding who was unresponsive to conventional therapies. By illustrating the procedural approach and outcomes, this report underscores the potential of PTE to provide effective, minimally invasive management in complex clinical scenarios.

Case presentation

A 69-year-old nonalcoholic male presented with multiple episodes of vomiting characterized as sudden in onset, non-projectile, nonbilious, and containing food particles along

with traces of blood. The patient reported associated symptoms of weight loss, loss of appetite, and a persistent cough. However, there was no accompanying history of fever, loose stools, or any prior surgical interventions. He had no known medical history of hypertension, diabetes mellitus, tuberculosis, bronchial asthma, or thyroid disorders.

The patient was a known case of chronic liver disease complicated by hepatocellular carcinoma (HCC) located in segment VIII of the liver. Previously, the patient had undergone transarterial chemoembolization (TACE) as a part of his treatment. Approximately 3 months following the TACE procedure, the patient presented again with hematemesis, which was subsequently found to be associated with portal vein thrombosis. At this stage, he underwent endoscopic esophageal variceal band ligation and was discharged after stabilization.

One month later, the patient was admitted to the emergency department with a recurrence of hematemesis and a significant drop in hemoglobin levels to 5.5 gm%. A contrast-enhanced computed tomography (CECT) scan revealed post-TACE changes in segment VIII of the liver with no evidence of arterial enhancement in the arterial phase. The scan also identified extensive portal vein thrombosis along with multiple intramural and extramural gastro-esophageal varices receiving afferent blood supply from the splenic artery. These findings were confirmed through imaging (Figs. 1 and 2).

Given the recurrent hematemesis and significant anemia despite prior endoscopic intervention, an emergency decision was made to proceed with endovascular embolization of the esophageal varices. After thorough review and preparation, a percutaneous transhepatic approach was selected for cannulation of the splenic artery. Local anesthesia was administered, and the left portal vein was targeted under real-time ultrasonographic guidance using an 18F spinal needle. Following the successful positioning of the needle tip within the left portal vein, a 0.035-inch Terumo guidewire was introduced to facilitate cannulation (Fig. 3).

A 4F Cobra catheter was then advanced over the guidewire, which was later exchanged for a stiffer guidewire to provide adequate support for accessing the splenic artery. Portosplenic venography confirmed the presence of varices with active afferent drainage. Using a Progreat microcatheter and microwave combination, the afferent vessel was cannulated. Subsequent imaging demonstrated multiple varices in the peri-gastric and peri-esophageal regions. A 3 mm × 7 mm pushable cook coil was deployed to slow the blood flow through the afferent channel. However, residual varices were still visible on subsequent imaging.

To achieve complete obliteration, a 20% glue solution was injected until reflux was observed (Fig. 4). Final contrast imaging from the proximal feeder demonstrated complete obliteration of all varices. Additionally, imaging from the splenic artery showed no residual draining varices. To seal the track from the liver surface to the left portal vein, a 1:1 mixture of glue and lipiodol was used. The procedure was uneventful, and the patient remained vitally stable postprocedure without further episodes of hematemesis. In light of the significantly reduced hemoglobin level, the patient received 3 units of packed red blood cells.

The patient was subsequently transferred to the ward for monitoring and was discharged in stable condition. Regular

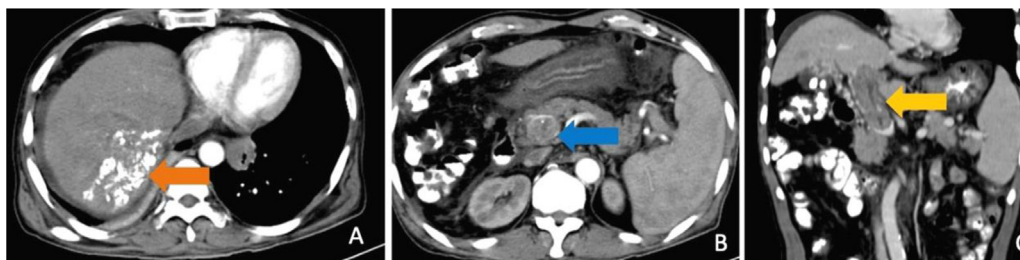


Fig. 1 – CECT images: (A) Axial section demonstrating post-TACE changes in the liver (orange arrow), (B) axial section, and (C) coronal section revealing a completely occlusive thrombus within the portal vein (blue and yellow arrows).

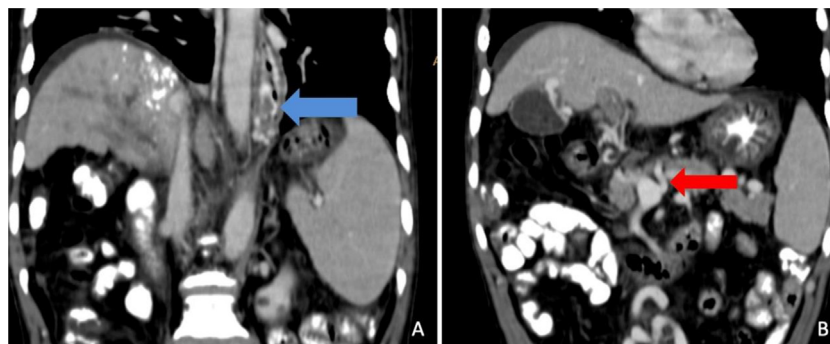


Fig. 2 – CECT images: (A) Coronal section illustrating multiple esophageal and a few gastric varices (blue arrow), and (B) coronal section depicting the afferent vessel from the splenic artery (red arrow).

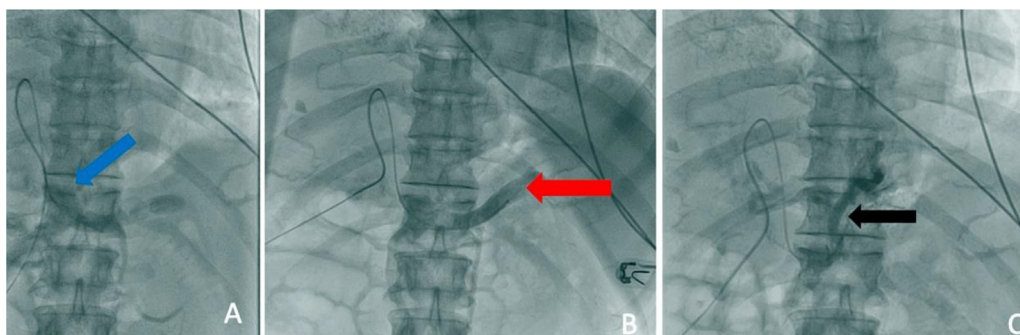


Fig. 3 – Fluoroscopic images: (A) Thrombosed portal vein (blue arrow), (B) splenic artery (red arrow), and (C) afferent vessel to gastro-esophageal varices (black arrow).

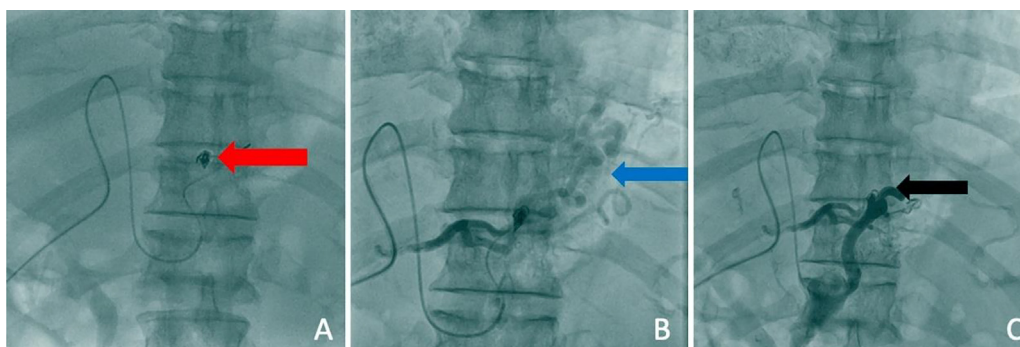


Fig. 4 – Fluoroscopic images: (A) Showing a small 3 x 7 mm pushable cook nester coil deployed in an afferent channel (red arrow), (B) depicting 20% glue embolization, and (C) demonstrating no flow in the varices, indicative of thrombosis (black arrow).

follow-up was advised to ensure long-term management and monitor for recurrence.

Discussion

Variceal bleeding is a major and potentially fatal complication in patients with chronic liver disease, particularly when compounded by portal vein thrombosis (PVT) and hepatocellular carcinoma (HCC) [11]. PVT exacerbates portal hypertension, leading to the formation of gastro-esophageal varices that are prone to rupture. While endoscopic variceal ligation (EVL) and pharmacological therapies remain the first-line treatments, these options may fail in cases of refractory bleeding, necessitating alternative interventions such as percutaneous transhepatic embolization (PTE) [12]. PTE is increasingly recognized as a viable salvage therapy for refractory variceal bleeding. Unlike EVL, which directly ligates varices, PTE addresses the underlying hemodynamic abnormality by targeting the afferent blood vessels supplying the varices [13]. This approach is particularly beneficial in patients with extensive or recurrent varices, as seen in this case. Studies have reported high technical success rates with PTE, with a significant reduction in rebleeding episodes and mortality in patients with refractory variceal bleeding. For instance, Sarin et al. [14] reported a durable obliteration of varices in 80% of patients treated with PTE, particularly in cases complicated by gastric varices, where conventional methods are less effective.

The technique of combining pushable coils and glue embolization, as used in this case, reflects advancements in embolization strategies. Pushable coils help reduce blood flow in high-pressure afferent vessels, while the addition of glue ensures complete obliteration by sealing residual pathways [15]. Glue embolization, in particular, is advantageous due to its rapid polymerization, durability, and capacity to prevent rebleeding. Studies have documented its effectiveness in treating high-flow gastric varices, with 1 study reporting a hemostasis success rate exceeding 90% [16]. Despite its benefits, PTE is associated with procedural risks, including bleeding, hepatic infarction, and infection. The careful sealing of the transhepatic puncture site with a glue-lipiodol mixture, as demonstrated here, is critical in minimizing these complications. Kim et al. [17] emphasized that sealing the puncture site significantly reduces the risk of postprocedure hemorrhage and bile leakage, which are common concerns in transhepatic approaches.

Moreover, the success of PTE depends on meticulous imaging and interventional expertise. Real-time ultrasound and fluoroscopic guidance are indispensable in navigating the hepatic vasculature and ensuring precise embolization. This patient's outcome underscores the importance of a multidisciplinary approach involving hepatologists, interventional radiologists, and oncologists. Collaborative decision-making facilitates timely and effective management of complex cases, as demonstrated in this instance. In addition to its role as a salvage therapy, PTE may also serve as a bridge to definitive treatments, such as liver transplantation or further oncological interventions. Saad et al. [18] highlighted the potential of

PTE to stabilize patients with advanced portal hypertension, enabling them to undergo curative procedures with reduced perioperative risks.

Conclusion

Percutaneous transhepatic embolization (PTE) represents a valuable and minimally invasive intervention for managing refractory variceal bleeding in patients with complex conditions such as portal vein thrombosis (PVT) secondary to hepatocellular carcinoma (HCC). This case highlights the efficacy of PTE in addressing recurrent, life-threatening hematemesis that persisted despite prior endoscopic interventions. By utilizing a transhepatic approach, clinicians can achieve direct access to variceal afferents and effectively obliterate the blood supply to varices, as demonstrated in this patient. The successful outcome, including complete variceal obliteration and stabilization of the patient's clinical status, underscores the importance of PTE as a salvage therapy when conventional methods fail. Furthermore, the procedure's safety profile and ability to rapidly restore hemodynamic stability make it a crucial option in the management of high-risk patients. Continued advancements in interventional radiology and comprehensive case-based evaluations will further solidify the role of PTE in treating variceal bleeding associated with PVT and HCC.

Patient consent

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

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