



# Rescue Devascularization in Coronavirus Disease 19 (COVID-19) Induced Early Shunt Thrombosis After Emergency Proximal Spleno-renal Shunt for Extrahepatic Portal Vein Obstruction

## CASE PRESENTATION

A 20-year-old boy presented with acute hematemesis to a nearby hospital. After stabilization, endoscopic variceal ligation (EVL) was carried out twice within a span of two days and was referred to our institute. On presentation, he had a hemoglobin of 6.5 gm/dl with hemodynamic instability. After initial resuscitation with intravenous fluid and packed red cell transfusions, he underwent urgent esophagogastroduodenoscopy (EGD), and EVL was carried out for large esophageal varices. His hemodynamics improved with stabilization of hemoglobin, and he was kept in the intensive care unit. Ultrasonography Doppler and contrast-enhanced computed tomography of the abdomen with portal venography suggested extrahepatic portal vein obstruction (EHPVO) with portal cavernoma with a patent mesenteric-splenic axis (Figure 1A). He again rebled during hospitalization, and emergency surgical intervention was planned after conservative management was unsuccessful.

Splenectomy with an end-to-side proximal spleno-renal shunt (PSRS) was created with Prolene 5-0 suture, Ethicon, USA. He improved and remained stable until day eight when he had low-grade fever spikes and was tested positive for coronavirus disease 19 (COVID-19) on reverse transcription - polymerase chain reaction (RT-PCR). On day nine, he had acute hematemesis requiring multiple transfusions. CT portography suggested complete shunt and splenic vein thrombosis (Figure 1B). Given the active ongoing bleed, he was planned for emergency surgery after conservative management failed. Modified Hassab's Procedure was performed (left gastric vein was ligated and divided, all the collaterals around gastroesophageal (GE) junction and lower esophagus were ligated, no pyloroplasty or esophageal transection was performed). He remained stable thereafter with follow-up EGD at 3 and 6 months showing only grade I esophageal varices.

## DISCUSSION

Re-bleeding after two sessions of EVL for acute bleed due to EHPVO is unlikely to respond to further endoscopic attempts, and shunt surgery should be considered if the pat-

ent splenic-portal axis is present.<sup>1,2</sup> Devascularization should be considered, where the shunt is not feasible or as a rescue measure if the patient rebleeds after shunt surgery, like in this case.<sup>3</sup> Interventional radiological procedures such as transjugular intrahepatic portosystemic shunts or percutaneous transhepatic/trans-splenic variceal embolization are gradually evolving but are technically challenging as the main portal venous access is not available in EHPVO, and there is a chance of recurrence as underlying portal hypertension is not cured.<sup>4</sup>

The overall patency of PSRS is reported between 60 and 90%, and most shunt thrombosis occurs after a few months.<sup>5,6</sup> After a thorough search of the literature, we could find only one case of in-hospital, radiologically documented shunt thrombosis presenting as rebleed within 48 h which was managed conservatively.<sup>7</sup> Factors postulated to cause shunt thrombosis are the presence of hypercoagulable states, a narrow diameter (<8 mm) shunt, excessive mobilization (>4 cm) of the splenic vein, postoperative thrombocytosis, and so on.<sup>5</sup> In this case, the shunt diameter was 10 mm, and none of the aforementioned patient or technical factors were present. As the index presentation was with acute refractory bleed, coagulation workup was carried out in the postoperative period which was reported as normal. As per protocol, we do not routinely perform Doppler in the postoperative period. The first check Doppler for shunt patency is carried out at three months or in cases of clinical suspicion of shunt block, for example, bleeding or ascites.

He remained stable in the initial postoperative days, which points to a patent shunt. The re-bleed was coexistent with COVID-19 with significantly elevated inflammatory marker levels, for example, CRP = 53 mg/L (normal < 10), D-Dimer = 2017 ng/ml (normal < 500), IL 6 = 73 (normal < 6 pg/ml), and ferritin = 882 ng/ml (normal < 250 ng/ml). The role of COVID-19 in vascular thrombosis is well established by now. We believe that COVID-19 might have contributed to the early and extensive thrombosis in this case, although postoperative anastomotic site thrombosis due to COVID-19 is yet to be reported.

To the best of our knowledge, this is the first report where COVID-19 complicated the emergency PSRS in the early postoperative period and a salvage devascularization was necessary to control the bleed.

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**Figure 1** A-) Coronal maximum intensity projection image showing dilated splenic vein (arrowhead) and prominent left gastric vein (long yellow arrow) draining the gastroesophageal varices (red arrows). The main portal vein is not visualized with multiple collaterals (short yellow arrows) forming cavernoma. (B) - Nonvisualization (the region of the arrowhead) of the thrombosed splenic vein and a prominent left gastric vein (long yellow arrow).

**CONSENT**

Consent was obtained from patients for publication.

**CREDIT AUTHORSHIP CONTRIBUTION STATEMENT**

**Hemanta K. Nayak:** Study concept, Study design, Formal analysis, interpretation of data, Writing - original draft, Writing - review & editing. **Bramhadatta Pattnaik:** Study concept, Study design, Writing - original draft, Writing - review & editing. **Sudipta Mohakud:** Writing - original draft, Data collection, Writing - review & editing. **Jayanta K. Mitra:** Writing - original draft. **Edla V. Krishna:** Data collection. **Shivam Sethi:** Data collection. **Subash C. Samal:** Formal analysis, Writing - review & editing.

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**CONFLICTS OF INTEREST**

The authors have none to declare.

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COVID-19 Related Complications