

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

journal homepage: [www.elsevier.com/locate/radcr](http://www.elsevier.com/locate/radcr)

## Case Report

# Endovascular stent grafting for superior mesenteric vein erosion in necrotizing pancreatitis: A lifesaving intervention in a rare complication ☆☆☆☆

Sophia Humphrey, BS<sup>a,\*</sup>, Elias El-Haddad, MD<sup>b</sup>, Manasa Veluvolu, MD<sup>c</sup>, Zachary Warriner, MD<sup>c</sup>, Andrew Bernard, MD<sup>c</sup>, Driss Raissi, MD<sup>b</sup>

<sup>a</sup> University of Kentucky College of Medicine, Lexington, KY 40506, USA

<sup>b</sup> University of Kentucky, Department of Vascular and Interventional Radiology, Lexington, KY 40506, USA

<sup>c</sup> University of Kentucky, Department of Surgery, Lexington, KY 40506, USA

## ARTICLE INFO

## Article history:

Received 11 February 2025

Accepted 22 February 2025

## Keywords:

Endovascular stent grafting

Necrotizing pancreatitis

Vascular complications

Superior mesenteric vein erosion

Hemorrhagic pancreatitis

## ABSTRACT

Vascular complications, though rare, significantly increase the morbidity and mortality associated with necrotizing pancreatitis (NP). While arterial pseudoaneurysms are well-documented, major venous injuries, particularly superior mesenteric vein (SMV) erosion, are exceedingly uncommon, with only 2 cases previously reported in the literature. We describe a 41-year-old male with severe necrotizing pancreatitis complicated by abdominal compartment syndrome, who developed acute, life-threatening hemorrhage due to pancreatic enzyme erosion of the SMV. Surgical attempts to control the bleeding were unsuccessful, and the hemorrhage was ultimately managed with endovascular stent grafting of the SMV. This case underscores the complexity of vascular injuries in pancreatitis and highlights the potential role of endovascular interventions, such as venous stent grafting, as life-saving procedures when conventional surgical techniques fail. Our case adds to the limited but growing body of evidence supporting the use of venous stenting for mesenteric venous injuries in NP.

© 2025 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

## Introduction

Vascular complications in necrotizing pancreatitis (NP) significantly increase morbidity and mortality, affecting approxi-

mately 25% of patients with NP [1]. These complications can manifest as pseudoaneurysm formation, thrombosis, stenosis, or, more rarely, complete venous disruption. While arterial injuries are more common, venous injuries are particularly challenging due to their rarity and the lack of estab-

☆ Consent was obtained from the patient's next of kin.

☆☆ This case report has not been presented or published elsewhere.

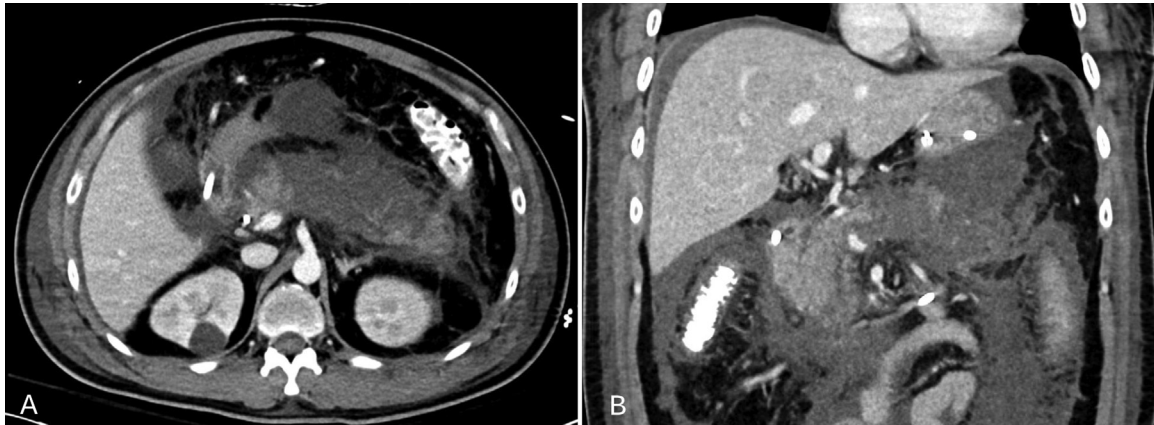
\* Competing Interests: The authors have declared that no competing interests exist.

\* Corresponding author.

E-mail address: [sophiehumphrey@gmail.com](mailto:sophiehumphrey@gmail.com) (S. Humphrey).

<https://doi.org/10.1016/j.radcr.2025.02.095>

1930-0433/© 2025 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)



**Fig. 1 – A 41-year-old male diagnosed with pancreatitis. Contrast enhanced CT scan of the abdomen and the pelvis with axial (A) and coronal (B) images showing significant enlargement and edema of the pancreas with multiple areas of decreased enhancement concerning for acute necrotizing pancreatitis with peripancreatic fluid and stranding.**

lished management guidelines. The complexity of the superior mesenteric vein (SMV) anatomy, its critical role in mesenteric circulation, and the proximity of other vital structures make injuries in this area especially challenging to treat. Endovascular stenting has emerged as a viable therapeutic option for venous injury, particularly in high-risk cases where surgical repair is not feasible.

To our knowledge, no prior cases of SMV erosion treated with endovascular stent grafting in the context of NP have been reported. We present the case of a 41-year-old male with necrotizing pancreatitis complicated by abdominal compartment syndrome and refractory hemorrhage from SMV erosion. The bleeding was successfully controlled with SMV stenting, with subsequent surgical confirmation of the exposed stent within the disrupted venous wall.

### Case presentation

A 41-year-old male with a medical history of hypertension and hyperlipidemia presented with acute pancreatitis and acute kidney injury. His condition rapidly deteriorated, requiring mechanical ventilation for hypoxic respiratory failure. Computed tomography (CT) of the abdomen revealed acute interstitial pancreatitis (Fig. 1), and endoscopic retrograde cholangiopancreatography (ERCP) confirmed the absence of gallstones. Due to worsening necrosis, pseudocyst formation, and nontraumatic abdominal compartment syndrome leading to end organ damage, the patient underwent decompressive laparotomies and necrosectomies.

Frank bloody output from his Jackson-Pratt (JP) drain prompted an urgent computed tomography angiography (CTA), which revealed an arterial source of bleeding from a branch of the celiac artery.

Interventional radiology (IR) embolized a 12 mm dorsal pancreatic artery pseudoaneurysm (Fig. 2), but the patient's critical condition persisted. Multiple exploratory laparotomies and necrosectomies evacuated significant volumes of necrotic tissue and old blood from the abdominal cavity.

Subsequently, the patient experienced hemodynamic collapse with severe hypotension and copious hemorrhagic output from his abdominal drains. Emergent exploratory laparotomy revealed significant bleeding from a large venous vessel and near-complete pancreatic necrosis. Intraoperative attempts to control the bleeding were unsuccessful, leading to temporizing abdominal packing.

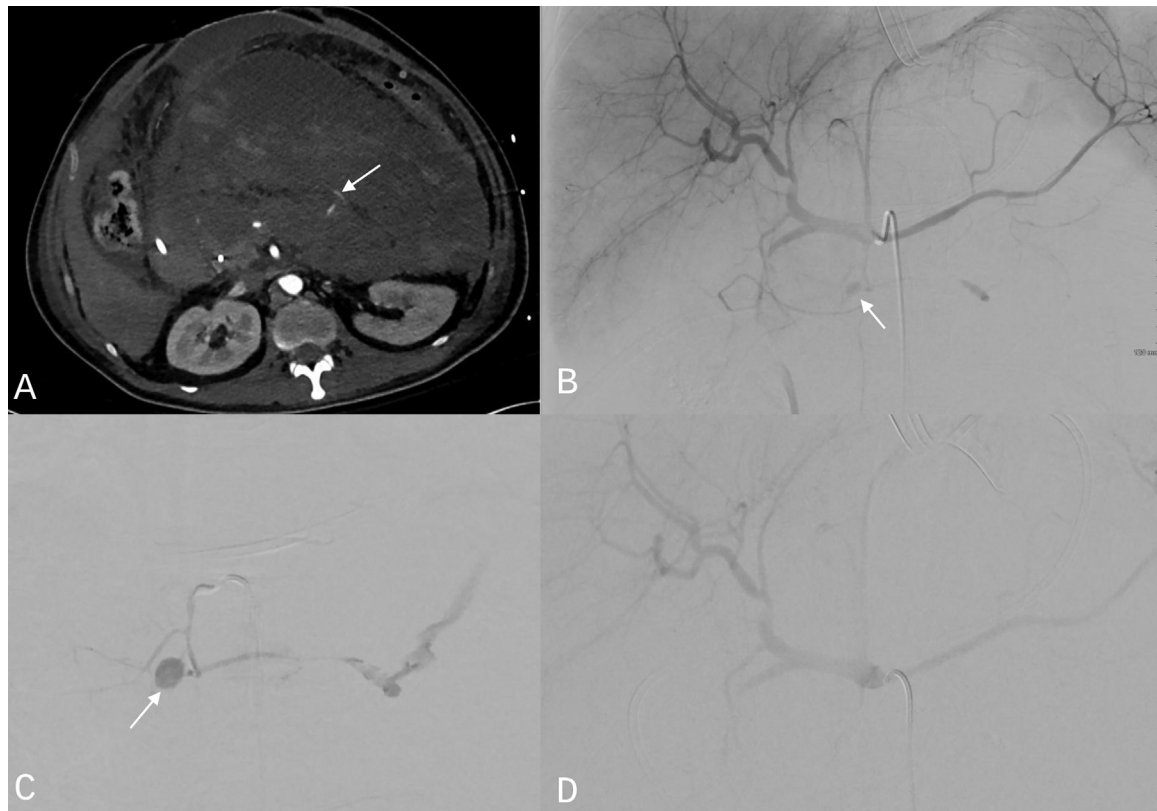
Postoperative CTA and CT venogram showed left hepatic and splenic infarctions, a compressed mid-SMV with patent distal segments, and a hyperdense hematoma near the inferior vena cava (IVC) (Fig. 3). The IR team was consulted for possible SMV repair.

### Endovascular procedure

Percutaneous portal venous access was obtained transhepatically under ultrasound guidance and confirmed fluoroscopically. After imaging and measurements, an 11 mm × 59 mm GORE VIABAHN stent (W. L. Gore & Associates, Flagstaff, AZ, USA) was deployed across the collapsed SMV segment. Post-deployment angioplasty restored patency and blood flow. The tract was closed with a 10 mm Abbott Amplatzer plug (Abbott Laboratories, Abbott Park, IL, USA), and embolization with a mixture of TruFill n-butyl-2-cyanoacrylate (n-BCA) (Codman Neuro, Raynham, MA, USA) and Lipiodol (Guerbet, Villepinte, France) was performed (Fig. 4). The patient was transferred to the intensive care unit (ICU) in stable condition.

During recovery, repeat surgeries revealed an exposed portion of the stent through the vessel wall, though no active bleeding was noted (Fig. 5). Subsequent CT imaging confirmed a patent SMV stent without active bleeding but with persistent hyperdense material indicative of ongoing hemorrhage and perihepatic fluid collections (Fig. 6). The patient later underwent embolization of a right ileocolic artery branch for angiographically evident extravasation.

Despite these interventions, the patient's clinical course was further complicated by septic shock, multiorgan failure, and severe metabolic acidosis, culminating in cardiac arrest and death.



**Fig. 2** – A 41-year-old male diagnosed with necrotizing pancreatitis. (A) CT angiogram showing interval increase in size of the peripancreatic collection with mass effect and a focus of arterial hyperenhancement concerning for pseudoaneurysm (arrow). (B) Digital subtraction angiogram of the celiac artery shows dorsal pancreatic artery arising directly from the celiac trunk with a distal pseudoaneurysm (arrow). (C) A more selective DSA of the dorsal pancreatic artery showing the pseudoaneurysm. (D) Postglue embolization DSA of the celiac artery showing complete embolization of the dorsal pancreatic artery.

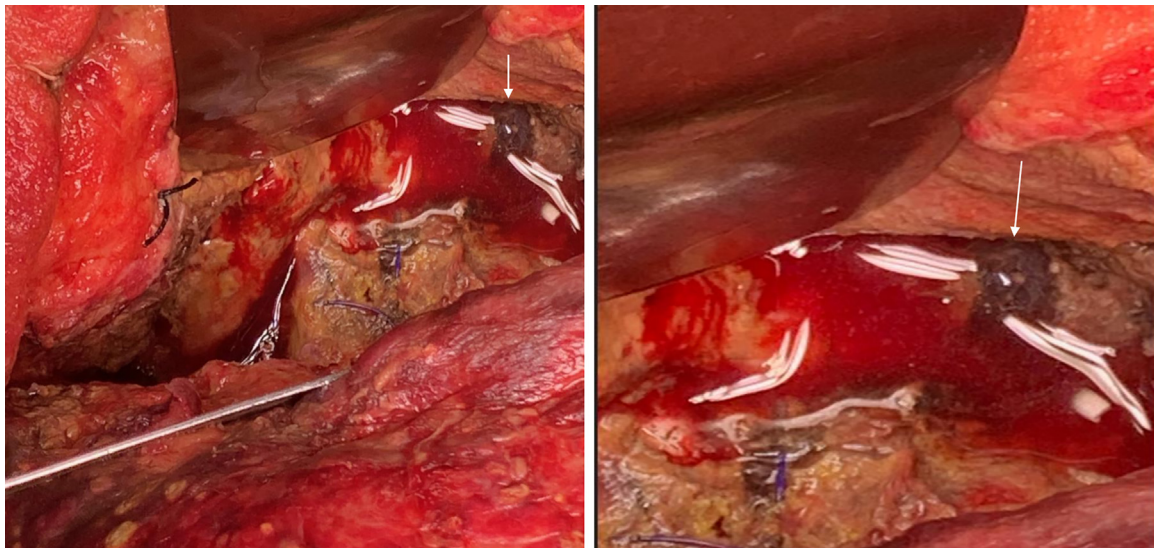


**Fig. 3** – A 41-year-old male diagnosed with necrotizing pancreatitis. (A) Axial and coronal (B) CT venogram showing a large hemorrhagic peripancreatic collection with evidence of surgical packing. The portal vein is degenerative but patent. The proximal SMV is not clearly visualized (arrow). Hematoma anterior to the IVC at the portacaval region (\*).





**Fig. 4** – A 41-year-old male diagnosed with necrotizing pancreatitis and hemorrhage. (A) Transhepatic portal venogram showing abrupt termination of the central segment of the SMV (arrow) including inflow into the portal vein with delayed and faint opacification the portal vein (\*) and a compressed central area. (B) Post stenting venogram showing a patent SMV and portal vein (arrow) and re-established portal flow (\*). (C) Post transhepatic tract closure venogram using a vascular plug (arrow) and glue.



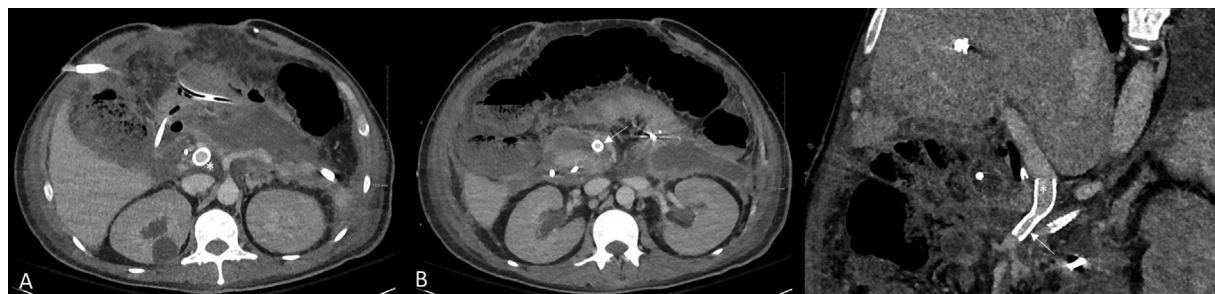
**Fig. 5** – A 41-year-old male diagnosed with necrotizing pancreatitis and hemorrhage from the SMV status post endovascular stent grafting of the SMV. Intraoperative observation of an exposed 0.5 cm segment of the stent off an SMV wall defect (arrows), without active bleeding.

## Discussion

Necrotizing pancreatitis (NP) carries a high mortality rate, reaching up to 15%, with severe vascular complications worsening outcomes [2]. Hemorrhagic pancreatitis is rare but devastating, increasing mortality to as high as 80% [3]. Vascular injuries associated with pancreatitis are primarily arterial, including pseudoaneurysms and arterial wall erosion. Venous injuries, particularly involving major mesenteric vessels like the SMV, are exceedingly rare.

Pancreatic enzymes such as elastase and phospholipase can auto-digest adjacent tissues, including vascular walls. The proximity of the pancreas to major vessels like the SMV, portal vein, and splenic vein predisposes these structures to injury during severe pancreatitis. While arterial injuries are more commonly reported due to higher pressures, venous erosion can cause life-threatening hemorrhage. The rarity of venous injuries and lack of standardized management protocols complicate their treatment.

Endovascular techniques have transformed the management of vascular complications, particularly in high-risk



**Fig. 6 – A 41-year-old male diagnosed with necrotizing pancreatitis and hemorrhage status post-SMV stent grafting. (A,B) Axial and (C) Coronal reconstruction images of a contrast enhanced CT scan demonstrating a patent stent within the portal vein (\*) extending into the SMV in a tapered fashion (arrow).**

patients. While arterial pseudoaneurysms are frequently treated with coil embolization or stenting, venous stenting remains less well-defined, with limited reported cases involving the portal or splenic veins (4–8). This case is the first to describe SMV stenting for venous erosion in NP.

This case illustrates the importance of early recognition of vascular injuries, multidisciplinary management, and the potential role of endovascular stenting. Further studies are needed to assess long-term outcomes of venous stent grafting, particularly in the inflammatory milieu of NP.

## Conclusion

This case demonstrates the successful use of SMV stent grafting to control life-threatening hemorrhage in necrotizing pancreatitis with venous erosion. Mesenteric venous injuries are rare but significant complications in severe pancreatitis. Endovascular stenting offers a promising therapeutic option, emphasizing the need for early recognition, multidisciplinary collaboration, and innovative interventions in managing these critically ill patients.

## Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used Chat GPT in order to assist with editing and improving clarity. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

## Patient consent

Informed consent was obtained from the patient's next of kin for participation in this case report, and all patient information has been de-identified to maintain confidentiality.

## REFERENCES

- [1] Kalas MA, Leon M, Chavez LO, Canalizo E, Surani S. Vascular complications of pancreatitis. *World J Clin Cases* 2022;10(22):7665–73.
- [2] Maatman TK, Zyromski NJ. Management of necrotizing pancreatitis. *Adv Surg* 2022;56(1):13–35.
- [3] Navlani LL, Verma A, Meshram R, Vaibhav V, Parate SV. Challenges in diagnosing sudden death caused by acute hemorrhagic pancreatitis: an autopsy-based case report. *Cureus* 2023;15(11):e49500.
- [4] Ko HS, Anders M, Deihl S, Dominguez E, Lohr M, Duber C. Portal vein erosion and acute abdominal hemorrhage as a complication of acute pancreatitis. *Abdominal Imaging* 2003;28(5):700–2.
- [5] Charvat F, Maskova J, Belina F, Buric I, Lacman J, Fuksa Z, et al. Portal vein erosion: a rare hemorrhagic complication of acute pancreatitis treated by percutaneous stent-graft placement. *J Vasc Interv Radiol* 2010;21(3):411–12.
- [6] Wan Z, Shen B, Cen D, Yu H, Cai X. Minimally invasive treatment for severe acute pancreatitis with superior mesenteric vein and common bile duct stenosis: a case report and review of the literature. *Pancreas* 2019;48(8):e61–3.
- [7] Schaible R, Textor J, Decker P, Strunk H, Schild H. Transjugular portal venous stenting in inflammatory extrahepatic portal vein stenosis. *Cardiovasc Intervent Radiol* 2002;25(6):530–2.
- [8] Covello B, Miller J, Fourzali R. Splenic vein stenting for recurrent chylous ascites in sinistral portal hypertension: a case report. *CVIR Endovasc* 2021;4(1):26.