



# Embolization of a Bleeding Duodenal Arteriovenous Malformation with a Conformable Embolic Material (Obsidio): Case Report

Kalei Hering<sup>1</sup> Patrick Sutphin<sup>2</sup> Sanjeeva Kalva<sup>3</sup>

<sup>1</sup> Harvard Medical School, Boston, Massachusetts, United States

<sup>2</sup> Division of Interventional Radiology, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts, United States

<sup>3</sup> Division of Interventional Radiology, Department of Radiology, University of Texas Southwestern, Dallas, Texas, United States

**Address for correspondence** Kalei Hering, BS, Harvard Medical School, 25 Shattuck St., Boston, MA 02114, United States (e-mail: kalei\_hering@hms.harvard.edu).

J Clin Interv Radiol ISVIR

## Abstract

We report a case of duodenal arteriovenous malformation (AVM) that was successfully treated with a conformable embolic material. A 69-year-old woman presented with acute gastrointestinal bleeding with associated hemodynamic instability. Computed tomography demonstrated active bleeding from the duodenum. Endoscopy showed angioectasia in the duodenum and small bowel. Angiography revealed a simple, but actively bleeding AVM in the duodenum fed by the inferior pancreaticoduodenal artery, a nidus, and an outflow vein that drained into the portal vein. A conformable embolic material (Obsidio) was utilized to occlude the nidus and the feeding artery, resulting in hemodynamic stability and complete occlusion of the AVM.

## Keywords

- conformable embolic
- embolization

## Introduction

Arteriovenous malformation (AVM) is a rare cause of gastrointestinal bleeding (GIB) and usually results in lower GIB due to its occurrence in the small bowel. It is commonly treated with surgical resection of the involved bowel segment. Embolization is performed with liquid embolic materials either preoperatively or as a definitive therapy.<sup>1</sup> Duodenal AVMs are rare and are often associated with hereditary hemorrhagic telangiectasia.<sup>2</sup> Initial diagnosis may be feasible on endoscopy, but angiography is definitive and allows therapy with embolic materials.<sup>3</sup> We report a case of duodenal AVM that is treated with a conformable embolic material.

## Case Presentation

A 69-year-old woman with systemic sclerosis complicated by esophageal stenosis presented to the emergency department with acute hematemesis, tachycardia, and hypotension. She had recently undergone endoscopy with esophageal dilation

and cautery for bleeding AVMs, and was found to have diffuse angioectasia in the distal duodenum and small bowel. Laboratory values showed a drop in hemoglobin from 10.3 to 9.2 g/dL, and a computed tomography (CT) scan revealed active extravasation from the duodenum (► **Fig. 1**). Emergent endoscopy was performed, and an arterial feeder of the duodenal AVM was clipped, but the patient experienced persistent bleeding, prompting catheter angiography to evaluate the need for embolization.

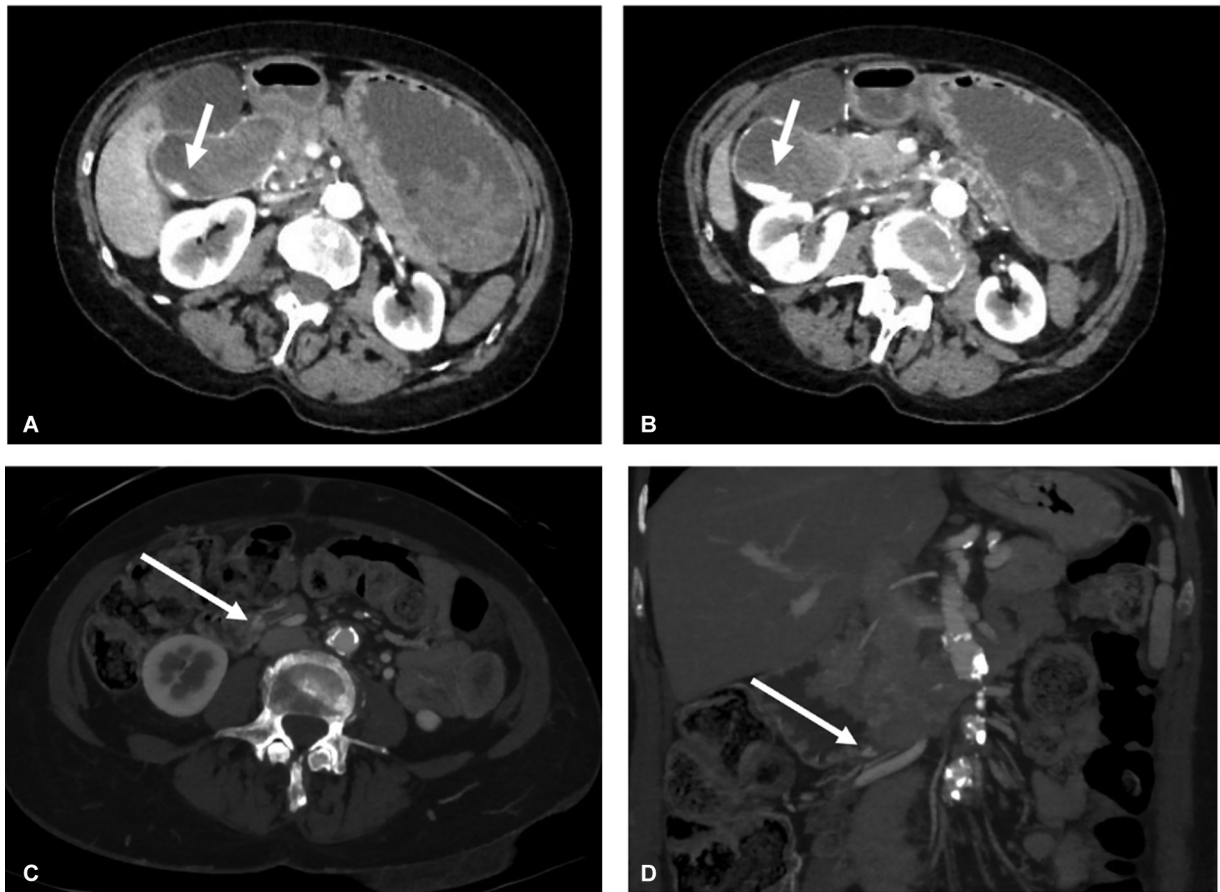
Digital subtraction angiography (DSA) of the celiac artery and the gastroduodenal artery demonstrated no active extravasation, pseudoaneurysm, or AVM. DSA of the superior mesenteric artery (SMA) revealed an actively bleeding AVM in the second portion of the duodenum fed by the inferior pancreaticoduodenal artery (IPDA; ► **Fig. 2A**). Super-selective angiography of the IPDA with a microcatheter confirmed the duodenal AVM with active extravasation (► **Fig. 2B**). The microcatheter was advanced to the nidus of the AVM. The nidus and the feeding artery were embolized with 1 mL of conformable gel embolic material (Obsidio) (► **Video 1**).

DOI <https://doi.org/10.1055/s-0045-1801868>.  
ISSN 2457-0214.

© 2025. The Author(s).

This is an open access article published by Thieme under the terms of the Creative Commons Attribution License, permitting unrestricted use, distribution, and reproduction so long as the original work is properly cited. (<https://creativecommons.org/licenses/by/4.0/>)

Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India



**Fig. 1** (A, B) Axial computed tomography image of a 69-year-old woman with systemic sclerosis demonstrates hyperdense layering of contrast (white arrows) in the proximal D1 and D2 segments of the duodenum, consistent with active gastrointestinal bleeding secondary to angioectasia. Duodenal arteriovenous malformation (white arrows) is visualized on (C) axial and (D) coronal MIP images (3.8 mm) obtained 3 years prior with no evidence of active extravasation. MIP, maximal intensity projection.

Embolic material distributed into the nidus, proximal venous segment, and the arterial feeder, leading to complete occlusion of the AVM (→Fig. 2C). Repeat SMA angiography demonstrated no residual filling of the AVM and no active extravasation (→Fig. 2D). The patient remained hemodynamically stable, and she was discharged on postoperative day 6.

#### Video 1

Selective embolization of duodenal AVM with conformable gel embolic (Obsidio). Online content including video sequences viewable at: <https://www.thieme-connect.com/products/ejournals/html/10.1055/s-0045-1801868>.

## Discussion

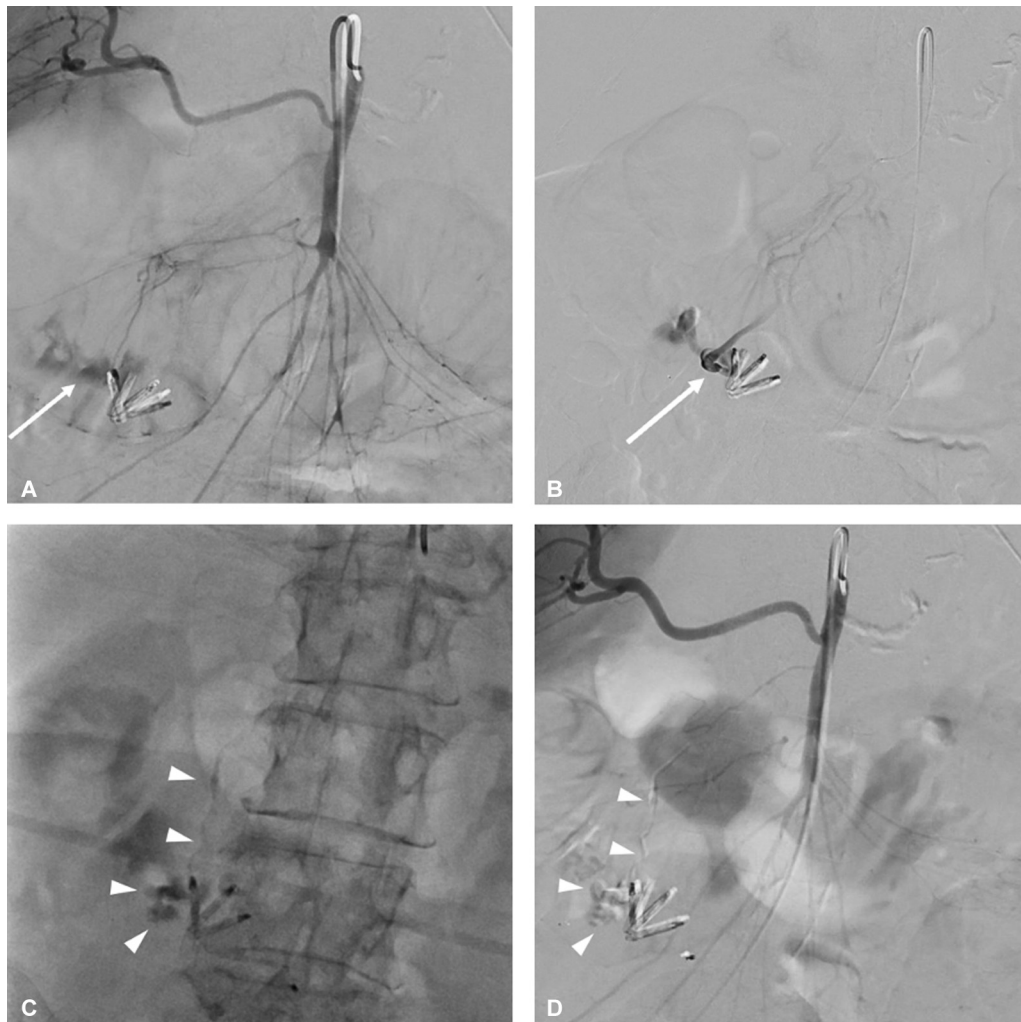
Duodenal AVMs are a rare but important cause of GIB. Thus, their management requires careful consideration of embolic options.<sup>1</sup> While coils are commonly used in the treatment of arterial bleeders and pseudoaneurysms, their role in AVMs is limited by difficulties in achieving complete occlusion, especially in small or tortuous vessels. Moreover, coils may not

provide the level of precision and durability required for optimal AVM management.<sup>2,4</sup>

For AVMs, where the goal is often not just to control hemorrhage but also to occlude the nidus without compromising surrounding healthy tissue, liquid embolic materials offer unique advantages. Liquid embolic materials, such as n-butyl cyanoacrylate (NBCA) and ethylene vinyl alcohol (EVOH), have been used with success in AVM embolization, offering superior flow control and the ability to penetrate small, tortuous vessels. However, these materials can be technically challenging, as they are prone to issues such as premature polymerization, catheter occlusion, or off-target embolization, particularly in high-flow systems such as duodenal AVMs.<sup>4</sup>

Obsidio is a newer, conformable embolic material offering advantages over traditional liquid embolics in AVM treatment. It behaves like a liquid in the microcatheter, becoming solid-like upon deployment due to shear-thinning properties, allowing for easier flow under pressure and stable occlusion once released. This unique behavior enables rapid, stable hemostasis, especially in technically challenging distal vessels.<sup>4</sup> These properties make Obsidio a good choice for complex AVMs, especially when the nidus is catheterized.

Obsidio offers several advantages over NBCA in embolizing duodenal AVMs, particularly in smaller, tortuous vessels where



**Fig. 2** (A) Superior mesenteric angiogram demonstrating an actively bleeding arteriovenous malformation (AVM) in the second portion of the duodenum fed by the inferior pancreaticoduodenal artery (IPDA), with active extravasation at the site of previously placed clips (*white arrow*). (B) Selective IPDA angiogram, *white arrow* at the site of clips. (C) Selective embolization of the IPDA with Obsidio (*white arrowheads*). (D) Postembolization superior mesenteric artery (SMA) angiogram demonstrating no filling of AVM.

NBCA can be difficult to control and carries a risk of reflux or off-target embolization. Obsidio is a conformable material that does not stick to the catheter and allows for modified penetration with injection force, providing more control. However, the Food and Drug Administration (FDA) has issued a warning about an increased risk of ischemia when using Obsidio for GIB, highlighting the need for careful patient selection and precise technique.<sup>5</sup> Despite this caution, Obsidio remains a valuable tool for managing AVMs, especially when distal access is challenging or other embolic agents are less effective.

## Conclusion

This case highlights the evolving role of conformable embolic materials like Obsidio in the management of duodenal AVMs. The ability to achieve rapid and durable hemostasis, particularly in complex or small vessels, makes Obsidio a valuable option for embolization in the cases where distal access is difficult or impossible. Compared with traditional embolic materials such as coils or NBCA, Obsidio offers distinct advantages, particularly in terms of flow control, precision, and long-term occlusion.

## Authors' Contributions

K.H. had full access to all of the patient data in the study and takes responsibility for the integrity and the accuracy. K.H., P.S., and S.K. contributed substantially to the study design, data analysis and interpretation, and writing of the manuscript.

## Funding

None.

## Conflict of Interest

None declared.

## References

- 1 Gordhan AD, Newey CR, Wong G, Wieland J. N-butyl cyanoacrylate embolization of small bowel arteriovenous malformation presenting with acute massive lower gastrointestinal hemorrhage. *J Vasc Interv Radiol* 2008;19(11):1669–1670
- 2 Inouye P, Marcon N, Pugash RA, Hyland RH, Faughnan ME. Embolization of a duodenal arteriovenous malformation in hereditary hemorrhagic telangiectasia: case report and

- review of the literature. *Can J Gastroenterol* 2003;17(11):661–665
- 3 Mathew S, Zacharias P, Kumar L, Mathews J, Menon P, Philip M. Duodenal arteriovenous malformation: endosonographic diagnosis and coil embolization. *Endoscopy* 2016;48(S 01):E378–E379
- 4 Avery RK, Albadawi H, Akbari M, et al. An injectable shear-thinning biomaterial for endovascular embolization. *Sci Transl Med* 2016;8(365):365ra156
- 5 U.S. Food and Drug Administration. Vascular embolization device correction: Boston Scientific updates use instructions for Obsidio conformable embolic for increased ischemia risk when used for GI bleeding. U.S. Food and Drug Administration; 2023. Accessed November 7, 2024 at: <https://www.fda.gov/medical-devices/medical-device-recalls/vascular-embolization-device-correction-boston-scientific-updates-use-instructions-obsidio>