

Delayed Distal Splenic Artery Stump Pseudoaneurysm After Splenectomy for Blunt Trauma Successfully Treated with NBCA – Lipiodol Embolization: A Case Report

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Abstract:

Background: Splenic artery pseudoaneurysm (SAP) is a rare but potentially fatal vascular consequence of trauma, iatrogenic or postoperative arterial damage, and pancreatitis. Regardless of diameter, a pseudoaneurysm presents a clinically significant risk of rupture because it lacks a full three-layer arterial wall, unlike a true aneurysm. Diagnosis and treatment planning heavily rely on catheter angiography and cross-sectional arterial-phase imaging. **Case presentation:** A 56-year-old man who had a splenectomy for traumatic abdominal injuries was readmitted around three to four weeks later. He developed giddiness, widespread weakness, and continuous drain output of about 400 mL. Contrast-enhanced CT showed postoperative splenic-bed changes with a centrally located vascular-enhancing focus consistent with a splenic artery pseudoaneurysm with partial thrombosis. A distal splenic artery stump pseudoaneurysm of about 18 × 20 × 20 mm was seen by selective celiac and splenic angiography. There was no active extravasation of contrast. N-butyl cyanoacrylate (NBCA; Histoacryl) was combined with Lipiodol in a 1:2 ratio (33% NBCA) to superselectively catheterize and embolize the feeding distal stump. Superior mesenteric artery angiography showed no retrograde filling through pancreatic collaterals, and completion celiac angiography revealed total exclusion. There were no immediate procedural issues. **Conclusion:** This case illustrates a rare delayed post-splenectomy splenic artery stump pseudoaneurysm and shows the value of liquid embolic treatment when detachable coils are unavailable and rapid, definitive occlusion is needed. Complete celiac and superior mesenteric angiography confirmed antegrade and collateral exclusion.

Keywords: NBCA; Histoacryl; Lipiodol; transcatheter arterial embolization; splenic artery pseudoaneurysm; splenectomy; blunt abdominal trauma; visceral artery pseudoaneurysm

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1. INTRODUCTION:

A focused circumscribed arterial rupture known as splenic artery pseudoaneurysm occurs when the adventitia and surrounding tissues, rather than all of the original arterial wall layers, restrict blood. Acute or chronic pancreatitis, severe or penetrating trauma, percutaneous or surgical iatrogenic damage, cancer, and less frequent arteriopathies are among the etiologies. Because pseudoaneurysm size cannot accurately predict rupture risk due to the wall's structural deficiency, detected SAPs are often taken into consideration for therapy rather than monitoring alone⁴⁻⁵.

In carefully chosen patients, the treatment of traumatic splenic vascular damage now focuses on endovascular and organ-preserving techniques. For active arterial bleeding, pseudoaneurysm, arteriovenous fistula, and some high-grade traumas, modern studies place a strong emphasis on catheter angiography and splenic artery embolization. Despite having previously had a splenectomy, the current patient.

For a residual artery stump pseudoaneurysm, the same endovascular principles apply: locate the feeding segment, rule out the lesion entirely, and investigate any collateral channels that can cause recurrent or permanent filling^{1, 2, 3} coils, vascular plugs, gelatin sponge, particles, liquid agents like NBCA, and covered stent grafts in certain anatomies are examples of embolic alternatives. When coils are not accessible, the target is tiny or convoluted, or quick permanent occlusion is required, NBCA is especially helpful. Precise microcatheter placement, avoiding early polymerization, cautious glue concentration selection, and prompt catheter extraction following injection to prevent adhesion are the main technical requirements^{3, 5, 7}.

We describe the effective treatment of a delayed distal splenic artery stump pseudoaneurysm after splenectomy for blunt abdominal trauma with superselective NBCA–Lipiodol embolization, with angiographic confirmation of the absence of residual antegrade and retrograde filling. Because postoperative bleeding can be sporadic, stump pseudoaneurysm following splenectomy is uncommon, and the lack of active extravasation at angiography does not rule out a hazardous pseudoaneurysm, the case is clinically significant^{8, 9, 6}.

2. CASE PRESENTATION:

On July 4, 2026, a 56-year-old male with hypertension undergoing cilnidipine treatment arrived to the hospital following a recent splenectomy due to traumatic abdominal injuries. The splenectomy in early June 2026 is inconsistently dated in the provided documents; so, the period is best characterized as around three to four weeks. He reported widespread weakness, giddiness, and a continuous 400 mL abdominal drain output. Chronic drinking and smoking are also noted in the discharge record. Upon evaluation, he was lucid, cooperative, aware, and compliant with instructions. His recorded vital signs upon discharge were 140/80 mmHg for blood pressure, 86 beats per minute for pulse, 22 breaths per minute for respiration, 98.7°F for temperature, and 98% oxygen saturation on room air.

A respiratory examination revealed bilateral air entrance, a cardiovascular test revealed normal heart sounds, and the abdomen was soft and not sensitive.

The clinical setting elevated the possibility of a splenic-bed vascular problem following surgery. On July 4, 2026, a contrast-enhanced CT scan revealed a non-enhancing hypodense lesion in the splenic bed with a centrally intensely enhancing arterial-phase focus, reported as a splenic artery pseudoaneurysm with thrombosis, irregular enhancing soft tissue interpreted as residual splenic parenchyma, and postsplenectomy changes. Additionally, an ectopic right

kidney in the right iliac fossa and a large pancreas with anterior renal fascial thickening - interpreted as pancreatitis or postoperative change - were noted in the record.

2.1 DIAGNOSTIC ASSESSMENT

Parameter	Finding
Clinical trigger	Persistent postoperative drain output (~400 mL), weakness and giddiness after splenectomy
CECT abdomen	Postoperative splenic-bed changes with centrally arterial-enhancing focus compatible with pseudoaneurysm and partial thrombosis
Angiographic location	Residual distal splenic artery stump
Pseudoaneurysm size	Approximately 18 × 20 × 20 mm
Parent artery diameter	Approximately 4 – 5 mm
Active extravasation	Not demonstrated during angiography
Collateral assessment	Small pancreatic collaterals present; no definite retrograde pseudoaneurysm filling
Definitive test	Selective celiac and splenic artery angiography

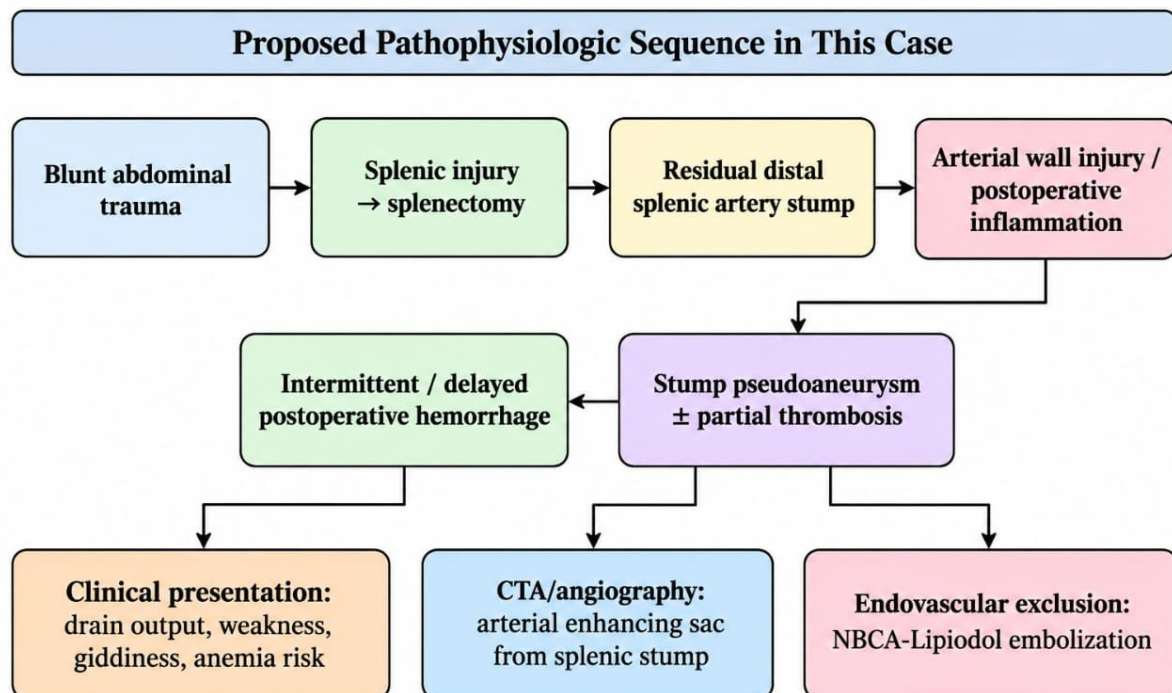


Figure 1. Proposed pathophysiologic sequence from blunt trauma and splenectomy to delayed splenic artery stump pseudoaneurysm and endovascular exclusion.

2.2 LABORATORY DATA

Instead of a comprehensive machine-generated laboratory report, the clinical record includes handwritten investigation charts. No laboratory result was created in order to maintain data integrity. Uncertain values were purposefully avoided; only values that were easily readable were recorded.

Date	Test	Documented value	Interpretation / comment
09 Jul 2026	Hemoglobin	9.3 g/dL	Anemia documented late in admission
09 Jul 2026	Sodium	141 mmol/L	Within typical reference range
09 Jul 2026	Potassium	3.4 mmol/L	Mildly low/borderline low
09 Jul 2026	Chloride	101 mmol/L	Within typical reference range
Admission course	Other CBC/biochemistry values	NR in a sufficiently clear form for reliable transcription	Not fabricated

2.3 ENDOVASCULAR TREATMENT

On July 6, 2026, the patient received endovascular therapy by right common femoral artery access under ultrasound guidance utilizing a 6F vascular sheath following informed high-risk consent and cardiac clearance. Celiac angiography was performed using a 5F celiac catheter (RDC/Cobra). A 2.7F microcatheter and microwire were used to conduct superselective catheterization of the distal splenic artery stump.

An approximately $18 \times 20 \times 20$ mm pseudoaneurysm originating from the distal remaining splenic artery stump was seen by selective celiac and splenic artery angiography. The parent vessel was around 4-5 mm in size. The pseudoaneurysm itself was a structurally unstable vascular lesion that needed to be excluded even though there was no active contrast extravasation^{4,5}.

There were no detachable coils available. As a result, the microcatheter was placed close to the pseudoaneurysm in the distal splenic artery stump. NBCA (Histoacryl) was combined with Lipiodol in a 1:2 ratio to create a 33% NBCA combination after the microcatheter was flushed with 5% dextrose. Under constant fluoroscopic surveillance, glue was gradually administered until the supplying distal stump was completely occluded. After birth, the microcatheter was taken out right away. This method is in line with previous experience demonstrating that, when liquid embolization is technically suitable, cyanoacrylate can quickly and permanently occlude splenic artery pseudoaneurysms^{6, 7, 10}.

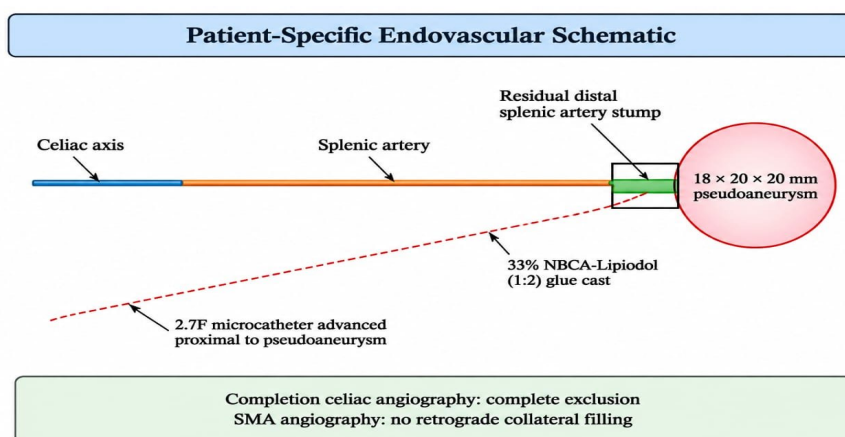


Figure 2. Patient-specific schematic of the residual distal splenic artery stump pseudoaneurysm and NBCA – Lipiodol embolization strategy.

2.4 COMPLETION ANGIOGRAPHY AND OUTCOME

Total exclusion of the pseudoaneurysm and total blockage of the distal splenic artery stump were shown by completion selective celiac angiography, which also showed no substantial glue reflux into major pancreatic branches or residual filling. Superior mesenteric artery angiography was next carried out because pancreatic collaterals may reconstruct distant splenic arterial segments. This procedure revealed no retrograde filling of the pseudoaneurysm. The case's dual-territory certification is a crucial technical aspect.

No immediate complications from the operation were noted. During the hospital stay, the patient got supportive care, gastrointestinal protection, antibiotics, and antihypertensive medicine. An unremarkable post-procedural course was reported. With cilnidipine, pantoprazole, amoxicillin-clavulanate, and symptomatic drugs, he was released on July 9, 2026, in hemodynamically stable condition. A reassessment was recommended one week later.

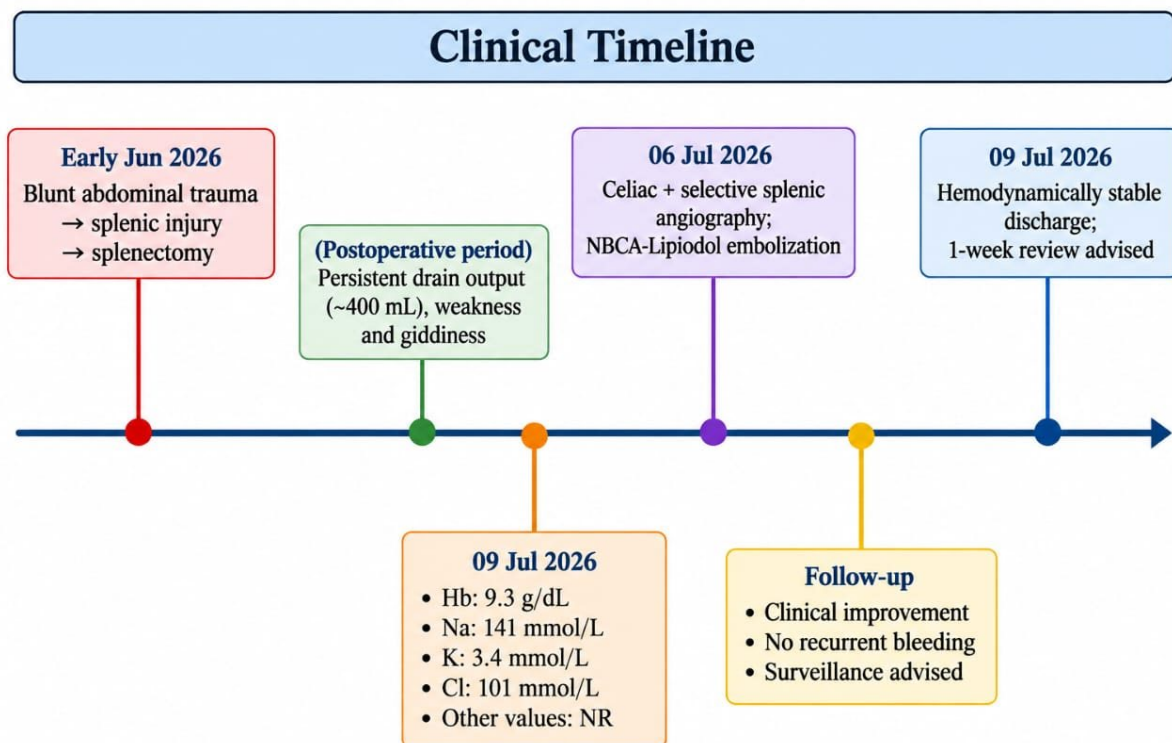


Figure 3. Clinical timeline from traumatic splenic injury and splenectomy to delayed diagnosis, embolization and discharge.

3. DISCUSSION

This case illustrates a delayed vascular problem following splenectomy for traumatic abdominal injuries. A pseudoaneurysm originating from the remaining distal splenic artery stump rather than a real splenic artery aneurysm was the clinically significant lesion. A pseudoaneurysm, which is contained by perivascular tissue or a hematoma, forms when the artery wall is disrupted. Recognized etiologies include trauma and iatrogenic/postoperative damage. A substrate for the development of a delayed pseudoaneurysm might be created by the remaining artery stump being exposed to localized inflammatory changes, mechanical damage, or insufficient vessel-wall repair^{4,5}. The patient's presentation serves as an example of why diagnosing postoperative pseudoaneurysms can be difficult. Instead of spectacular exsanguination, drain flow, weakness, and giddiness may be signs of gradual or sporadic bleeding.

Furthermore, because bleeding may be sporadic or the lesion may be partly thrombosed, angiography may not reveal active extravasation at the time of examination, as was the case in

this case. Therefore, when a pseudoaneurysm is clearly seen, the absence of contrast extravasation should not be regarded as the absence of rupture risk ^{6, 8, 4}.

Because arterial-phase imaging can reveal a focused enhancing sac, connection to the parent artery, thrombus, postoperative collections, and surrounding pancreatic or inflammatory alterations, multiphase CT is crucial. Angiography continues to be used for both diagnosis and treatment. Modern imaging studies place particular emphasis on catheter angiography for final endovascular management and CTA/CECT for treatment planning ^{4, 5}.

Anatomy, clinical stability, collateral circulation, and accessible technologies influence the decision between proximal embolization, distal selective embolization, combination sandwich occlusion, stent grafting, and surgery. While distal embolization targets specific vascular lesions, proximal embolization lowers splenic artery pressure while maintaining collateral perfusion in traumatic splenic damage. In the current postsplenectomy example, complete closure of the remaining stump was suitable because splenic preservation was no longer a target ¹⁻³.

The procedure's use of NBCA instead of coils was a unique feature. When NBCA comes into contact with ionic fluid, it quickly polymerizes and can pass through narrow or convoluted target vessels. It is especially helpful when traditional coils are not accessible or when quick permanent occlusion is needed.

Cyanoacrylate mixes have been demonstrated in published case reports to completely exclude pseudoaneurysms, including traumatic and nontraumatic lesions. Distal penetration and polymerization duration are influenced by NBCA concentration; greater concentrations polymerize faster, whereas more diluted mixes often go further. In this instance, 5% dextrose flushing was followed by a 1:2 NBCA-to-Lipiodol ratio (33% NBCA) ^{6, 7}.

Moreover, liquid embolic agents are dangerous. Depending on collateral routes, non-target embolization may result in pancreatic ischemia, gastric or hepatic ischemia, or inadvertent distant embolization. Polymerization surrounding the microcatheter tip may result in catheter trapping. Therefore, crucial technical procedures include continuous fluoroscopy, a suitable NBCA:Lipiodol ratio, a dextrose flush, regulated injection, and prompt catheter extraction.

Collateral reperfusion, a less evident cause of therapy failure, was also addressed by the method. Although complete superior mesenteric artery angiography revealed no retrograde pseudoaneurysm filling, small pancreatic collateral arteries were seen. The ability of pancreatic arterial arcades to connect with splenic arterial branches makes this significant. Technical success is increased when antegrade exclusion on celiac angiography and the lack of retrograde collateral filling are both shown. Angiography and the lack of retrograde collateral filling boost technical success confidence ^{3, 5}. Splenic artery embolization is a successful treatment for traumatic vascular lesions, according to recent systematic and narrative research. Although rebleeding, infarction, and abscess are still known side effects, a 2024 comprehensive review of splenic angioembolization in blunt trauma found a low overall failure rate.

More recent studies include an emphasis on post-procedure observation, cautious embolic selection, and collateral preservation when splenic salvage is planned ^{1, 2, 3}.

Because the target was a postoperative artery stump and the spleen had previously been surgically removed, this instance is different from the majority of recent cases. Therefore, the aim of treatment was to definitively close a residual arterial lesion that was causing delayed hemorrhagic danger rather than to save the organs. The lack of active angiographic extravasation is especially illuminating in this context because the rationale for therapy was the pseudoaneurysm itself rather than actual bleeding at one point in time ^{8, 10, 9}.

Comparison With Recent Published Case Reports

Report	Etiology	Presentation	Lesion / timing	Treatment	Relevance to present case
[6] Uniyal et al., 2025	Blunt trauma	Delayed post-injury detection	Multiple pseudoaneurysms detected on day 5	Percutaneous/ Gelfoam embolization	Supports delayed vascular injury and need for surveillance
[7] Tonpe et al., 2024	Pseudoaneurysm; nontraumatic clinical setting	Abdominal pain + GI bleeding	Mid-splenic artery PSA	Cyanoacrylate glue embolization	Direct evidence supporting glue as definitive embolic
[8] Almunthin et al., 2024	Blunt trauma	Delayed presentation	Large traumatic SAP	Endovascular embolization	Shows delayed traumatic SAP can be managed endovascularly
[9] Abbas et al., 2024	Pancreatitis	Incidental / symptomatic PSA	Splenic artery PSA	Case-based multimodality management	Highlights pancreatitis association and rupture potential
[10] JVSCIT case, 2024	Chronic pancreatitis	Contained rupture	3.5-cm mid-splenic PSA	Direct thrombin injection + splenectomy after failed endovascular access	Illustrates alternative rescue when standard embolization fails

Evidence Summary From Review Articles

Ref	Review type / year	Key point	Application to this case
[1]	Narrative review, 2024	SAE is established for traumatic vascular lesions including pseudoaneurysm; proximal vs distal strategy is anatomy-dependent.	Supports endovascular control of traumatic splenic vascular injury.
[2]	Systematic review, 2024	SAE has a low overall failure rate; recognized complications include rebleeding, infarction, abscess and access-related events.	Frames expected efficacy and surveillance after embolization.
[3]	Technical review, 2026	Modern SAE requires knowledge of splenic/pancreatic collaterals, embolic selection, access, and post-procedural care.	Supports deliberate collateral interrogation and embolic selection.
[4]	Systematic review, 2024	Pseudoaneurysm treatment should be individualized; endovascular and surgical options depend on anatomy and rupture status.	Supports definitive treatment despite small-to-moderate lesion size.
[5]	Comprehensive review, 2024	Endovascular stent-graft/embolization strategies are effective when anatomy is appropriate; coil embolization remains common.	Provides comparative endovascular context.

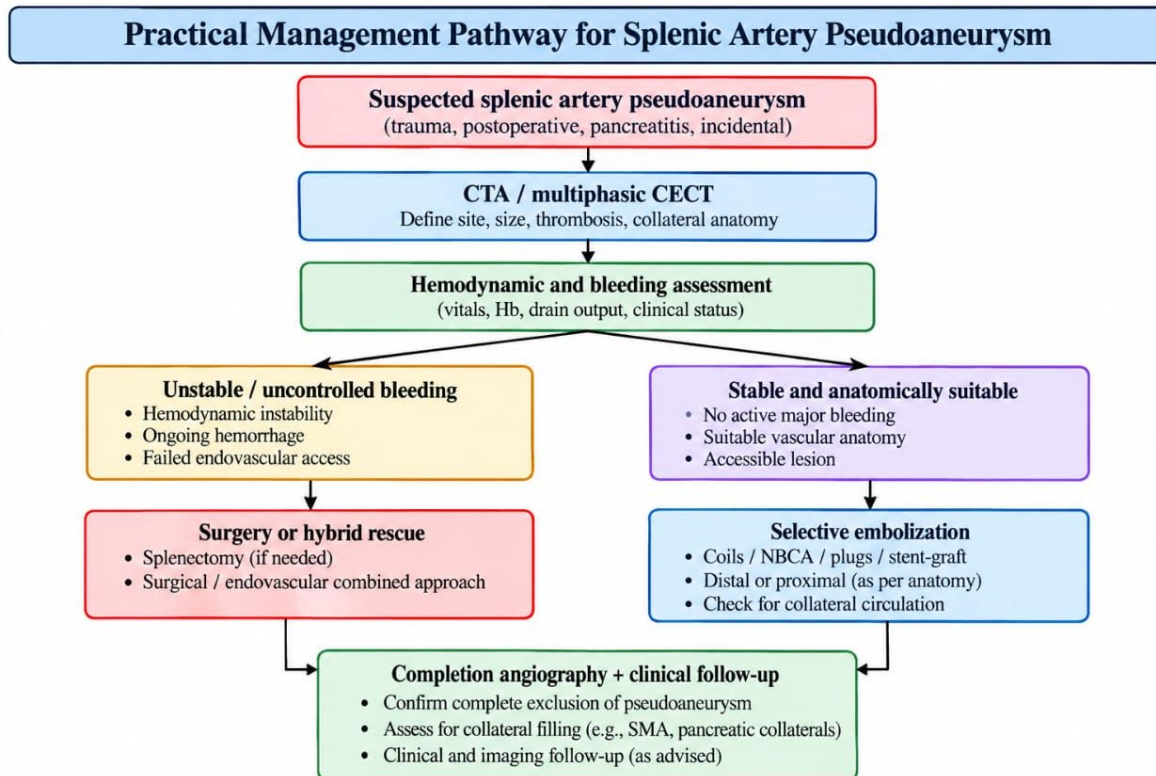


Figure 4. Practical management pathway for suspected splenic artery pseudoaneurysm.

3.1 CLINICAL LESSONS

Even if the patient is not in shock, screening for delayed vascular problems should be prompted by persistent postoperative drain output or unexplained anemia/weakness following splenic surgery. Following splenectomy, an arterial-phase enhancing focus in the splenic bed should raise the possibility of a persistent splenic artery stump pseudoaneurysm. The absence of active extravasation during angiography does not rule out the possibility of pseudoaneurysm rupture because it is linked to wall disruption. When selective catheterization is possible and coils are either unavailable or unsuitable, NBCA–Lipiodol embolization is a helpful, last choice. In this instance, SMA angiography did not include retrograde pancreatic collateral filling; completion angiography should evaluate both direct antegrade flow and likely collateral routes. Invented laboratory data should not be included in clinical records or case reports. Instead of being rebuilt, missing values should be expressly left unreported.

4. LIMITATIONS

This report has limitations since it is based on the hospital record that was provided. The period was stated roughly since the source records do not consistently indicate the precise date of the prior splenectomy. The pictures in this work are explanatory schematics rather than diagnostic images since the supplied imaging data did not contain exportable CT or DSA image series appropriate for publishing. Only easily readable values were recorded, and the laboratory record is largely handwritten and fragmentary. The provided material did not provide longer-term imaging follow-up that demonstrated chronic blockage.

5. CONCLUSION

In conclusion, an uncommon but possibly fatal consequence following splenectomy for traumatic abdominal trauma is delayed splenic artery stump pseudoaneurysm. Catheter

angiography revealed an approximately 18 × 20 × 20 mm pseudoaneurysm of the remnant distal splenic artery stump in this patient due to the combination of persisting postoperative drain output, weakness, and arterial-phase CT abnormalities. Complete angiographic exclusion was accomplished with superselective embolization with 33% NBCA-Lipiodol without any acute complications. The case serves as an example of the need of timely vascular imaging, decisive endovascular treatment, and methodical collateral reperfusion evaluation.

6. PATIENT CONSENT AND ETHICS

In compliance with the target journal's policy, the patient or a legally designated representative must provide written informed consent for the publication of any diagnostic pictures and clinical data. This revision of the manuscript does not include direct identifiers.

7. ACKNOWLEDGEMENT

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8. CLINICAL SOURCE DOCUMENTATION USED

The provided discharge summary, inpatient case-sheet data, and interventional radiology procedure report served as the basis for the case narrative. Information that may be used to identify patients was purposefully left out of the text body.

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