

Treatment of Gastric Varices

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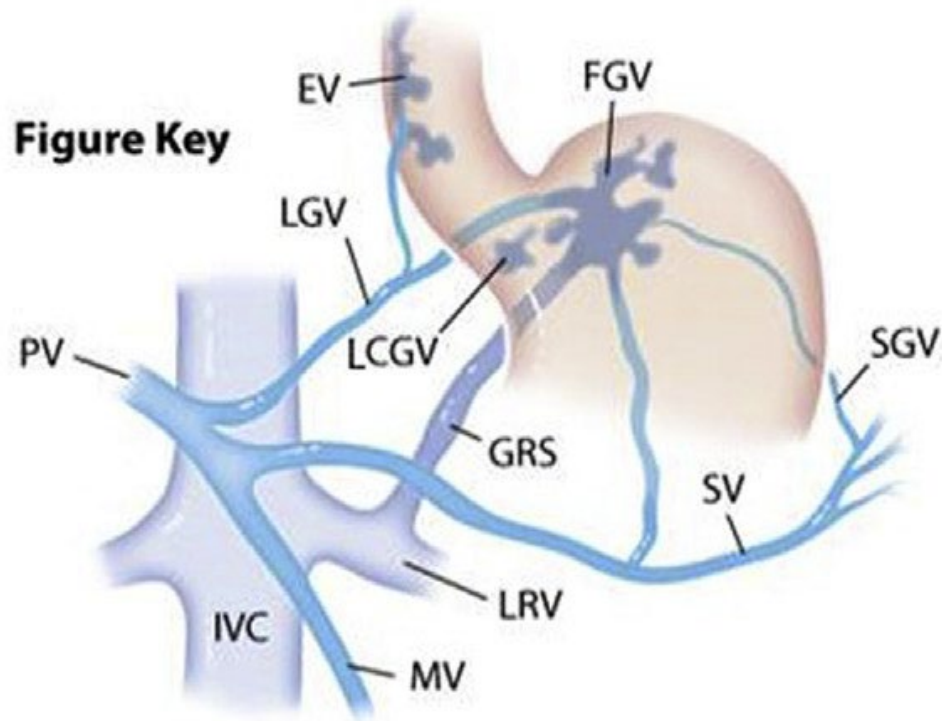
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Disclosures

- Boston Scientific, consultant
- Olympus, consultant
- Cook Medical, consultant

Gastric variceal anatomy and classification

Saad-Caldwell Classification



No standardized practice exists for bleeding gastric varices: the literature is case series, restricted cohorts, and a few small randomized trials, all with real selection bias. The Saad–Caldwell classification (isolated GV vs. gastroesophageal GOV1/GOV2) is the anatomic framework the rest of this evidence is organized around.

Clinical Gastroenterology and Hepatology 2021;19:1098–1107

AASLD 2024: first-line options for acute bleeding

AASLD Practice Guidance 2024

In patients with acute hemorrhage from gastric (GOV2/IGV1) or ectopic varices, either endoscopic cyanoacrylate therapy, TIPS, or retrograde transvenous variceal embolization/obliteration can be considered first-line options. Retrograde obliteration is preferred when TIPS is contraindicated.

Hepatology 79(5):p 1180–1211, May 2024

EUS-guided vs. direct cyanoacrylate injection

	EUS <i>n</i> = 45	DEI <i>n</i> = 44	<i>p</i> -value
Vascular occlusion rates of GV [<i>n</i> (%)]	45 (100.0)	44 (100.0)	1.00
EV disappearance rates (%)	36 (80.0)	32 (72.7)	0.419
Number of sessions to eradicate GV [<i>n</i> (%)]			0.005
1	36 (80.0) ^a	21 (47.7) ^b	
2	6 (13.3) ^a	11 (25.0) ^a	
3	2 (4.4) ^a	3 (6.8) ^a	
4	1 (2.2) ^a	9 (20.5) ^b	
GV rebleed [<i>n</i> (%)]			
Overall	4 (8.9)	10 (22.7)	0.073
Early (< 48 h)	1 (2.2)	0	1.000
Late (> 48 h)	3 (6.7)	10 (22.7)	0.032

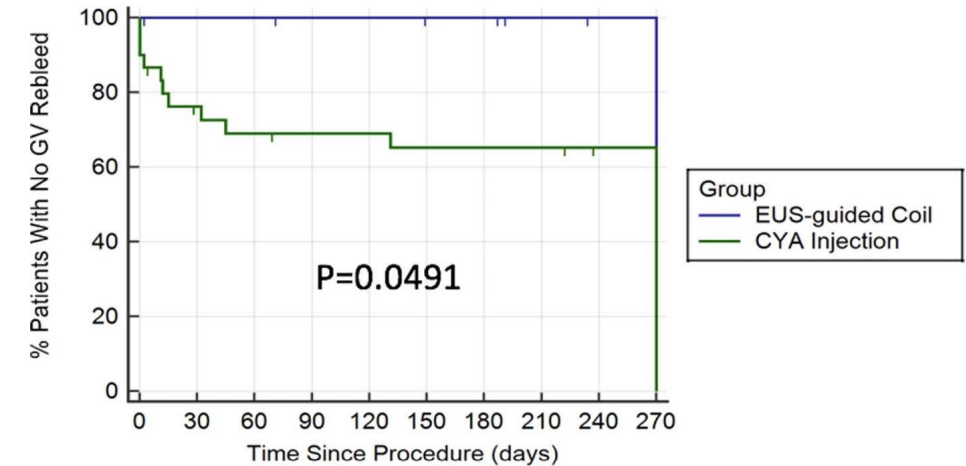
In a randomized trial of 89 patients with GOV1 varices, EUS-guided cyanoacrylate injection needed fewer sessions to eradicate varices and produced less late rebleeding (6.7% vs. 22.7%) and fewer postinjection ulcers (8.9% vs. 27.3%) than direct endoscopic injection — without impairing liver function.

Surg Endosc. 2023 Nov;37(11):8277–8284; PMID: 37674054

EUS coil + gelatin sponge vs. cyanoacrylate

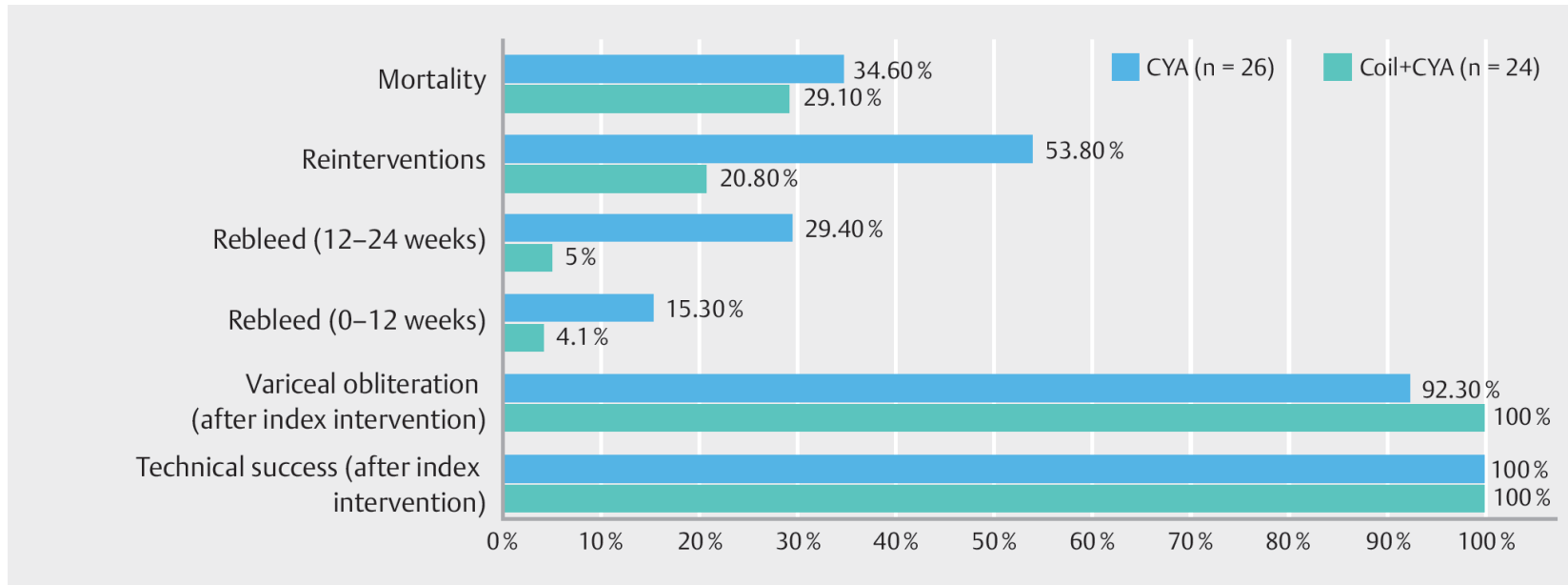
Table 2. Comparison of primary and secondary outcomes

	Coil embolization + gelfoam	CYA injection	P value
No. of patients	10	30	
Mean follow-up time (d) (max 270 d; ended if death, lost to follow-up, or insufficient time passed)	191.4 ± 93.5	224.2 ± 90.6	0.33
Technical success	10 (100%)	29 (97%)	1.0
Initial therapeutic success (i.e., cessation of bleeding at end of endoscopy)	10 (100%)	26 (87%)	0.56
No. of complications	1 (10%)	5 (20%)	0.65
Complications, by type	Persistent abdominal pain (1)	Splenic infarct (1), persistent abdominal pain (1), hemorrhage (3)	
No. of reinterventions	1 (10%)	17 (56%)	0.013



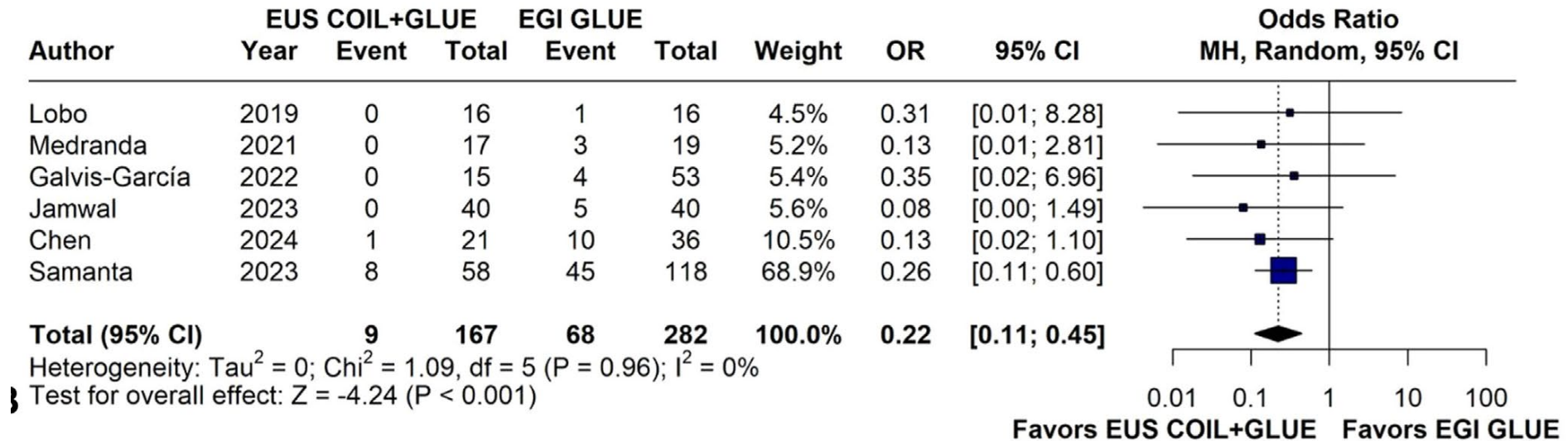
In a matched cohort of 40 patients, EUS-guided coil + gelatin sponge embolization: no patient rebled by 9 months vs. 38% with cyanoacrylate injection, no coil patient needed transfusion for rebleeding (vs. over half of the cyanoacrylate group), and only 10% needed reintervention vs. 60%.

EUS coil + cyanoacrylate vs. cyanoacrylate alone



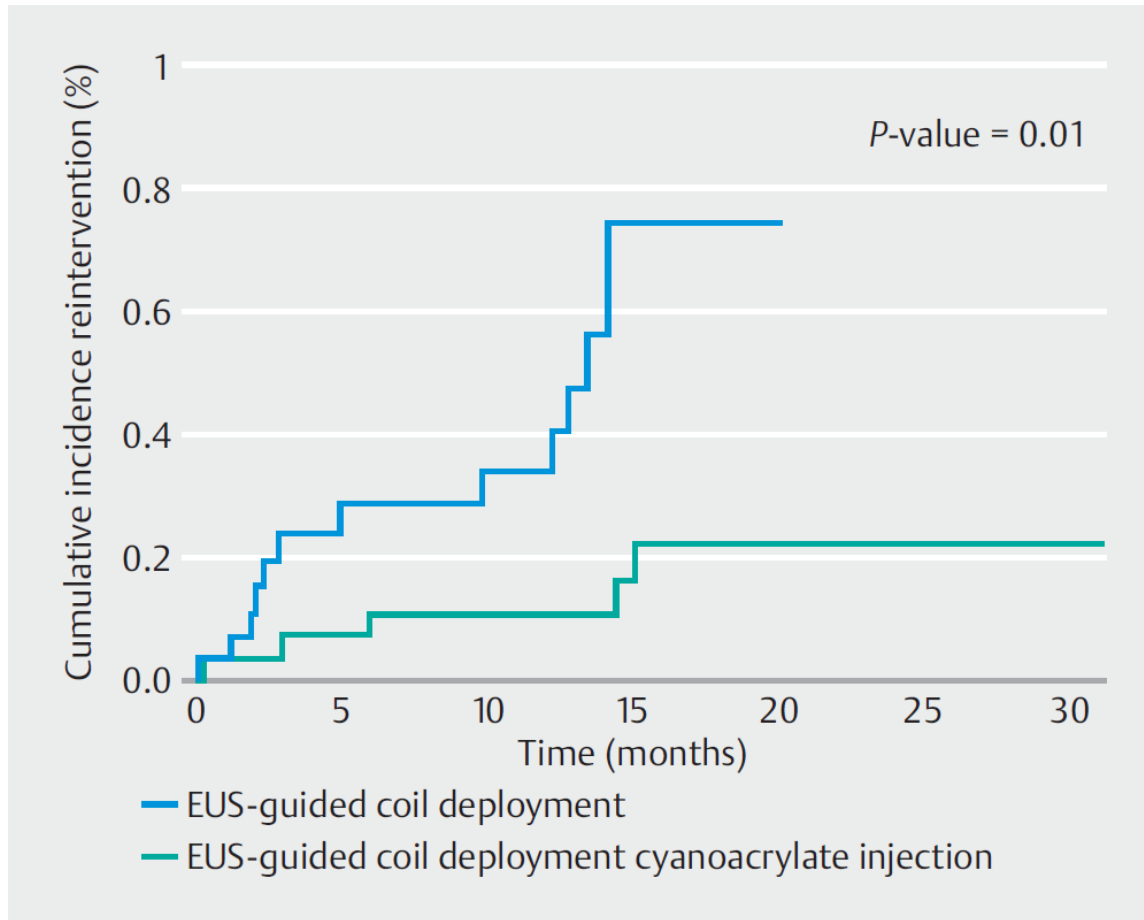
In a 50-patient randomized trial, adding coil embolization to cyanoacrylate roughly halved reintervention (20.8% vs. 53.8%) and improved survival, with comparable obliteration and rebleeding rates between groups.

Meta-analysis: EUS coil + glue vs. direct glue injection



Pooled across 6 studies (445 patients), EUS-guided coil + glue reduced recurrent bleeding (OR 0.22, 95% CI 0.11–0.45) and reintervention (OR 0.29) compared with direct endoscopic glue injection, with no difference in pulmonary embolism, technical success, or mortality.

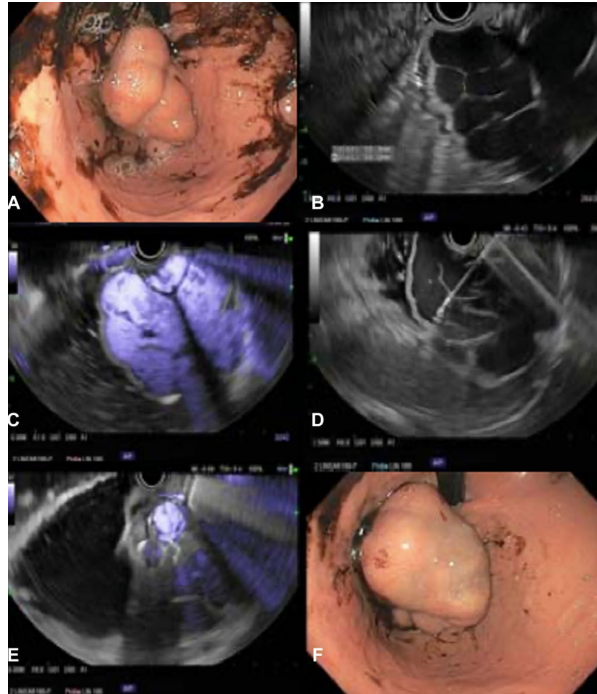
EUS coil + cyanoacrylate vs. coil embolization alone



In a 60-patient randomized trial, combined coil + cyanoacrylate produced immediate variceal disappearance in 86.7% of patients vs. 13.3% with coils alone, with less rebleeding (3.3% vs. 20%) and a much higher rate of freedom from reintervention (83.3% vs. 60%).

Endoscopy. 2020 Apr;52(4):268–275; PMID: 32126576

First U.S. multicenter experience with EUS-COIL



Measure	Value
Primary outcome	
Technical success	106/106 (100)
Clinical success	94/106 (88.7)
Adverse events	
Intraprocedural	2 (1.8)
Active bleeding from puncture site	1 (0.9)
Systemic embolization	1 (0.9)
Postprocedural	5 (4.7)
Transient fever	3 (2.8)
Abdominal pain	1 (0.9)
Systemic embolization	1 (0.9)
Secondary outcomes	
Recurrent bleeding rate	15 (14.2)
Re-intervention rate	
EUS-COIL	12/15 (80.0)
IR guided therapies	3/15 (20)
Surveillance EUS (n)	63 (59.4)
Time to surveillance, days	75 ± 66
GV obliteration or reduction in Doppler flow at surveillance (n)	47/63 (74.6)
Follow-up, days	283 ± 325

Across 106 patients at 10 U.S. centers, EUS-guided coil embolization achieved 100% technical success and 88.7% clinical success. Recurrent bleeding occurred in 14.1%, and most of those patients were successfully re-treated with a repeat EUS-guided procedure.

Gastrointest Endosc 2024 Jan;99(1):31–37

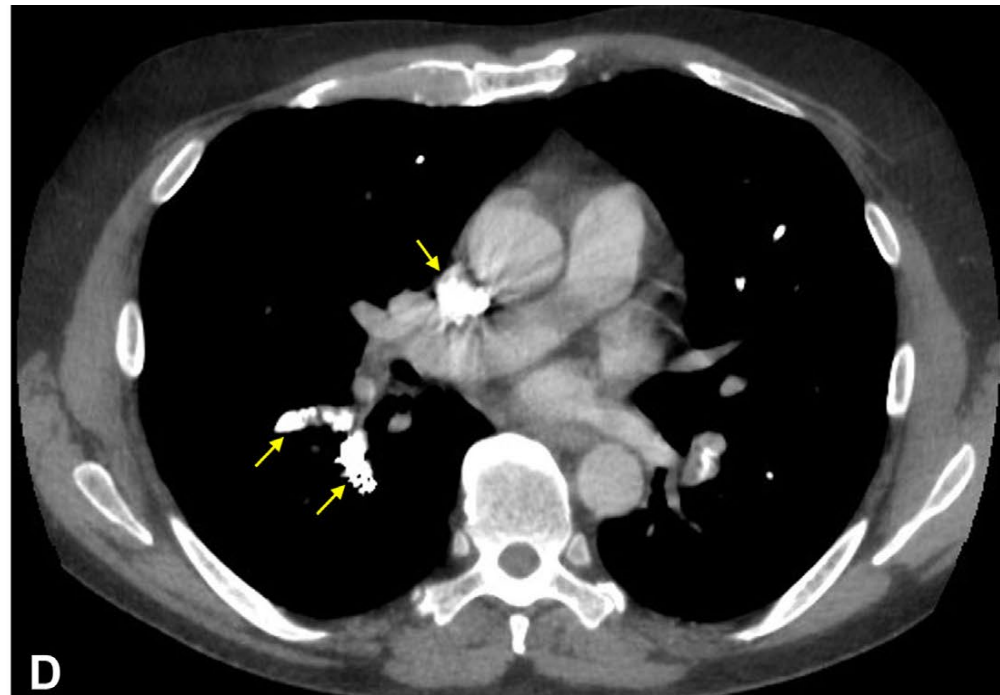
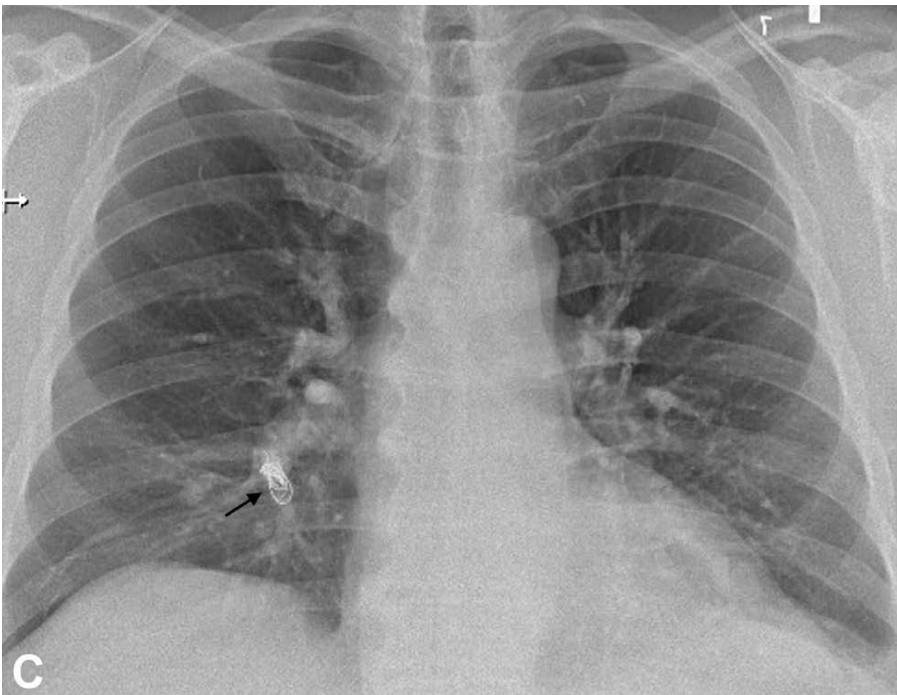
EUS coil + cyanoacrylate vs. BERTO for high-risk shunts

In 104 patients with gastric varices at high risk of ectopic embolism, EUS-guided coil + cyanoacrylate performed comparably to balloon-occluded retrograde transvenous obliteration (Berto) — similar rebleeding, mortality, length of stay, and cost.

	EUS (n=50), n (%)	BERTO (n=37), n (%)	P
Five-day rebleeding	0	0	1.000 [‡]
Six-week mortality	0	0	1.000 [‡]
All-cause Rebleeding	12 (24.0)	8 (21.6)	0.794*
One-year all-cause rebleeding	10 (20.0)	7 (18.9)	0.900*
All-cause mortality	5 (10.0)	1 (2.7)	
Rebleeding	1 (2.0)	0	0.234 [‡]
Ectopic embolism	0	0	
Others	4 (8.0)	1 (2.7)	
One-year mortality	1 (2.0)	0	1.000 [‡]
Ectopic embolism	1 (2.0)	0	1.000 [‡]

Endosc Ultrasound. 2023 Jan-Feb;12(1):74–83; PMID: 36510863

A reported complication: coil migration



Imaging from a reported complication: an embolization coil migrating into the pulmonary vasculature — a reminder of the ectopic-embolization risk that motivates deliberate coil sizing and dense packing at the target vessel.

Gastrointest Endosc. 2024 Aug;100(2):330–332; PMID: 38432495

A novel extension: EUS-guided shunt obliteration

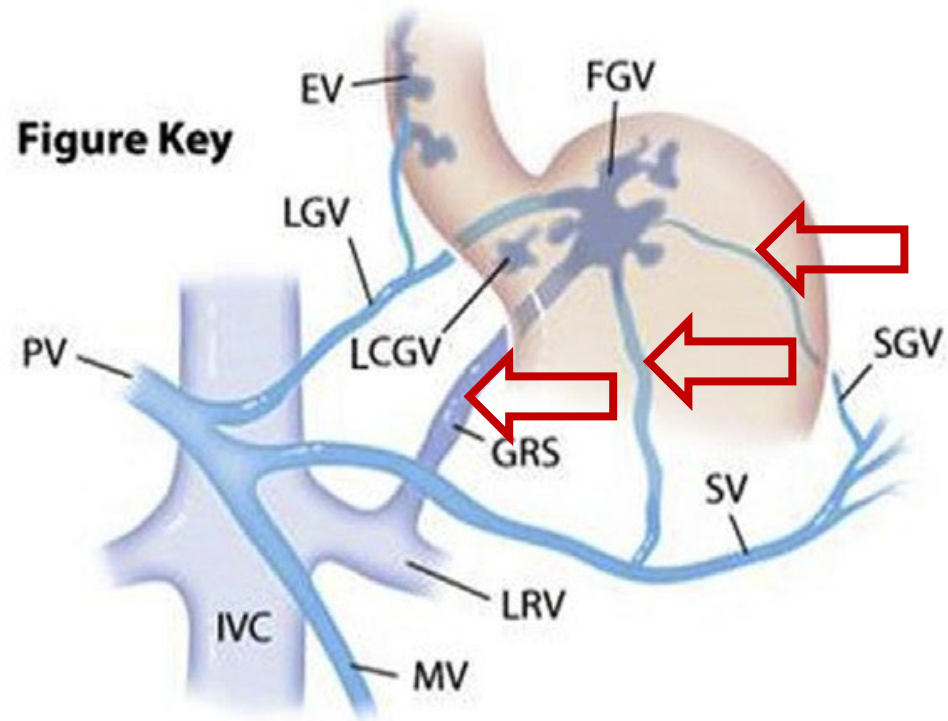
For recurrent hepatic encephalopathy

Occlusion of a spontaneous portosystemic shunt (SPSS) may be needed for recurrent or refractory hepatic encephalopathy. In this series, EUS-guided transgastric shunt obliteration — injecting glue and coils directly into the shunt — was performed in 7 patients over 9 sessions, with complete cessation of Doppler flow in 6 of 7 cases, adequate clinical response in 6 of 7 patients, and no severe procedure-related adverse events.

Am J Gastroenterol. 2023 Oct 1;118(10):1895–1898; PMID: 37589493

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A novel extension: EUS-guided shunt obliteration

Characteristics

Age -yr	55 ±13 years
Male sex	20 (80%)
MELD-3.0	14 (± 7)

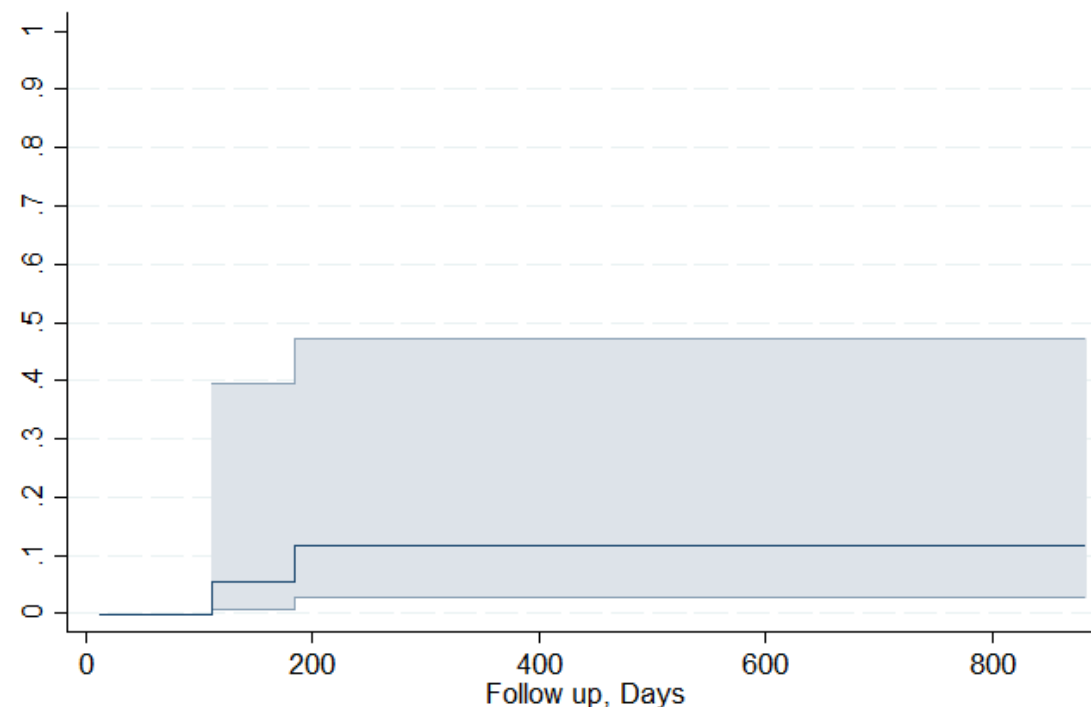
Laboratory Values

Serum Creatinine	1.21 ± 1.31 mg/dL
Serum Sodium	137 ± 4 mEq/L
Albumin	3.3 ± 0.7 g/dL
Total Bilirubin	2.3 ± 4 mg/dL
Aspartate Aminotransferase	115 ± 227 units/L
Alanine Aminotransferase	60 ± 119 units/L
International Normalized Ratio	1.4 ± 0.4
Platelet	107 ± 49 x 10 ³ /uL

Procedure Characteristics

19-gauge	22 (88%)
22-gauge	3 (12%)
Coils and Glue Used	22 (88%)
Coils Only	3 (12%)
Average Amount of Glue Used	2 grams (± 1.2)
Total Number of Coils Used	58 cm (± 52)
Number of Embolization Sessions	1

Table 1. Characteristics of Study Population and Procedure



Re-Bleeding Risk			Survival	
6 months	1 year	2 year	1 year	2 year
5.6% (95% CI 0.8-39%)	8.4% (95%CI 3-47%)	8.4% (95%CI 3-47%)	85% (95%CI 59-95%)	64% (95%CI 30-84%)

Data under review

Technique pearls

- Always use coils.
- Preferably combine coils with cyanoacrylate (CYA) or Gelfoam.
- Use 0.018-inch coils through a 22-gauge needle, or 0.035-inch coils through a 19-gauge needle.
- Choose large-diameter coils to achieve dense accumulation.
- Dilute cyanoacrylate no more than 1:1.
- Use fluoroscopic guidance.
- Obtain a planning CT beforehand.