Cosa c'è di nuovo in chirurgia d'urgenza – Ischemia Mesenterica (Acuta)

PROF. MARIO D'ORIA, MD

SC (UCO) CLINICA DI CHIRURGIA VASCOLARE ED ENDOVASCOLARE

- DIPARTIMENTO DI SCIENZE MEDICHE, CHIRURGICHE E DELLA SALUTE, UNIVERSITA' DEGLI STUDI DI TRIESTE
- DIPARTIMENTO CARDIO-TORACO-VASCOLARE, AZIENDA SANITARIA UNIVERSITARIA GIULIANO ISONTINA

BACKGROUND

- Acute mesenteric ischemia (AMI) is a rare but life-threatening condition with high morbidity and mortality rates despite improvements in surgical and intensive care.
- Diagnosis is often delayed due to nonspecific symptoms and, possibly, underestimation of disease prevalence.
- Endovascular treatment, which can be carried out through different technical modalities, nowadays offers a minimally invasive alternative to open surgery. Amongst its benefits:
  - Minimally invasive
  - Can address multiple vessels during same procedure
  - Enables real-time assessment of perfusion status before bowel resection
  - Can address different etiologic forms (embolism, thrombosis, vasospasm)
  - When successful, may allow to avoid laparotomy or enable limited-extent bowel resection

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CLINICAL PRACTICE GUIDELINE DOCUMENT

Editor's Choice – European Society for Vascular Surgery (ESVS) 2025 Clinical Practice Guidelines on the Management of Diseases of the Mesenteric and Renal Arteries and Veins☆

Mark J. Koelemay, (Chair) *, Robert H. Geelkerken, (Co-chair), Jussi Kärkkäinen, (Co-chair), Nicola Leone, (Co-chair), George A. Antoniou, Jorg L. de Bruin, Alexander Gombert, Anders Gottsäter, Elena Iborra, Sonia Ronchey, Konstantinos Spanos, Jos C. van den Berg, Sabine Wipper, Frederico Bastos Gonçalves, Martin Björck, Raphael Coscas, Sandro Lepidi, Timothy A. Resch, Jean-Baptiste Ricco, Riikka Tulamo, Anders Wanhainen, Olivier Corcos, Thomas S. Huber, Alexander Oberhuber, Annika Reintam Blaser, Matti Tolonen †

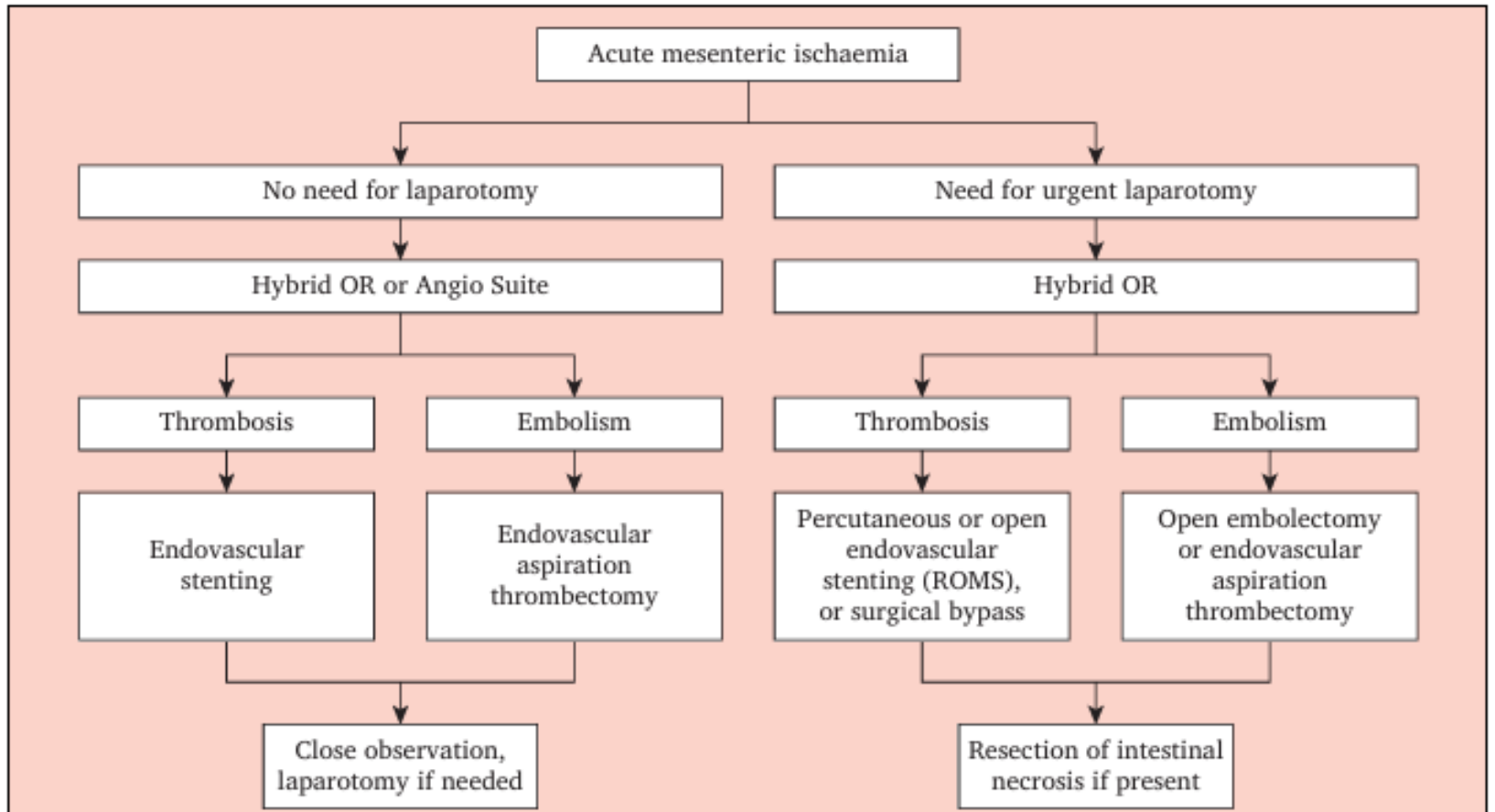

Figure 4. Flowchart for invasive treatment of acute mesenteric ischaemia. Adapted from.[150] OR = operating room; ROMS = retrograde open mesenteric stenting.

Table 1 – Summary of revascularization procedures, open and endovascular.

Revascularization technique	Description	Pros	Cons
Surgical bypass	Antegrade bypass: An approach that bypasses the affected portion of the SMA to the proximal aorta Retrograde bypass: An approach that bypasses the affected portion of the SMA from the common iliac artery or infrarenal aorta	Useful when other interventions are not feasible or have failed Provides long-term patency Good for complex anatomy, multivessel disease, or patients with difficult access Allows for bowel inspection and resection, if needed	Longer recovery time Higher risk of complications (ie, bleeding, infection, graft kinking, graft failure) Requires graft material and surgical expertise
Open embolectomy	Open exposure and access of the occluded vessel (most often SMA) with embolectomy using a Fogarty balloon catheter	Provides direct access to the occlusion High success rate Allows for bowel inspection and resection, if needed	Difficult exposure of the SMA Longer time to reperfusion Longer recovery time Higher risk of complications such as bleeding and infection
Retrograde open mesenteric stenting	A small transverse arteriotomy with SMA exposure is performed, followed by retrograde deployment of a balloon-expandable stent	High technical success rate Adventitious when percutaneous stenting is not feasible Does not compromise surgical bypass Does not expose graft material to a contaminated field	Limited to specific types of occlusions May require repeat intervention
Direct open retrograde revascularization	Open SMA exposure is obtained and a hydrophilic guide wire is advanced directly into the SMA and then snared in the aorta, followed by stenting of the SMA	Provides direct access to the occlusion Good for lesions that are difficult to transverse High technical success rate Allows for bowel inspection and resection, if needed	Longer recovery time Higher risk of complications (ie, bleeding and infection)
Percutaneous stenting	Endovascular stenting (most appropriate in the setting of an atherosclerotic lesion) is performed with endovascular access of the SMA, followed by the deployment of a balloon-expandable stent	Minimally invasive Rapid reperfusion High technical success rate Low complication rate Ideal for stable patients without signs of bowel necrosis Not exposing graft material to contaminated field	May require repeat intervention Does not allow for bowel inspection
Mechanical thrombectomy	Endovascular access of the occluded vessel is obtained, and an electric aspiration device (eg, Penumbra) is used to aspirate the thrombus	Rapid removal of thrombus Low risk of bowel perforation Can be used as an adjunct or primary therapy Can be used for atrial or venous thrombosis	Does not allow for bowel inspection if used as primary therapy Risk of distal embolus
Catheter-directed thrombolytic therapy	Endovascular access of the occluded vessel is obtained, followed by the administration of tPA and urokinase to break down the clot	Minimally invasive Low risk of bowel perforation Can be used as an adjunct or primary therapy	Delayed time to reperfusion Higher risk of bleeding complications Does not allow for bowel inspection if used as primary therapy

Retrograde Open Mesenteric Stenting (ROMS)

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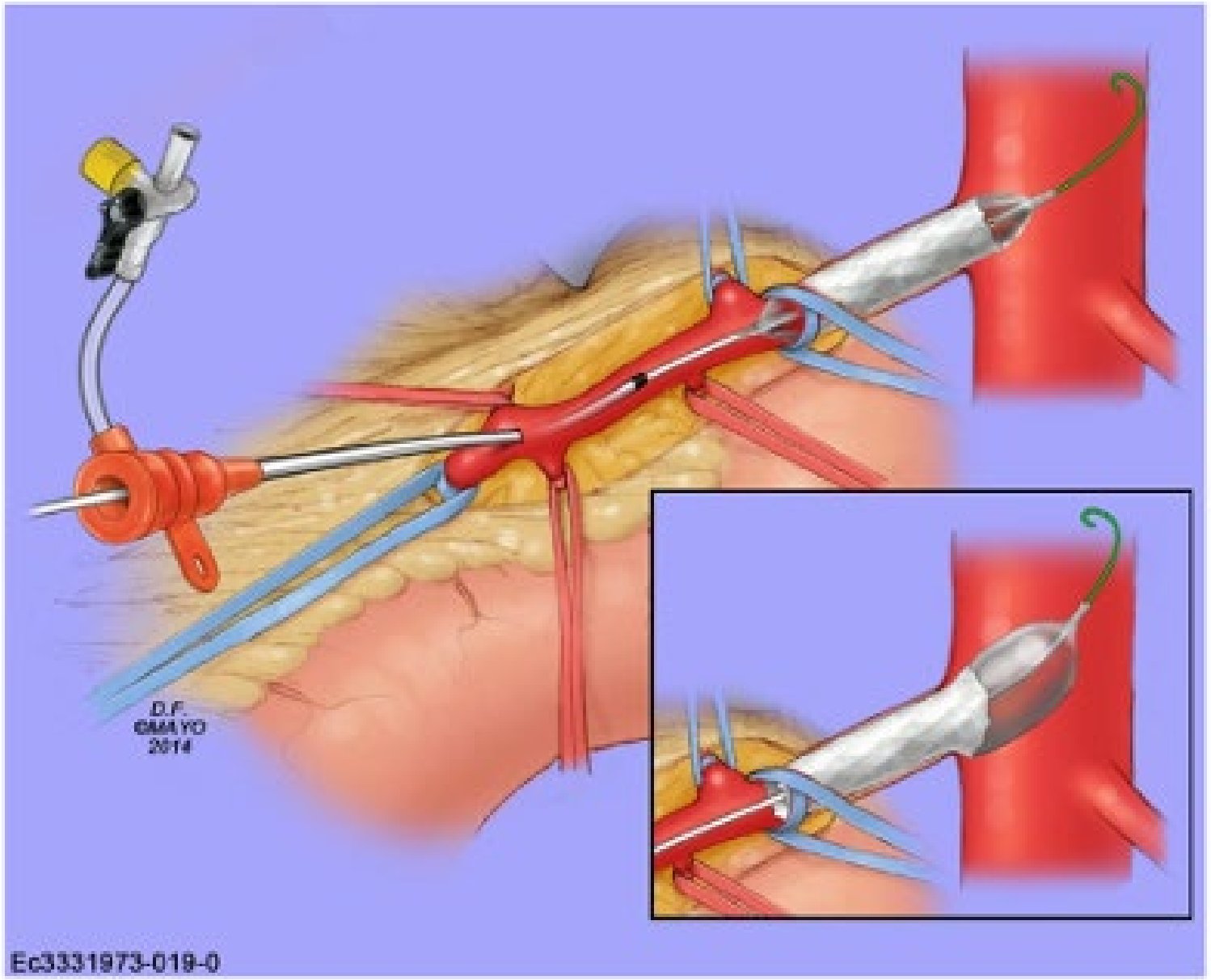
Review Article

Acute management of mesenteric emergencies: Tailoring the solution to the problem

Rebecca N. Treffalls[a], *David P. Stonko*[a,b], *Randall R. DeMartino*[a], *Jonathan J. Morrison*[a,*]

[a] *Division of Vascular and Endovascular Surgery, Mayo Clinic, 200 First Street SW, Rochester, MN 55905*

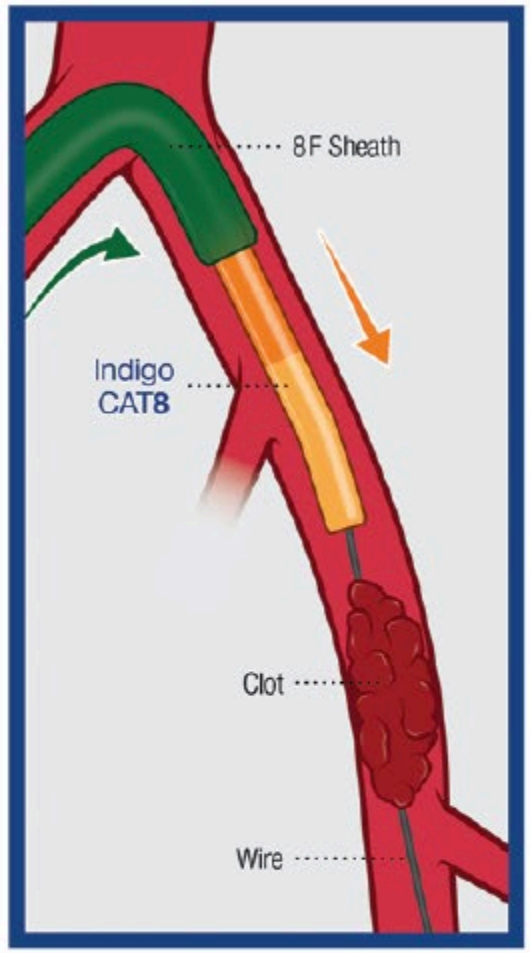


Picture from Treffals et al (Sem Vasc Surg. 2023)

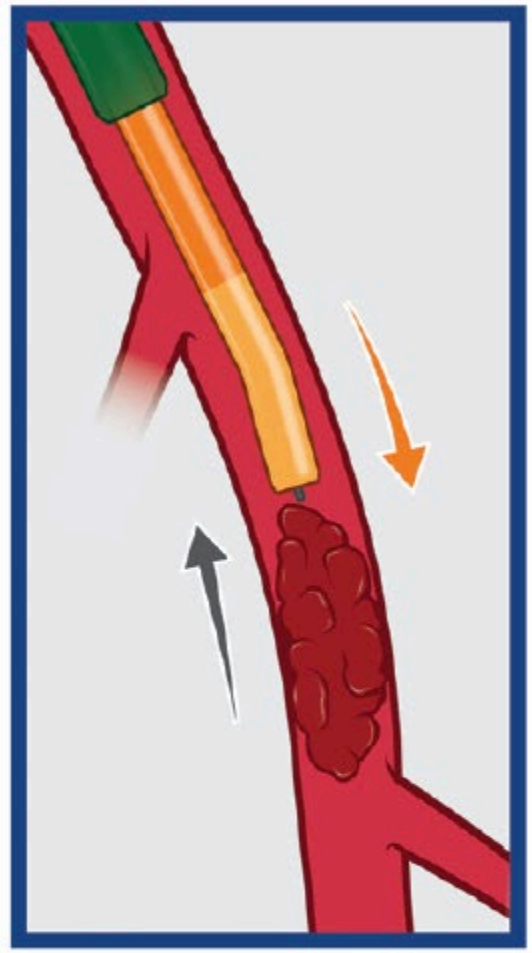
Endovascular Aspiration Thrombectomy (EAT)

As part of the Indigo Aspiration System, the Indigo Aspiration Catheters and Separators are indicated for the removal of fresh, soft emboli and thrombi from vessels of the peripheral arterial and venous systems, and for the treatment of pulmonary embolism.

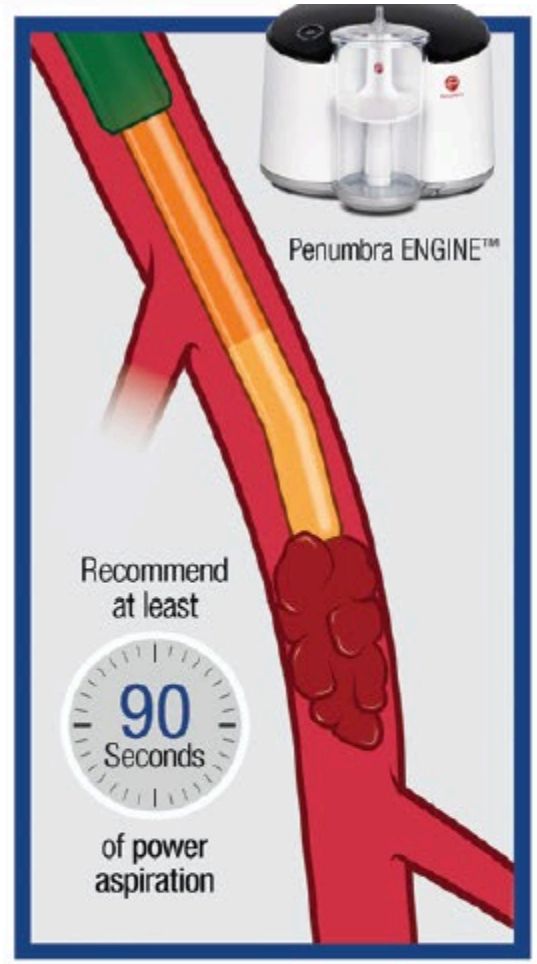
As part of the Indigo Aspiration System, the Indigo CAT RX Aspiration Catheters and Indigo Separator™ 4 are indicated for the removal of fresh, soft emboli and thrombi from vessels in the coronary and peripheral vasculature.



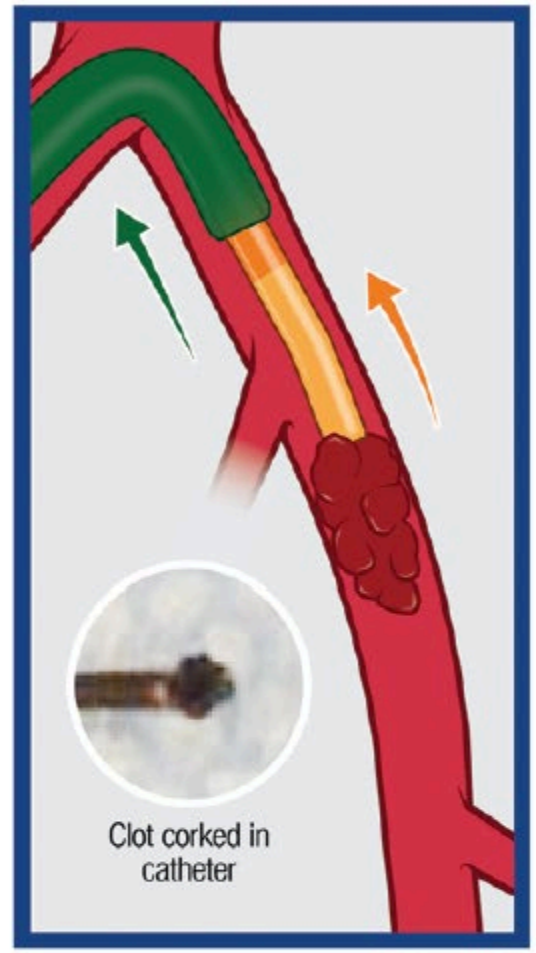
The contralateral sheath with RHV/Tuohy is positioned as close to the lesion as possible and the Indigo CAT8 is advanced through sheath over a wire



The Indigo CAT8 is placed just proximal to the face of the clot and wire is retracted



Aspiration is applied to Indigo CAT8 via Penumbra ENGINE until CAT8 becomes occluded (recommend waiting at least 90 seconds)



The Indigo CAT8 is removed under aspiration to ensure clot remains engaged in catheter tip and clot is extracted out of the body

ORIGINAL ARTICLE **ACUTE LIMB ISCHEMIA MANAGEMENT** Free access

The Journal of Cardiovascular Surgery 2023 June;64(3):247-54

DOI: **10.23736/S0021-9509.23.12668-1**

lingua: Inglese

Mechanical thrombectomy in acute limb ischemia: ad Interim results of the INDIAN UP Trial

Gianmarco de DONATO [1], Edoardo PASQUI [1], Maria A. RUFFINO [2], Massimo SPONZA [3], Angelo SPINAZZOLA [4], Giuseppe GUZZARDI [5], Francesco INTRIERI [6], Daniele SAVIO [7], Giancarlo PALASCIANO [1] INDIAN UP Trial group

[1] Unit of Vascular Surgery, Department of Medicine, Surgery and Neuroscience, University of Siena, Siena, Italy; [2] EOC - Ente Ospedaliero Cantonale, Lugano, Switzerland; [3] S. Maria della Misericordia Hospital, Udine, Italy; [4] ASST Crema, Crema, Italy; [5] Maggiore della Carità Hospital, Novara, Italy; [6] Santa Annunziata Hospital, Cosenza, Italy; [7] San Giovanni Bosco Hospital, Turin, Italy

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Vacuum-assisted mechanical thrombectomy in extensively occlusive thrombosis of dialysis arteriovenous grafts with indigo system

Filippo Piacentino, Andrea Coppola, [...], and Eugenio Annibale Genovese +11 View all authors and affiliations

Eur J Vasc Endovasc Surg (2023) 66, 77–84

ORIGINAL ARTICLE: OBSERVATION STUDY

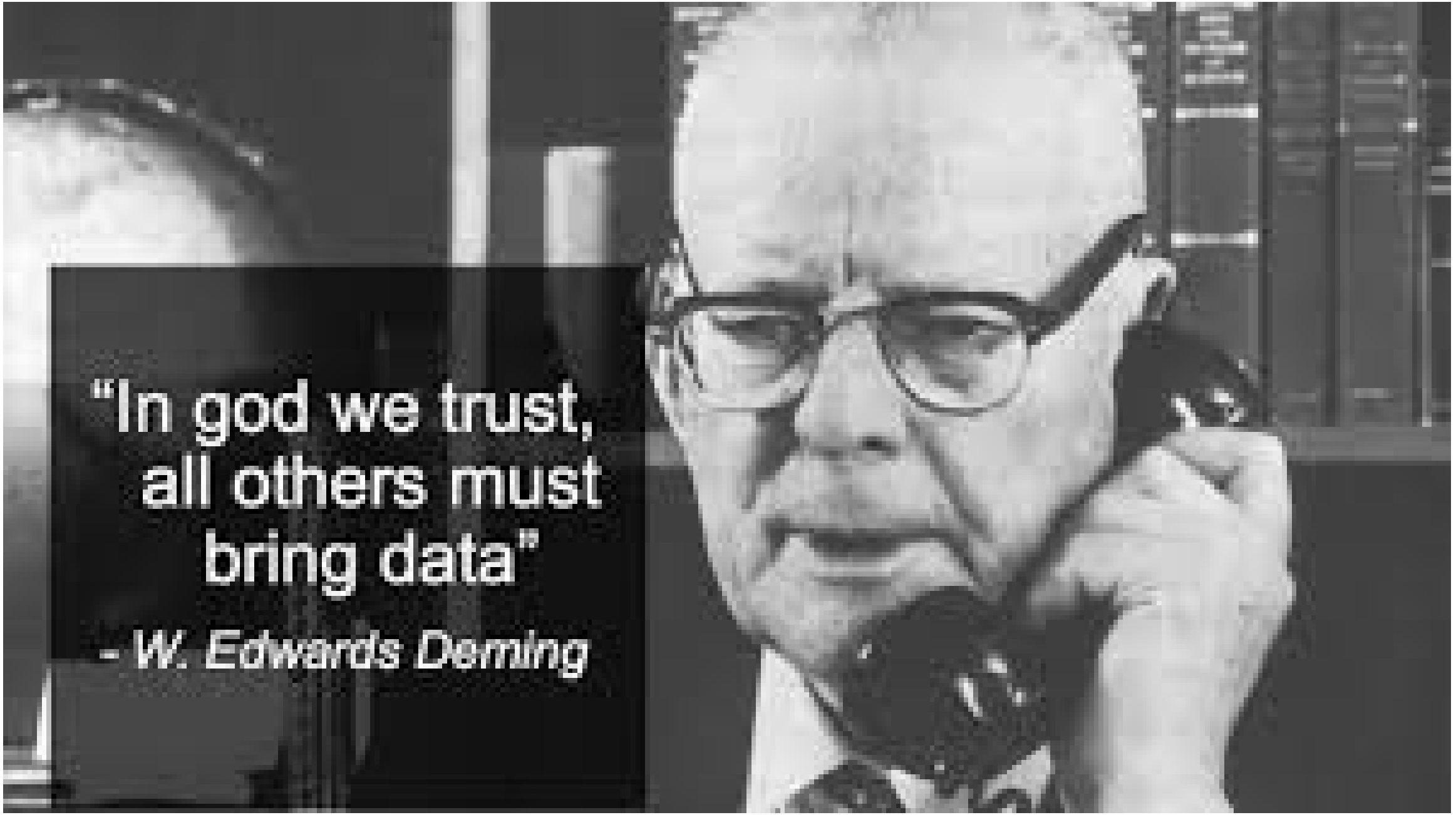
Penumbra Indigo Percutaneous Aspiration Thrombectomy System in the treatment of Aortic Endograft Iliac Limb Occlusion: Results from an Italian Multicentre Registry ☆

Paolo Spath [a,b,*], Edoardo Pasqui [c], Domenico Angiletta [d], Angelo Spinazzola [e], Fabrizio Chegai [f], Giacomo Isernia [g], Sandro Lepidi [h], Roberto Silingardi [i], Gianmarco de Donato [c], Mauro Gargiulo [a,j]; on behalf of the Italian Multicentre Thrombo-Aspiration in ILO Study Group [†]

[a] Vascular Surgery, University of Bologna, DIMEC, Bologna, Italy
[b] Department of Vascular Surgery, Hospital "Infermi" Rimini, AUSL Romagna, Rimini, Italy
[c] Vascular Surgery, University of Siena, DSMCN, Siena, Italy
[d] Department of Vascular Surgery, University of Bari, Bari, Italy
[e] Interventional Radiology, Unit of Radiology, ASST-Crema, Crema, Italy
[f] Vascular and Interventional Radiology, Unit of Radiology, Hospital Viterbo, Viterbo, Italy
[g] Department of Vascular and Endovascular Surgery, University of Perugia, Perugia, Italy
[h] Department of Vascular Surgery, University Hospital of Trieste, Trieste, Italy
[i] Department Vascular Surgery of Modena, University of Modena and Reggio Emilia, Modena, Italy
[j] Bologna Metropolitan Vascular Surgery Unit, IRCCS Azienda Ospedaliero-Universitaria S. Orsola, Bologna, Italy

WHAT THIS PAPER ADDS

This paper reports for the first time the safety and effectiveness of the Indigo (Penumbra Inc., Alameda, CA, USA) percutaneous aspiration thrombectomy system for the clinical presentation of iliac limb occlusion (ILO) after endovascular aortic repair, and analyses the results from an Italian multicentre registry. These results report a promising success rate of 94% after use of the Indigo system with or without adjunctive procedures, and freedom from recurrence of limb occlusion at one year. These results may lead to a change in treatment option for the treatment of complex ILO, giving a valid alternative to traditional or more invasive procedures.


"In god we trust,
all others must
bring data"
– W. Edwards Deming

ITALIAN EXPERIENCE

- Multicenter retrospective study (10 Italian centers, January 2020 – January 2025)

Patients with arterial AMI confirmed on triple-phase CT angiography

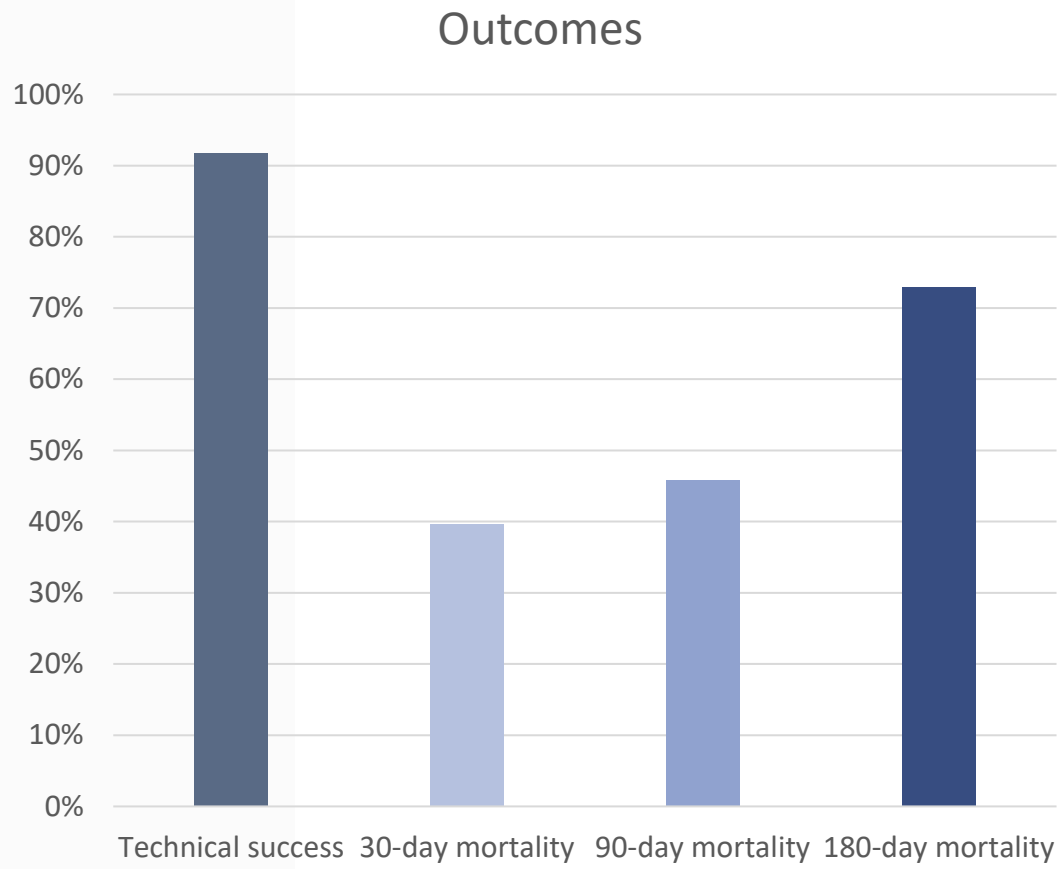
Intervention: EAT using **Penumbra Indigo Aspiration System** ® ± adjunctive procedures

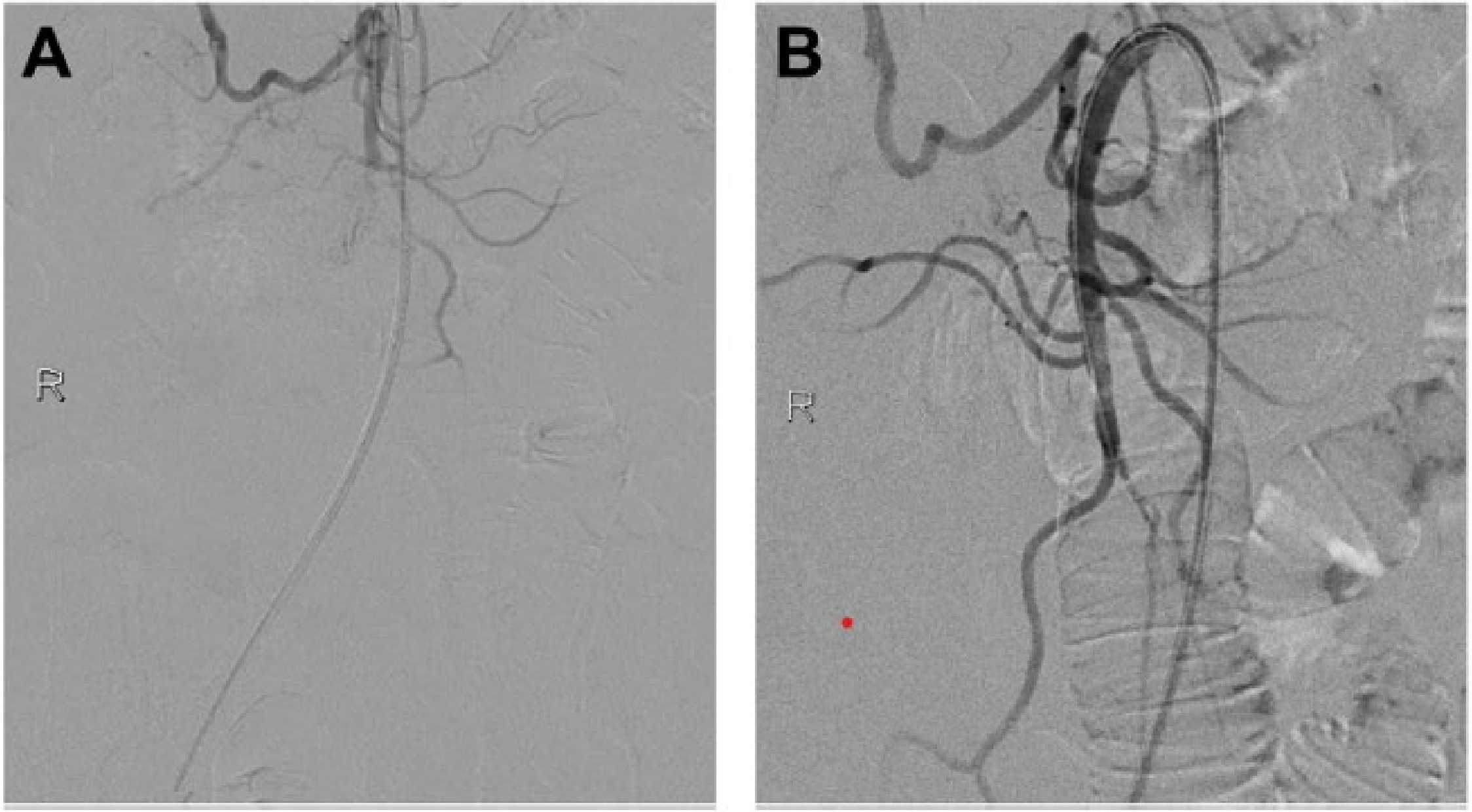
Technical success defined by TIPI score 2-3 (i.e., near/complete revascularization)

RESULTS

- N = 48 patients
- EAT alone: 29 pts (60.4%)
- EAT + bowel resection: 19 pts (39.6%)
- Adjunctive techniques (i.e., thrombolysis, angioplasty, stenting): 32 pts (66.7%)
- ICU admission: 31 pts (64.6%)
- Median hospital stay: 10 (range 3-20) days

- Technical success: 44 pts (91.7%)
- Severe complications (i.e., Clavien-Dindo ≥ 3): 58.3% (28 pts)
- 90-day mortality: 45.8% (22 pts)
  - 86.4% within 30 days
- 180-day mortality: 72.9% (35 pts)
- Early death for all patients without successful revascularization
- At multivariate analysis, a procedure longer than 90 minutes (OR=6.3 95% CI= 1.0-37.2; p=.041) and Clavien-Dindo score greater than 3 (OR=19.5 95% CI= 3.2 – 115.5; p=<.001) resulted as independent factors for mortality.

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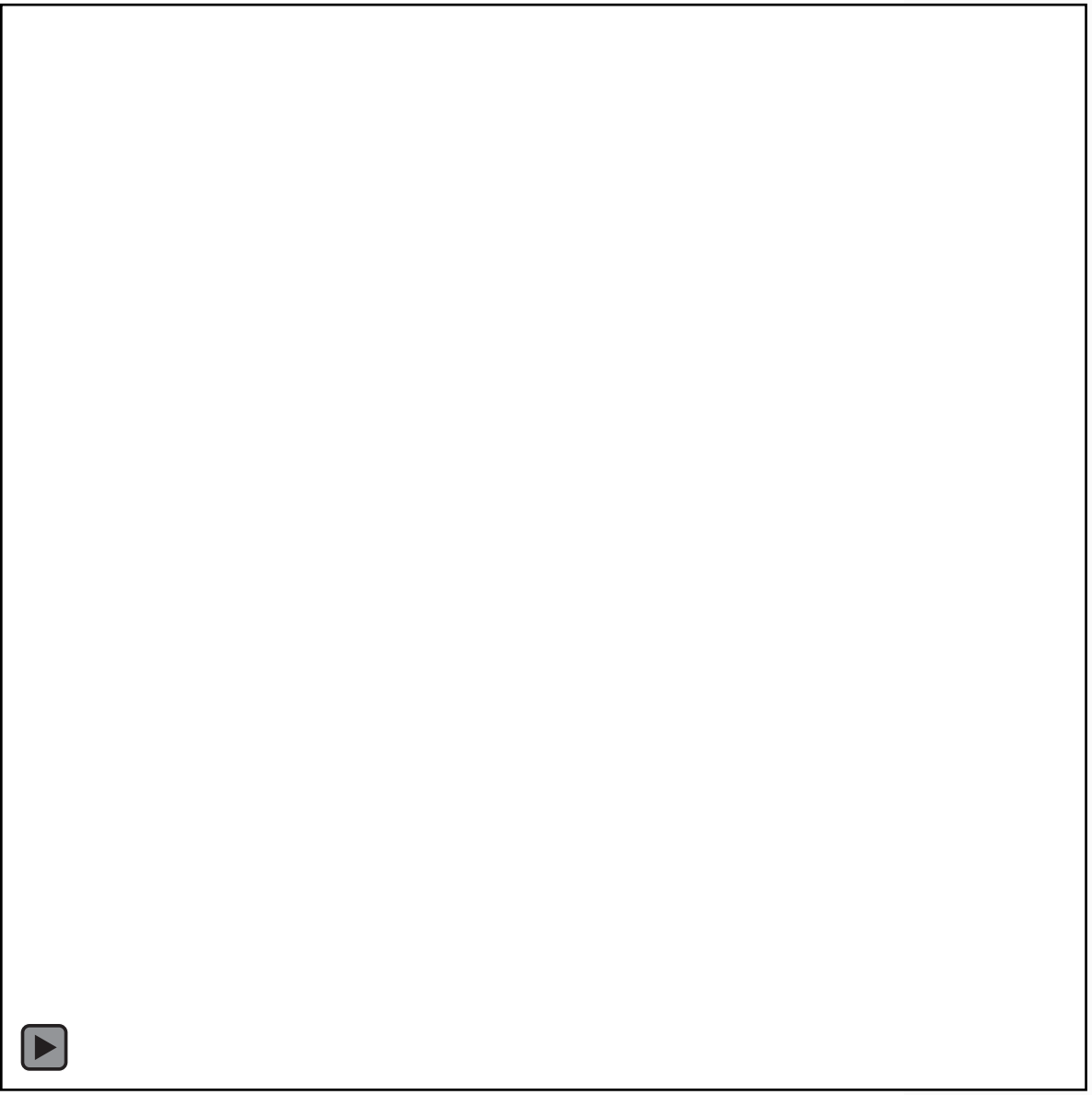

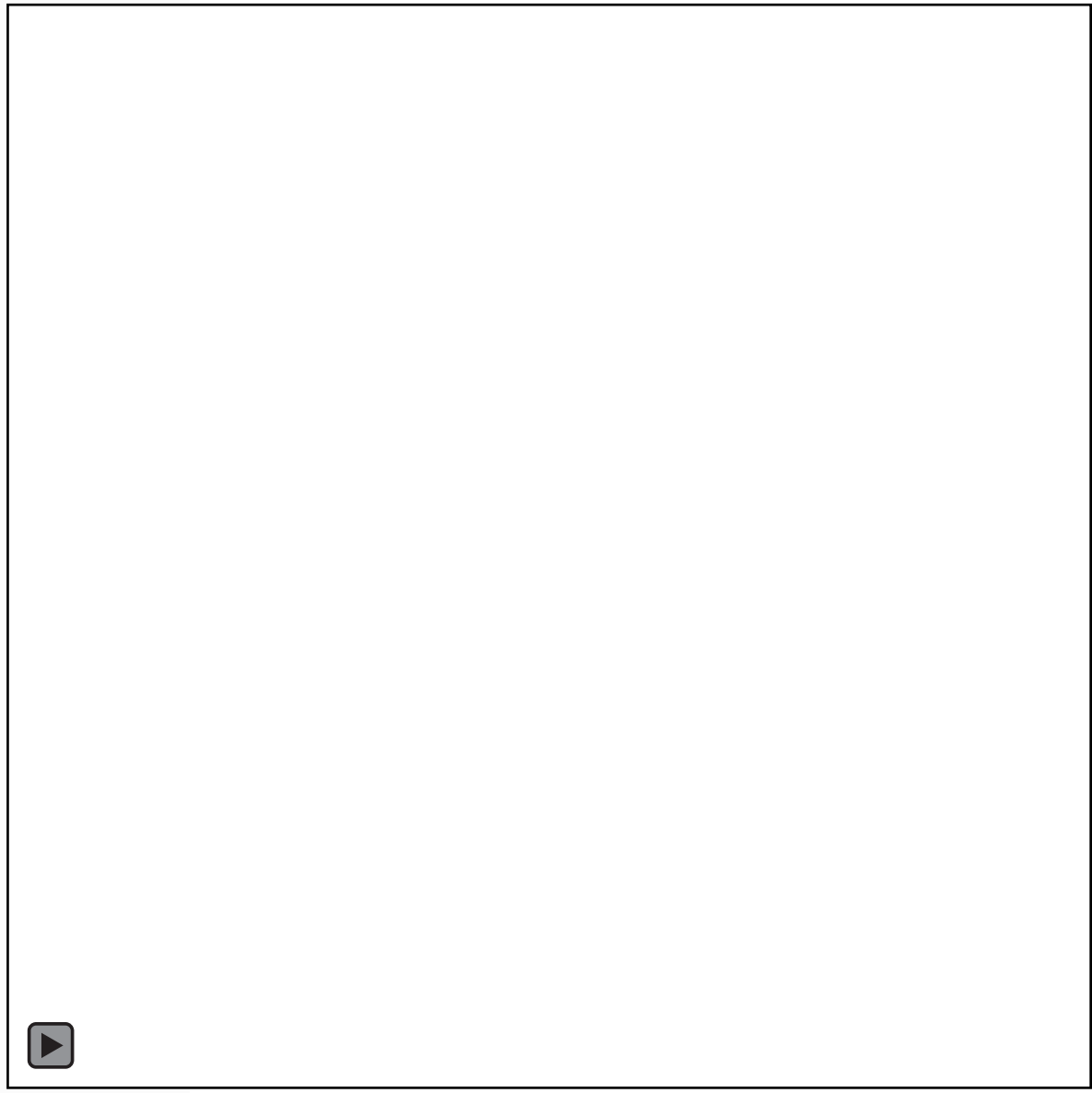

Recommendation 34 — New

It is recommended to treat patients with acute mesenteric ischaemia in centres with 24/7 multidisciplinary services and experience in both open and endovascular mesenteric artery revascularisation.

Class	Level	References	ToE
I	C	Lemma *et al.* (2019),[120] Blauw *et al.* (2017),[148] Tolonen *et al.* (2021)[150]	

Recommendation 35 — Changed

Revascularisation first before bowel resection should be considered in patients with acute mesenteric ischaemia.

Class	Level	References	ToE
IIa	C	Block *et al.* (2010),[149] Tolonen *et al.* (2021),[150] Arthurs *et al.* (2011),[152] Beaulieu *et al.* (2014)[153]	

Recommendation 37 — Unchanged

Endovascular revascularisation should be considered as first line therapy in patients with acute mesenteric ischaemia due to thrombotic or embolic superior mesenteric artery occlusion.

Class	Level	References	ToE
IIa	B	Kärkkäinen *et al.* (2015),[141] Murphy *et al.* (2019),[158] Salsano *et al.* (2018),[159] Shi *et al.* (2024),[160] Raupach *et al.* (2016),[162] Shi *et al.* (2022),[163] Li *et al.* (2022)[164]	

Recommendation 38 — Changed

Retrograde open mesenteric artery stenting may be considered in patients with acute mesenteric ischaemia needing superior mesenteric artery revascularisation when percutaneous stenting is not possible.

Class	Level	References	ToE
IIb	C	Blauw *et al.* (2014),[84] Sénémaud *et al.* (2021),[85] Hou *et al.* (2022),[86] Crillo-Penn *et al.* (2023)[87]	

CONCLUSIONS

- ✓ Endovascular treatment of AMI is safe and effective for many patients and can be seen as first-line modality (in the absence of overt peritonism) where adequate expertise is available.
- ✓ Amongst available endovascular techniques, EAT is highly feasible and minimally invasive (with option for adjunctive therapies such as in-situ thrombolysis, angioplasty and/or stenting).
- ✓ High revascularization rates are achieved with the Penumbra system (> 90%). It enables treatment of both EAMI and TAMI, also in challenging scenarios.

CONCLUSIONS

- ✓ Unfortunately, in-hospital mortality rates remain high, especially due to delayed diagnosis, patients' comorbidities and disease severity.
- ✓ High index of suspicion upon ED presentation, early and accurate imaging assessment (i.e. triple-phase thin-slice CTA), and close multidisciplinary collaboration with established pathways of care are needed to establish adequate pathways of care for AMI.
- ✓ Ultimately, a perfusion-focused initial approach to AMI and selective bowel resection based on severity of peritonism and anatomical knowledge by the provider could improve patient outcomes and reduce mortality.

Grazie per l'attenzione