When Should SMA Endovascular Embolectomy Be The Standard Of Care:

How To Do It

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Disclosures

"No Disclosures"

Introduction

- In 1926, A.J. Cokkinis wrote:

"the diagnosis is impossible, the prognosis hopeless and the treatment useless"

A.J. Cokkinis
Mesenteric Vascular Occlusion, Bailliere, Tindall and Cox, London (1926), pp. 1-93

Introduction

Operative Mortality 30-80%

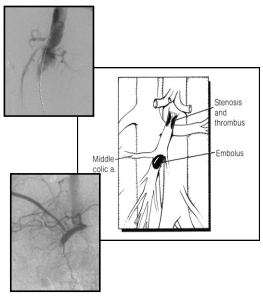
5-year survival of AMI around 20%

Clair DG, NEJM 2016
Reintam B Crit Care 2024
Tamma K BMJ 2022
Pengerna JVS 2023
Beaulieu et al JVS 2014

Introduction

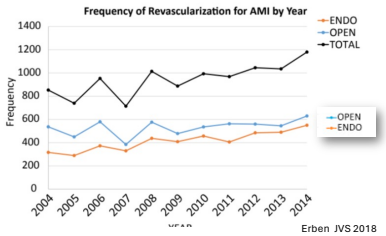
50% of AMI is caused by an embolic event

50% of AMI is caused by acute thrombosis underlying atherosclerotic disease



Kärkkäinen JM et al Best Practice & Research Clinical Gastroenterology 2016
Kadri BMJ 2022

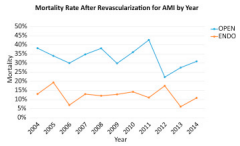
NIS data



Erben JVS 2018

Endovascular Revascularization (EVR)

- Lower mortality
- Less bowel resection
- Shorter length of hospital stay
- Lower Costs



Erben JVS 2018

Endovascular revascularization vs open surgical revascularization as the first strategy for arterial acute mesenteric ischemia: A systematic review and meta-analysis

Yadong Shi, MD, Boxiang Zhao, MD, Yangyi Zhou, MD, Liang Chen, MD, Haobo Su, MD, *and* Jianping Gu, MD, *Nanjing, China*

ABSTRACT

Objective: This paired meta-analysis aimed to compare the mortality and morbidity of endovascular revascularization (EVR) and open surgical revascularization (OSR) as the first strategy for arterial acute mesenteric ischemia (AMI).

Methods: This systematic review and meta-analysis were performed in accordance with the PRISMA statement. A systematic search strategy was performed to identify eligible studies using the following databases: PubMed, Embase, and Cochrane Library database from inception to December 31, 2023, with restriction to the English language. The end search date was January 2, 2024. The primary outcome was short-term mortality. Secondary outcome[illegible] resection, second-look laparotomy, and short bowel syndrome. The counterenhanced funnel plot a[illegible] were used to assess bias. Outcomes were reported as odds ratio (OR) with a 95% confidence interval (CI) using the Mantel-Haenszel method. The GRADE classification was used to estimate the certainty of evidence.

Results: A total of 11 studies [1141 patients] comparing EVR vs OSR for arterial AMI were identified and analyzed. The mean patient age was 61.9 to 73.6 years and 45.1% of the patients were male. Compared with OSR, EVR as the first treatment may not decrease short-term mortality (OR, 0.79; 95% CI, 0.50-1.25; *P* = .31; very low certainty) and second-look laparotomy (OR, 1.00; 95% CI, 0.30-3.36; *P* = .99; very low certainty). However, EVR may be associated with decreased bowel resection (OR, 0.42; 95% CI, 0.20-0.88; *P* = .022; very low certainty) and short bowel syndrome (OR, 0.39; 95% CI, 0.21-0.75; *P* = .005; very low certainty). The metaregression revealed that the mortality regarding EVR vs OSR was not impacted significantly by thrombotic etiology (−0.002; 95% CI, −0.027 to 0.022; *P* = .85), whereas it was impacted significantly by publication year (0.076; 95% CI, 0.069-0.145; *P* = .031).

Conclusions: Compared with OSR, EVR as the first treatment for arterial AMI may not decrease short-term mortality or second-look laparotomy. Future multicenter randomized controlled trials are needed urgently to confirm these results. (J Vasc Surg 2024;■:1-11.)

Keywords: Acute mesenteric ischemia; Endovascular revascularization; Open surgical revascularization; Meta-analysis; Review

11 retrospective studies

Shi JVS 2024

Endovascular revascularization vs open surgical revascularization as the first strategy for arterial acute mesenteric ischemia: A systematic review and meta-analysis

Table III. Summary of findings for endovascular revascularization (*EVR*) vs open surgical revascularization (*OSR*) as the first strategy for the treatment of arterial acute mesenteric ischemia (AMI)

Outcomes	Anticipated absolute effects* (95% CI) Risk with OSR	Risk with EVR	Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Short-term mortality	36 per 100	31 per 100 (22-42)	OR 0.79 (0.50-1.25)	11 cases 0 controls 93/303 exposed 304/858 unexposed (11 nonrandomized studies)	⨁◯◯◯ Very low[a,c]	EVR may have no effect on short-term mortality, but the evidence is very uncertain
Bowel resection	51 per 100	30 per 100 (17-48)	OR 0.42 (0.20-0.88)	1035 (9 nonrandomized studies)	⨁◯◯◯ Very low[a,c]	EVR may reduce bowel resection, but the evidence is very uncertain
Second-look laparotomy	30 per 100	30 per 100 (11-59)	OR 1.00 (0.30-3.36)	833 (6 nonrandomized studies)	⨁◯◯◯ Very low[a,c]	EVR may have no effect on second-look laparotomy, but the evidence is very uncertain
SBS	37 per 100	19 per 100 (11-31)	OR 0.39 (0.21-0.75)	243 (2 nonrandomized studies)	⨁◯◯◯ Very low[a,c]	EVR may reduce short bowel syndrome, but the evidence is very uncertain

CI, Confidence interval; *OR*, odds ratio; *SBS*, short bowel syndrome.
GRADE Working Group grades of evidence: High certainty: we are very confident that the true effect lies close to that of the estimate of the effe[illegible] Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different. Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect. Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.
*The risk in the intervention group (and its 95% CI) is based on the assumed risk in the comparison group and the relative effect of the intervention (and its 95% CI).
†All included studies had retrospective study designs.
‡The funnel plot showed possible publication bias.

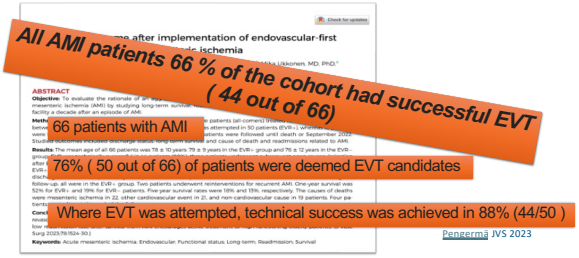
Shi JVS 2024

endovascular revascularization (EVR)

- But…
- ……. there is a bias for selection for easier cases for EVR
- ……..not everyone is a candidate for EVR

Erben JVS 2018

EVT fist strategy for arterial acute mesenteric ischemia



All AMI patients 66 % of the cohort had successful EVT (44 out of 66)

66 patients with AMI

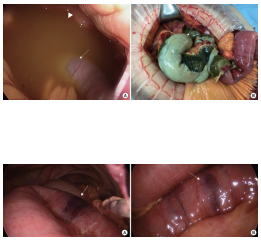
76% (50 out of 66) of patients were deemed EVT candidates

Where EVT was attempted, technical success was achieved in 88% (44/50)

Pengermä JVS 2023

How to think about AMI

- Endovascular revascularization (EVR) techniques
  - Embolic occlusions
    - Aspiration embolectomy /Mechanical thrombectomy First approach
  - Thrombotic/atherosclerotic occlusion
    - Angioplasty, and stenting
  - Thrombolysis--- probably should not be used as first line therapy
  - Failed EVR
    - Open Thrombectomy or ROMS
  - Embolic occlusion of the distal branches of the superior mesenteric artery
    - bowel resection alone.
  - Patients that were beyond rescue due to extensive bowel necrosis or very poor clinical status
    - Palliative care



Low Threshold For Laparoscopic / Open Bowel Evaluations

Kim et al ACC 2019

Percutaneous thrombectomy (PT)

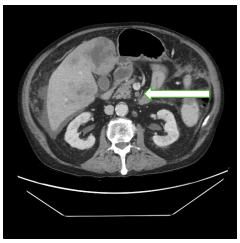
- Aspiration
  - Plain Od Catheter Aspiration (POCA)
  - Indigo aspiration system (Penumbra, Inc.)
  - Export AP aspiration catheter (Medtronic)
  - Control mechanical thrombectomy system (Control Medical Technology)
  - QuickClear mechanical thrombectomy system (Philips)
- Mechanical thrombectomy
  - Waterjet catheters
    - Angio.Jet (Boston Scientific)
    - Jeti thrombectomy system (Abott)
  - Basket emboletomy
    - Pounce (Surmodics)
    - Attix (Inari)
    - iCHOR (ICHORVASCULAR)
    - PVASC THROMBECTOMY SYSTEM (VELSALIO)
  - Mechanical with suction devices with aspiration capabilities
    - Prodigy Thrombectomy System(*Truvic)*
    - Jetstream (Boston Scientific)
    - Rotarex (Bard Medical)
- Adjuncts
  - Balloon maceration
  - Stent

14 Devices

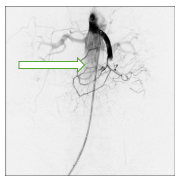
Case #1

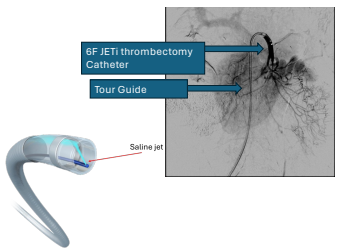
- 69 y.o. male
- PMHx
  - COPD on 2-3 L of O2
  - ETOH abuse
  - Recently diagnosed pancreatic cancer with metastatic disease to pulmonary, hepatic, peritoneal, and nodal mets.
- He presented with worsening abdominal pain and found to have new focal occlusive superior mesenteric artery thrombus

Case #1



Case #1





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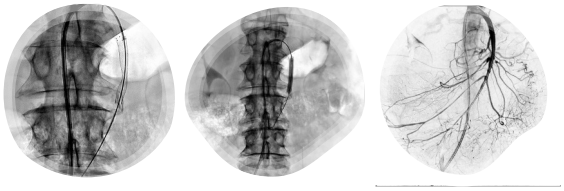
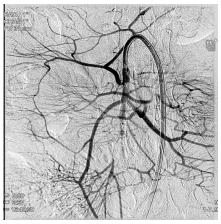


Case #1

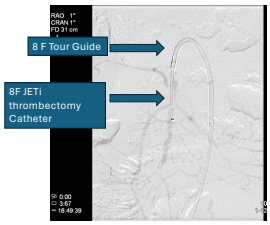
Case #2

- 54-year-old male
- MELD score of 18 currently
- presented with abdominal pain
- CT scan with findings of a thrombus in the distal superior mesenteric artery



Pics Courtesy of Dr Mitch Weaver

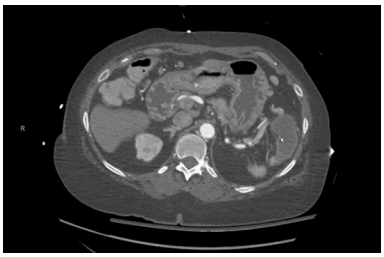
Case #2



Pics Courtesy of Dr Mitch Weaver

Case # 3

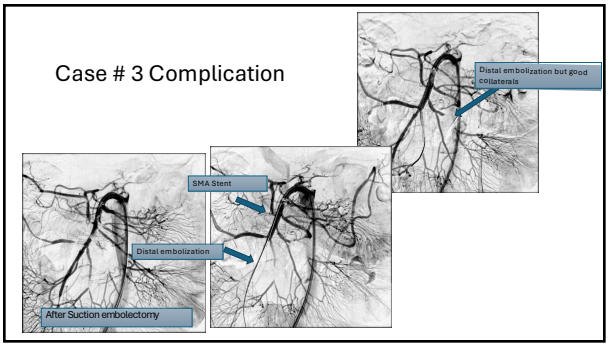
- 70 year old women who presented to an outside hospital with complaints of acute stroke.
  - CTA of the head showed occlusion of the left internal carotid artery, clot in her ascending aorta, and clot in her left subclavian artery
- On presentation to our hospital she had epigastric pain, nausea and vomiting, with epigastric tenderness but no peritonitis.
  - CTA of her chest and abdomen, which showed occlusion of her proximal SMA with reconstitution of flow distally and circumferential thickening of the jejenum

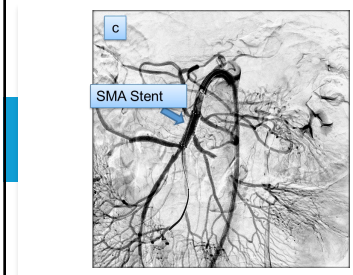


Case # 3

Case # 3

Case # 3 Complication

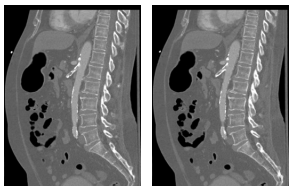


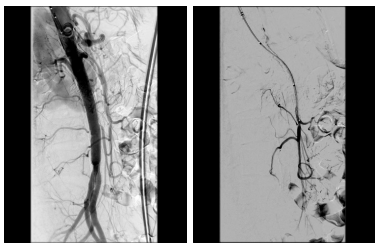


Case # 3

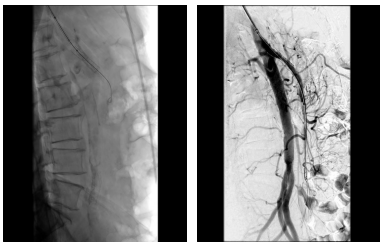
Case # 4

- 60 you male
- Acute on chronic abdominal pain.





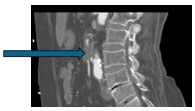
Case # 4



Case # 4

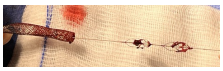
Case #5

- 85 yo female
- PMHx
  - Afib
- Presented with abdominal pain



Case #5

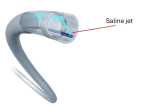
Pics Courtesy of Dr Mitch Weaver



Pounce Thrombectomy Surmodics

Case #5

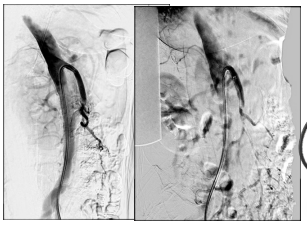
Pics Courtesy of Dr Weaver

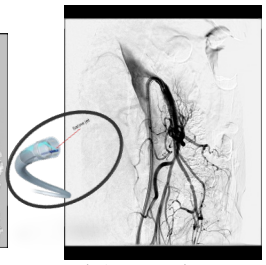


JETi Overview Abbott

Abbot. In Service JETi Thrombectomy System. *Marketing presentation.*

Case #5





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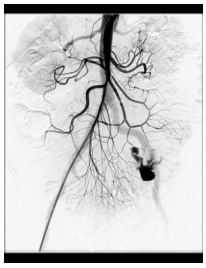

Case #5 Complication

Mesenteric Hematoma

Pics Courtesy of Dr Mitch Weaver

Conclusion

- Endovascular Therapy should be considered in all patients with acute mesenteric ischemia
- Success rates of EVT is > 60% … But not 100%
  - Be prepared to offer open surgery

Conclusion

- EVT complications include
  - Failure
    - Open
  - Dissection / residual thrombus –
    - Stent
  - Distal embolization –
    - Chase/ TPA / Thrombolysis / leave alone
  - Perforation –
    - observe / open

Low threshold for bowel evaluation laparoscopic / open