Visceral Arterial Intervention: Mesenteric Ischemia

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Disclosure

• Nothing to disclose.
Mesentric Circulation:

- Responsible for blood supply to entire digestive system
  - Celiac Axis: liver, spleen, stomach and part of pancreas
  - Superior Mesentric Artery: Pancreas, small bowel and part of large bowel
  - Inferior Mesenteric artery (IMA): left colon and rectum
Protection

- Anastomosis with
  - Internal Mammary artery
  - Internal iliac artery
- Rich anastomosis
  - CA
  - SMA
  - IMA

Buhler Anastomosis
Arc of Riolan
Artery of Drummond
Mesenteric Vessels

- Celiac Axis
  - Left Gastric
  - Spleenic
  - Hepatic
- SMA
  - Ileio colic
  - Right colic
  - Middle colic
- IMA
  - Left colic
  - Sigmoidal
  - Hemmorrhoidal

Most consequences
Acute Mesenteric occlusion: Ischemia

- Acute
  - Embolic occlusion
  - Hypotension, Low cardiac output
  - Systemic causes: FMD, Takayasu
  - Mesenteric vein Thrombosis
  - Cocaine abuse

- Dissection of vessels: severe retching/ Vomiting
- Trauma
  - MVA: Transection of SMA/Celiac
  - GSV
  - Stab injury/ surgical injury during abdominal surgery

Time is of essence
Diagnosis is often difficult
Mostly treated by surgical intervention
Treatment Guidelines for acute Mesenteric Ischemia

- Acute mesenteric arterial embolism (AMAE) –
  - Papaverine infusion,
  - surgical embolectomy,
  - intra-arterial thrombolysis

- Acute mesenteric arterial thrombosis (AMAT)
  - Papaverine infusion and arterial reconstruction

- Nonocclusive mesenteric ischemia (NOMI)
  - Papaverine infusion

- Mesenteric venous thrombosis (MVT) –
  - Anticoagulation with heparin or warfarin, either alone or in combination with surgery;
  - Immediate heparinization should be started even when surgical intervention is indicated

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Lactic Acid
Mesenteric Endarterectomy

Surgical procedures
Role of endovascular

Comparison of open and endovascular treatment of acute mesenteric ischemia.

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Abstract
INTRODUCTION: Acute mesenteric ischemia (AMI) is a commonly fatal result of inadequate bowel perfusion that requires immediate evaluation by both vascular and general surgeons. Treatment often involves vascular repair as well as bowel resection and the possible need for parenteral nutrition. Little data exist regarding the rates of bowel resection following endovascular vs open repair of AMI.

METHODS: Using the National Inpatient Sample database, admissions from 2005 through 2009 were identified according to International Classification of Diseases, Ninth Revision codes correlating to both AMI (557.0) and subsequent vascular intervention (39.26, 38.16, 38.06, 39.9, 99.10). Patients with a diagnosis of AMI but no intervention or nonemergent admission status were excluded. Patient level data regarding age, gender, and comorbidities were also examined. Outcome measures included mortality, length of stay, the need for bowel resection (45.6, 45.71-8, 45.8), or infusion of total parenteral nutrition (TPN, 99.10) during the same hospitalization. Statistical analysis was conducted by χ² tests and Wilcoxon rank-sum comparisons.

RESULTS: Of 23,744 patients presenting with AMI, 4,915 underwent interventional treatment from 2005 through 2009. Of these patients, 57.1% were male, and the mean age was 70.5 years. A total of 679 patients underwent vascular intervention; 514 (75.7%) underwent open surgery, and 165 (24.3%) underwent endovascular treatment overall during the study period. The proportion of patients undergoing endovascular repair increased from 11.9% of patients in 2005 to 30.0% in 2009. Severity of comorbidities, as measured by the Charlson index, did not differ significantly between the treatment groups. Mortality was significantly more common associated with open revascularization compared with endovascular intervention (39.3% vs 24.5%, P = .01). Length of stay was also significantly longer in the patient group undergoing open revascularization (12.9 ± 17.1 days; P = .006). During the study time period, 14.4% of patients undergoing endovascular procedures required bowel resection compared with 33.4% for open revascularization (P < .001). Endovascular repair was also less commonly associated with requirement for TPN support (13.7% vs 24.4%, P = .025).

CONCLUSIONS: Endovascular intervention for AMI had increased significantly in the modern era. Among AMI patients undergoing revascularization, endovascular treatment was associated with decreased mortality and shorter length of stay. Furthermore, endovascular intervention was associated with lower rates of bowel resection and need for TPN. Further research is warranted to determine if increased use of endovascular repair could improve overall and gastrointestinal outcomes among patients requiring vascular repair for AMI.

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National Data: 2005-2009
23,744 patients: Mesenteric Ischemia
679: Intervention
165: Endovascular
14.4%: Bowel Resection

Endovascular
Thrombolysis with or without BA/Stent
47 yr old male after UGI/LGI endoscopy : 6 hrs later: severe abdominal pain
Chronic Mesenteric Ischemia

- Mesenteric ischemia
  - uncommon
  - incidence increases with age.
  - more common in females (75% of CMI patients),
  - history of coronary or peripheral vascular disease (50% of CMI patients).
  - Risk factors: DM, HTN, Smoking

- The incidence of bowel ischemia was reported as 1.09 per 100,000 person-years in a recent study using data from the General Practice Research Database.
Symptoms

- Abdominal pain: Specific
  - Post Prandial pain
  - (Abdominal Angina)
  - Progressively worse
  - Patient is afraid of eating

- Vomiting and or diarrhea

- Weight loss: constant

- Diagnosis
  - Process of elimination
  - CTA is best way to evaluate
  - MRI/MRA has been used
  - “Three vessel Angiography”
History

- 1901: Schnitzler first described the clinical picture of postprandial pain.
- 1918: Postprandial abdominal angina is attributed to Baccelli or Goodman.
- 1957: Mikkelsen proposed surgical treatment of occlusive mesenteric vascular disease.
- 1958: Shaw and Maynard reported the first transarterial thromboendarterectomy of the superior mesenteric artery (SMA) in
Treatment

• No Medical therapy

• Surgical
  • Bypass from aorta, conduit or from iliac arteries
  • Vein vs synthetic
  • Long term patency is very good

• Endovascular
  • BA
  • BA with stent placement
Surgical Therapy
Symptomatic recurrence requiring reintervention is common (overall 16/80 [20%]) after open and endovascular treatment for CMI. PTA/Stent was associated with decreased primary patency, primary assisted patency, and the need for earlier reintervention. In-hospital mortality or major morbidity were similar in patients undergoing PTA/Stent and OR. These findings suggest that OR and PTA/Stent should be applied selectively in CMI patients in accordance with individual patient anatomic and comorbidity considerations.
Total cases: 66
CTO: 21.5%
Stenosis: 78.5%
Major complications: 16%
Follow up: 36 months
Primary patency: 63%
Reintervention: 30%
1/3 required OSP
Chronic mesenteric ischemia: critical review and guidelines for management.

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Abstract

BACKGROUND: CMI is caused by chronic occlusive disease of mesenteric arteries. In such an uncommon disease, clear recommendations are strongly needed. Unfortunately, treatment options for symptomatic CMI are still controversial and no guidelines exist.

METHODS: A systematic literature review of the last 25 years was conducted through MEDLINE, Embase, and Cochrane Review/Trials register to identify studies reporting on CMI treatment with more than 10 patients. Primary outcomes were perioperative mortality and morbidity rates. Secondary outcomes were survival rates, primary and secondary patency rates, vessels treated, CMI recurrence, follow-up (FU), technical success (TS), and in-hospital length of stay (InH-LOS). Patients were divided into endovascular treatment (ET) or open treatment (OT) groups. Subsequently, primary and secondary outcomes were analyzed by study publication year for the interval periods 1986-2000 ("A") and 2001-2010 ("B"). Differences were assessed using the t-test and the \( \chi^2 \) test.

RESULTS: Forty-three articles with 1,795 patients were included. Perioperative mortality and morbidity rates were lower in the ET group. No difference in survival rates was observed. Primary and secondary patencies were superior in the OT group. A greater number of vessels were revascularized in the OT group. CMI recurrence was more frequent in the ET group. FU was longer in the OT group. TS was superior in the OT group and InH-LOS was shorter in the ET group. A higher number of patients were treated by ET in the period "A." No differences in mortality and morbidity were observed between period "A" and "B" in ET and OT groups.

CONCLUSIONS: Considering the lower periprocedural mortality and morbidity after ET, this approach should be considered as the first treatment option in most CMI patients, especially in those with severe malnutrition. Primary OT should be restricted to cases that do not qualify for ET or good surgical risk patients with long life expectancy. Considering better long-term results of OT, ET treatment should be considered as a bridge therapy to OT in some patients requiring retreatment if ET does not preclude subsequent OT.

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6x22 Balloon Expandable stent
5x20 Balloon expandable stent
3 yr follow up

CTA/ Vitrea follow up

Patent stents
2010-2012 Endovascular Center experience

- Total cases: 23
- M/f: 7/16
- Age: 63-84
- Vessels treated: SMA 16
  - SMA +CA: 6
  - IMA alone: 1
- Complication: 1 (4%) (rupture of SMA) tr CS
- Reintervention: 3 (13%) (BA)
- Patency: 86%
Conclusion

• Mesenteric Ischemia is a rare condition presenting in acute and chronic form.

• AMI is associated with high mortality, treatment is often surgical. Endovascular options may be utilized in selected cases

• CMI is diagnosed with High index of suspicion

• Both OS and endovascular produce good results

• Data indicate high reintervention rates in EV group

• Future stent technology may help improve long term patency