Acute and chronic mesenteric ischemia

Incidence, clinical presentation and treatment options

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Disclosure

Speaker`s name: Marcus Thieme, MD

I have the following potential conflicts of interest to report:

☐ Consulting
☐ Employment in industry
☐ Stockholder of a healthcare company
☐ Owner of a healthcare company
☐ Other(s)

☒ I do not have any potential conflict of interest
Acute mesenteric ischemia - History

• “The diagnosis is impossible, the prognosis hopeless, and the treatment useless.”  
  (A.J. Cokkinis 1926)

• “With good luck, one third of the cases can be treated with 50% survival, overall mortality more than 80%.”  
  (O. Järvinen 1994)

→ multi-slice contrast-enhanced CT and endovascular therapy

• “In-hospital mortality of American patients declines to 26% in 2010.”  
  (M. Fokkema 2014)
Acute mesenteric ischemia - Incidence

- Annual incidence in Sweden (autopsie-rate 87%) 12/100.000
  - 2/3 thromboembolic occlusive mesenteric ischemia
  - 1/6 non-occlusive mesenteric ischemia (NOMI), 1/6 mesenteric venous thrombosis
  - Acute occlusion of the superior mesenteric artery (SMA) 8.6/100.000
  - Embolism 70%, thrombotic 30%
  - Since 1990 the embolism : thrombotic rate has changed to 1:1 or 0.6:1
  - The incidence of AMI was 1.5 times higher than the incidence of ruptured abdominal aortic aneurysm

- AMI is found as cause of symptoms in 10% of acute abdomen in patients >70 y

Acute mesenteric ischemia - Incidence exponentially increases with age

**Prevalence of mesenteric and coeliac artery stenosis**

- Hemodynamically significant SMA stenosis ~ 2% in elderly patients, in 50-80% with concomitant disease of Coeliac artery (CA)

- Isolated CA stenosis is much more common
  - Up to 15% in elderly asymptomatic patients,
  - 27-40% in PAD and patients with abdominal aortic aneurysm
  - etiology is more often external compression than arteriosclerosis
  - Isolated CA is usually asymptomatic (85%)
  - Is not a significant risk factor for AMI

- **Concomitant obstruction** of SMA, CA and IMA is a major risk factor for symptomatic mesenteric ischemia, **up to 86% symptomatic patients**
Acute mesenteric ischemia - Etiological categorization

- Arterial mesenteric ischemia
- Occlusive mesenteric ischemia
- Embolism
- Non-occlusive mesenteric ischemia (NOMI)
- Venous mesenteric ischemia
- Mesenteric arterial occlusive disease

AMi – Clinical presentation

- Acute occlusion of MA → Vascular spasm in the area of ischemic bowel → Hyperperistalisis → paroxysmal midabdominal or epigastric pain
- Diarrhea, blood per rectum, nausea, vomiting
- Pain-free intervall after 3-6h
- Peritonitis, ileus, sepsis and multiple organ failure as final stage
- CT as gold standard
  - Arterial and venous phases should be performed!
  - Ultrasound is not recommended in AMi

In stable patients (with/without transmural bowel necrosis) intestinal revascularisation should be performed prior to resection

1. Endovascular revascularization (EVT)
2a) If EVT successful: re-evaluation of the abdomen
   - Laparoscopy on demand if symptoms don’t resolve quickly
   - Laparotomy in patients with advanced peritoneal signs
   - Resection of unsalvageable part of the intestine
   - If symptoms resolve → close surveillance
2b) If EVT unsuccessful: laparotomy
   - retrograde hybrid stenting, surgical revascularisation (embolectomy, Bypass from the external or common iliac artery to SMA)
3) Second look on demand

AMI – Endovascular treatment options

- Thrombus aspiration, mechanical thrombectomy
- Balloon dilatation, stent implantation
- Additional local thrombolysis
- Rotarex thrombectomy (6F)
  - Single-center experience with 20 patients (6 years)
  - Successful revascularisation via left brachial artery in 100%
- Additional PTA (30%), stenting (25%), thrombolysis (20%), aspiration (10%)
- 70% followed by open surgery, death rate 40%

AMNI and CMI - Single-center results

Sample Size n = 37
Mean age = 75.39 years (SD 8.75)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Male</td>
<td>14 (37.8%)</td>
</tr>
<tr>
<td>Female</td>
<td>23 (62.2%)</td>
</tr>
<tr>
<td>Acute</td>
<td>14 (37.8%)</td>
</tr>
<tr>
<td>Chronic</td>
<td>23 (62.2%)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Treatment</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>PTA + Stent</td>
<td>26 (70.3%)</td>
</tr>
<tr>
<td>Thrombolysis + Stent</td>
<td>3 (8.1%)</td>
</tr>
<tr>
<td>Lysis + Thrombectomy</td>
<td>3 (8.1%)</td>
</tr>
<tr>
<td>Other</td>
<td>6 (16.2%)</td>
</tr>
</tbody>
</table>
AMI and CMI – Single-center treatment results

Outcome of all patients (n = 37)
- Restitution: 23 (62%)
- Low deficit: 7 (19%)
- Strong deficit: 2 (5%)
- Death: 5 (14%)

Outcome of acute cases (n = 14)
- Restitution: 6 (43%)
- Low deficit: 2 (14%)
- Strong deficit: 1 (7%)
- Death: 5 (36%)

Operation rate in AMI
- Bowel resection: 4 (29%)
- Laparoscopy/Laparotomy: 4 (29%)
## AMI and CMI - Treatment results

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>n</th>
<th>Surgical treatment</th>
<th>Endovascular treatment</th>
<th>Bowel resection open vs endo</th>
<th>Mortality at 30days Open vs endo</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schermerhorn et al (Nationwide Inpatient Sample)</td>
<td>2009</td>
<td>3380</td>
<td></td>
<td>1857</td>
<td>48%</td>
<td>28%</td>
<td>49% 30% AMI cohort (6 years US, ICD-based)</td>
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<tr>
<td>Block et al (Swedish Vascular registry)</td>
<td>2010</td>
<td>121</td>
<td></td>
<td>42</td>
<td>63%</td>
<td>19%</td>
<td>42% 24% AMI only (8 years nationwide Sweden)</td>
</tr>
<tr>
<td>Arthur et al (Cleveland Clinic)</td>
<td>2011</td>
<td>14</td>
<td></td>
<td>56</td>
<td>94%</td>
<td>84%</td>
<td>36% 50% AMI only (9 years median 60h to EVT)</td>
</tr>
<tr>
<td>Ryer et al (Mayo Clinic)</td>
<td>2012</td>
<td>82</td>
<td></td>
<td>11 (incl. hybrid)</td>
<td>63%</td>
<td>17%</td>
<td>AMI only (20 years)</td>
</tr>
<tr>
<td>Beaulieu et al (Nationwide Inpatient sample)</td>
<td>2014</td>
<td>514</td>
<td></td>
<td>165</td>
<td>33.4%</td>
<td>14.4%</td>
<td>39.3% 24.9% AMI only (5 years US, ICD-based)</td>
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<tr>
<td>Arya et al (Michigan)</td>
<td>2016</td>
<td>77</td>
<td></td>
<td>38</td>
<td>43.5%</td>
<td>36.4%</td>
<td>34.8% 45.4% AMI and CMI (10 years)</td>
</tr>
</tbody>
</table>
Case Example 1

• 62-year-old female patient
• Acute severe abdominal pain
• CT-Scan: acute SMA-occlusion
Case Example 1

After PTA
Case Example 1

After local thrombolysis (rt-PA) for 24 hours
Case Example 2

- 59-year-old female patient
- Acute severe on chronic abdominal pain
- CT-Scan:
  Subacute perforation/bleeding of SMA-aneurysm and SMA-dissection
Case Example 2
Case Example 3

- 78-year-old female patient
- Acute abdominal pain and diarrhea
- CT-Scan:
  Subtotal occlusion of coeliac trunk, thrombotic material in common liver and splenic artery, splenic infarction
Case Example 3
Case Example 3

after 24h thrombolysis

Mesenteric Ischemia
Summary

- CT scan without delay is required for suspected AMI and unexplained abdominal pain
- EVT is safe and evidence-based in treatment of AMI and CMI
- AMI still shows a high mortality of up to 40%, mostly due to delayed diagnosis
Thank you for your attention!

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