Outcomes after Endovascular Treatment for Mesenteric Ischemia

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UCSF Vascular Symposium 2012
San Francisco, California
April 26-28, 2012

Conflict of Interest
None

Mesenteric Ischemia

Arterial
Venous

Presentation
Acute
Chronic

Patients who present with acute mesenteric arterial thrombosis had previous symptoms of chronic mesenteric ischemia in

A. <5%
B. 10%
C. 15%
D. 65%
E. 90%
Chronic Mesenteric Ischemia Progresses to Acute Mesenteric Ischemia

65% of patients with acute mesenteric thrombosis had symptoms of CMI
Mortality: 40%


A. TRUE
B. FALSE

Open and Endovascular Revascularization For Acute Mesenteric Ischemia in the US

A study of 6342 PTA/S and 16,071 open surgical repairs from the Nationwide Patient Sample (1998-2006) revealed that in patients with chronic mesenteric ischemia PTA/S surpassed all surgeries already in 2002

A. TRUE
B. FALSE

Open and Endovascular Revascularization For Chronic Mesenteric Ischemia in the US

The mortality rate is lower after PTA/S than after bypass for chronic but not for acute mesenteric ischemia.

A. TRUE
B. FALSE

The mortality rate is lower after PTA/S than after bypass for chronic but not for acute mesenteric ischemia.

A. TRUE
B. FALSE

Mortality Rates for Revascularization
For Acute MI in the US

The mortality rate is lower after PTA/S than after bypass for both CMI (3.7% vs 13%), p= <.01) and AMI (16% vs 28%, p= .01)
Bowel resection was more common after bypass than after PTA/S (7% vs 3%, p< .01)
Acute Mesenteric Ischemia

- Morbid condition
- Difficult to diagnose
- Usually seen late in course
- High mortality

Diagnostic Challenge

- Non-specific presentation
- Lack of physical findings (pain out of proportion)
- Physical examination may be unreliable
- Complications (ileus, peritonitis, pancreatitis, GI bleeding) may mask mesenteric ischemia
- Risk factors different in the different types of AMI

From the Peripheral Vascular Surgery Society

A comparison of endovascular revascularization with traditional therapy for the treatment of acute mesenteric ischemia

Zachary M. Ashara, MD, Jessica Tins, MD, Mohsen Rousou, MD, Matthew E. Engleman, MD, Sebastian Sfode, MD, Timurr F. Saran, MD, and Daniel G. Gladd, MD, Cleveland, Ohio

Objective: Few centers have adopted endovascular therapy for the treatment of acute mesenteric ischemia (AMI). We sought to evaluate the effect of endovascular therapy on outcomes for the treatment of AMI.

Methods: A single-center, retrospective cohort study was performed on all consecutive patients with chronic or acute AMI presenting between 1999 and 2008. Patients with mesenteric venous obstruction, nonspecific mesenteric ischemia, and ischemia associated with acute dissection were excluded. Demographic factors, procedural and medical outcomes, and mortality were compared. Primary clinical outcomes included endovascular technical success, operative complications, and in-hospital mortality.

Results: A total of 327 patients were evaluated: 161 patients in the endovascular (Endo) group and 166 patients in the open (OR) group. The mean age was 69 years, and the mean American Society of Anesthesiologists score was 2.3. The procedural success rate was 98% (97% in the Endo group and 100% in the OR group). In-hospital mortality was 11% (7% in the Endo group and 15% in the OR group). The 60-day mortality was 15% in the Endo group and 24% in the OR group. The mean length of stay was 4 days in the Endo group and 5 days in the OR group.

Conclusion: Endovascular therapy may be a viable alternative to traditional therapy for the treatment of acute mesenteric ischemia. Further studies are needed to determine the long-term outcomes and cost-effectiveness of endovascular therapy.

Open and Endovascular Mesenteric Revascularizations
Mayo Clinic (1990 – 2009)

- 327 patients
- 70 pts (1999-2008)
- Endo first 81%, OR first 19%
- Endo OR = 69%
- Mortality: Endo first: 36%
- OR first: 50% (p<0.05)
## Treatment of Acute Ischemia
### 2001 – 2011 / 66 patients

<table>
<thead>
<tr>
<th>Endovascular (20)</th>
<th>No.</th>
<th>Open (46)</th>
<th>No.</th>
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<tr>
<td>Target vessel</td>
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</tr>
<tr>
<td>SMA</td>
<td>18</td>
<td>Embolectomy</td>
<td>27</td>
</tr>
<tr>
<td>CA</td>
<td>4</td>
<td>Endarterectomy + patch</td>
<td>2</td>
</tr>
<tr>
<td>Intervention</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>PTA / stent (+ tPA in 4)</td>
<td>18</td>
<td>Antegrade</td>
<td>12</td>
</tr>
<tr>
<td>Thrombolysis</td>
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<td>Retrograde</td>
<td>8</td>
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<tr>
<td>Access site</td>
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<td>Conduit</td>
<td></td>
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<tr>
<td>Femoral</td>
<td>8</td>
<td>Vein</td>
<td>2</td>
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<tr>
<td>Brachial</td>
<td>9</td>
<td>Synthetic</td>
<td>8</td>
</tr>
<tr>
<td>Retrograde SMA</td>
<td>3</td>
<td>Dacron soaked</td>
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</table>

### Treatment

- Open
- Endovascular

### Peri-operative Mortality

**Predictive Factors**
- Age
- Bowel infarction at presentation
- Generalized atherosclerosis
- H/O CMI was protective

### Technical Tips

- Heparinize early
- Antegrade transbrachial access
- Build adequate support
- Pharmacological/mechanical thrombectomy
Technical Tips

• Maintain wire in SMA main trunk
• Selective use of embolic protection
  Occlusions
  Severe calcification
  >3cm long lesions
  Acute thrombosis

Hybrid Revascularization

Technique of Hybrid Retrograde Superior Mesenteric Artery Stent Placement for Acute-on-Chronic Mesenteric Ischemia

Revascularization for acute mesenteric ischemia can be challenging in a setting of peripheral contamination, and the vast majority of patients are usually not candidates for surgical revascularization. Ketogenic diet and dialysis arterio-venous fistula can be used as a bridge to revascularization. However, in patients with acute mesenteric ischemia, the retrograde SMA stenting is performed using a stent-graft. The SMA is accessed through a femoral artery and a balloon-expandable stent is placed. The stent-graft is then placed and the SMA is recanalized. This technique allows for rapid revascularization and can be performed in a hybrid setting.
Hybrid Revascularization

- Ideally suited for
  - patients requiring immediate laparotomy
  - those with unsuccessful percutaneous revascularization
  - if AMI is diagnosed intraoperatively
- Avoids bypass in presence of necrotic bowel

Wyers MC et al. J Vasc Surg 2007; 45(2) 269-75

Contemporary Results

<table>
<thead>
<tr>
<th>Author / year</th>
<th>No. of Patents</th>
<th>Mortality (%)</th>
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<tr>
<td>Arthurs 2011</td>
<td>14</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>56</td>
<td>36%</td>
</tr>
<tr>
<td></td>
<td>Lap -69%</td>
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</tr>
<tr>
<td>Ryer (Mayo) 2011</td>
<td>49</td>
<td>15%</td>
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<tr>
<td></td>
<td>17</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td>Lap -71%</td>
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</tr>
<tr>
<td>Wyers 2007</td>
<td>5</td>
<td>80%</td>
</tr>
<tr>
<td></td>
<td>8(6 retro)</td>
<td>100%</td>
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<tr>
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<td>(17%)</td>
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Revascularization for Chronic Mesenteric Ischemia


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<th>Open n= 146</th>
<th>Endovascular = 83</th>
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<tbody>
<tr>
<td>2.4%</td>
<td>Mortality</td>
</tr>
<tr>
<td>36%</td>
<td>Morbidity</td>
</tr>
<tr>
<td>2%</td>
<td>Early thrombosis</td>
</tr>
<tr>
<td>7%</td>
<td>Restenosis (21 months)</td>
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<tr>
<td>6%</td>
<td>Reinterventions</td>
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<tr>
<td>96%</td>
<td>5 year Patency</td>
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<tr>
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<td>2.7%</td>
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<td>18%</td>
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<td>4%</td>
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<tr>
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<td>61%</td>
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</table>

Mesenteric artery complications during angioplasty and stent placement for atherosclerotic chronic mesenteric ischemia

Gastardo S, Oderich, MD, Tiziano Tullarita, MD, Peter Gloviczki, MD, Audrey A. Duncan, MD, Martin Kalal, MBBS, Sanjiv Misra, MD, Stephen Cha, MS, and Thomas C. Bower, MD, Rochester, Minn

Objective: The purpose of this study was to describe the incidence, management, and outcomes of mesenteric artery complications (MACs) during angioplasty and stent placement (MAS) for chronic mesenteric ischemia (CMI). Methods: We retrospectively reviewed the clinical data of 156 patients treated with 173 MAS for CMI (1998-2010). MACs were defined as procedure-related mesenteric artery dissection, vein dislodgement, embolization, thrombosis, or perforation. End points were procedure-related morbidity and death. Results: There were 113 women and 43 men (mean age, 73 ± 14 years). Eleven patients (7%) developed 14 MACs, including: 13% required mesenteric revascularization (13% vs 15% LIMA), false aneurysm cohort, and 37% dissection. There were 3 bowel infarctions (21 months) and 6% of revascularization for CMA and longer loop. There was a case of Death (J Vasc Surg 2014;60:1060-1061). 156 pts. 173 MAS procedures (1998-2010) Mortality: 2.5% Complications: 7% (14/173)
Complications:
distal embolization: 6
branch perforation: 3
dissection: 2
thrombosis: 1
Mortality with complications: 18%
without complications: 1.5%

Mortality from both AMI and CMI has decreased in recent years
In AMI endovascular treatment decreases the need for laparotomy
Endovascular first approach in patients who present with AMI without peritoneal signs is justified

Complications resulted in higher mortality, morbidity and longer hospital stay.
Factors affecting complications: antiplatelet therapy (OR:0.2)
large profile system (p=.07)

Conclusions

• Retrograde mesenteric revascularization during laparotomy for AMI is an attractive option. It is also useful in patients with CMI if access is a problem.
• Endovascular treatment for mesenteric ischemia has greatly improved outcome, but further progress is needed to decrease restenosis, recurrent symptoms and the need for re-interventions
Thank You!

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