Mycotic abdominal aortic aneurysm

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Mycotic abdominal aortic aneurysm
Mycotic aneurysm

• Sir William Osler 1885
  – Patient with fever, chills and pneumonia
  – Autopsy: aortic valve vegetations and multiple beadlike aneurysms of aortic arch resulting from suppuration in vessel wall
  – “Fresh fungal vegetation”

• Misnomer
  – Fungal infection rare but “mycotic” still used
Mycotic aneurysm

• Finseth and Abbott 1973
  – Primary mycotic = direct extension from adjacent suppurative field
  – Secondary mycotic = embolomycotic usually due to endocarditis
  – Cryptogenic mycotic = lodgement of circulating viable organisms within arterial wall during septicemia

• Now used to describe any infected aneurysm regardless of pathogenesis
Etiology

- Previously mycotic aneurysm associated with infective endocarditis
  - *Staph* and *Salmonella* species
- Now most are secondary to trauma
  - Iatrogenic
  - Traumatic
  - Self-induced; IVDA
## Etiology

<table>
<thead>
<tr>
<th></th>
<th>Prior 1965</th>
<th>After 1965</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial trauma</td>
<td>4 (10%)</td>
<td>71 (51%)</td>
<td>75 (42%)</td>
</tr>
<tr>
<td>Endocarditis</td>
<td>15 (37%)</td>
<td>14 (10%)</td>
<td>29 (16%)</td>
</tr>
<tr>
<td>Local infection</td>
<td>3 (7%)</td>
<td>6 (4%)</td>
<td>9 (5%)</td>
</tr>
<tr>
<td>Bacteremia</td>
<td>-</td>
<td>9 (6%)</td>
<td>9 (5%)</td>
</tr>
<tr>
<td>Unknown</td>
<td>15 (36%)</td>
<td>30 (22%)</td>
<td>45 (25%)</td>
</tr>
</tbody>
</table>

Bacteriologic and surgical determinants of survival in patients with mycotic aneurysms

### Location

<table>
<thead>
<tr>
<th>Artery</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Femoral</td>
<td>68</td>
<td>38</td>
</tr>
<tr>
<td>Abdominal aorta</td>
<td>56</td>
<td>31</td>
</tr>
<tr>
<td>Superior mesenteric</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>Brachial</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>Iliac</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Carotid</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Radial-Ulnar</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

*Bacteriologic and surgical determinants of survival in patients with mycotic aneurysms*

Bacteriology

<table>
<thead>
<tr>
<th></th>
<th>Prior 1965</th>
<th>After 1965</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Salmonella</em> sp</td>
<td>14 (38%)</td>
<td>15 (10%)</td>
<td>75 (42%)</td>
</tr>
<tr>
<td><em>Staph Aureus</em></td>
<td>7 (19%)</td>
<td>47 (30%)</td>
<td>29 (16%)</td>
</tr>
<tr>
<td><em>Streptococcus</em> sp</td>
<td>5 (14%)</td>
<td>15 (10%)</td>
<td>9 (5%)</td>
</tr>
<tr>
<td>Culture negative</td>
<td>7 (19%)</td>
<td>41 (25%)</td>
<td>48 (25%)</td>
</tr>
</tbody>
</table>

Variety of organisms increasing: *Pseudomonas*, *E. Coli*, *Enterobacter*, *Clostridia*

*Bacteriologic and surgical determinants of survival in patients with mycotic aneurysms*

Workup

• Symptoms
  – Usually present but vague
  – Including: fever, abdominal pain, leukocystosis, elevated ESR

• Radiology
  – CT: test of choice
  – Aortogram
  – Indium tagged WBC scan
  – MRA
Workup

• CT scan abdomen and pelvis
  – Rapid expansion known aneurysm or newly developing aneurysm
  – Gas in aorta wall
  – Saccular aneurysm
  – Soft tissue mass surrounding aorta

• Aortography
  – Saccular, eccentric or multilobulated appearance in otherwise normal aorta
Diagnosis

• Operative findings
  – Inflammation
  – Purulence

• Clinical evidence
  – Fever
  – Pain
  – Leukocytosis

• Cultures
  – Aneurysm and/or blood
Treatment

• Antibiotics

• Prompt surgical treatment
  – Risk of rupture and hemorrhage
  – Excision of infected artery and associated infected tissue

• Arterial reconstruction: controversy
  – In-line graft vs. extra-anatomic bypass
In-line vs Extra-anatomic bypass

• Advantage extra-anatomic bypass
  – Theoretically decreased risk graft infection by revascularization remote from infected site

• Anatomic sites not amenable to extra-anatomic bypass
  – Aortic arch
  – Thoracoabdominal aorta
  – Paravisceral aorta
In-line vs Extra-anatomic bypass

- Reduced graft patency rate with extra-anatomic bypass
- Complications extra-anatomic bypass
  - Aortic stump disruption 20%
  - Amputation 20-29%
  - Infection 20%

Infected aortic aneurysms: Aggressive presentation, complicated early outcome, but durable results.

Mayo Clinic Review

- Reviewed 6137 aortic reconstructions for aneurysmal disease from 1976-2000
- 43 infected aortic aneurysms
  - Incidence 0.7%
- 14 thoracic component
- 25 limited to intraabdominal aorta
  - 2 pararenal, 5 juxtarenal, 18 infrarenal

Infected aortic aneurysms: Aggressive presentation, complicated early outcome, but durable results

Mayo Clinic Review

• Intraoperative findings
  – 29 saccular, 14 fusiform
  – 53% evidence of rupture

• Reconstruction
  – 35 (85%) in-situ grafts
    • 28 straight, 7 bifurcated
  – 6 (15%) axillobifemoral grafts

Infected aortic aneurysms: Aggressive presentation, complicated early outcome, but durable results

Operative mortality 21% (10-50% in literature)
- 7/35 in-situ, 1/6 extra-anatomic

Significant postop complication 60%
- Including: renal failure, MI, respiratory failure, CVA
- 2 late graft infections

Surgical complications 21%
- Including: bleeding, wound, ischemic colitis

Infected aortic aneurysms: Aggressive presentation, complicated early outcome, but durable results

Retrospective reviews

• 33 mycotic aneurysms
  – Thoracoabdominal 13
  – Suprarenal 4
  – Infrarenal 10
  – Visceral arteries 6

• 24% ruptured, 61% contained leak

• 15% intact

*Mycotic aneurysms of the thoracic and abdominal aorta and iliac arteries: experience with anatomic and extra-anatomic repair*

Retrospective reviews

• Reconstruction
  – In-situ repair 17
  – Extra-anatomic bypass 16

• Operative mortality 36%
  – No difference morbidity or mortality two groups

Mycotic aneurysms of the thoracic and abdominal aorta and iliac arteries: experience with anatomic and extra-anatomic repair

Retrospective reviews

- 25 infrarenal mycotic aneurysms
  - In-situ repair 21
  - Extra-anatomic bypass 4
- Operative mortality
  - In-situ 3/21 (14%)
  - Extra-anatomic bypass 2/4 (50%)

Infected infrarenal aortic aneurysms: when is in situ reconstruction safe?

Recommendations

• Excision infected artery, adequate debridement

• Antibiotics
  – At least 3-6 months vs life-long

• Indications for extra-anatomic bypass
  – Infrarenal aneurysm
  – Extensive purulence

Infected aortic aneurysms: Aggressive presentation, complicated early outcome, but durable results

Cryopreserved homografts

• Multiple institutional review

• Indication, n=56
  – Primary graft infection 43
  – Mycotic aneurysm 7
  – Aortoenteric fistula 4
  – Concomitant bowel resection 2

*Abdominal aortic reconstruction in infected fields: Early results of the US cryopreserved aortic allograft registry*

Cryopreserved homografts

- 28/55 (51%) had postop complications
- 14 were graft-related complications
  - Persistent infection with perianastomotic hemorrhage: 5 (9%)
  - Graft limb occlusion: 5 (9%)
  - Pseudoaneurysm: 1 (2%)
  - Amputation: 3 (5%)

*Abdominal aortic reconstruction in infected fields: Early results of the US cryopreserved aortic allograft registry*

Cryopreserved homografts

• Surgical mortality rate 13% (7/56)
  – 3/5 patients who underwent emergency operation died within first 30 postop days
  – 2 graft-related mortality: persistent infection with lethal hemorrhage

• Cannot support preferential use of cryopreserved allografts at this time

*Abdominal aortic reconstruction in infected fields: Early results of the US cryopreserved aortic allograft registry*