HOW TO TREAT INFECTED ENDOGRAFTS AFTER EVAR AND WHEN ARE ENDOGRAFTS EFFECTIVE TREATMENT FOR MYCOTIC AAAS

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VEITHLaohapensang 11-17-17 8:34A.

DISCLOSURES

I have nothing to Disclose

DIAGNOSIS OF INFECTED ANEURYSMS

• Positive blood culture specimen
• First presentation of an aneurysm after bacterial sepsis
• Positive culture from aneurysmal wall, its content or the surrounding tissue with an associated infection
• Positive Polymerase Chain Reaction (PCR)
• Negative culture with
  - Image finding of eccentric aneurysms
  - Signs of infection
  - Preoperative treatment with antibiotics

Principles of operative treatment

• Antibiotics: initial and long term
• Prompt surgical treatment: rupture risk
  - Excision of infected artery
  - Removal of surrounding infected tissue
• Arterial reconstruction
  - In-situ graft replacement
  - Extra-anatomical bypass
• Appropriate postoperative antibiotics


ENDOGRAFTS FOR THE TREATMENT OF INFECTED AORTIC ANEURYSMS

• An alternative to open surgery
• Less invasive, rapid aneurysm exclusion
• Prompt control of bleeding in the face of hemodynamic instability
• The better choice for critically ill patients with hostile abdomen


THE SUCCESSFUL USE OF EVAR IN MYCOTIC AORTIC ANEURYSMS

• Broad – spectrum antibiotics are administered as soon as a mycotic aneurysm is suspected
• No microbes could be isolated from blood and tissue cultures in 25% to 40% of mycotic aortic aneurysms
• The use of antibiotic-coated grafts to reduce the source of infection
• Adjunct procedures such as surgical debridement or percutaneous drainage are important to eliminate the source of infection
• Prolonged postoperative antibiotic therapy is a key component to success

THE ROLE OF EVAR FOR TREATMENT OF INFECTED AORTIC ANEURYSMS

- Well-controlled of an active infection by broad-spectrum antibiotics and with the patient without fever and with stable hemodynamic parameters
- Acute presentation with fever, positive blood culture, active bleeding and hemodynamic instability from aneurysm rupture

CHIANG MAI UNIVERSITY REVIEW (FROM JANUARY 2009 DECEMBER 2011)

Elective Open repair for stable infected AAAs
All 5 cases (1 E. coli, 1 B. pseudomallei and 3 Salmonella)
- No operative and 30 days mortality
- Significant postoperative complications 40%
  - Renal failure, MI, respiratory failure, etc
- Surgical complications 21%
  - Bleeding, wound, ischemic colitis, etc

All survived patients have a lifelong antibiotics treatment


Endovascular Stenting for Patients with Infected AAA

- Placement of the stent-graft in an infected aneurysm
- Does not resolve infection or treat complications
- May have a role in excluding aorto-enteric fistula, temporizing for open surgery at a later date and palliation in the critically ill patients

WHEN ARE ENDOGRAFTS EFFECTIVE TREATMENT FOR MYCOTIC AAAS

- Good immediate results with no 30 days mortality and few complications
- Persistent infection after EVAR has a high rate of Infected Stent Grafts (ISG) 20-33.33%
- EVAR is not a definitive treatment of MAA; it is a bridging treatment prior to definitive open surgical repair


Emergency EVAR for un-stable Infected AAAs
All 5 case had Salmonella infection with 30 days mortality rate of 60% (3/5)

All survived patients have a lifelong antibiotics treatment


Emergency EVAR for un-stable Infected AAAs

<table>
<thead>
<tr>
<th>Case</th>
<th>Gender/Age</th>
<th>Organisms</th>
<th>Procedures</th>
<th>Complication</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>75/F</td>
<td>Salmonella</td>
<td>Bifurcated Graft</td>
<td>Infected Stent Graft 10 months after</td>
<td>CT guided percutaneous drainage</td>
</tr>
<tr>
<td>2</td>
<td>65/M</td>
<td>E. coli</td>
<td>Bifurcated Graft</td>
<td>No</td>
<td>Surgical drainage</td>
</tr>
<tr>
<td>3</td>
<td>85/F</td>
<td>Salmonella</td>
<td>Tube Graft</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>70/M</td>
<td>B. pseudomallei</td>
<td>Bifurcated Graft</td>
<td>Infected Stent Graft 30 months after</td>
<td>CT guided percutaneous drainage</td>
</tr>
</tbody>
</table>

CHIANG MAI UNIVERSITY REVIEW (FROM JANUARY 2009 DECEMBER 2011)

Emergency Open repair for un-stable Infected AAAs

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</thead>
<tbody>
<tr>
<td>1</td>
<td>75/F</td>
<td>Salmonella</td>
<td>Bifurcated Graft</td>
<td>Left Graft Limb Thrombo-embolectomy</td>
<td>Alive</td>
</tr>
<tr>
<td>2</td>
<td>58/M</td>
<td>E. coli</td>
<td>Bifurcated Graft</td>
<td>Infected Stent Graft 26 months after</td>
<td>CT guided percutaneous drainage</td>
</tr>
<tr>
<td>3</td>
<td>81/M</td>
<td>Salmonella</td>
<td>AUI , F-F bx</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>61/F</td>
<td>Salmonella</td>
<td>Tube Graft</td>
<td>No</td>
<td>No</td>
</tr>
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WHEN ARE ENDOGRAFTS EFFECTIVE TREATMENT FOR MYCOTIC AAAS

- Good immediate results with no 30 days mortality and few complications
- Persistent infection after EVAR has a high rate of Infected Stent Grafts (ISG) 20-33.33%
- EVAR is not a definitive treatment of MAA; it is a bridging treatment prior to definitive open surgical repair

HOW TO TREAT INFECTED ENDOGRAFTS AFTER EVAR

MECHANISM OF GRAFTS INFECTIONS

- Contamination at the time of implantation
- Early postoperative septicemia (incisional site or remote infection)
- Hematogenous spread
- Adjacent infection such as diverticular abscess
- Re-intervention

INFECTED AORTIC GRAFTS

- Conventional open repair of AAA has a graft infection rate of 0.5% to 3%
- EVAR has a graft infection rate of 0.2-5% (0.43%)
- EVAR for Infected AAAs has a graft infection rate of 33.33% (3/9) in our series

Explantation of the Infected Stent Graft (ISG)

<table>
<thead>
<tr>
<th>Case</th>
<th>Gender/Age</th>
<th>Organisms</th>
<th>Procedures</th>
<th>Complications</th>
<th>Status</th>
<th>Antibiotics and Drainage for Treating Stent-Graft Infection after EVAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M 71/ M</td>
<td>Salmonella</td>
<td>Infected Graft</td>
<td>Refused an operation</td>
<td>Dead 1 month later from Sepsis and GI bleeding</td>
<td>Refused an operation 6 month later from brain and bleeding</td>
</tr>
<tr>
<td>2</td>
<td>M 57/ M</td>
<td>B. pseudomallei</td>
<td>Infected Stent Graft</td>
<td>No Growth</td>
<td>Alive with lifelong antibiotics</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>M 58/ M</td>
<td>E. coli</td>
<td>Infected Stent Graft</td>
<td>Refused an operation</td>
<td>Alive with lifelong antibiotics</td>
<td></td>
</tr>
</tbody>
</table>
Diagnosis of Aortic Graft Infection: A Case Definition by the Management of Aortic Graft Infection Collaboration

Clinical/Surgical
- Localized clinical features of AGI, e.g., fever, wound drainage, gas within the graft
- Fever >100°F with AGI as most likely cause
- Other e.g., incidental CT-graft, hyperdense focus, new abscess formation, focal linear wall thickening, cholesterol granulomas, infectious material on FGD PET/CT radiolabeled leukocytes

RADIOLoGY
- Paragraft fluid on CT scan >3 mm thickness, perigraft fluid on CT scan >7 mm thickness
- Increase in paragraft fluid volume demonstrated on serial imaging

LABORATORY
- Organisms recovered from an explanted graft
- Organisms recovered from an intra-operative specimen
- Organisms recovered from a percutaneously, radiographically guided access of paragraft fluid
- Blood culture positive and no apparent source except AGI
- Abnormally elevated inflammatory markers with AGI as most likely cause e.g., ESR, CRP values not count

The PRIMARY GOALS AND PRINCIPLE OF SURGICAL TREATMENT (MORTALITY RATES 4-30%)
- Removal of the infected prosthesis
- Debrid all infected soft tissue
- Restored blood flow to the lower extremities and visceral arteries
- Prevent recurrent infection of the new grafts - specific antibiotics
- CT imaging for follow-up

CONSERVATIVE MANAGEMENT
- High mortality rates 75 - 100%
- Combined with endoluminal devices should be used as a bridge to definitive operative treatment
- Considered in patients with Moribund
  - High risk for operation
  - Minimal graft contamination by a low grade virulent organisms

CONCLUSIONS
- Conservative management (percutaneous drainage, antibiotics irrigation, and intravenous antibiotics) can improve the systemic sepsis temporarily
- Leaving the infected aortic endograft in place has mortality rates 75 - 100%
- Endovascular stent grafts extensions prevent immediate death from rupture or bleeding but need further explantation
- Explantation is the potential technique that can cure an aortic endograft infection

**TABLE 1. PATIENT DEMOGRAPHIC, MANAGEMENT AND OUTCOMES**

<table>
<thead>
<tr>
<th>Case</th>
<th>Age/Gender</th>
<th>Organisms</th>
<th>Procedure</th>
<th>Complications</th>
<th>Second Procedure</th>
<th>Third Procedure</th>
<th>Follow-up</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>71M</td>
<td>Salmonella</td>
<td>CT guided</td>
<td>Percutaneous drainage, Salmonella</td>
<td>Explantation</td>
<td>Axillo-bifemoral bypass</td>
<td>Alive</td>
</tr>
<tr>
<td>2</td>
<td>57M</td>
<td>B. pseudomallei</td>
<td>AneuRX 36</td>
<td>CT guided percutaneous drainage, No Growth</td>
<td>Explantation</td>
<td>In situ Dacron Graft Interposition</td>
<td>Alive</td>
</tr>
<tr>
<td>3</td>
<td>58M</td>
<td>E. coli</td>
<td>Zenith 26</td>
<td>CT guided percutaneous drainage, E. coli</td>
<td>No, refused an operation</td>
<td>Dead 1 month later from Sepsis and GI bleeding</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>42M</td>
<td>B. fragilis, E. coli</td>
<td>Medtronic Limb graft</td>
<td>No Explantation</td>
<td>Axillo-bifemoral bypass</td>
<td>Alive</td>
<td></td>
</tr>
</tbody>
</table>
THANK YOU FOR ATTENTION